VOYAGES
OF THE
ADVENTURE
AND
BEAGLE.

VOL. I.

KING.

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NARRATIVE

OF THE

SURVEYING VOYAGES

OF HIS MAJESTY'S SHIPS

ADVENTURE AND BEAGLE,

BETWEEN

THE YEARS 1826 AND 1836,

DESCRIBING THEIR

EXAMINATION OF THE SOUTHERN SHORES

OF

SOUTH AMERICA,

AND

THE BEAGLE'S CIRCUMNAVIGATION OF THE GLOBE.

IN THREE VOLUMES.

VOL. I.

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VOLUME I.

PROCEEDINGS

OF

THE FIRST EXPEDITION,

1826—1830,

UNDER THE COMMAND OF

CAPTAIN P. PARKER KING,

R.N., F.R.S.

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TO

THE RIGHT HONOURABLE

THE EARL OF MINTO, G.C.B.,

FIRST LORD COMMISSIONER

OF THE

ADMIRALTY.

MY LORD:

I have the honour of dedicating to your lordship, as Head of the Naval Service, this narrative of the Surveying Voyages of the Adventure and Beagle, between the years 1826 and 1836.

Originated by the Board of Admiralty, over which Viscount Melville presided, these voyages have been carried on, since 1830, under his lordship's successors in office.

Captain King has authorized me to lay the results of the Expedition which he commanded, from 1826 to 1830, before your lordship, united to those of the Beagle's subsequent voyages.

I have the honour to be,

MY LORD,

Your lordship's obedient servant,

ROBERT FITZ-ROY.

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PREFACE.

In this Work, the result of nine years' voyaging, partly on coasts little known, an attempt has been made to combine giving general information with the paramount object—that of fulfilling a duty to the Admiralty, for the benefit of Seamen.

Details, purely technical, have been avoided in the narrative more than I could have wished; but some are added in the Appendix to each volume: and in a nautical memoir, drawn up for the Admiralty, those which are here omitted will be found.

There are a few words used frequently in the following pages, which may not at first sight be familiar to every reader, therefore I need hardly apologize for saying that, although the great Portuguese navigator's name was Magalhaens—it is generally pronounced as if written Magellan:—that the natives of Tierra del Fuego are commonly called Fuegians;—and that Chiloé is thus accented for reasons given in page 384 of the second volume.

In the absence of Captain King, who has entrusted to me the care of publishing his share of this work, I may have overlooked errors which he would have detected. Being hurried, and unwell, while attending to the printing of his volume, I was not able to do it justice.

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It may be a subject of regret, that no paper on the Botany of Tierra del Fuego is appended to the first volume. Captain King took great pains in forming and preserving a botanical collection, aided by a person embarked solely for that purpose. He placed this collection in the British Museum, and was led to expect that a first-rate botanist would have examined and described it; but he has been disappointed.

In conclusion, I beg to remind the reader, that the work is unavoidably of a rambling and very mixed character; that some parts may be wholly uninteresting to most readers, though, perhaps, not devoid of interest to all; and that its publication arises solely from a sense of duty.

ROBERT FITZ-ROY.

London, March 1839.

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INTRODUCTION.

In 1825, the Lords Commissioners of the Admiralty directed two ships to be prepared for a Survey of the Southern Coasts of South America; and in May, of the following year, the Adventure and the Beagle were lying in Plymouth Sound, ready to carry the orders of their Lordships into execution.

These vessels were well provided with every necessary, and every comfort, which the liberality and kindness of the Admiralty, Navy Board, and officers of the Dock-yards, could cause to be furnished.

On board the Adventure, a roomy ship, of 330 tons burthen, without guns,* lightly though strongly rigged, and very strongly built, were—

Phillip Parker King, Commander and Surveyor, Senior Officer of the Expedition.

J. Cooke ..... Lieutenant.
B. Ainsworth ..... Master.
J. Tarn ..... Surgeon.

* Excepting one for signals.

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G. Rowlett ..... Purser.
R. H. Sholl..... Mate.
J. C. Wickham..... Mate.
J. F. Brand ..... Mate.
T. Graves..... Mate and Assistant Surveyor.
G. Harrison ..... Mate.
E. Williams..... Second Master.
J. Park ..... Assistant Surgeon.
W. W. Wilson ..... Midshipman.
A. Millar..... Master's Assistant.
A. Mellersh ..... Volunteer 1st Class.
J. Russell ..... Volunteer 2d Class.
G. Hodgskin ..... Clerk.
J. Anderson ..... Botanical Collector.

Gunner——Boatswain——and Carpenter.

Serjeant and fourteen Marines; and about forty Seamen and Boys.

In the Beagle, a well-built little vessel, of 235 tons, rigged as a barque, and carrying six guns, were—

Pringle Stokes ..... Commander and Surveyor.
E. Hawes ..... Lieutenant.
W. G. Skyring ..... Lieut. and Assist. Surveyor.
S. S. Flinn ..... Master.
E. Bowen ..... Surgeon.
J. Atrill ..... Purser.
J. Kirke ..... Mate.
B. Bynoe ..... Assistant Surgeon.
J. L. Stokes ..... Midshipman.
R. F. Lunie ..... Volunteer 1st Class.
W. Jones ..... Volunteer 2d Class.
J. Macdouall ..... Clerk.

Carpenter.

Serjeant and nine Marines; and about forty Seamen and Boys.

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In the course of the voyage, several changes occurred among the officers, which it may be well to mention here.

In September, 1826, Lieutenant Hawes invalided: and was succeeded by Mr. R. H. Sholl, the senior mate in the Expedition.

In February, 1827, Mr. Ainsworth was unfortunately drowned; and, in his place, Mr. Williams acted, until superseded by Mr. S. S. Flinn, of the Beagle.

Lieutenant Cooke invalided in June, 1827; and was succeeded by Mr. J. C. Wickham.

In the same month Mr. Graves received information of his promotion to the rank of Lieutenant.

Between May and December, 1827, Mr. Bowen and Mr. Atrill invalided; besides Messrs. Lunie, Jones, and Macdouall: Mr. W. Mogg joined the Beagle, as acting Purser; and Mr. D. Braily, as volunteer of the second class.

Mr. Bynoe acted as Surgeon of the Beagle, after Mr. Bowen left, until December, 1828.

In August, 1828, Captain Stokes's lamented vacancy was temporarily filled by Lieutenant Skyring; whose place was taken by Mr. Brand.

Mr. Flinn was then removed to the Adventure; and Mr. A. Millar put into his place.

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In December, 1828, the Commander-in-chief of the Station (Sir Robert Waller Otway) superseded the temporary arrangements of Captain King, and appointed a commander, lieutenant, master, and surgeon to the Beagle. Mr. Brand then invalided, and the lists of officers stood thus—

Adventure (1828-30).

PHILLIP PARKER KING, Commander and Surveyor, Senior Officer of the Expedition.

T. GRAVES..... Lieut. and Assist. Surveyor.
J. C. WICKHAM ..... Lieutenant.
S. S. FLINN ..... Master.
J. TARN ..... Surgeon.
G. ROWLETT ..... Purser.
G. HARRISON ..... Mate.
W. W. WILSON..... Mate.
E. WILLIAMS..... Second Master.
J. PARK ..... Assistant Surgeon.
A. MELLERSH ..... Midshipman.
A. MILLAR .... Master's Assistant.
J. RUSSELL ..... Volunteer 2d Class.
G. HODGSKIN ..... Clerk.
J. ANDERSON ..... Botanical Collector.

Gunner——Boatswain——and Carpenter.

Serjeant and fourteen Marines: and about fifty* Seamen and Boys.

Beagle (1828-30).

ROBERT FITZ-ROY ... Commander and Surveyor.
W. G. SKYRING ..... Lieut. and Assist. Surveyor.
J. KEMPE ..... Lieutenant.
M. MURRAY ..... Master.

* Twelve additional seamen having been ordered, by the Admiralty, for the Adelaide schooner.

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J. Wilson ..... Surgeon.
W. Mogg ..... (Acting) Purser.
J. Kirke ..... Mate.
B. Bynoe ..... Assistant Surgeon.
J. L. Stokes ..... Midshipman.
J. May ..... Carpenter.
D. Braily ..... Volunteer 2d Class.
J. Megget ..... Clerk.

Serjeant and nine Marines: and about forty Seamen and Boys.

In June, 1829, Lieutenant Mitchell joined the Adventure; and in February, 1830, Mr. A. Millar died very suddenly:—and very much regretted.

The following Instructions were given to the Senior Officer of the Expedition.

"By the Commissioners for executing the Office of Lord High Admiral of the United Kingdom of Great Britain and Ireland, &c.

"Whereas we think fit that an accurate Survey should be made of the Southern Coasts of the Peninsula of South America, from the southern entrance of the River Plata, round to Chilóe; and of Tierra del Fuego; and whereas we have been induced to repose confidence in you, from your conduct of the Surveys in New Holland; we have placed you in the command of His Majesty's Surveying Vessel the Adventure; and we have directed Captain Stokes, of His Majesty's Surveying Vessel the Beagle, to follow your orders.

"Both these vessels are provided with all the

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means which are necessary for the complete execution of the object above-mentioned, and for the health and comfort of their Ships' Companies. You are also furnished with all the information, we at present possess, of the ports which you are to survey; and nine Government Chronometers have been embarked in the Adventure, and three in the Beagle, for the better determination of the Longitudes.

"You are therefore hereby required and directed, as soon as both vessels shall be in all respects ready, to put to sea with them; and on your way to your ulterior destination, you are to make, or call at, the following places, successively; namely; Madeira: Teneriffe: the northern point of St. Antonio, and the anchorage at St. Jago; both in the Cape Verd Islands: the Island of Trinidad, in the Southern Atlantic: and Rio de Janeiro: for the purpose of ascertaining the differences of the longitudes of those several places.

"At Rio de Janeiro, you will receive any supplies you may require; and make with the Commander-in-chief, on that Station, such arrangements as may tend to facilitate your receiving further supplies, in the course of your Expedition.

"After which, you are to proceed to the entrance of the River Plata, to ascertain the longitudes of the Cape Santa Maria, and Monte Video: you are then to proceed to survey the Coasts, Islands, and Straits; from Cape St. Antonio, at the south side

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of the River Plata, to Chilóe; on the west coast of America; in such manner and order, as the state of the season, the information you may have received, or other circumstances, may induce you to adopt.

"You are to continue on this service until it shall be completed; taking every opportunity to communicate to our Secretary, and the Commander-in-Chief, your proceedings: and also, whenever you may be able to form any judgment of it, where the Commander-in-Chief, or our Secretary, may be able to communicate with you.

"In addition to any arrangements made with the Admiral, for recruiting your stores, and provisions; you are, of course, at liberty to take all other means, which may be within your reach, for that essential purpose.

"You are to avail yourself of every opportunity of collecting and preserving Specimens of such objects of Natural History as may be new, rare, or interesting; and you are to instruct Captain Stokes, and all the other Officers, to use their best diligence in increasing the Collections in each ship: the whole of which must be understood to belong to the Public.

"In the event of any irreparable accident happening to either of the two vessels, you are to cause the officers and crew of the disabled vessel to be

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removed into the other, and with her, singly, to proceed in prosecution of the service, or return to England, according as circumstances shall appear to require; understanding that the officers and crews of both vessels are hereby authorized, and required, to continue to perform their duties, according to their respective ranks and stations, on board either vessel to which they may be so removed. Should, unfortunately, your own vessel be the one disabled, you are in that case to take the command of the Beagle: and, in the event of any fatal accident happening to yourself; Captain Stokes is hereby authorized to take the command of the Expedition; either on board the Adventure, or Beagle, as he may prefer; placing the officer of the Expedition who may then be next in seniority to him, in command of the second vessel: also, in the event of your inability, by sickness or otherwise, at any period of this service, to continue to carry the Instructions into execution, you are to transfer them to Captain Stokes, or to the surviving officer then next in command to you, who is hereby required to execute them, in the best manner he can, for the attainment of the object in view.

"When you shall have completed the service, or shall, from any cause, be induced to give it up; you will return to Spithead with all convenient expedition; and report your arrival, and proceedings, to our Secretary, for our information.

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"Whilst on the South American Station, you are to consider yourself under the command of the Admiral of that Station; to whom we have expressed our desire that he should not interfere with these orders, except under peculiar necessity.

"Given under our hands the 16th of May 1826.

(Signed) "MELVILLE.
"G. COCKBURN.

"To Phillip P. King, Esq., Commander of His Majesty's Surveying Vessel Adventure, at Plymouth.

"By command of their Lordships.

(Signed) "J. W. CROKER."

On the 22d of May, 1826, the Adventure and Beagle sailed from Plymouth; and, in their way to Rio de Janeiro, called successively at Madeira, Teneriffe, and St. Jago.

Unfavourable weather prevented a boat being sent ashore at the northern part of San Antonio; but observations were made in Terrafal Bay, on the south-west side of the island: and, after crossing the Equator, the Trade-wind hung so much to the southward, that Trinidad could not be approached without a sacrifice of time, which, it was considered, might be prejudicial to more important objects of the Expedition.

Both ships anchored at Rio de Janeiro on the

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10th of August, and remained there until the 2d of October, when they sailed to the River Plata.

In Maldonado,* their anchors were dropped on the 13th of the same month; and, till the 12th of November, each vessel was employed on the north side of the river, between Cape St. Mary and Monte Video.

* On the north side of the river Plata.

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ERRATA ET CORRIGENDA.

Page 76, line 4 from bottom, *for* lying, *read* being.
118, Heading, line 4, *for* Beagle sailed, *read* Beagle sails.
123, line 17, *insert* narrow, *before* and shoal.
164, line 23, *instead of* the, *read* our.
174, line 6, *for* cuts, *read* cut.
193, line 5, *for* have, *read* had.
223, (Note) line 2 from bottom, *for* they, *read* he.
229, line 9, *for* was, *read* were.
265, line 8, *after* day, *insert a* colon *instead of a* comma.
273, line 21, *after* as well, *insert* as.
301, line 23, *for* Lieutenants Skyring and Graves again took with them, *read* Lieutenant Skyring again took with him.
411, line 2, *dele* the.
437, line 16, *for* contiue, *read* continue.
— line 19, *for* wit, *read* with.
462, line 21, *for* Santa Catalina, *read* Santa Catharina.
473, line 17, *after* which is, *insert* a.
481, bottom line, *for* 53. 32. 30, *read* 53. 52. 30.
485, line 7, (of positions) *for* 53. 31, *read* 53. 51.
— bottom line, *for* 11. 51, *read* 3. 26.
488, line 9, *for* Northern, *read* Southern.
489, line 4 from bottom, *for* 46. 03, *read* 46. 30; and *for* 40. 50, *read* 40. 05.
490, line 6, *for* 50°, *read* 49°.
491, line 6, *for* 36. 56, *read* 36. 16.
493, line 9, *for* 54. 30. 00, *read* 54. 05. 20; and *for* 73. 1. 30, *read* 73. 25. 30.
526, *for* Variation, *read* Dip.

MAMMALIA.

529, line 8, *for* Harlau *read* Harlan.
531, line 6, *for* KERODA *read* KERODON.

BIRDS.

532, line 1, *for* Duménel, *read* Duméril.
— line 7, *for* MILOAGO, *read* MILVAGO.
— line 19, *for* SPARORRIUS, *read* SPARVERIUS.
533, line 16, dele *Spix*.
— bottom line, *for* SILVIA, *read* SYLVIA, and in next page the same.
534, line 12, *dele* Fursa, Vellot.
— line 10 from bottom, *for* SMARAGDIMIS, *read* SMARAGDINUS.
536, line 9 from bottom, *for* STRUTHEO, *read* STRUTHIO.
— line 6 from bottom, for *rinacea*, read *binacea*.
537, line 14, *for* TOTAMUS, *read* TOTANUS.
538, line 5, for *subtas*, read *subtus*.
— lower lines, *where* HŒMATOPUS occurs, *read* HÆMATOPUS.
540, last line, for *meneque*, read *minegue*; and for *parié*, read *parcé*.
541, line 12, *for* CATARRHOCTES, *read* CATARRHACTES.
— line 2 from bottom, for *ud*, read *ad*.
543, line 13, for *gracillimus*, read *gracillimis*.

SHELLS.

545, last line, for *brachyptera*, read *brachypterus*; for *Putachonica*, read *Putachonicus*.

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SURVEYING VOYAGES

OF THE

ADVENTURE AND THE BEAGLE,

1826—1830.

CHAPTER I.

Departure from Monte Video—Port Santa Elena—Geological remarks—Cape Fairweather—Non-existence of Chalk—Natural History—Approach to Cape Virgins, and the Strait of Magalhaens (or Magellan).

We sailed from Monte Video on the 19th of November 1826; and, in company with the Beagle, quitted the river Plata.

According to my Instructions, the Survey was to commence at Cape San Antonio, the southern limit of the entrance of the Plata; but, for the following urgent reasons, I decided to begin with the southern coasts of Patagonia, and Tierra del Fuego, including the Straits of Magalhaens.* In the first place, they presented a field of great interest and novelty; and secondly, the climate of the higher southern latitudes being so severe and tempestuous, it appeared important to encounter its rigours while the ships were in good condition—while the crews were healthy—and while the charms of a new and difficult enterprize had full force.

* Commonly called Magellan. See p. 11.

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Our course was therefore southerly, and in latitude 45° south, a few leagues northward of Port Santa Elena, we first saw the coast of Patagonia. I intended to visit that port; and, on the 28th, anchored, and landed there.

Seamen should remember that a knowledge of the tide is of especial consequence in and near Port Santa Elena. During a calm we were carried by it towards reefs which line the shore, and were obliged to anchor until a breeze sprung up.

The coast along which we had passed, from Point Lobos to the north-east point of Port Santa Elena, appeared to be dry and bare of vegetation. There were no trees; the land seemed to be one long extent of undulating plain, beyond which were high, flat-topped hills of a rocky, precipitous character. The shore was fronted by rocky reefs extending two or three miles from high-water mark, which, as the tide fell, were left dry, and in many places were covered with seals.

As soon as we had secured the ships, Captain Stokes accompanied me on shore to select a place for our observations. We found the spot which the Spanish astronomers of Malaspina's Voyage (in 1798) used for their observatory, the most convenient for our purpose. It is near a very steep shingle (stony) beach at the back of a conspicuous red-coloured, rocky projection which terminates a small bay, on the western side, at the head of the port. The remains of a wreck, which proved to be that of an American whaler, the Decatur of New York, were found upon the extremity of the same point; she had been driven on shore from her anchors during a gale.

The sight of the wreck, and the steepness of the shingle beach just described, evidently caused by the frequent action of a heavy sea, did not produce a favourable opinion of the safety of the port: but as it was not the season for easterly gales, to which only the anchorage is exposed, and as appearances indicated a westerly wind, we did not anticipate danger.

While we were returning on board, the wind blew so strongly that we had much difficulty in reaching the ships, and the boats were no sooner hoisted up, and every thing

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made snug, than it blew a hard gale from the S.W. The water however, from the wind being off the land, was perfectly smooth, and the ships rode securely through the night: but the following morning the gale increased, and veered to the southward, which threw a heavy sea into the port, placing us, to say the least, in a very uneasy situation. Happily it ceased at sunset. In consequence of the unfavourable state of the weather, no attempt was made to land in order to observe an eclipse of the sun; to make which observation was one reason for visiting this port.

The day after the gale, while I was employed in making some astronomical observations, a party roamed about in quest of game: but with little success, as they killed only a few wild ducks. The fire which they made for cooking communicated to the dry stubbly grass, and in a few minutes the whole country was in a blaze. The flames continued to spread during our stay, and, in a few days, more than fifteen miles along the coast, and seven or eight miles into the interior were overrun by the fire. The smoke very much impeded our observations, for at times it quite obscured the sun.

The geological structure of this part of the country, and a considerable portion of the coast to the north and south, consists of a fine-grained porphyritic clay slate. The summits of the hills near the coast are generally of a rounded form, and are paved, as it were, with small, rounded, siliceous pebbles, imbedded in the soil, and in no instance lying loose or in heaps; but those of the interior are flat-topped, and uniform in height, for many miles in extent. The valleys and lower elevations, notwithstanding the poverty and parched state of the soil, were partially covered with grass and shrubby plants, which afford sustenance to numerous herds of guanacoes. Many of these animals were observed feeding near the beach when we were working into the bay, but they took the alarm, so that upon landing we only saw them at a considerable distance. In none of our excursions could we find any water that had not a brackish taste. Several wells have been dug in the valleys, both near the sea and at a considerable distance from it, by the

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crews of sealing vessels; but, except in the rainy season, they all contain saltish water. This observation is applicable to nearly the whole extent of the porphyritic country. Oyster-shells, three or four inches in diameter, were found, scattered over the hills, to the height of three or four hundred feet above the sea. Sir John Narborough, in 1652, found oyster-shells at Port San Julian; but, from a great many which have been lately collected there, we know that they are of a species different from that found at Port Santa Elena. Both are fossils.

No recent specimen of the genus *Ostrea* was found by us on any part of the Patagonian coast. Narborough, in noticing those at Port San Julian, says, " They are the biggest oyster-shells that I ever saw, some six, some seven inches broad, yet not one oyster to be found in the harbour: whence I conclude they were here when the world was formed."

The short period of our visit did not enable us to add much to natural history. Of quadrupeds we saw guanacoes, foxes, cavies, and the armadillo; but no traces of the puma (*Felis concolor*), or South American lion, although it is to be met with in the interior.

I mentioned that a herd of guanacoes was feeding near the shore when we arrived. Every exertion was made to obtain some of the animals; but, either from their shyness, or our ignorance of the mode of entrapping them, we tried in vain, until the arrival of a small sealing-vessel, which had hastened to our assistance, upon seeing the fires we had accidentally made, but which her crew thought were intended for signals of distress. They shot two, and sent some of the meat on board the Adventure. The next day, Mr. Tarn succeeded in shooting one, a female, which, when skinned and cleaned, weighed 168 lbs. Narborough mentions having killed one at Port San Julian, that weighed, " cleaned in his quarters, 268 lbs." The watchful and wary character of this animal is very remarkable. Whenever a herd is feeding, one is posted, like a sentinel, on a height; and, at the approach of danger, gives instant alarm by a loud neigh, when away they all go, at a hand-gallop, to the next eminence, where they quietly resume their feeding,

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until again warned of the approach of danger by their vigilant 'look-out.'

Another peculiarity of the guanaco is, the habit of resorting to particular spots for natural purposes. This is mentioned in the 'Dictionnaire d'Histoire Naturelle,' in the 'Encyclopédie Méthodique,' as well as other works.

In one place we found the bones of thirty-one guanacoes collected within a space of thirty yards, perhaps the result of an encampment of Indians, as evident traces of them were observed; among which were a human jaw-bone, and a piece of agate ingeniously chipped into the shape of a spear-head.

The fox, which we did not take, appeared to be small, and similar to a new species afterwards found by us in the Strait of Magalhaens.

The cavia* (or, as it is called by Narborough, Byron, and Wood, the hare, an animal from which it differs both in appearance and habits, as well as flavour), makes a good dish; and so does the armadillo, which our people called the shell-pig.† This little animal is found abundantly about the low land, and lives in burrows underground; several were taken by the seamen, and, when cooked in their shells, were savoury and wholesome.

Teal were abundant upon the marshy grounds. A few partridges, doves, and snipes, a rail, and some hawks were shot. The few sea-birds that were observed consisted of two species of gulls, a grebe and a penguin (*Aptenodytes Magellanica*).

We found two species of snakes and several kinds of lizards. Fish were scarce, as were also insects; of the last, our collec-

* *Dasyprocta patachonica:* it is the *Patagonian cavy* of Dr. Shaw, and Pennant's Quadr., tab. 39, and the *lièvre pampa* of D'Azara. M. Desmarest thinks that if the teeth were examined it would form a new genus, for which he proposes the name of *Dolichotis* (Ency. Meth. Mamm. p. 359). At present he has, from its external character, placed it amongst the genus *Dasyprocta* (agouti). The only one that was taken was not preserved, which prevented me from ascertaining the fact.

† *Dasypus minutus*, Desm. *Tatou pichiy*, or *tatou septième* of D'Azara, &c. &c. It has seven bands.

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tions consisted only of a few species of *Coleoptera*, two or three *Lepidoptera*, and two *Hymenoptera*.

Among the sea-shells, the most abundant was the *Patella deaurata*, Lamk.; this, with three other species of Patella, one *Chiton*, three species of *Mytilus*, three of *Murex*, one of *Crepidula*, and a *Venus*, were all that we collected.

About the country, near the sea-shore, there is a small tree, whose stem and roots are highly esteemed for fuel by the crews of sealing-vessels which frequent this coast. They call it 'piccolo.' The leaf was described to me as having a prickle upon it, and the flower as of a yellow colour. A species of berberis also is found, which when ripe may afford a very palatable fruit.

Our short visit gave us no flattering opinion of the fertility of the country near this port. Of the interior we were ignorant; but, from the absence of Indians and the scarcity of fresh water, it is probably very bare of pasturage. Falkner, the Jesuit missionary, says these parts were used by the Tehuelhet tribes for burying-places: we saw, however, no graves, nor any traces of bodies, excepting the jaw-bone abovementioned; but subsequently, at Sea Bear Bay, we found many places on the summits of the hills which had evidently been used for such a purpose, although then containing no remains of bodies. This corresponds with Falkner's account, that after a period of twelve months the sepulchres are formally visited by the tribe, when the bones of their relatives and friends are collected and carried to certain places, where the skeletons are arranged in order, and tricked out with all the finery and ornaments they can collect.

The ships sailed from Port Santa Elena on the 5th December, and proceeded to the southward, coasting the shore as far as Cape Two Bays.

Our object being to proceed with all expedition to the Strait of Magalhaens, the examination of this part of the coast was reserved for a future opportunity. On the 13th, we had reached within fifty miles of Cape Virgins, the headland at the entrance of the strait, but it was directly in the wind's eye

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of us. The wind veering to S.S.W., we made about a west course. At day-light the land was in sight, terminating in a point to the S.W., so exactly like the description of Cape Virgins and the view of it in Anson's voyage, that without considering our place on the chart, or calculating the previous twenty-four hours' run, it was taken for the Cape itself, and, no one suspecting a mistake, thought of verifying the ship's position. The point, however, proved to be Cape Fairweather. It was not a little singular, that the same mistake should have been made on board the Beagle, where the error was not discovered for three days.*

From the appearance of the weather I was anxious to approach the land in order to anchor, as there seemed to be every likelihood of a gale; and we were not deceived, for at three o'clock, being within seven miles of the Cape, a strong wind sprung up from the S.W., and the anchor was dropped. Towards evening it blew so hard, that both ships dragged their anchors for a considerable distance.

On the charts of this part of the coast the shore is described to be formed of "chalk hills, like the coast of Kent." To geologists, therefore, especially, as they were not disposed to believe that such was the fact, this was a question of some interest. From our anchorage the appearance of the land favoured our belief of the existence of chalk. The outline was very level and steep; precipitous cliffs of whitish colour, stratified horizontally, with their upper part occasionally worn into hollows, strongly resembled the chalk cliffs of the English coasts.

The gale prevented our landing for three days, when (19th) a few minutes sufficed to discover that the cliffs were composed

* A similar error was made by one of the ships of the fleet under Loyasa in the year 1525. The Nodales also, in their description of the coast, mention the similarity of appearance in the two capes, Virgins and Fairweather. "Y venido de mar en fuera à buscar la tierra facilmente podian hacer de Rio de Gallegos el Cabo de Virgenes," (and in making the land Cape Virgins may easily be mistaken for the river Gallegos). —Viage de los Nodales, p. 53.

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of soft clay, varying in colour and consistence, and disposed in strata running horizontally for many miles without interruption, excepting where water-courses had worn them away. Some of the strata were very fine clay, unmixed with any other substance, whilst others were plentifully strewed with round siliceous gravel,* without any vestige of organic remains. The sea beach, from high-water mark to the base of the cliffs, is formed by shingle, with scattered masses of indurated clay of a green colour.† Between the high and low tide marks there is a smooth beach of the same green clay as the masses above-mentioned, which appears to have been hardened by the action of the surf to the consistence of stone. Generally this beach extends for about one hundred yards farther into the sea, and is succeeded by a soft green mud, over which the water gradually deepens. The outer edge of the clay forms a ledge, extending parallel with the coast, upon the whole length of which the sea breaks, and over it a boat can with difficulty pass at low water.

The very few shells we found were dead. Strewed about the beach were numbers of fish, some of which had been thrown on shore by the last tide, and were scarcely stiff. They principally belonged to the genus *Ophidium*; the largest that we saw measured four feet seven inches in length, and weighed twenty-four pounds. Many caught alongside the ship were, in truth, coarse and insipid; yet our people, who fed heartily upon them, called them ling, and thought them palatable. The hook, however, furnished us with a very wholesome and well-flavoured species of cod (*Gadus*). Attached to the first we found two parasitical animals; one was a *Cymothoa*, the other a species of *Lernæa*, which had so

* Some of the specimens of the clay strata consist, according to Dr. Fitton, who has kindly examined my collection, of a white marl not unlike certain varieties of the lower chalk; and of a clay having many of the properties of fuller's earth. The pebbles on the beach consist of quartz, red jasper, hornstone, and flinty slate, but do not contain any stone resembling chalk flint.

† Dr. Fitton considers these masses of clay to bear a resemblance to the upper green sand of England.

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securely attached itself under the skin, as not to be removed without cutting off a piece of the flesh with it. An undescribed species of *Muræna* was also taken.

Whilst we were on shore, the Beagle moved eight or nine miles nearer to the Cape, where Captain Stokes landed to fix positions of remarkable land. One peaked hill, from the circumstance of his seeing a large animal near it, he called Tiger Mount. Mr. Bowen shot a guanaco; and being at a distance in shore, unable to procure assistance, he skinned and quartered it with his pocket-knife, and carried it upon his shoulders to the boat.

Next morning the ships weighed, and proceeded towards Cape Virgins.

When a-breast of Cape Fairweather, the opening of the river Gallegos was very distinctly seen; but the examination of it was deferred to a future opportunity. Passing onward, the water shoaled to four fathoms, until we had passed extensive banks, which front the river.

Our approach to the entrance of the Strait, although attended with anxiety, caused sensations of interest and pleasure not easily to be described. Though dangers were experienced by some navigators who had passed it, the comparative facility with which others had effected the passage showed that, at times, the difficulties were easily surmounted, and we were willing to suppose that in the former case there might have been some little exaggeration.

The most complete, and, probably, the only good account of the navigation of the Strait of Magalhaens is contained in the narrative of Don Antonio de Cordova, who commanded the Spanish frigate Santa Maria de la Cabeza, on a voyage expressly for the purpose of exploring the strait. It was published under the title of 'Ultimo Viage al Estrecho de Magallanes.' That voyage was, however, concluded with only the examination of the eastern part, and a subsequent expedition was made, under the command of the same officer, the account of which was appended to the Cabeza's voyage; so that Cordova's expedition still retained the appellation of 'Ultimo

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Viage, &c.' It is written in a plain and simple style, gives a most correct account of every thing seen, and should therefore be in the possession of every person who attempts the navigation of the strait.

Cordova's account of the climate is very uninviting. Speaking of the rigours of the summer months (January, February, and March), he says, "Seldom was the sky clear, and short were the intervals in which we experienced the sun's warmth: no day passed by without some rain having fallen, and the most usual state of the weather was that of constant rain."*

The accounts of Wallis and Carteret are still more gloomy. The former concludes that part of his narrative with the following dismal and disheartening description: "Thus we quitted a dreary and inhospitable region, where we were in almost continual danger of shipwreck for near four months, having entered the strait on the 17th of December, and quitted it on the 11th of April 1767: a region where, in the midst of summer, the weather was cold, gloomy, and tempestuous, where the prospects had more the appearance of a chaos than of nature; and where for the most part the valleys were without herbage and the hills without wood."

These records of Cordova and Wallis made me feel not a little apprehensive for the health of the crew, which could not be expected to escape uninjured through the rigours of such a climate. Nor were the narratives of Byron or Bougainville calculated to lessen my anxiety. In an account, however, of a voyage to the strait by M. A. Duclos Guyot, the following paragraph tended considerably to relieve my mind upon the subject:—"At length, on Saturday the 23d of March, we sailed out of that famous Strait, so much dreaded, after having experienced that there, as well as in other places, it was very fine, and very warm, and that for three-fourths of the time the sea was perfectly calm."

In every view of the case, our proximity to the principal scene of action occasioned sensations of a peculiar nature, in which, however, those that were most agreeable and hopeful

* Ultimo Viage al Estrecho de Magallanes, part ii. p. 298.

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preponderated. The officers and crews of both ships were healthy, and elated with the prospect before them; our vessels were in every respect strong and sea-worthy; and we were possessed of every comfort and resource necessary for encountering much greater difficulties than we had any reason to anticipate.

There has existed much difference of opinion as to the correct mode of spelling the name of the celebrated navigator who discovered this Strait. The French and English usually write it Magellan, and the Spaniards Magallanes; but by the Portuguese (and he was a native of Portugal) it is universally written Magalhaens. Admiral Burney and Mr. Dalrymple spell it Magalhanes, which mode I have elsewhere adopted, but I have since convinced myself of the propriety of following the Portuguese orthography for a name which, to this day, is very common both in Portugal and Brazil.

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CHAPTER II.

Enter the Straits of Magalhaens (or Magellan), and anchor off Cape Possession — First Narrow—Gregory Bay — Patagonian Indians— Second Narrow — Elizabeth Island — Freshwater Bay — Fuegian Indians—Arrival at Port Famine.

A CONTRARY tide and light winds detained us at anchor near Cape Virgins until four o'clock in the afternoon, when, with the turn of the tide, a light air carried us past Dungeness Point, aptly named by Wallis from its resemblance to that in the English Channel. A great number of seals were huddled together upon the bank, above the wash of the tide, whilst others were sporting about in the surf. Cape Possession was in sight, and with the wind and tide in our favour we proceeded until ten o'clock, when the anchor was dropped. At daylight we found ourselves six miles to the eastward of the cape. The anchor was then weighed, and was again dropped at three miles from the cape until the afternoon, when we made another attempt; but lost ground, and anchored a third time. Before night a fourth attempt was made, but the tide prevented our making any advance, and we again anchored.

Mount Aymond* and "his four sons," or (according to the old quaint nomenclature) the Asses' Ears, had been in sight all day, as well as a small hummock of land on the S.W. horizon, which afterwards proved to be the peaked hillock upon Cape Orange, at the south side of the entrance to the First Narrow.

At this anchorage the tide fell thirty feet, but the strength of the current, compared with the rate at which we afterwards found it to run, was inconsiderable Here we first experienced

* A hill on the north shore of Possession Bay, having near it, to the westward, four rocky summits, which, from a particular point of view, bear a strong resemblance to the cropped ears of a horse or ass. These are described less briefly in the Sailing Directions.

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the peculiar tides of which former navigators have written. During the first half of the flood* or westward tide, the depth decreased, and then, after a short interval, increased until three hours after the stream of tide had begun to run to the eastward.

The following morning (21st) we gained a little ground. Our glasses were directed to the shore in search of inhabitants, for it was hereabouts that Byron, and Wallis, and some of the Spanish navigators held communication with the Patagonian Indians; but we saw none. Masses of large sea-weed,† drifting with the tide, floated past the ship. A description of this remarkable plant, although it has often been given before, may not be irrelevant here. It is rooted upon rocks or stones at the bottom of the sea, and rises to the surface, even from great depths. We have found it firmly fixed to the ground more than twenty fathoms under water, yet trailing along the surface for forty or fifty feet. When firmly rooted it shows the set of the tide or current. It has also the advantage of indicating rocky ground: for wherever there are rocks under water, their situation is, as it were, buoyed by a mass of sea-weed‡ on the surface of the sea, of larger extent than that of the danger below. In many instances perhaps it causes unnecessary alarm, since it often grows in deep water; but it should not be entered without its vicinity having been sounded, especially if seen in masses, with the extremities of the stems trailing along the surface. If there be no tide, or if the wind and tide are the same way, the plant lies smoothly upon the water, but if the wind be against the tide, the leaves curl up and are visible at a distance, giving a rough, rippling appearance to the surface of the water.

During the last two days the dredge had furnished us with a few specimens of *Infundibulum* of Sowerby (*Patella trochi-formis*, Lin.), and some dead shells (*Murex Magellanicus*) were brought up by the sounding-lead.

We made another attempt next morning, but again lost

* Flowing into the strait from the east towards the west.

† Fucus giganteus.

‡ Usually called by seamen 'kelp.'

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ground, and the anchor was dropped for the eighth time. The threatening appearances of the clouds, and a considerable fall of the barometer indicating bad weather, Captain Stokes agreed with me in thinking it advisable to await the spring-tides to pass the First Narrow: the ships were therefore made snug for the expected gale, which soon came on, and we remained several days wind-bound, with top-masts struck, in a rapid tide-way, whose stream sometimes ran seven knots. On the 28th, with some appearance of improving weather, we made an attempt to pass through the Narrow. The wind blowing strong, directly against us, and strengthening as we advanced, caused a hollow sea, that repeatedly broke over us. The tide set us through the Narrow very rapidly, but the gale was so violent that we could not show more sail than was absolutely necessary to keep the ship under command. Wearing every ten minutes, as we approached either shore, lost us a great deal of ground, and as the anchorage we left was at a considerable distance from the entrance of the Narrows, the tide was not sufficient to carry us through. At slack water the wind fell, and as the weather became fine, I was induced to search for anchorage near the south shore. The sight of kelp, however, fringing the coast, warned me off, and we were obliged to return to an anchorage in Possession Bay. The Beagle had already anchored in a very favourable berth; but the tide was too strong to permit us to reach the place she occupied, and our anchor was dropped a mile astern of her, in nineteen fathoms. The tide was then running five, and soon afterwards six miles an hour. Had the western tide set with equal strength, we should have succeeded in passing the Narrow. Our failure, however, answered the good purpose of making us more acquainted with the extent of a bank that lines the northern side of Possession Bay, and with the time of the turn of tide in the Narrow; which on this day (new moon) took place within a few minutes of noon.

As we passed Cape Orange, some Indians were observed lighting a fire under the lee of the hill to attract our notice; but we were too busily engaged to pay much attention to

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their movements. Guanacoes also were seen feeding near the beach, which was the first intimation we had of the existence of that animal southward of the Strait of Magalhaens.

When day broke (29th) it was discovered that the ship had drifted considerably during the night. The anchor was weighed, and with a favourable tide we reached an anchorage a mile in advance of the Beagle. We had shoaled rather suddenly to eight fathoms, upon which the anchor was immediately dropped, and on veering cable the depth was eleven fathoms. We had anchored on the edge of a bank, which soon afterwards, by the tide falling, was left dry within one hundred yards of the ship. Finding ourselves so near a shoal, preparations were made to prevent the ship from touching it. An anchor was dropped under foot, and others were got ready to lay out, for the depth alongside had decreased from eleven to seven fathoms, and was still falling. Fortunately we had brought up to leeward of the bank, and suffered no inconvenience; the flood made, and as soon as possible the ship was shifted to another position, about half a mile to the S. E., in a situation very favourable for our next attempt to pass the Narrow. This night the tide fell thirty-six feet, and the stream ran six knots.

The ensuing morning we made another attempt to get through the Narrow, and, from having anchored so close to its entrance, by which the full benefit of the strength, as well as the whole duration of the tide was obtained, we succeeded in clearing it in two hours, although the distance was more than twenty miles, and the wind directly against us, the sea, as before, breaking repeatedly over the ship.

After emerging from the Narrow we had to pass through a heavy 'race' before we 'reached' out of the influence of the stream that runs between the First and Second Narrow, but the tide lasted long enough to carry us to a quiet anchorage. In the evening we weighed again, and reached Gregory Bay, where the Beagle joined us the next morning.

Since entering the Strait, we had not had any communication

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with the Beagle on account of the weather, and the strength of the tide; this opportunity was therefore taken to supply her with water, of which she had only enough left for two days.

The greater part of this day was spent on shore, examining the country and making observations. Large smokes* were noticed to the westward. The shore was strewed with traces of men and horses, and other animals. Foxes and ostriches were seen; and bones of guanacoes were lying about the ground.

The country in the vicinity of this anchorage seemed open, low, and covered with good pasturage. It extends five or six miles, with a gradual ascent, to the base of a range of flat-topped land, whose summit is about fifteen hundred feet above the level of the sea. Not a tree was seen; a few bushes† alone interrupted the uniformity of the view. The grass appeared to have been cropped by horses or guanacoes, and was much interspersed with cranberry plants, bearing a ripe and juicy, though very insipid fruit.

Next day the wind was too strong and adverse to permit us to proceed. In the early part of the morning an American sealing vessel, returning from the Madre de Dios Archipelago on her way to the Falkland Islands, anchored near us. Mr. Cutler, her master, came on board the Adventure, passed the day and night with us, and gave me much useful information respecting the nature of the navigation, and anchorages in the Strait. He told me there was an Englishman in his vessel who was a pilot for the strait, and willing to join the ship. I gladly accepted the offer of his services.

In the evening an Indian was observed on horseback riding to and fro upon the beach, but the weather prevented my sending a boat until the next morning, when Lieutenant Cooke went on shore to communicate with him and other Indians who appeared, soon after dawn, upon the beach. On landing, he was received by them without the least distrust. They were eight or ten in number, consisting of an old man and his wife, three young men, and the rest children, all mounted on

* Columns of smoke rising from large fires. † Berberis.

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good horses. The woman, who appeared to be about fifty years of age, was seated astride upon a pile of skins, hung round with joints of fresh guanaco meat and dried horse-flesh. They were all wrapped in mantles, made chiefly of the skins of guanacoes, sewed together with the sinews of the same animal. These mantles were large enough to cover the whole body. Some were made of skins of the 'zorillo,' or skunk, an animal like a pole-cat, but ten times more offensive; and others, of skins of the puma.

The tallest of the Indians, excepting the old man, who did not dismount, was rather less than six feet in height. All were robust in appearance, and with respect to the head, length of body, and breadth of shoulders, of gigantic size; therefore, when on horseback, or seated in a boat, they appeared to be tall, as well as large men. In proportion to the parts above-mentioned, their extremities were very small and short, so that when standing they seemed but of a moderate size, and their want of proportion was concealed by the mantle, which enveloped the body entirely, the head and feet being the only parts exposed.

When Mr. Cooke landed, he presented some medals * to the oldest man, and the woman; and suspended them round their necks. A friendly feeling being established, the natives dismounted, and even permitted our men to ride their horses, without evincing the least displeasure, at the free advantage taken of their good-nature. Mr. Cooke rode to the heights, whence he had a distinct view of the Second Narrow, and Elizabeth Island, whither, he explained to the Indians who accompanied him, we were going.

Mr. Cooke returned to the ship with three natives, whom he had induced to go with us to Elizabeth Island; the others were to meet them, and provide us with guanaco meat, to which arrangement the elders of the family had, after

* Previous to the expedition quitting England, I had provided myself with medals, to give away to the Indians with whom we might communicate, bearing on one side the figure of Britannia, and on the reverse "George IV." "Adventure and Beagle," and "1826."

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much persuasion, assented. At first they objected to their companions embarking with us, unless we left hostages for their safety; but as this was refused, they did not press the point, and the three young men embarked. They went on board singing; in high glee.

While the ship was getting under way, I went ashore to a larger number of Indians who were waiting on the beach. When my boat landed they were mounted, and collected in one place. I was surprised to hear the woman accost me in Spanish, of which, however, she knew but a few words. Having presented medals to each of the party, they dismounted (excepting the elders), and in a few minutes became quite familiar. By this time Captain Stokes had landed, with several of his officers, who increased our party to nearly double the number of theirs: notwithstanding which they evinced neither fear nor uneasiness. The woman, whose name was Maria, wished to be very communicative; she told me that the man was her husband, and that she had five children. One of the young men, whom we afterwards found to be a son of Maria, who was a principal person of the tribe, was mounted upon a very fine horse, well groomed, and equipped with a bridle and saddle that would have done credit to a respectable horseman of Buenos Ayres or Monte Video. The young man wore heavy brass spurs, like those of the Guachos of Buenos Ayres. The juvenile and feminine appearance of this youth made us think he was Maria's daughter, nor was it until a subsequent visit that our mistake was discovered. The absence of whiskers and beard gives all the younger men a very effeminate look, and many cannot be distinguished, in appearance, from the women, but by the mode in which they wrap their mantles around them, and by their hair, which is turned up and confined by a fillet of worsted yarn. The women cross their mantle over the breast like a shawl, and fasten it together with two iron pins or skewers, round which are twisted strings of beads and other ornaments. They also wear their hair divided, and gathered into long tresses or tails, which hang one before each ear; and those who have short hair, wear false tails made of horse-hair. Under

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their mantle the women wear a sort of petticoat, and the men a triangular piece of hide instead of breeches. Both sexes sit astride, but the women upon a heap of skins and mantles, when riding. The saddles and stirrups used by the men are similar to those of Buenos Ayres. The bits, also, are generally of steel; but those who cannot procure steel bits have a sort of snaffle, of wood, which must, of course, be frequently renewed. Both sexes wear boots, made of the skins of horses' hind legs, of which the parts about the hock joints serve for the heels. For spurs, they use pieces of wood, pointed with iron, projecting backwards two or three inches on each side of the heel, connected behind by a broad strap of hide, and fastened under the foot and over the instep by another strap.

The only weapons which we observed with these people were the 'bolas,' or balls, precisely similar to those used by the Pampas Indians; but they are fitter for hunting than for offence or defence. Some are furnished with three balls, but in general there are only two. These balls are made of small bags or purses of hide, moistened, filled with iron pyrites, or some other heavy substance, and then dried. They are about the size of a hen's egg, and attached to the extremities of a thong, three or four yards in length. To use them, one ball is held in the hand, and the other swung several times around the head until both are thrown at the object, which they rarely miss. They wind round it violently, and if it be an animal, throw it down. The bolas, with three balls, similarly connected together, are thrown in the same manner.

As more time could not be spared we went on board, reminding the natives, on leaving them, of their promise to bring us some guanaco meat. Aided by the tide, the ships worked to windward through the Second Narrow, and reached an anchorage out of the strength of tide, but in an exposed situation. The wind having been very strong and against the tide, the ship had much motion, which made our Patagonian passengers very sick, and heartily sorry for trusting themselves afloat. One of them, with tears in his eyes, begged to be landed, but was soon convinced of the difficulty of compliance,

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and satisfied with our promise of sending him ashore on the morrow.

After we anchored, the wind increased to a gale, in which the ship pitched so violently as to injure our windlass. Its construction was bad originally, and the violent jerks received in Possession Bay had done it much damage. While veering cable, the support at one end gave way, and the axle of the barrel was forced out of the socket, by which some of the pawls were injured. Fortunately, dangerous consequences were prevented, and a temporary repair was soon applied.

The Beagle, by her better sailing, had reached a more advanced situation, close to the N.E. end of Elizabeth Island, but had anchored disadvantageously in deep water, and in the strength of the tide. Next morning we made an attempt to pass round Elizabeth Island, but found the breeze so strong that we were forced to return, and were fortunate enough to find good anchorage northward of the island, out of the tide.

The Patagonians, during the day, showed much uneasiness at being kept on board so much longer than they expected; but as they seemed to understand the cause of their detention, and as their sickness ceased when we reached smooth water, they gradually recovered their good-humour, and became very communicative. As well as we could understand their pronunciation, their names were 'Coigh,' 'Coichi,' and 'Aighen.' The country behind Cape Negro they called 'Chilpéyo;' the land of Tierra del Fuego, 'Oschērri;' Elizabeth Island, 'Tŭrrĕtterr;' the island of Santa Magdalena, 'Shrēe-ket-tup;' and Cape Negro, 'Oērkrĕckur.' The Indians of Tierra del Fuego, with whom they are not on friendly terms, are designated by them 'Săpāllĭŏs.' This name was applied to them in a contemptuous tone.

Aighen's features were remarkably different from those of his companions. Instead of a flat nose, his was aquiline and prominent, and his countenance was full of expression. He proved to be good-tempered, and easily pleased; and whenever a shade of melancholy began to appear, our assurance of

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landing him on the morrow restored his good-humour, which was shown by singing and laughing.

The dimensions of Coichi's head were as follows :—

From the top of the fore part of the head to the eyes			4 inches.
Do	do	to the tip of the nose	6
Do	do	to the mouth	7
Do	do	to the chin	9
Width of the head across the temples			7½
Breadth of the shoulders			18½

The head was long and flat, at the top; the forehead broad and high, but covered with hair to within an inch and a half of the eyebrow, which had scarcely any hair. The eyes were small, the nose was short, the mouth wide, and the lips thick. Neck short, and shoulders very broad. The arms were short, and wanting in muscle, as were also the thighs and legs. The body was long and large, and the breast broad and expanded. His height was nearly six feet.

The next day we rounded Elizabeth Island, and reached Cape Negro, where we landed the Indians, after making them several useful presents, and sending some trifles by Aighen to Maria, who, with her tribe, had lighted large fires about the country behind Peckett's Harbour, to invite us to land. Our passengers frequently pointed to them, telling us that they were made by Maria, who had brought plenty of guanaco meat for us.

Our anxiety to reach Port Famine prevented delay, and, as soon as the boat returned, we proceeded along the coast towards Freshwater Bay, which we reached early enough in the afternoon to admit of a short visit to the shore.

From Cape Negro the country assumed a very different character. Instead of a low coast and open treeless shore, we saw steep hills, covered with lofty trees, and thick underwood. The distant mountains of Tierra del Fuego, covered with snow, were visible to the southward, some at a distance of sixty or seventy miles.

We had now passed all the difficulties of the entrance, and had reached a quiet and secure anchorage.

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The following day was calm, and so warm, that we thought if Wallis and Cordova were correct in describing the weather they met with, Duclos Guyot was equally entitled to credit; and we began to hope we had anticipated worse weather than we should experience. But this was an unusually fine day, and many weeks elapsed, afterwards, without its equal. The temperature of the air, in the shade on the beach, was 67½°, on the sand 87½°; and that of the water 55°. Other observations were made, as well as a plan of the bay, of which there is a description in the Sailing Directions.

Here we first noticed the character of the vegetation in the Strait, as so different from that of Cape Gregory and other parts of the Patagonian coast, which is mainly attributable to the change of soil; the northern part being a very poor clay, whilst here a schistose sub-soil is covered by a mixture of alluvium, deposited by mountain streams; and decomposed vegetable matter, which, from the thickness of the forests, is in great quantity.

Two specimens of beech (*Fagus betuloides* and *antarctica*), the former an evergreen,—and the winter's bark (*Wintera aromatica*), are the only trees of large size that we found here; but the underwood is very thick, and composed of a great variety of plants, of which *Arbutus rigida*, two or three species of *Berberis*, and a wild currant (*Ribes antarctica*, Bankes and Solander MSS.), at this time in flower, and forming long clustering bunches of young fruit, were the most remarkable. The berberis produces a berry of acidulous taste, that promised to be useful to us. A species of wild celery, also, which grows abundantly near the sea-shore, was valuable as an antiscorbutic. The trees in the immediate vicinity of the shore are small, but the beach was strewed with trunks of large trees, which seemed to have been drifted there by gales and high tides. A river falls into the bay, by a very narrow channel, near its south end; but it is small, and so blocked up by trees as not to be navigable even for the smallest boat: indeed, it is merely a mountain torrent, varying in size according to the state of the weather.

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Tracks of foxes were numerous about the beach, and the footsteps of a large quadruped, probably a puma, were observed. Some teal and wild ducks were shot; and several geese were seen, but, being very wary, they escaped.

Upon Point St. Mary we noticed, for the first time, three or four huts or wigwams made by the Fuegian Indians, which had been deserted. They were not old, and merely required a slight covering of branches or skins to make them habitable. These wigwams are thus constucted: long slender branches, pointed at the end, are stuck into the ground in a circular or oval figure; their extremities are bent over, so as to form a rounded roof, and secured with ligatures of rush; leaving two apertures, one towards the sea, and the other towards the woods. The fire is made in the middle, and half fills the hut with smoke. There were no Indians in the bay when we arrived, but, on the following evening, Lieutenant Sholl, in walking towards the south end of the bay, suddenly found himself close to a party which had just arrived in two canoes from the southward. Approaching them, he found there were nine individuals—three men, and the remainder women and children. One of the women was very old, and so infirm as to require to be lifted out of the canoe and carried to the fire. They seemed to have no weapons of any consequence; but, from our subsequent knowledge of their habits, and disposition, the probability is they had spears, bows, and arrows concealed close at hand. The only implement found amongst them was a sort of hatchet or knife, made of a crooked piece of wood, with part of an iron hoop tied to the end. The men were very slightly clothed, having only the back protected by a seal's skin; but the females wore large guanaco mantles, like those of the Patagonian Indians, whom our pilot told us they occasionally met for the purpose of barter. Some of the party were devouring seal's flesh, and drinking the oil extracted from its blubber, which they carried in bladders. The meat they were eating was probably part of a sea lion (*Phoca jubata*); for Mr. Sholl found amongst them a portion of the neck of one of those animals, which is

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remarkable for the long hair, "like a lion's mane," growing upon it. They appeared to be a most miserable, squalid race, very inferior, in every respect, to the Patagonians. They did not evince the least uneasiness at Mr. Sholl's presence, or at our ships being close to them; neither did they interfere with him, but remained squatting round their fire while he staid near. This seeming indifference, and total want of curiosity, gave us no favourable opinion of their character as intellectual beings; indeed, they appeared to be very little removed from brutes; but our subsequent knowledge of them has convinced us that they are not usually deficient in intellect. This party was perhaps stupified by the unusual size of our ships, for the vessels which frequent this Strait are seldom one hundred tons in burthen.

We proceeded next morning at an early hour. The Indians were already paddling across the bay in a northerly direction. Upon coming abreast of them, a thick smoke was perceived to rise suddenly from their canoes; they had probably fed the fire, which they always carry in the middle of their canoe, with green boughs and leaves, for the purpose of attracting our attention, and inviting us to communicate with them.

It was remarked that the country begins to be covered with trees at Cape Negro; but they are stunted, compared with those at Freshwater Bay. Near this place, also, the country assumes a more verdant aspect, becoming also higher, and more varied in appearance. In the neighbourhood of Rocky Point some conspicuous portions of land were noticed, which, from the regularity of their shape, and the quantity as well as size of the trees growing at the edges, bore the appearance of having been once cleared ground; and our pilot Robinson (possessing a most inventive imagination) informed us that they were fields, formerly cleared and cultivated by the Spaniards, and that ruins of buildings had been lately discovered near them. For some time his story obtained credit, but it proved to be altogether void of foundation. These apparently cleared tracts were afterwards found to be occasioned by unusual poverty of soil, and by being overrun with thick

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spongy moss, the vivid green colour of which produces, from a distance, an appearance of most luxuriant pasture land. Sir John Narborough noticed, and thus describes them: "The wood shows in many places as if there were plantations: for there were several clear places in the woods, and grass growing like fenced fields in England, the woods being so even by the sides of it."*

The wind, after leaving Freshwater Bay, increased, with strong squalls from the S.W., at times blowing so hard as to lay the ship almost on her broadside. It was, however, so much in our favour, that we reached the entrance of Port Famine early, and after some little detention from baffling winds, which always render the approach to that bay somewhat difficult, the ships anchored in the harbour.

* Narborough, p. 67.

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CHAPTER III.

Prepare the Beagle, and our decked boat (the Hope) for surveying the Strait—Beagle sails westward, and the Hope towards the south-east—Sarmiento's voyage—and description of the colony formed by him at Port Famine—Steamer-duck—Large trees—Parroquets—Mount Tarn—Barometrical observations — Geological character — Report of the Hope's cruize.

In almost every account published of the Strait of Magalhaens, so much notice has been taken of Port Famine, that I had long considered it a suitable place for our purposes; and upon examination I found it offered so many advantages, that I did not hesitate to make it our head-quarters. As soon, therefore, as the ship was moored, tents were pitched, our decked-boat was hoisted out and hauled on shore, to be coppered and equipped for the survey;—and Captain Stokes received orders to prepare the Beagle for examining the western part of the Strait; previous to which she required to be partially refitted, and supplied with fuel and water.

For several days after our arrival, we had much rain and strong south-westerly wind, with thick clouds, which concealed the high land to the southward; allowing us only now and then a partial glimpse. One evening (11th) the air was unusually clear, and many of the mountains in that direction were distinctly defined. We had assembled to take leave of our friends in the Beagle, and were watching the gradual appearance of snow-capped mountains which had previously been concealed, when, bursting upon our view, as if by magic, a lofty mountain appeared towering among them; whose snowy mantle, strongly contrasted with the dark and threatening aspect of the sky, much enhanced the grandeur of the scene.

This mountain was the "Snowy Volcano" (*Volcan Nevado*) of Sarmiento, with whose striking appearance that celebrated navigator seems to have been particularly impressed, so minute

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THE MOFE, IN THE STRAIT OF MAGALHAENS.

THE ADELAIDE, IN MUSHING BIRD COVE.

DISTANT VIEW OF MT SARMIENTO.

Published by Henry Colburn, Great Marlborough Street 1838.

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HERE... PERMANEN...

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and excellent is his description. It is also mentioned in the account of Cordova's voyage.* The peculiar shape of its summit as seen from the north would suggest the probability of its being a volcano, but we never observed any indication of its activity. Its volcanic form is perhaps accidental, for, seen from the westward, its summit no longer resembles a crater. From the geological character of the surrounding rocks its formation would seem to be of slate. It is in a range of mountains rising generally two or three thousand feet above the sea; but at the N.E. end of the range are some, at least four thousand feet high. The height of the "Snowy Volcano," or as we have called it, Mount Sarmiento,† was found, by trigonometrical measurement, to be six thousand eight hundred feet‡ above the level

* Ultimo Viage, p. 120.

† From an attentive perusal of the voyage of Magalhaens, I have lately been led to think that this is the mountain which Magalhaens called Roldan's Bell. Sarmiento has, however, assigned that name to a mountain at the back of his Bay of Campana, which will be noticed in it's proper place. The name of Mount Sarmiento was too long, and too well established with us, or I should have restored the name bestowed upon it by Magalhaens. Herrera, in his Descripcion de las Indias Occidentales, cap. xxiii, notices the "Campana de Roldan" as a great mountain in the midst of the entrance of a channel; they gave it this name (Campana de Roldan) because one of Magalhaens's companions, named Roldan, an artillery officer, went to examine it. "Y la Campana de Roldan una Peña grande en medio al principio de un canal: dieron le este nombre porque la fué a reconocer uno de los compañeros de Magallanes llamado Roldan que era artillero."

‡ By angular measurement, with a theodolite, from the tent, the base being by diff. of lat. 297,863 feet, and allowing $\frac{1}{12}$ of the intercepted arc for terrestrial refraction .. 6,864 feet.
By angular measure with sextant (index error, dip, and $\frac{1}{12}$ of the intercepted arc being allowed) the base being 290,074 feet 7,237
By angular measurement, with a theodolite, from Warp Bay, by Lieuts. Skyring and Graves 6,800

Mean..... 6,967 feet,

but as the last observation, from the angle of elevation being greater, was more likely to be correct, 6,800 feet is considered to be its elevation.

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of the sea. It is the highest land that I have seen in Tierra del Fuego; and to us, indeed, it was an object of considerable interest, because its appearance and disappearance were seldom failing weather guides. In our Meteorological Diary, a column was ruled for the insertion of its appearances.*

This clear state of the atmosphere was followed by a heavy fall of rain, with northerly and easterly winds, which did not, however, last long.

In the vicinity of our tents erected on the low land, on the S.W. side of the bay, were several ponds of water, perfectly fit for immediate use; but, perhaps, too much impregnated with vegetable matter to keep good for any length of time. Captain Stokes, therefore, filled his tanks from the river; but as that water did not keep well, it was probably taken into the boat too near the sea. This, however, was unavoidable, except by risking the boats among a great number of sunken trees in the bed of the river.

The Beagle sailed on the 15th, to survey the western entrance of the Strait, with orders to return to Port Famine by the end of March.

Our decked boat, the Hope, being ready, the command of her was given to Mr. Wickham, who was in every way qualified for the trust. We were, however, much mortified by finding that she leaked so considerably as to oblige us to unload, and again haul her on shore. When ready for sea, she sailed under the direction of my assistant-surveyor, Mr. Graves, to examine the St. Sebastian channel and the deep opening to the S.E. of Cape Valentyn. Her crew consisted of seven men, besides Mr. Wickham, and Mr. Rowlett, the purser.

Having despatched the Beagle and the Hope, I was at leisure to carry on the survey of the coast in the neighbourhood of Port Famine, and to make a plan of the port itself. The

* At a subsequent visit, embracing a period of 190 days, it was only seen on twenty-five, and during seven days only was it constantly visible. On the remaining eighteen, portions only were seen, and those but for a few hours at a time.

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Transit, and Altitude circle, were set up; but from the very unfavourable state of the weather, and the interference of other occupations, I was only enabled to procure a series of zenith distances of the sun, and stars, for the latitude.

Port Famine, a name well known to all who have interested themselves about the Strait of Magalhaens, was selected by Sarmiento as the most convenient place for the site of an establishment formed, at his suggestion, by Philip II. King of Spain.

The voyage of Sir Francis Drake through the Strait into the Pacific, and his successes against the Spanish colonies and trade on the western side of the continent of America, induced the Viceroy of Lima to send an Expedition to pursue the "Corsair," with orders to fight and take him, dead or alive.* This Expedition, commanded by Pedro Sarmiento de Gamboa, who had already been engaged twice with Drake, consisted of two ships, containing in all two hundred armed men, sailors and soldiers; a force which was considered sufficient to ensure the capture.†

The Strait of Magalhaens being the most likely place to meet with Drake, Sarmiento was ordered to proceed through it, and take the opportunity of exploring its coasts.

All this he performed in a manner highly creditable, as well for the excellent description handed down in his unpretending journal, as for the enterprising zeal, and steady perseverance, shown among difficulties of no trifling nature. To his accounts of various places there will be frequent occasion to refer. Our object, at present, is to give a short account of the Colony.

Sarmiento sailed from Peru (1583), and entered the Strait from the Pacific. After experiencing many serious difficulties, and escaping imminent dangers, in the western part of the Strait, where the climate is so rigorous and the country so desolate, it was not surprising that he should become enraptured with the verdant, and picturesque appearance of the shores to the eastward of Cape Froward, and with the open country in

* Sarmiento's Voyage, p. 25. † Id. l. c.

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the neighbourhood, and to the northward of Cape Virgins.* After much opposition from the Duke of Alva† and other powerful people, he succeeded in convincing the King of the expediency of fortifying the shores of the First Narrow, and forming several establishments within the Strait, to prevent the passage of strange ships, to the prejudice of the King's colonies in Chile and Peru; for at that time the passage round Cape Horn was not known. Accordingly, an Expedition was prepared, consisting of twenty-three vessels, under the joint command of Diego Florez de Valdez and Sarmiento; the former being appointed Captain-general of the fleet, and of the coast of Brazil; and the latter, Captain-general of the Strait of Magalhaens, and Governor of all the Establishments that should be formed within it.

Of the twenty-three ships which sailed from Spain, five only reached the entrance of the Strait; and these, after experiencing many difficulties from bad weather and foul winds, returned to Rio de Janeiro to refit, where Sarmiento met four vessels which had been sent from Spain to his succour. His colleague and General in chief, Florez, who had deserted the Expedition, did all in his power to impede Sarmiento, to the latest moment of his stay at the Brazils. At last, however, five ships, commanded by Ribera, and manned by five hundred and thirty men,‡ sailed; and, without encountering further loss or detention, arrived off the Strait in December (1584), and soon after reached an anchorage, between the First and Second Narrows.

Ribera would go no further; but landed about three hundred men, under Sarmiento. A city was marked out, and named Jesus,§ in a valley well provided with water. The

* See Burney, ii. p. 45, for a fuller account; also id. 71.

† Who made a remark on the occasion, which became proverbial, "that if a ship carried out only anchors and cables, sufficient for her security against the storms in that part of the world, she would go well laden." Burney Coll. vol. ii. 45.

‡ Burney, ii. 51.

§ The situation of "Jesus" must have been about half-way between the First and Second Narrow, near the point named in the chart N. S. de Valle,

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ships were blown away to sea, leaving the colonists very destitute; fortunately, however, they were enabled to return, but were four times, afterwards, obliged to put to sea, from stress of weather. On the last return, one of the ships, La Trinidad, was run on shore. The ardour of Ribera being damped by repeated misfortunes, he returned to Spain, without the knowledge or consent of Sarmiento, leaving, for the use of the colony, only one ship, the Maria.

While unloading the Trinidad, the Spaniards were attacked by Indians, whom they dispersed.

Sarmiento, after making the necessary arrangements at Jesus, set out by land with one hundred men, to go to Point St. Anna,* the ship Maria being ordered to follow. On the journey, the sufferings of the party were very great, as well from the fatiguing nature of the march, as from their being harassed by the natives, with whom they had an engagement, in which one was killed, and ten men were wounded. A mutiny among his people then broke out, which was quelled by assistance from the ship. At last they reached their destination, and founded, with the usual solemnities, the city of King Philip (or San Felipe).

At the latter end of March, while preparing habitations, the winter set in so suddenly, that for fifteen days it did not cease to snow. Sarmiento, then, after quelling a mutiny which had broken out afresh among the soldiers, embarked with thirty men to visit the first encampment at Jesus, and to superintend the erection of forts in the Narrow; but upon reaching the anchorage, a gale of wind forced him to sea, and, lasting twenty days, obliged him (with his people blinded and frost-bitten) to bear up for Rio de Janeiro.

Here his ship was stranded; upon which he chartered a vessel to convey flour to the Strait, and went himself to Pernambuco, to procure large boats for carrying supplies to his

Valle, where some peaked elevations, dividing vallies near the coast line, are conspicuous. The Beagle anchored there, and found plenty of fresh water.

* Close to Port Famine.

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colony, and assisting in the recovery of his stranded ship; she had, however, drifted off, and sunk near Bahia; and all his boats were destroyed. Still Sarmiento persevered in his zealous efforts to succour his friends in the Strait; and succeeded in procuring a vessel of fifty or sixty tons, which, loaded with arms and whatever he considered useful, sailed, and reached Rio de Janeiro a month after the departure of the first vessel (January 1585). He followed, but in the latitude of 39° met with a furious gale, which drove him back to Rio de Janeiro, where the vessel that had preceded him had returned in distress.

Disappointed in his attempts to carry succour to the colony, he determined to go to Spain; but on his voyage thither, to complete the catalogue of his misfortunes, his ship was captured by three English vessels, and taken to England, after which the ill-fated colony in the Strait was neglected, if not entirely forgotten.

Two months after Sarmiento's departure from the Strait of Magalhaens, in the month of August, the middle of the winter of that region, the party belonging to the first establishment at Jesus set off by land, and joined that at San Felipe, with the unwelcome tidings of their deserted state. But as the provisions at San Felipe were insufficient to support all the people, Andres de Viedma, who, after Sarmiento's departure, had assumed the command, detached two hundred soldiers, under the command of Juan Iniguez, back to Jesus, for the purpose of communicating with any ship that might make her appearance, and awaiting the expected return of Sarmiento; but the winter and following summer passed by without any relief.

In this unhappy state, the colonists were obliged to think only of providing for their safety, and built two boats; in which fifty people embarked, besides Viedma, Suarez, a Franciscan friar named Antonio, and five Spanish women. They had not proceeded farther than Point Santa Brigida,*

* From Sarmiento's description of the coast, Point Santa Brigida is the outward point of Nassau Island.(*a*) See Sarmiento's Voyage, p. 220.

(*a*) By Nassau Island is meant the land forming the south shore of the Second Narrow.—R. F.

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when one of the boats struck upon a reef, and was lost, but the people were saved. The loss of this boat caused them to give up every hope of saving themselves in that way; and Viedma, with Suarez, the friar, and twenty soldiers, returned in the remaining boat to San Felipe, leaving the rest of the party, consisting of thirty men and five women, to support themselves through the approaching winter as they could. After that season had passed, Viedma sent to collect the wanderers; but fifteen men, and three women only, could be found; the rest having died of hunger and disease. The survivors then determined upon going to the first establishment at Jesus; on their way to which they passed by the skeletons of the two hundred who had been first detached. Travelling onwards, they observed three ships entering the strait, which anchored at a distance to the southward.

During the night, Viedma and his companions kept up large fires, supposing that the ships belonged to their own nation. Next morning a boat was despatched from them; and three of Viedma's party obtained permission to go and reconnoitre her. Having approached near enough, a signal was made; upon which, the people in the boat pulled towards the beach, and said they were from England, bound to Peru, and that if the Spaniards wanted a passage, they had better embark. After some hesitation, arising from the fear of trusting themselves in the power of heretics, they consented; and one was permitted to get in, but the other two were left on the beach. In the boat was the enterprizing Cavendish* himself, who, on hearing the particulars of their story, sent the other two soldiers to Viedma, offering to take him and the residue of his people on board. Cavendish returned to his ship; but, without further delay, sailed on to the Isla dos Patos (Santa Magdalena Island), where he leisurely salted down six casks of penguins; and then proceeded to San Felipe, for wood and water; he remained there four days (during which time he destroyed the houses of the Spaniards, and embarked six guns); and thence continued his voyage. The person saved

* Formerly spelled 'Candish.'

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by Cavendish, whose name was Tomé Hernandez, afterwards escaped from him at Quintero, near Valparaiso; and, proceeding to Peru, gave an account of the fate of this cruelly neglected colony.

This was the first, and perhaps will be the last, attempt made to occupy a country, offering no encouragement for a human being; a region, where the soil is swampy, cold, and unfit for cultivation, and whose climate is thoroughly cheerless.

The name, San Felipe, ceased with the colony; for Cavendish called it Port Famine, in allusion to the fate of the colonists, all of whom, except the man he took away, and one saved two years afterwards (in 1589), by Andrew Mericke,* perished from hunger and its attendant diseases; and by this appellation the bay has since been universally known. To commemorate the ill-fated town, a very thickly-wooded mountain at the bottom of the bay, which forms a conspicuous and picturesque object, has been named by us Mount San Felipe.

At this port, Sarmiento, on his first voyage through the Strait, communicated with a large party of Indians, in consequence of which he called it Bahia de la Gente; and the river, which now bears the name of Sedger, he named San Juan. Of this river Sarmiento took formal possession, as well as of the whole Strait, for the 'Mui Poderoso y mui Católico Señor Phelipe Segundo,' &c. &c. It was also here that, in consequence of the miraculous preservation of his vessel on many

* "Near to Port Famine they took on board a Spaniard, who was the only one then remaining alive of the garrison left in the Strait by Sarmiento. The account given by this man, as reported by Magoths, is, that he had lived in those parts six years, and was one of the four hundred men sent thither by the King of Spain in the year 1582, to fortify and inhabit there, to hinder the passage of all strangers that way into the South Sea. But that town (San Felipe) and the other Spanish colony being destroyed by famine, he said he had lived in a house, by himself, a long time, and relieved himself with his caliver(*b*) until our coming thither." Burney, ii. p. 96. This man died on the voyage to Europe Id. p. 97.

(*b*) A kind of gun —R. F.

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occasions, he attempted to change the name of the strait to Estrecho de la Madre de Dios; but it had been too long called Magalhaens, for even the influence of Sarmiento, backed by the power of Philip, to persuade the world to countenance so great an injustice.

> " Magallanes, Señor, fué el primer hombre
> Que abriendo este camino le dió nombre."
>
> Ercilla Araucana, Cant. I. oct. 8.

During an excursion with Mr. Tarn to Eagle Bay,* beyond Cape San Isidro, we found many wigwams. They were then novelties to us, and we were ignorant of their being such certain indications of very sheltered places, as subsequent experience has shown them to be. We often used them, after they had been well cleaned out: a boat's sail, thrown over the hemispherical roof, was a sufficient protection from rain;—and from wind they are always well defended by their situation. Here we saw, for the first time, that most remarkable bird the Steamer-duck. Before steam-boats were in general use, this bird was denominated, from its swiftness in skimming over the surface of the water, the 'race-horse,' a name which occurs frequently in Cook's, Byron's, and other voyages. It is a gigantic duck, the largest I have met with. It has the lobated hind-toe, legs placed far backwards, and other characteristics of the oceanic ducks.† The principal peculiarity of this bird is, the shortness and remarkably small size of the wings, which, not having sufficient power to raise the body, serve only to propel it along, rather than through the water, and are used like the paddles of a steam-vessel. Aided by these and its strong, broad-webbed feet, it moves with astonishing velocity.

* So named by Bougainville.

† It belongs to the group which M. Temminck has lately named *Hylobates*, without attending to the name long since conferred upon it by Dr. Fleming. I designated it *Oidemia Patachonica*, from its large dimensions, in my communication upon the Ornithology of the Straits. Zoological Journal, vol. iv. p. 100. On my return to England, I found that M. de Freycinet had figured this bird, in the account of his last voyage in l'Uranie, where it is described by Messrs. Quoy and Gaimard under the name of *Micropterus brachypterus*.

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It would not be an exaggeration to state its speed at from twelve to fifteen miles an hour. The peculiar form of the wing, and the short rigid feathers which cover it, together with the power this bird possesses of remaining a considerable length of time under water, constitute it a striking link between the genera *Anas* and *Aptenodytes*. It has been noticed by many former navigators. The largest we found measured forty inches, from the extremity of the bill, to that of the tail, and weighed thirteen pounds; but Captain Cook mentions, in his second voyage, that the weight of one was twenty-nine pounds.* It is very difficult to kill them, on account of their wariness and thick coat of feathers, which is impenetrable by any thing smaller than swan shot. The flavour of their flesh is so strong and fishy, that at first we killed them solely for specimens. Five or six months, however, on salt provisions, taught many to think such food palatable, and the seamen never lost an opportunity of eating them. I have preferred these ducks to salt-beef, but more as a preventive against scurvy, than from liking their taste.

I am averse to altering names, particularly in natural history, without very good reason, but in this case I do think the name of 'steamer' much more appropriate, and descriptive of the swift paddling motion of these birds, than that of 'race-horse.' I believe, too, the name of 'steamer' is now generally given to it by those who have visited these regions.

Many shells† were taken from the bottom by means of a fizgig which Mr. Tarn found in one of the wigwams: it was a

* Cook's Second Voyage, 4to. p. 570.

† On the shores of Eagle Bay we procured a large collection of shells, among which were *Margarita violacea* (Nob. in Zool. Journ. v. 346, No. 53), a beautiful *Modiola* (*M. trapesina*, Lam.ᵏ), a new *Pecten* (P. vitreus Nob. in Zool. Jour. v. 337, No. 17), and a delicate transparent-shelled *Patella*, answering the description of *P. cymbularia*. These four species were found attached to floating leaves of the kelp (*Fucus giganteus*), and afford food to the steamer-duck. We also collected good specimens of *Murex Magellanicus*, Lam.ᵏ, of *Fissurella picta*, Lam.ᵏ, and a great number of the common patella of the Strait, which forms a considerable article of food for the Natives.

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rough pole, eight or ten feet long, split crosswise at one end, and opened so as to form four prongs, kept apart by two small pieces of wood. Although rudely made, it was excellently adapted for a shell-gatherer, and is used by the Indians for collecting sea-eggs, which are found in the Strait of very large size, and are doubtless, to them, a great delicacy.

During our excursion we ascertained the best place to ascend the snowy mountain, since named 'Tarn;' and the surgeon, whose name it bears, set off with a party of officers to make the attempt, in which he succeeded, and obtained such an extensive view as induced me to decide upon ascending it, a few days afterwards, to procure bearings from the summit, and for the purpose of measuring its height with a barometer.

In the meantime I visited the Sedger river (Sarmiento's 'Rio de San Juan de Posesion'), and found some difficulty in entering it, because of several banks which are dry at low water. Between them, however, the stream keeps a small channel open, by which we effected our purpose. Every gale of wind causes the banks to shift, and between the times of our first, and last, visit to Port Famine, the river's mouth underwent many changes. The bed of the river is so full of fallen trees, that we could not go, with the boat, more than three miles and a half above the entrance; there it was about fifteen yards wide, bounded on each side by thickly wooded banks, of moderate height. The trees on these banks are large, chiefly the two species of Beech before-mentioned, and Winter's-bark; there are besides many shrubs, and an impenetrable underwood of Arbutus, Berberis, and currant bushes. The largest Beech-tree that we saw could not have been more than thirty or forty inches in diameter, which was insignificant compared with those noticed by Commodore Byron. In describing his excursion up this river, he mentions "trees that would supply the British navy with the best masts in the world."* "Some of them are of a great height, and more than eight feet in diameter, which is proportionably more than eight yards in circum-

* Byron's Voyage round the World, 4to. p. 38.

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ference."* The Commodore may have been pleased by the appearance of these trees, but must have fancied their quality and dimensions such as he describes. The largest are generally rotten at the heart, and all are more or less defective. Their wood is heavy, and far too brittle for masts: we could not use it even for boat-hook staves. It makes, however, tolerable plank for boat-building, and, when seasoned, might be used in ships. For common purposes, such as houses, or fences, it is very serviceable.

We wandered about to examine the country; but, excepting the track of some quadruped, whose foot was small and cloven, rather like a pig's, we saw nothing new. The traces of foxes were numerous every where. We found no fish of any description in the river. Geese and wild ducks were numerous, whose young were at this time scarcely fledged, and an easy prey. We also observed here, for the first time, the parroquet, which Bougainville described to be common in the Strait. He carried specimens home with him; but some naturalists of those days decided that there must have been a mistake, because, as they averred, parroquets did not exist in so high a latitude. Bougainville, however, made no mistake, for the species† is very abundant in the neighbourhood of Port Famine, and has been seen by us in all parts of the Strait. It feeds principally upon the seeds of the Winter's-bark. The existence of this bird in Tierra del Fuego is also mentioned by Cook and Narborough.*

* I. c.

† *Psittacus smaragdinus*, Gmel. I have no doubt that the bird we saw is the same as Bougainville procured, and from which a description has been given in the Ency. Méth., art. Ornith. 139; although a material error is made, for they are not *splendidé viridis*, nor is the *uropygium* red; in other points, however, the description is correct. See Buffon's Hist. Nat. des Oiseaux, vi. 262. Pl. enl. n. 85, Perruche des Terres Magellaniques.

* Bougainville says, "we have likewise perceived some perrokeets: the latter are not afraid of the cold." To which the English translator, T. R. Forster, who is incredulous of the correctness of Bougainville's assertion, appends the following note: "Perruches, probably sea-parrots, or

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All accounts of Port Famine informed us of its abounding in fish, but as yet we had taken none excepting with hook and line, although the seine had been frequently shot. At last, however, in the first week of February, we had a successful haul of mullet and smelts, many of the former weighing eight pounds, and the latter measuring fifteen inches in length. After this we were often very fortunate, and on one occasion caught, at one haul of the seine, sixteen hundred-weight of smelts, some weighing two pounds, and measuring twenty inches in length. A few days previously we had a draught of mullet, which served the crews of both Adventure and Beagle for three days. Geese, wild ducks and teal, snipe, and now and then woodcocks, were to be found by taking a short walk; there were, however, no quadrupeds fit for food which we could take. Foxes and wild cats were occasionally seen, and a foot-mark of some large animal of the feline race, probably a puma, was once observed upon the beach. We found many traces of horses, which showed that the Patagonian Indians sometimes come thus far south. Had we been so fortunate as to meet them here, we might have procured, perhaps, a regular supply of guanaco meat.

On the 9th of February, as the weather seemed favourable for ascending Mount Tarn,* Lieutenant Cooke, the Surgeon, and Anderson, the botanical collector, set off in advance to select a convenient place for passing the night, carrying with them a tent and provisions. I followed later in the day, and, while the boat's crew were arranging their loads, made some observations with a barometer on the beach.

Our way led through thick underwood, and then, with a gradual ascent, among fallen trees, covered with so thick a coating of moss, that at every step we sunk up to the knees

or auks." Buffon also doubted the fact, and the author of Histoire Naturelle, art. Oiseaux, tom. ii. p. 322, suggests the possibility of a specimen having been obtained in some other part of the world, and put, by mistake, amongst those collected in the Strait.

* So named because Mr. Tarn, the surgeon of the Adventure, was the first person who reached its summit.

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before firm footing could be found. It was very laborious work, and the ground being saturated, and each tree dripping with moisture, we were soon wet through. We proceeded along the same sort of road up a steep ascent; some one of the party constantly falling into deep holes covered by moss, or stumbling over fallen trunks of trees. As I carried a barometer I was obliged to proceed with caution, and succeeded in emerging from this jungle without accident. After about three quarters of an hour spent in this way, we reached an open space, where we rested, and I set up the barometer. Here we found a cypress of very stunted growth.

Our road hence was rather more varied: always steep, but sometimes free from impediment. Here and there we observed the boggy soil was faced with a small plant (*Chamitis sp.*) of a harsh character, growing so thick and close as to form large tufts, over which we walked as on hard ground. We struggled through several thickets of stunted beech-trees, with a thick jungle of Berberis underneath, whose strong and sharp thorns penetrated our clothes at every step; and began to find the fatigue very oppressive: some of my boat's crew suffered much, being unused to such exercise. At last we approached the place where Mr. Cooke and his party had established themselves, and upon hailing, were invigorated by a cheer in reply. We reached the bivouac in a very way-worn condition, and found, to our great comfort, the tent pitched, and a good fire burning.*

The ground was so exceedingly wet, that although we slept upon branches, forming a layer at least a foot thick, we found ourselves, in the night, lying as if in a morass, and suffering from cold, even with a large fire blazing at our feet. At day-light next morning, just as we were starting, a boat was seen sailing round Cape San Isidro, which, by the aid of a telescope, I made out to be the Hope.

We resumed the ascent, and passed over, rather than through, thickets of the crumply-leaved beech, which, from

* The height of this place, as shown by the barometer, on the ascent, was 941 feet, and, on the descent, 973 feet.

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their exposure to the prevailing winds, rose no higher than twelve or fourteen inches from the ground, with widely-spreading branches, so closely interwoven, as to form a platform that bore our weight in walking. We next traversed an extent of table-land,* much intersected by ponds of water. Mr. Tarn shot two plovers of a new species (*Charadrius rubecola*, Zool. Jour. vol. iv. p. 96), and a snipe. We then ascended three or four hundred feet, and crossed a deep ravine. The bottom of the ravine was clay-slate in a decomposing state, but the surface of the ground was strewed with pebbles of granite. Another plain, with many ponds, succeeded; the intervening spaces being covered with tufts of chamitis, and studded here and there with small clusters of dwarf beech; but the ground was so hard, and firm, that we proceeded rapidly, without fatigue, until we attained the height of 1,800 feet, when the ascent became very steep. Near the summit lay a large mass of snow, rapidly melting away. We reached the highest pinnacle of the mount at seven o'clock (having left our resting-place at four), and immediately set up the instruments. I was obliged to avail myself of Mr. Tarn's assistance to hold the barometer, whilst two of my boat's crew held the legs of the theodolite-stand, for the wind was blowing very strongly, and the edge of a precipice was close to us, perpendicular for many hundred feet, and thence downwards so steep, that any body going over would fall at least a thousand feet. The theodolite-stand was unavoidably placed within a very few inches of the edge, and I took a round of angles, suffering, however, intense pain from the piercing coldness of the wind, which, heated as we were by the ascent, was much felt, though the temperature was not lower than 39°. I was lightly clothed, and should have fared badly, had not one of the party lent me his Flushing jacket, while he descended under the lee of the mountain-top to make a fire. The barometer stood at 26, 618, the temperature of the air being 40°, and of

* On this table-land the barometer stood at 27,767. Temperature of the air 46°,5, and of the mercury 47°,5, which gave the elevation 1,327 feet.

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the mercury 43°.* Unfortunately the day was very cloudy, and many squalls of sleet and rain, which obscured the hills, passed whilst I was taking bearings. To the N.E., towards the supposed Sebastian Channel, the horizon was too hazy to allow much view. A deep inlet was seen in that direction; but whether the land closed round, or whether a channel was at the bottom, we could not distinguish. A considerable body of water was observed to the southward of Cape St. Valentyn, behind Lomas Bay, but its extent was screened from our view by the intervention of the Lomas hills. It appeared to be a channel, the opposite or eastern side of it being formed by the high ranges previously seen from Point St. Mary. Cordova's Ports San Antonio and Valdez were distinctly made out; but, to the southward, every thing was enveloped in mist.

The bearings and observations, which occupied me nearly two hours, being completed, we all adjourned to a sheltered cleft in the rock close to our station, where we soon recovered the use of our fingers.†

* The result of the barometric observation for the height of Mount Tarn is as follows:

Height by one barometer	ascent 2,567·7 / descent 2,625·4	mean 2,596·5 feet.	
Do. two do.	ascent 2,619·3 / descent 2,596·7	—	2,608·0
			2,602·2

By angular measurement from Observation Cove, Port Famine, with theodolite, allowing $\frac{1}{13}$ of the intercepted arc for terrestrial refraction, the height is 2,850 feet.

Another observation, with the sextant, made it 2,855 feet. The mean 2,852 I consider more correct, from the difficulty of obtaining a correct reading of the barometer on the summit.

† By Daniell's hygrometer, used in this sheltered spot, I found the temperature of the air to be 48°; dew point 41°: but upon exposing the instrument to the wind, the air was 39½°, and the dew point 36°: the difference in the former being 7°; and the latter 3½°; from which the following results are obtained:

	air.	dew pt.	diff.	exp.	dryness.	weight of a cubic foot of air.
In the ravine	48	41	7	292	776	3·323
Exposed to wind	39½	36	3½	248	898	2·871
Difference	8½	5	3½	44	122	0·452

The

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Having accomplished our object, we began the descent. In a comparatively mild and agreeable spot, I again set up the theodolite and barometer, while some of the party employed themselves in fruitless attempts to kindle a fire. The height, by the barometer, proved to be 1,845 feet above the sea; and the bearings from this station were much better than those I had taken from the exposed summit.

We reached our tent at noon, having been absent seven hours. At three we reached the beach, where the barometer stood at 29,312 (air 61.°3,* and mercury 62,°5).

Excepting near the sea, where clay-slate (very similar to that of Point St. Anna, but with an opposite dip) showed itself, the side of the hill is clothed with trees and underwood, and no rock is visible until one arrives at the ravine. Around the summit of Mount Tarn the ground is bare, but so covered with small decomposed fragments, that the solid rock only appears occasionally: it is very hard, and breaks with a conchoidal fracture: some of the specimens which we detached bore indistinct impressions of organic remains. We also found, projecting from the rock in which they were embedded, nodules, or small rounded masses of stone, in an advanced state of decomposition, mouldering away in laminar forms somewhat resembling the inner leaves of a cabbage. Several were brought away carefully, but before we arrived on board they had crumbled to pieces: the nucleus was quite hard, but was surrounded by concentric laminæ, more brittle the nearer they approached to the outer surface. It seemed as if the face of the summit

The above being the difference in the short space of three feet apart; the instrument, in the first case, being just under the lee of the rocky summit of the mountain, and in the last, above it, exposed to the wind.

* The air was so dry this afternoon that I failed to procure a deposit of dew upon Daniell's hygrometer, although the internal temperature was lowered from 61° to 37°. One of Jones's portable hygrometers was also tried, and the temperature was lowered to 31°½ without a deposit; so that, the difference being more than thirty degrees, the expansive force of the air must have been less than 212, the dryness, on the thermometric scale, less than 367, and the weight of vapour, in a cubic foot of air, less than 2,355 grains.

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above-mentioned was covered with the decomposing fragments of these nodules.

The highest parts of the Mount form a ridge extending S. E. and N.W., being a succession of strata of slaty rock, dipping to the eastward, at an angle of 15° or 20° from the horizon. The strata are very narrow, and separated from each other by a vein of quartz, much of which is in a crystallized state. We reached the ship about seven o'clock, and found that the Hope and her party had done well. Her cruize proved interesting, with regard to the geography of the Strait, and a summary of it is subjoined.

Mr. Graves's orders were to survey the Sebastian Channel; but in the event of his seeing any thing more interesting to the S.E., he was allowed to defer that service to another opportunity. The Hope crossed the Strait, and anchored in a small bay, formed between the two projecting points of Cape Valentyn, where some few defects in the vessel were remedied, and a good round of angles obtained from the summit of the Cape, whence there was a fine view. The country was low, undulating, and destitute of trees. From a station about two miles overland, to the eastward, a large body of water was observed to the southward, forming a channel, or deep sound, and it was determined to follow up its examination, rather than risk the crew in the deep bay that was supposed to communicate with the San Sebastian Channel, on board a vessel whose capabilities were unknown. Several fire-places and remains of wigwams were seen; the latter were, however, very different, both in shape and material, from those at Port Famine, for the country being destitute of trees, they were built of driftwood, piled up in a conical form.

Passing round Cape Valentyn, the Hope hauled to the southward, keeping the land on board. At night she anchored in Philip Gidley Cove, at the bottom of Willes Bay, where she was weather-bound until the 29th of January. The shores of Willes Bay are thickly clothed with wood, growing to the water's edge, except at the S.W. side. The great abundance of muscles and limpets attracts the Indians, whose wigwams

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were found standing, and from the green appearance of the branches with which they were formed, seemed to have been lately erected. After leaving Willes Bay, the Hope visited Fox Bay, and Sir Edward Owen's Sound, which, it was thought, would lead into Lomas Bay, opposite to Port Famine; but, after running ten miles up, they got into shoal water, and as there was no current, or stream of tide, they landed, and found that a mile and a half farther on, the sound was terminated by low land. Another day, while proceeding along the south side of Brenton Sound, the smoke of Indians' fires was noticed near the beach. As this was the first time the Natives of this part had been seen, the course was shaped towards them, until the Hope anchored. Three Indians then approached, holding up the skins of some animal, and inviting them to land. The small boat was hoisted out, and Messrs. Wickham and Rowlett, with Robinson the pilot, went on shore. The Fuegians presented a fox skin to each of the party, who in return gave them some trifles. After a short interview the boat left them, and no further communication was held that night. The following morning a canoe came off to the vessel, containing three young men, two women, and three children, the youngest not more than four months old. They were no sooner alongside than the men went on board, and commenced an active traffic with all the valuables they possessed; and for a few buttons, a glass bottle, or an empty preserved-meat canister, many of their goods were bartered. They had several fox-skins with them, but no other kind of peltry, except their clothing, obtained from the seal or guanaco: and though many of them wore a penguin skin suspended from their girdle, some were without even that covering. This canoe was followed by another, containing an old man, sixty or seventy years of age, with a grey beard; an elderly woman, and two children. Before they came alongside they put their dogs on shore.

Although the visit from these Indians did not last very long, they had time enough to pilfer. One of the young men, who was seen going into a canoe, excited, by his manner, a suspi-

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cion of his having stolen something, and a tin pot was found concealed under his mantle. As there was every probability of their soon separating, and Mr. Graves feared that punishment would cause a rupture, he only turned him out of the vessel: the rest soon followed him, and landed. Having made a fire, the men squatted round it; while the women were despatched to collect shell-fish.

As soon as the Natives had finished their meal, they embarked, and proceeded eastward. Next day they again visited the Hope, but in consequence, perhaps, of the occurrence the day before, did not venture alongside, until invited by the words, 'ho-say, ho-say,' which mean, 'come, come.' In a few minutes confidence was restored, and they began to barter. The trade was opened by one of the women making a peace-offering of a shell necklace, in return for which, red caps and medals were given to each of the women and children. The Hope went thence to Soapsuds Cove, where the crew washed their clothes, and replaced a broken spar.

In a S.E. direction from this cove there appeared to be a considerable channel leading to the S.E., and to the southward was a deep sound, towards which they were proceeding the next morning; but having advanced about two miles, the land of Cape Expectation trended suddenly round to the eastward, and a long narrow channel presented itself, which seemed likely to communicate with the Strait, to the southward of Port San Antonio. They proceeded through this channel, which takes a very straight course, and gradually narrows from Port Waterfall, where it is two miles and a half wide, to Passage Cove, where it is scarcely three quarters of a mile; and there they anchored.

Between Port Waterfall and Passage Cove, a party of Natives was seen; but, being probably the same who were met at Indian Cove, no attention was paid to their hallooings and fires of invitation.* The Hope came into the Strait, eastward of an opening then called Magdalen Sound; her passage

* Fires made to attract attention, and invite strangers to land.

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must therefore have been through Sarmiento's 'San Gabriel' Channel.

At night, when between Cape Froward and Port San Antonio, a heavy squall from S.W. carried the little vessel rapidly towards Cape San Isidro, and, at daylight the next morning, she was in the position observed by us, while ascending Mount Tarn.

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CHAPTER IV.

Deer seen — Hope sails again — Eagle Bay — Gabriel Channel — 'Williwaws' — Port Waterfall — Natives — Admiralty Sound — Gabriel Channel — Magdalen Channel — Hope returns to Port Famine — San Antonio — Lomas Bay — Loss of boat — Master and two seamen drowned.

From Mr. Graves's report of the appearance of the channel to the S.E. of Dawson Island, I decided to proceed there as soon as the Hope was ready, for she required some alteration, and repairs.

A deer having been seen on Point St. Anna, Mr. Tarn landed, very early in the morning, eager for the prize, but could only get an ineffectual shot. At another time a few deer were seen by our party, near the river; but instead of returning with the information, they fired their guns, loaded with small shot only, which served but to scare them away. As the animal was new to us, and we had evidence of its being equally new to Science, I was anxious to procure a specimen, but never afterwards had an opportunity. Here Sarmiento saw the only deer which he mentions in his journal.

The morning of the 16th seeming more favourable, I set out in the Hope. The heights were covered with snow which had fallen the preceding night, the thermometer had been at freezing point, and much ice had formed; but the appearance of the weather deceived us: we had scarcely left the ship, when it began to rain, and by the time we reached Cape San Isidro the wind had freshened to a gale, which obliged me to anchor in Eagle Bay.

Having landed, a tent was pitched, and a blazing fire made to dry our clothes. In the evening the gale blew with great

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violence from S.W., and the Hope, at her anchor, sheered about by the squalls, was occasionally laid over so as to dip her gunwale under water.

The following day (17th), although the rain had ceased, the wind was still strong. Towards evening it fell, and early on the 18th we left Eagle Bay with a fresh breeze from E.N.E., and passed close to Port San Antonio; but were then delayed by calms and squalls. At noon a westerly wind sprung up, and we proceeded down the Gabriel Channel, with the wind aft, and the tide in our favour. Port Waterfall sheltered us for the night.

The apparently artificial formation of this channel is very striking. It seems to have been formerly a valley between two ridges of the range, in the direction of the strata (of which there are frequent instances, such as the valley in the Lomas Range, opposite Cape San Isidro, the valley of Valdez Bay, and one immediately to the north of the channel itself, besides many others), and that at some remote period the sea had forced its way through, effecting a communication between the Strait and the waters behind Dawson Island: as if one of those great 'northern waves,' of which we once heard so much, had rolled down the wide reach of the Strait (the parallelism of whose shores is also remarkable) from the north-west, towards Cape Froward; and finding itself opposed by the Lomas Range, had forced a passage through the valley until stopped by the mountains at Fitton Bay. Having imagined such a wave in motion, the reader may fancy it uniting with another northern roller from Cape San Valentyn, attacking the hills and carrying all before it, until Mount Hope, at the bottom of Admiralty Sound, arrested its course. I have already noticed the remarkably straight direction in which this curious channel trends. At both extremities the width may be from two to three miles; but the shores gradually approach each other midway, and the coast on each side rises abruptly to the height of fifteen hundred feet. The south shore, sheltered from the prevailing and strongest winds, is thickly covered with trees and luxuriant underwood, which, being chiefly evergreen, improve

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the scenery greatly, particularly in the winter season: the north shore is also well wooded for about two-thirds up; but the summit is barren and the outline very much serrated, as is usual in slate formations.

On the north shore we noticed some extraordinary effects of the whirlwinds which so frequently occur in Tierra del Fuego. The crews of sealing vessels call them 'williwaws,' or 'hurricane-squalls,' and they are most violent. The south-west gales, which blow upon the coast with extreme fury, are pent up and impeded in passing over the high lands; when, increasing in power, they rush violently over the edges of precipices, expand, as it were, and descending perpendicularly, destroy every thing moveable. The surface of the water, when struck by these gusts, is so agitated, as to be covered with foam, which is taken up by them, and flies before their fury until dispersed in vapour. Ships at anchor under high land are sometimes suddenly thrown over on their beam-ends, and the next moment recover their equilibrium, as if nothing had occurred. Again a squall strikes them, perhaps on the other side, and over they heel before its rage: the cable becomes strained, and checks the ship with a jerk, that causes her to start a-head through the water, until again stopped by the cable, or driven astern by another gust of wind.

At all these anchorages, under high land, there are some parts more exposed than others; and by watching for those places which are least troubled by these squalls, a more secure, or rather a more quiet, spot may be selected. I do not consider ships so anchored to be in danger if their ground tackle be good; but every thing that offers a stiff resistance must suffer from the fury of these blasts. In many parts of this country trees are torn up by the roots, or rent asunder by the wind; and in the Gabriel Channel the 'williwaws' bursting over the mountainous ridge, which forms the south side of the channel, descend, and striking against the base of the opposite shore, rush up the steep, and carry all before them. I know of nothing to which I can better compare the bared track left by one of these squalls than to a bad broad road. After

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having made such an opening, the wind frequently sweeping through prevents the growth of vegetation. Confused masses of up-rooted trees lie at the lower ends of these bared tracks, and show plainly what power has been exerted.

The southern shore of the channel is formed by the base of that range of hills, which extends, from the eastern side of the Magdalen Channel, towards the E.S.E. It is the highest part of Tierra del Fuego, and on it are several remarkable mountains, besides Sarmiento, towering over all.

Close to the east end of the Gabriel Channel is Mount Buckland, a tall obelisk-like hill, terminating in a sharp needle-point, and lifting its head above a chaotic mass of 'reliquiæ diluvianæ,' covered with perpetual snow, by the melting of which an enormous glacier on the leeward, or north-eastern side, has been gradually formed. This icy domain is twelve or fourteen miles long, and extends from near the end of the channel to Port Waterfall, feeding, in the intermediate space, many magnificent cascades, which, for number andheight, are not perhaps to be exceeded in an equal space of any part of the world. Within an extent of nine or ten miles, there are upwards of a hundred and fifty waterfalls, dashing into the channel from a height of fifteen hundred, or two thousand feet. The course of many is concealed, at first, by intervening trees, and, when half-way down the descent, they burst upon the view, leaping, as it were, out of the wood. Some unite as they fall, and together are precipitated into the sea, in a cloud of foam; so varied, indeed, are the forms of these cascades, and so great their contrast with the dark foliage of the trees, which thickly cover the sides of the mountain, that it is impossible adequately to describe the scene. I have met with nothing exceeding the picturesque grandeur of this part of the Strait.

There are several coves on the south shore, but opposite to them there is no shelter until you reach a deep bay in which are several islets; and where, I think, there is a communication with Brenton Sound, but we did not enter it.

Port Waterfall may easily be known by a large flat-topped bare rock, lying across the summit of the eastern head, and

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by a magnificent cascade formed by the union of two torrents.

All the plants of the Strait grow here: a sweet-scented Callixene (*C. marginata*, Lam^k.) filled the air with its odour; and a beautiful flower we had not previously seen, was found by Mr. Graves: it was pendulous, tubular, about two inches long (Class. Hexand. Monog. Cal. 2. Pet. 3. pointed), and of a rich carnation colour.

The trees are small and stunted; they are of the usual species, Beech and Winter's-bark. Here we first noticed a large fern,* having a stem two or three feet long, and five or six inches in diameter, very similar to the Zamia of New Holland. We saw very few birds, and no quadrupeds. Among the former was a king-fisher, which at the time was new to us; but it is distributed over a large tract of South America, and I have since seen a specimen said to have been shot at Rio de Janeiro.

Fitton Harbour is a deep inlet, surrounded on all sides by precipitous land, rising to the height of three, or four thousand feet, and terminated by peaks, of most fantastic shape, covered with ice and snow.

Between Fitton Harbour and Cape Rowlett are high mountains, two of which, more conspicuous than the rest, we called 'Mount Sherrard,' and 'Curious Peak.'

Card Point proved to be clay-slate, and I think the projection of Cape Rowlett, and the mountains, are also of this rock.

While crossing over towards Cape Rowlett, (the south head of a deep sound, trending to the S.E., which it was my intention to examine), we were met by three canoes, containing, together, about twenty-four people, and ten or twelve dogs. Mr. Wickham recognised them to be the same party who had visited the Hope on her last cruize; the thief, however, was not amongst them, fearing probably he might be known.

These natives conducted themselves very quietly, and, except one of the women, who wished to keep a tin-pot in which some

* This fern we found at the island of Juan Fernandez also.

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PORT FAMINE.

PORT FAMINE.

CONDOR PEAK, ADMIRALTY SOUND.

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water had been given her, made no attempt to pilfer. One of the party, who seemed more than half an idiot, spit in my face; but as it was not apparently done angrily, and he was reproved by his companions, his uncourteous conduct was forgiven.

If possessed of any furs, they had left them, perhaps concealed, near their wigwams: only a few arrows, a necklace of shells, and a fillet for the head, made of ostrich feathers, were obtained by barter. Their canoes were paddled by the women, occasionally helped by the men. One or two of the former were young, and well-featured, but the rest were hideous; and all were filthy and most disagreeable, from the quantity of seal-oil and blubber, with which they had covered their bodies. After we had obtained, by barter, all the articles they had to dispose of, I presented them with red caps and medals, of which they were very proud: the latter they requested might have a hole drilled through them, that they might be suspended by a string round their necks. Their astonishment was much excited, and they were pleased by hearing a watch tick; but I believe I had very nearly, though unintentionally, given great offence, by cutting off a lock of hair, from the head of one of the men. Assuming a grave look, he very carefully wrapped the hair up, and handed it to a woman in the canoe, who, as carefully, stowed it away in a basket, in which she kept her beads and paint: the man then turned round, requesting me, very seriously, to put away the scissors, and my compliance restored him to good-humour.

The features of these people bore a great resemblance to those of the Patagonian Indians, but in person they were considerably shorter and smaller. The elderly people of both sexes had hideous figures; the children, however, and young men, were well-formed; particularly one of the boys, whom they called 'Yāl-lă-bă,' which, I believe, meant a youth, or a young warrior. The word 'Shērrōo' was used to denote a canoe, or vessel.

They were ill-clothed, with mantles made of guanaco, or otter skins, but not so neatly as those of the Patagonians.

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Their bodies were smeared over with a mixture of earth, charcoal, or red-ocre, and seal-oil; which, combined with the filth of their persons, produced a most offensive smell. Some were partially painted with a white argillaceous earth; others were blackened with charcoal; one of the men was daubed all over with a white pigment. Their hair was bound by a fillet of plaited twine, made perhaps with strips of bark, and a few of them had it turned up; but to none did it appear to be an object of attention, except one of the young women, who repeatedly combed and arranged her's with the well-toothed jaw of a porpoise.

During a remarkably calm night, we were frequently startled by the loud blowing of whales, between us and the shore. We had noticed several of those monsters on the previous day, but had never heard them blow in so still a place.

At dawn, a light air carried us towards some broken land to the S.E. of Cape Rowlett, between the eastern trend of which, and the projecting point of an island, we found a secure and land-locked harbour, with two entrances, one to the north and the other to the south of High Islet. The south side of the port, which I called Port Cooke,* is a narrow strip of land, forming the head of a deep inlet or sound, called† Brook Harbour. It seemed to extend to the base of the high mountainous range, and to be separated only by a narrow isthmus from Fitton Harbour.

We had scarcely been at anchor half an hour when the same party of Fuegians was seen arriving. The men hastened to us in their canoes, as soon as the women had landed, to cover or thatch the wigwams, which they found standing, and to light fires.

We afterwards went ashore, and, sitting down near them, commenced a brisk trade for arrows, skins, necklaces, and other commodities. The furs which covered their backs they parted with, for a few beads, and went quite naked the whole evening.

Among them was a young man, who appeared to be treated

* After the lieutenant of the Adventure.

† At Mr. Tarn's request.

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with some deference by the others; he was one of the best-looking of the party; and there was a good-natured smile on his countenance during our communication, while the rest frequently manifested displeasure, even about trifles. He was, at least, the master of one of the two families; his wigwam contained his wife, and two children, his, or his wife's father, and mother, as well as the idiot, and his wife, who, from her appearance, must have been a Patagonian, or else a woman of unusual size among these people. The old woman was very inquisitive, and the man, in a long speech, described to her all the wonders I had shown him, applying to me, from time to time, to point out to her the articles he was trying to describe.

Their dexterity with the sling is extraordinary; and, I should think, when used as a weapon of offence, it must be very formidable. Upon asking the same man to show us its use, he picked up a pebble, about the size of a pigeon's egg, and placed it in the sling; then intimating that he was going to strike a canoe, he turned his back to the mark, and threw the stone in an opposite direction, against the trunk of a tree, whence it rebounded over his head, and fell close to the canoe.

I have seen them strike a cap, placed upon the stump of a tree, fifty or sixty yards off, with a stone from a sling. In using the bow and arrow, also, with which they kill birds, they are very dexterous. The spear is principally for striking porpoises and seals, but is also used in war; and from the nature of the barb, must be an efficient weapon. For close quarters, they use clubs, stones held in the hand, and short wooden daggers, pointed with very sharp-edged quartz, pitch-stone, or flint.

The next morning, seeing us underweigh, they came alongside and tried to induce us to anchor again. The young man, of whom I have spoken, was very importunate, and at last offered us his wife, as a bribe, who used all her fancied allurements to second his proposal.

So highly did they esteem beads and buttons, that a few of each would have purchased the canoe, the wife, and children,

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their dogs, and all the furniture. Seeing us proceed to the southward, with the apparent intention of sailing down the inlet, they motioned to us to go to the north, repeatedly calling out 'Sherroo, sherroo,' and pointing to the northward; which we thought intimated that there was no passage in the direction we were taking.

At noon, I landed to observe the latitude, and take bearings down the Sound to the S.E., at the bottom of which was a hill, standing by itself, as it were, in mid-channel. The view certainly excited hopes of its being a channel; and as we had begun to calculate upon reaching Nassau Bay in a few days, we named this hill, Mount Hope.

The point on which we landed was at the foot of a high snow-capped hill, called by us Mount Seymour; whence, had not the Indians been near, I should have taken bearings.

We sailed south-eastward, close to the south shore, until the evening; when from the summit of some hills, about three hundred feet above the sea, we had a view down the Sound, which almost convinced us it would prove to be a channel. The rock at this place differed from any we had seen in the Strait. The mountains are high, and evidently of clay-slate; but the point, near which we anchored, is a mass of hard, and very quartzose sand-stone, much resembling the old red sand-stone formation of Europe, and precisely like the rock of Goulburn Island, on the north coast of New Holland.*

The following morning (23d), we proceeded towards Mount Hope, while running down to which some squalls passed over, clouding the south shore, and as we passed Parry Harbour it bore so much the appearance of a channel, that we stood into it; but the clouds clearing away soon exposed the bottom to our view, where there seemed to be two arms or inlets. In the south-eastern arm, the shores were covered with thick ice (like the bottom of Ainsworth Harbour, to the west of Parry Harbour, where an immense glacier slopes down to the water's edge). The south-west arm appeared to be well sheltered, and if it affords a moderate depth of water, would be an excellent harbour.

* King's 'Australia,' vol. i. p. 70; also vol. ii. pp. 573, 582, and 613.

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After satisfying ourselves that there was no channel here, we bore up on our original course; but, before long, found ourselves within two miles of the bottom of the Sound; which is shallow, and appears to receive two rivers. The great quantity of ice water, which mingles here with the sea, changed its colour to so pale a blue, that we thought ourselves in fresh water.

Mount Hope proved to be an isolated mass of hills, lying like the rest N.W. and S.E., having low land to the southward, over which nothing was visible except one hill, thirty or forty miles distant, covered with snow, to which the rays of the sun gave the appearance of a sheet of gold. Finding ourselves embayed, we hastened out of the scrape, and, after beating for some hours, anchored in Parry Harbour.

Our entrance into a little cove in Parry Harbour disturbed a quantity of ducks, steamers, shags, and geese. Their numbers showed that Indians had not lately visited it.

Next day we reached Ainsworth Harbour, which is of the same character as Parry Harbour, and affords perfect security for small vessels: by dint of sweeping, we reached a secure anchorage in a cove at the south-east corner.

The bottom of the port is formed, as I before said, by an immense glacier, from which, during the night, large masses broke off and fell into the sea with a loud crash,* thus explaining the nocturnal noises we had often heard at Port Famine, and which at the time were thought to arise from the eruption of volcanoes. Such were also, probably, the sounds heard by the Spanish officers during their exploration of the Straits, whilst in the port of Santa Monica, where they had taken refuge from a violent gale of wind.†

* At high tide the sea-water undermines, by thawing, large masses of ice, which, when the tide falls, want support, and, consequently, break off, bringing after them huge fragments of the glacier, and falling into the still basin with a noise like thunder.

† "En los dias 24, y 25, oimos un ruido sordo, y de corta duracion, que, por el pronto, nos pareció trueno; pero habiendo reflexîonado, nos inclinamos à creer que fué efecto de alguna explosion subterranea, formado

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The harbour was full of fragments of ice, the succeeding morning, drifting into the Sound, where the sea-water, being at a higher temperature than the air, rapidly melted them.

Since our departure from Port Waterfall, the weather had been mild, clear, and settled; but as it wanted only three days of the change of the moon, at which period, as well as at the full, it always blew a gale, I wished to reach a place of security in the Gabriel Channel or Magdalen Sound.

Near the islands of Ainsworth Harbour, three canoes passed us, steering across the Sound, each with a seal-skin fixed up in the bow for a sail; and we recognised in them the party left at Port Cooke, among whom was the Indian who had been detected in stealing a tin pot. They did not come along-side; but as we went by, pointed to the north, apparently urging us to go in that direction.

We had noticed several wigwams at Parry and Ainsworth Harbours, which shows that they are much frequented by Indians, perhaps on their way to the open low country east of Mount Hope, where numerous herds of guanacoes may be found.

Porpoises and seal were not scarce in this inlet, and in the entrance there were many whales. The presence of seal and whales made me think it probable there was a channel; but I believe every person with me was satisfied of its being a sound, terminating under Mount Hope. Since my later experience of the deceptive character of some passages in Tierra del Fuego (the Barbara Channel, for example), I have felt less certain that there may not be a communication with the low land, behind Mount Hope, round its northern base. The improbability was, however, so great,—from the bottom of the sound

formado en el seno de alguna de las montañas inmediatas, en que parece haber algunos minerales, y aun volcanes, que están del todo ó casi apagados, moviéndonos a hacer este juicio, el haberse encontrado, en la cima de una de ellas, porcion de materia compuesta de tierra y metal, que en su peso, color, y demas caracteres, tenia impreso el sello del fuego activo en que habia tomado aquel estado, pues era una perfecta imagèn de las escorias del hierro que se ven en nuestras ferrerías.—*Apendice al Viage de Cordova al Magallanes*, p. 65.

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being shoal,—from the very slight tide-stream,—and from the information of the Natives; who evidently intended to tell us we could not get out to sea,—that we did not consider it worth while to make another examination.

I have before observed that the strata of the slate rocks, in the Strait, dip to the S.E.; and I found that they dip similarly all the way to the bottom of this inlet, which I named Admiralty Sound.

The north side, like that of the Gabriel Channel, is steep, without indentations, excepting where there is a break in the hills; but on the south shore there are many coves, and bights, the cause of which is shown in the accompanying imaginary section of the Gabriel Channel. The same cause operates on the outline of the north shore of the reach of Cape Froward, westward as far as Cape Holland, where the rock assumes a still more primitive form. Its general character, however, is micaceous slate, with broad veins of quartz; the latter being particularly conspicuous at Port Gallant.

The following slight sketch, intended to represent an imaginary section of such an opening as the Gabriel Channel, may also serve to give a general idea of many Fuegian anchorages;—of deep water passages existing between the almost innumerable islands of Tierra del Fuego;—and of the effects of those sudden, and violent gusts of wind,—so frequent and dangerous,—commonly called hurricane-squalls,* or williwaws.

* No canvas could withstand some of these squalls, which carry spray, leaves, and dirt before them, in a dense cloud, reaching from the water to the height of a ship's lower yards, or even lower mast-heads. Happily their duration is so short, that the cable of a vessel, at anchor, is scarcely strained to the utmost, before the furious blast is over. Persons who have been some time in Tierra del Fuego, but fortunate enough not to have experienced the extreme violence of such squalls, may incline to think their force exaggerated in this description: but it ought to be considered, that their utmost fury is only felt during unusually heavy gales, and in particular situations; so that a ship might pass through the Strait of Magalhaens many times, without encountering one such blast as has occasionally been witnessed there.—R.F.

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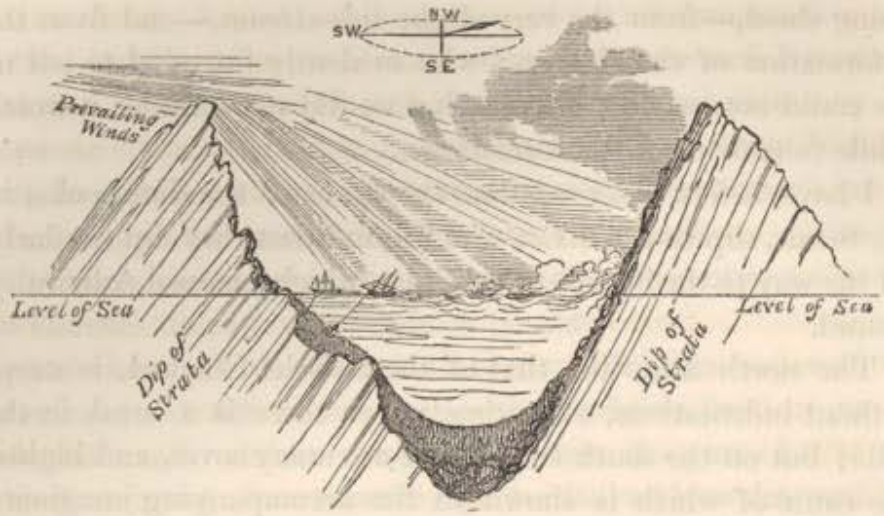

The rock, of course, decomposes equally on both sides; but on that exposed to the south wind, it breaks off in flakes parallel to the direction of the strata, and therefore does not make the course of the beach more irregular; while on the other side it moulders away transversely to the direction of the dip, leaving holes, in which water lodges, and hastens decomposition by entering deeply into the interstices. Water, air, and frost decompose the rock, and form a soil, which, if not too much exposed to the wind, is soon occupied by vegetation.

The rugged faces of the cliffs, on the southern shore, caused by the rock decomposing across the grain, collect sand and mud; and hence it happens that anchorages are frequently found on one side, whilst, on the other, the anchor will not hold, from the steepness of the ground; there being nothing upon the smooth declivity to retain mud and sand before it gets to the bottom; which, in most cases known to me, lies far beyond the reach of the anchor.

After a tedious and difficult passage through the Gabriel Channel, we anchored in a snug harbour within the entrance of Magdalen Channel, on the west side, under a peaked hill called by Sarmiento 'El Vernal,'—in our plan, the 'Sugar-loaf.' The entrance is about a quarter of a mile wide; but after a few hundred yards the harbour opens, extending in for nearly a mile. It is of easy depth; seven fathoms in the entrance, and four, five, and six fathoms within; so that it is

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very convenient for a small vessel: to us, indeed, it was a most welcome discovery. The land rises, around this cove, to the height of two or three thousand feet. It is covered with Beech, and Winter's-bark, and near the water is adorned with large groves of Fuchsia, Berberis, and the common shrubs of Port Famine, growing so thickly as to form an almost impenetrable jungle; but, notwithstanding the picturesque character of its scenery, the towering height of the hills, which exclude the sun's rays for the whole day, during the greater portion of the year, renders it a gloomy and melancholy spot.*

We found a family of Fuegians in the inner harbour. Three canoes were hauled up on the beach, but their owners were not at first visible. At last, after our repeatedly calling out 'Ho-say, ho-say,' they appeared, and, rather reluctantly, invited us, by signs, to land. There seemed to be fourteen or fifteen people, and seven or eight dogs. Mr. Wickham and Mr. Tarn went on shore to these natives, who exhibited some timidity, until a hideous old woman began to chatter, and soon made them understand that the young men (Lā-ā-pas) were absent on a hunting excursion, but were every moment expected to return. There were only three men with the women and children. To inspire them with confidence in our good intentions, Mr. Wickham gave each man a red cap, and some other trifles. One of them complained of being sick, but I rather imagine his illness was feigned, and the others did not at all seem to like our visit. By degrees their fears subsided, and, restraint being laid aside, an active trade began; in which several otter skins, shell-necklaces, spears, and other trifles, were obtained from them in exchange for beads, buttons, medals, &c. The otters are caught by the help of dogs, on which account, principally, the latter are so valuable.

These people were slightly clothed with skins of the seal and otter, but some had pieces of guanaco mantles over their shoulders, whence we supposed that they were either of the same tribe, or at peace, with the Indians of Admiralty Sound:

* "sub rupe cavatâ
Arboribus clausam circum atque horrentibus umbris."

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unless, indeed, they trade with the Patagonian Indians; but such is the poverty of the Fuegians, they can scarcely possess any thing of value sufficient to exchange with the goods of their northern neighbours, unless it be iron pyrites, which I think is not found in the open country inhabited by the Patagonian Indians, and, from the facility with which it yields sparks of fire, must be an object of importance.

We were not a little amused by the surprise which these natives showed at the things in our possession, and by the effect produced in their countenances when they saw any thing extraordinary: the expression was not that of joy or surprise, but a sort of vacant, stupified, stare at each other. They must have been very suspicious of our intentions, or very much excited by what they had seen during the day, as throughout the night an incessant chattering of voices was heard on shore, interrupted only by the barking of their dogs.

Looking down the Magdalen Inlet, we saw two openings, which, while the hills were enveloped in mist, had the appearance of being channels. We proceeded for some distance into the more westerly of the two, but found that it was merely a sound, terminated by high land. The boat was then steered under a steep mass of black mountainous land,* the summit of which is divided into three peaks, which Sarmiento called 'El Pan de Azucar de los Boquerones' (the Sugar-loaf of the Openings). We ran southward, fifteen miles down this sound, and reached the Labyrinth Islands; but finding there no suitable anchorage, resumed our course towards the bottom of what we thought another sound, terminated by mountains. At noon, the furthest point, on the west shore, which we called Cape Turn, was within three miles of us, and we should soon have discovered the continuation of the channel (as it has since been proved); but a breeze set in from the S.W., and in a short time it blew so strong as to oblige us to turn back. 'Williwaws' and baffling eddy winds kept us seven hours under Mount Boqueron. These squalls were at first alarming, but by taking in all sail, before they passed, we sustained no injury. At sun-

* Mount Boqueron.

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set we were abreast of Hope Harbour, in which we purposed taking shelter from the gale. Our late neighbours, the Indians, had lighted a fire at the entrance to invite our return; but wind and tide were against us, and as we knew of no port to leeward, our only resource was to run out of the sound. Furious squalls carried us into the true, or steady, wind, which we found very strong; and as Port San Antonio was on the lee-bow, we had to carry such a press of sail, that our excellent boat had nearly half the lee side of her deck under water. By daylight we got into smooth water, and, with less wind and better weather, steered for Port Famine. The smoother water enabled us to light a fire and cook a meal, not an unimportant affair, as we had eaten nothing since six o'clock on the preceding morning.

In our absence Mr. Graves had surveyed Lomas Bay, and, after his return, Mr. Ainsworth had crossed the Strait with the gig and cutter to survey Port San Antonio. They were victualled for five days; the gig was manned by my own boat's crew, and the cutter by volunteers: but although they had not come back, we felt no anxiety about their safety, being assured that Mr. Ainsworth would not run the risk of crossing the Strait during bad weather. The tempestuous state of the two following days, however, made us uneasy, and on the third morning, when the wind moderated much, we looked out anxiously for their arrival. In the evening the cutter returned; but, alas! with the melancholy information of the loss of Mr. Ainsworth, and two seamen, drowned by the upsetting of the gig. One of the latter was my excellent coxswain, John Corkhill. The remainder of the gig's crew were only rescued from drowning by the strenuous exertions of those in the cutter.

Mr. Ainsworth, anxious to return to the ship, thought too little of the difficulty and danger of crossing the Strait during unsettled weather. He set out from Port San Antonio under sail, and, while sheltered by the land, did very well; but as soon as they got into the offing, both wind and sea increased so much that the gig was in great danger, although under only a small close-reefed sail.

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The people in the cutter were anxiously watching her labouring movements, when she disappeared! They hastened to the spot—saved three men; but the other two had gone down. Poor Ainsworth was still clinging to the gig's gunwale when his shipmates eagerly approached; but letting go his hold from extreme exhaustion, and being heavily clothed, he sunk from their sight to rise no more.

He had been cheering the drowning crew, and trying to save his companions, till the moment his grasp relaxed. Just before Ainsworth himself let go, Mr. Hodgskin lost his hold, exclaiming, "Ainsworth, save me!" when, exhausted as he was, with one hand he rescued his friend, and, directly afterwards, his strength failing, sunk.

This addition of three people to the already loaded cutter, made her cargo more than was safe, therefore Mr. Williams, who commanded her, very prudently bore up for the first convenient landing-place, and happily succeeded in reaching the only part of the beach, between Lomas Bay and Cape Valentyn, where a boat could land.

The following morning, the weather being more favourable, they crossed under sail to Freshwater Bay, and thence pulled to Port Famine.

This melancholy disaster was much felt by every one. Ainsworth was a deserving officer, and highly esteemed. Corkhill was captain of the forecastle, and had served in the Polar voyages under Sir Edward Parry. On the Sunday following, the colours were hoisted half-mast high, and the funeral service was read after morning prayers: for although to recover the bodies was impossible, their watery grave was before our eyes; and the performance of this last sad duty was a melancholy satisfaction.

> "Ours are the tears, tho' few, sincerely shed,
> When ocean shrouds and sepulchres our dead."

A tablet was subsequently erected, on Point St. Anna, to record this fatal accident.

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CHAPTER V.

Lieutenant Sholl arrives—Beagle returns—Loss of the Saxe Cobourg sealer—Captain Stokes goes to Fury Harbour to save her crew—Beagle's proceedings—Bougainville's memorial—Cordova's memorial—Beagle's danger—Difficulties—Captain Stokes's boat-cruize—Passages—Natives—Dangerous service—Western entrance of the Strait of Magalhaens—Hope's cruize—Prepare to return to Monte Video.

The Beagle's time of absence had expired on the 1st of April, and our anxiety, more excited by our recent loss, was becoming painful. I detained the Hope from going upon a service for which she was prepared, in case she might be required to search for our consort: but on the 6th a strange whale-boat was descried pulling towards us from the southward, in which we soon distinguished Lieut. Sholl. His appearance, under such circumstances, of course raised fears for the Beagle's safety; but, on approaching, his gratifying shout, "all's well!" at once removed anxiety.

Mr. Sholl informed me, that the Beagle had picked up a boat, belonging to the schooner 'Prince of Saxe Cobourg,' wrecked in Fury Harbour, at the south entrance of the Barbara Channel; and that she had put into Port Gallant, whence Captain Stokes had gone with the boats to assist the Sealers, leaving Lieut. Skyring on board.

The safety of the Beagle being established, I despatched Mr. Graves, in the Hope, to examine some openings between the Magdalen Channel and the Dos Hermanos of Bougainville.

Several days earlier than I expected, the Beagle made her appearance, and Captain Stokes soon gave me the agreeable intelligence of having succeeded in saving the Prince of Saxe Cobourg's crew. Favoured by the weather, though delayed by his guide having forgotten the way, Captain Stokes reached Fury Harbour in two days, and embarked the master and

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crew of the wrecked vessel, with all their personal property, and the greater part of the seal-skins which they had cured. He reached Port Gallant again on the fourth day; sailed immediately in the Beagle, and two days afterwards anchored in Port Famine.

The Prince of Saxe Cobourg, belonging to Mr. Weddel (whose voyage towards the South Pole is so well known), and commanded by Mr. Matthew Brisbane, who accompanied Weddel on that occasion, sailed from England in the summer of 1826, on a sealing voyage. At South Shetland she encountered a continuance of bad weather, was beset by a large body of ice for several days, and received so much damage as to oblige her to run for the Fuegian coast, and anchor in Fury Harbour, at the entrance of the Barbara Channel. There (December 16th, 1826) she was driven on shore by the furious strength of the williwaws, and wrecked. The crew were, however, enabled to save most of the provisions and stores, as well as their three boats. Having made tents, and established themselves on shore, they remained in anxious expectation of the arrival of some vessel which might relieve them; day after day however passed, without succour.

Two boats were despatched to look for any sealing vessel that might be in the vicinity, but after fifteen days' absence they returned unsuccessful. In this interval one of the crew, who had long been sickly, died; and another, in carelessly discharging a musket, exploded twenty pounds of gunpowder, by which he was very much burned. Three of the people being mutinous, were punished by being sent, each to a different island, with only a week's provisions.

Soon afterwards another boat was sent away, which reached Hope Harbour, but found no vessel there. Seven of the people then obtained permission from the master (who kept up a very proper state of discipline), to take the largest whale-boat, and go towards the River Negro. Previous to their departure they drew up articles of agreement for their general conduct, a breach of which was to be punished by the offender being left upon the coast, wherever they might happen to

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be. The boat eventually arrived safely at the place of her destination, and the crew entered as volunteers on board of the Buenos Ayrean squadron, at that time engaged in the war with Brazil.

Again a boat was despatched, directed to go westward through the Strait in search of vessels. She had only reached as far as Playa Parda, when the Beagle fell in with her (March 3d, 1827). While passing through the small channels, before entering the Strait, she met several canoes, with Indians, who endeavoured to stop her, and shot arrows at the crew; but, happily, without doing any mischief.

After the last boat's departure, Mr. Brisbane began to build a small vessel, and, while so employed, was visited by a party of natives, who conducted themselves very peaceably, and went away. Their visit, however, gave the shipwrecked people, now much reduced in number,* reason to apprehend the return of a larger body, who might try to possess themselves of the property which was lying about on the shore; they therefore buried a great deal, and took means to preserve the rest by making preparations to repel attack. When Captain Stokes appeared with his two boats, the Sealers flew to their arms, calling out "the Indians, the Indians!" but in a very few minutes excess of joy succeeded to their sudden alarm.

Captain Stokes found the vessel lying on the rocks, bilged, and an utter wreck. The master and crew were extremely anxious to get away, he therefore embarked them, with as much of the property as could be carried, and succeeded (after another night in the boats, and a long pull of eighty miles,) in conveying them safely to the Beagle.

The following is an abstract of Captain Stokes's journal of his cruise to the western entrance of the Strait.

The Beagle sailed from Port Famine on the 15th of January, to explore the Strait westward of Cape Froward, and to fix particularly the positions of Cape Pillar, the rock called West-

* Including the master, there were on board, when cast away, twenty-two persons.

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minster Hall, and the Islands of Direction, at the western entrance of the Strait.

For the first night Captain Stokes anchored in San Nicolas Bay, and in the evening examined a harbour* behind Nassau Island, which Bougainville, in the year 1765, visited for the purpose of procuring wood for the French settlement at the Falkland Islands.

On the second night, after a day nearly calm, the Beagle was anchored in a cove to the eastward of Cape Froward, and the next day (17th) passed round the Cape, carrying a heavy press of sail against a dead foul wind. Captain Stokes's account of this day's beat to windward will give the reader an idea of the sort of navigation.

"Our little bay had screened us so completely from the wind, that though, when (at five A.M.) we weighed, the breeze was so light as scarcely to enable us, with all sail set, to clear its entrance; no sooner were we outside, than we were obliged to treble reef the topsails. We continued to beat to windward under a heavy press of sail; our object being to double Cape Froward, and secure, if possible, an anchorage ere nightfall under Cape Holland, six leagues further to the westward. At first we made 'boards' right across the Straits to within a third of a mile of each shore, gaining, however, but little. We then tried whether, by confining our tacks to either coast, we could discover a tide by which we might profit; and for that purpose I began with the north shore, for though we were there more exposed to violent squalls which came down the valleys, I thought it advisable to avoid the indraught of various channels intersecting the Fuegian coast; but having made several boards without any perceptible advantage, we tried the south shore, with such success that I was induced to keep on that side during the remainder of the day.

"And here let me remark, that in consequence of the westerly winds which blow through the western parts of the Straits of Magalhaens, with almost the constancy (as regards

* Bougainville Harbour, better known to Sealers by the name of 'Jack's Harbour.'

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direction, not force) of a trade-wind; a current setting to the eastward, commonly at the rate of a knot and three quarters an hour, will be found in mid-channel. The tides exert scarcely any influence, except near either shore; and sometimes appear to set, up one side of the Straits, and down the other: the weather tide is generally shown by a rippling. (*c*)

"Heavy squalls off Cape Froward repeatedly obliged us to clew all up. By day their approach is announced, in time for the necessary precautions, by their curling up and covering with foam the surface of the water, and driving the spray in clouds before them.

"At last we doubled Cape Froward. This Cape (called by the Spaniards El Morro de Santa Agueda), the southernmost point of all America, is a bold promontory, composed of dark coloured slaty rock; its outer face is nearly perpendicular, and whether coming from the eastward or westward, it 'makes' as a high round-topped bluff hill ('Morro').

"Bougainville observes, that 'Cape Froward has always been much dreaded by navigators.'† To double it, and gain an anchorage under Cape Holland, certainly cost the Beagle as tough a sixteen hours' beat as I have ever witnessed: we made thirty-one tacks, which, with the squalls, kept us constantly on the alert, and scarcely allowed the crew to have the ropes out of their hands throughout the day. But what there is to inspire a navigator with 'dread' I cannot tell, for the coast on both sides is perfectly clear, and a vessel may work from shore to shore."

From Cape Holland, the Beagle proceeded to Port Gallant, and during her stay there, Mr. Bowen ascended the Mountain de la Cruz. Upon the summit he found some remains of a glass bottle, and a roll of papers, which proved to be the memorials stated to have been left by Don Antonio de Cordova,

(*c*) While the 'current' runs eastward for many days in mid-channel, or along one shore, it often happens that the 'stream of tide' either sets in a contrary direction, along each side of the Strait, or that it follows only the shore opposite to that washed by the 'current.'—R. F.

† "Voyage autour du Monde." 1767.

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and a copy of a document that had previously been deposited there by M. de Bougainville. With these papers was found a Spanish two-rial piece of Carlos III., which had been bent to admit of its being put into the bottle. It was with considerable difficulty that any of the writing could be decyphered, for the papers, having been doubled up, were torn, and the words defaced at the foldings, and edges.

Bougainville's memorial was in Latin. Cordova's, besides a document in Latin, was accompanied by an account of his voyage, written in four languages, Spanish, French, Italian, and English. The legible part of the former was as follows :—

Viatori Benevolo salus.....
..... que a periculose admodum naviga.....
..... Brasilie Bonarve et insularum.....
.....
..... incertis freti Magellanici portubus....
..... historia astronomia....
.... Boug.....
.... Boug ....Duclos et de la Giranda 2 navium..
.....Primaris
.... Comerson....Doct med naturalista Regio
accu....m. Veron astronomo de Romainville hidrographio
..... a rege Christianissimo demandans
..... Landais Lavan Fontaine navium
Loco tenentibus et Vexillariis.....
..... itineris locus DD Dervi Lemoyne....
..... Riouffe voluntariis.
..... vives..... scriba
Anno MDCCLXVI.

The Latin inscription of Cordova was as follows :—

Benevolo Navigatori
Salutem
Anno Domini MDCCLXXXVIII Vir celeberrimus
DD Antonius de Cordova Laso de Vega navibus duabus (*quarum* nomina SS Casilda et Eulalia *erant ad scrutamen* Magellanici freti subsequendum *unáque* littorum, portuum aliorumque notabilium
..... iter iterum fecit.
.... e Gadibus classis tertio nonas Octobris habenas *immittit* quarto idus *ejusdem Nova* ..... vidit

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A Boreali ad Austra.....*miserium* postridie Kalendæ Novembris emigravit.

Decimo quarto Kalendas Januarii Patagonicis recognitis litoribus ad ostium appulit freti.

Tandem ingentibus periculis et horroribus tam in mari quam in freto magnanime et constanter super*atis* et omnibus portubus atque navium *fundamentis* utriusque litoris correctissime cognitis ad hunc portum Divini Jose vel Galante septimo idu Januarii pervenit ubi ad perpetuam rei memoriam in monte sanctissimæ crucis hoc monumentum reliquit.

Tertio et excelso Carolo regnante potente
Regali jussu facta fuere suo.

Colocatum fuit nono Kalendæ Februarii Anno MDCCLXXXIX.

together with a list of the officers of both vessels, and enclosing a memorial of Cordova's former voyage in the Santa Maria de la Cabeza. The originals are placed in the British Museum; but before we finally left the Strait, copies were made on vellum, and deposited on the same spot.

The Beagle left Port Gallant* with a fair wind, which carried her to Swallow Harbour.

The next stopping place was Marian's Cove, a very snug anchorage on the north shore, a few miles beyond Playa Parda. Proceeding thence to the westward, with the wind 'in their teeth,' and such bad weather, that they could only see the land of either coast at intervals, and failing in an attempt to find anchorage under Cape Upright, the Beagle was kept under weigh during a squally dark night.

In that very place, Commodore Byron, with the Dolphin and Tamar, passed the anxious night, which he thus describes:—

"Our situation was now very alarming; the storm increased every minute, the weather was extremely thick, and the rain seemed to threaten another deluge; we had a long dark night before us, we were in a narrow channel, and surrounded on

* One of the feathered tribe, which a naturalist would not expect to find here, a 'humming bird,' was shot near the beach by a young midshipman.—Stokes MS.

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every side by rocks and breakers."* The Beagle was under similar circumstances, but the land being known to be high and bold, her danger was not considered so imminent.

Eastward of Cape Upright the water was smooth; but between it and Cape Providence a heavy breaking sea was caused by the deep swell of the Pacific. Captain Stokes found an anchorage the next night in a bay under Cape Tamar; and the following evening very nearly reached another under Cape Phillip; but the darkness of a rainy night, and strong squalls, prevented their attempting to anchor in an unknown place, and the only resource was to bear up for shelter under Cape Tamar, where the previous night had been passed. Even this was a dangerous attempt; they could hardly discern any part of the high land, and when before the wind could not avoid the ship's going much too fast. While running about eight knots, a violent shock—a lift forward—heel over—and downward plunge—electrified every one; but before they could look round, she was scudding along, as before, having fairly leaped over the rock.

It was afterwards found that a great part of the gripe and false keel were knocked away. Captain Stokes's account of this day's beat will give an idea of the difficulties which the Beagle's crew encountered, in working out of the Strait.

January 31st. "The hands were turned up at daylight "up anchor;" but the heavy squalls that came off the high land of the harbour, rendered it too hazardous to weigh, until a temporary lull enabled us to make sail, and re-commence beating to the westward against a dead foul wind, much rain, hard squalls, and a turbulent cross sea.

"The squalls became more frequent and more violent after noon; but they gave, in daylight, sufficient warning, being preceded by dark clouds gradually expanding upwards, until their upper line attained the altitude of about fifty degrees: then came heavy rain, and perhaps hail; immediately after followed the squall in all its fury, and generally lasted fifteen or twenty minutes.

* Hawkesworth's Coll. of Voyages, vol. i. p. 76.

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"In working to windward we frequently extended our 'boards' to the south shore (not without risk considering the state of the weather), with the hope of making out Tuesday Bay, or some anchorage thereabout; but the coast was covered with so thick a mist, that not a single point, mentioned by preceding navigators, could be recognised.

"About seven in the evening we were assailed by a squall, which burst upon the ship with fury far surpassing all that preceded it; had not sail been shortened in time, not a stick would have been left standing, or she must have capsized. As it was, the squall hove her so much over on her broadside, that the boat which was hanging at the starboard quarter was washed away. I then stood over to the north shore, to look for anchorage under the lee of a cape, about three leagues to the north-west of Cape Tamar. On closing it, the weather became so thick that at times we could scarcely see two ships' lengths a-head.

"These circumstances were not in favour of exploring unknown bays, and to think of passing such a night as was in prospect, under sail in the Straits, would have been a desperate risk; I was obliged therefore to yield the hard-gained advantage of this day's beat, and run for the anchorage whence we had started in the morning.

"It was nearly dark ere we reached it; and in entering, desirous to keep well up to windward, in order to gain the best anchorage, I went too close to the outer islet, and the ship struck violently on a rocky ledge. However, she did not hang a moment, and was soon anchored in safety."

Finding so much danger and difficulty, in proceeding with the ship, without first knowing where to run for anchorages, Captain Stokes left her in Tamar Bay, under the charge of Lieutenant Skyring; and, accompanied by Mr. Flinn, set out in the cutter, with a week's provisions, to examine the south coast.

In a very arduous and dangerous cruize he discovered several well-sheltered anchorages, but experienced a "constant heavy gale from W.N.W., with thick weather and incessant drenching rain."

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Captain Stokes says, " Our discomfort in an open boat was very great, since we were all constantly wet to the skin. In trying to double the various headlands, we were repeatedly obliged (after hours of ineffectual struggle against sea and wind) to desist from useless labour, and take refuge in the nearest cove which lay to leeward."

From the Harbour of Mercy, Captain Stokes attempted to cross the Strait, on his return to the Beagle; but the sea ran too high, and obliged him to defer his daring purpose until the weather was more favourable.

During his absence, Lieutenant Skyring surveyed Tamar Bay and its vicinity.

Again the Beagle weighed, and tried hard to make some progress to the westward, but was obliged a third time to return to Tamar Bay. After another delay she just reached Sholl Bay, under Cape Phillip, and remained there one day, to make a plan of the anchorage, and take observations to fix its position.

The Beagle reached the Harbour of Mercy (Separation Harbour of Wallis and Carteret),* after a thirty days' passage from Port Famine, on the 15th, having visited several anchorages on the south shore in her way. But tedious and harassing as her progress had been, the accounts of Byron, Wallis, Carteret, and Bougainville show that they found more difficulty, and took more time, in their passages from Port Famine to the western entrance of the Strait. Byron, in 1764, was forty-two days; Wallis, in 1766, eighty-two; Carteret, in the same year, eighty-four; and Bougainville, in 1768, forty days, in going that short distance.

Five days were passed at this place, during which they communicated with a few natives, of whom Captain Stokes remarks; " As might be expected from the unkindly climate in which they dwell, the personal appearance of these Indians does not

* It was here that Commodore Wallis and Captain Carteret separated, the Dolphin going round the world; the Swallow returning to England. Sarmiento's name of Puerto de la Misericordia, or ' Harbour of Mercy,' being of prior date, ought doubtless to be retained.

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exhibit, either in male or female, any indications of activity or strength. Their average height is five feet five inches; their habit of body is spare; the limbs are badly turned, and deficient in muscle; the hair of their head is black, straight, and coarse; their beards, whiskers, and eyebrows, naturally exceedingly scanty, are carefully plucked out; their forehead is low; the nose rather prominent, with dilated nostrils; their eyes are dark, and of a moderate size; the mouth is large, and the under-lip thick; their teeth are small and regular, but of bad colour. They are of a dirty copper colour; their countenance is dull, and devoid of expression. For protection against the rigours of these inclement regions, their clothing is miserably suited; being only the skin of a seal, or sea-otter, thrown over the shoulders, with the hairy side outward.

"The two upper corners of this skin are tied together across the breast with a strip of sinew or skin, and a similar thong secures it round the waist; the skirts are brought forward so as to be a partial covering. Their comb is a portion of the jaw of a porpoise, and they anoint their hair with seal or whale blubber; for removing the beard and eyebrows they employ a very primitive kind of tweezers, namely, two muscle shells. They daub their bodies with a red earth, like the ruddle used in England for marking sheep. The women, and children, wear necklaces, formed of small shells, neatly attached by a plaiting of the fine fibres of seal's intestines.

"The tracts they inhabit are altogether destitute of four-footed animals; they have not domesticated the geese or ducks which abound here; of tillage they are utterly ignorant; and the only vegetable productions they eat are a few wild berries and a kind of sea-weed. Their principal food consists of muscles, limpets, and sea-eggs, and, as often as possible, seal, sea-otter, porpoise, and whale: we often found in their deserted dwellings bones of these animals, which had undergone the action of fire.

"Former voyagers have noticed the avidity with which they swallowed the most offensive offal, such as decaying seal-skins,

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rancid seal, and whale blubber, &c. When on board my ship, they ate or drank greedily whatever was offered to them, salt-beef, salt-pork, preserved meat, pudding, pea-soup, tea, coffee, wine, or brandy—nothing came amiss. One little instance, however, happened, which showed what they preferred. As they were going ashore, a lump of the tallow used for arming the lead was given to them, and received with particular delight. It was scrupulously divided, and placed in the little baskets which they form of rushes, to be reserved for eating last, as the richest treat.

"To their dwellings have been given, in various books of voyages, the names of huts, wigwams, &c.; but, with reference to their structure, I think old Sir John Narborough's term for them will convey the best idea to an English reader; he calls them 'arbours.' They are formed of about a couple of dozen branches, pointed at the larger ends, and stuck into the ground round a circular or elliptical space, about ten feet by six; the upper ends are brought together, and secured by tyers of grass, over which is thrown a thatching of grass and seal-skins, a hole being left at the side as a door, and another at the top as a vent for the smoke. A fire is kept burning within, over which the natives are constantly cowering; hence, when seen abroad, instead of appearing to be hardy savages, inured to wet and cold, you see wretched creatures shivering at every breeze. I never met people so sensible of cold as these Fuegian Indians.

"The nature of their domestic ties we had no opportunity of discovering; their manner towards their children is affectionate and caressing. I often witnessed the tenderness with which they tried to quiet the alarms our presence at first occasioned, and the pleasure which they showed when we bestowed upon the little ones any trifling trinkets. It appeared that they allow their children to possess property, and consult their little whims and wishes, with respect to its disposal; for lying in a boat, alongside one of the canoes, bargaining for various articles, spears, arrows, baskets, &c., I took a fancy to a dog lying near one of the women, and offered a price for it; one of my seamen, supposing the bargain concluded, laid

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hands on the dog, at which the woman set up a dismal yell; so bidding him desist, I increased my offers. She declined to part with it, but would give two others. At last, my offers became so considerable, that she called a little boy out of the thick jungle (into which he had fled at our approach), who was the owner of the dog. The goods were shown to him, and all his party urged him to sell it, but the little urchin would not consent. He offered to let me have his necklace, and what he received in exchange was put away in his own little basket.

"These people never evinced any thankfulness for our presents. Whatever was offered they 'clutched at,' doubtful of getting it, although held out to them; and when in their own hand, it was instantly stowed away, as if they feared it would be recalled.

"I sometimes tried to discover whether they preferred any particular colour, and for that purpose held out three strings of beads, black, white, and red; they clutched at all three, in their usual manner, without showing any preference.

"Their pronunciation is exceedingly harsh and guttural; not more than two words, whose signification was at all ascertained, could be made out, 'sherroo,' a ship, boat, or canoe, and 'peteet,' a child. They have a wonderful aptitude for imitating the sounds of strange languages: let a sentence, of even a dozen words, be distinctly pronounced, and they will repeat it with the utmost precision.

"Their only articles of traffic, besides such implements and weapons as they use, are seal and otter skins; and I should say that the quantity of peltry to be procured from them would be insignificant towards completing the cargo of a sealing vessel."

During the next few days the Beagle was employed in the most exposed, the least known, and the most dangerous part of the Strait. Fortunately, she was favoured by weather, and effected her purpose without injury or loss; but I never reflect upon this piece of service without an inward tribute of admiration to the daring, skill, and seamanship of Captain Stokes, Lieutenant Skyring, and Mr. Flinn.

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In his journal Captain Stokes says:

"Incessant rain and thick clouds prevented my completing, until this day (19th), the observations necessary for making an island, just outside the Harbour of Mercy, the southern end of my base, for the trigonometrical connection of the coasts and islands near the western entrance of this weather-beaten Strait.

"On the 20th, I weighed and beat to windward, intending to search for anchorage on the north shore, where I might land and fix the northern end of our base line. In the evening we anchored in an archipelago of islands, the real danger of whose vicinity was much increased to the eye by rocks, scattered in every direction, and high breakers, occasioned doubtless by reefs under water. We observed that most of the larger islands have small banks of sand at their eastern sides, on which anchorage may be found; but for ordinary purposes of navigation, this cluster of islands* need only be pointed out to be avoided. The number and contiguity of the rocks, below as well as above water, render it a most hazardous place for any square-rigged vessel: nothing but the particular duty on which I was ordered would have induced me to venture among them. Fore-and-aft vessels might work with far less risk; and as the rocks are frequented by vast numbers of fur seal, a season or two might be profitably passed here by a sealing vessel so rigged.

"This morning (21st) I landed on one of the larger islands, with Lieutenant Skyring, and having ascended an eminence (Observation Mount) with the necessary instruments, fixed its position, and made it the northern end of our base.

"It was a beautiful, and clear day; the Isles of Direction (or Evangelists), as well as every point of importance on the adjacent coast, were seen distinctly during several hours.

"My next object was to fix the position of Cape Victory, and ascertain whether anchorage could be found in its neighbourhood. Accordingly, we weighed early next morning (22d,) and after extricating ourselves from this labyrinth (not without much difficulty and danger), we beat to the westward. Violent squalls, a heavy sea, and thick weather, which came on about

* Called the Scilly Isles.

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noon, obliged me to choose the least evil, and run for the Harbour of Mercy.

"On the 23d, we went out again, and beat towards the Isles of Direction, off which we passed a night under sail.

"The morning of the 24th was very fine, and the wind moderate. Leaving the Beagle to sound about the Isles of Direction, I set out in my boat, with two days' provisions, towards Cape Victory. As we rowed along these rocky shores, threading the mazes of the labyrinth of islets which fringe them, we saw vast numbers of black whales, and the rocks were quite covered with fur seal and brant geese.

"After pulling, in earnest, for six hours, we landed upon Cape Victory, the north-western limit of the Strait of Magalhaens, and there, with a sextant, artificial horizon, and chronometer, ascertained the position of this remarkable promontory. From an eminence, eight hundred feet above the sea, we had a commanding view of the adjacent coasts, as well as of the vast Pacific, which enabled us to rectify former material errors. Late in the evening we were fortunate enough to get safely on board again, which, considering the usual weather here and the heavy sea, was unexpected success. This night was passed under sail in the Pacific, and next morning we commenced our return to Port Famine.

"When within four or five miles of Cape Pillar, and to the westward of it, a current was found to set southward, at about two knots an hour. As we neared the Cape the wind fell, and the Beagle was set rapidly towards those dangerous rocks, called the Apostles. Fortunately, a commanding breeze sprung up, and we extricated ourselves from the difficulty. While passing Cape Pillar, I landed in a cove near it, and determined its position. By sunset we had arrived near the Harbour of Mercy; and being becalmed, towed the ship in, with her boats, until an anchor was dropped at the proper place.

"On the 26th, we went to Tuesday Bay, and on the 27th crossed the Strait, and anchored under Cape Parker. I have rarely witnessed such a high, cross, and irregular sea as we this day passed through, near the strange mass of rock, called by

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Narborough, 'Westminster Hall.' The coast about our unsafe anchorage was as barren and dismal-looking as any part of this country, which, as the old navigator above-mentioned said, is 'so desolate land to behold.'

"Next day (March 1st) we ran down to Cape Upright, and there remained until the 3d, collecting the required data for our survey.

"While standing towards the bay called Playa Parda (on the 3d), a boat under sail was seen making towards us from the southern coast. I fired several guns, to show our position, before we became shut in by the land, and soon after anchoring a whale-boat came alongside, with the second mate and five men belonging to the sealing-vessel Prince of Saxe Cobourg.

"Anxious not to lose a moment in hastening to the relief of our shipwrecked countrymen, I ran down next day to Port Gallant, and thence proceeded with two ten-oared boats (on the 5th) through the Barbara Channel, and the following evening reached Fury Harbour."

Having already given a short account of the Saxe Cobourg's loss, and the rescue of her crew by Captain Stokes, I will not repeat the story by extracting more from his journal.

Mr. Graves returned from his cruize in the Hope on the 17th, after suffering much from stormy weather and incessant rain; but having made a survey of the openings in the land to the west of Magdalen Channel as far as the Sugar Loaf Point, at the west head of Lyell Sound, which he found to be deep inlets, affording no anchorages of value to navigation.

The time having arrived for our return to Monte Video, preparations were made for sailing, and in the mean time I went to the northward, in the Hope, to survey the coast between Port Famine and Elizabeth Island, including Shoal Haven.

At the bottom of Shoal Haven we were stopped by the water shoaling to five feet, so that we were obliged to haul out till we could anchor in more than two fathoms. During the night the wind shifted to N.E., and blew right in, obliging us to weigh, and work under the S.W. end of Elizabeth Island into a bay close to that shore. From the summit of the S.W.

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point I afterwards took angles, among which the most important gave Mount Sarmiento bearing S. 1½° W. (true). Its distance must have been (by recent observations) ninety-four miles.

Elizabeth Island is a long, low strip of land, lying parallel to the shores of the Strait, which here take a N.N.E. direction. Compared with the land to the southward it is very low, no part being more than two or three hundred feet high. It is composed of narrow ranges of hills, extending in ridges in the direction of its length, over which are strewed boulders of the various rocks, which have been noticed before as forming the shingle beaches of Point St. Mary and Point St. Anna; two kinds of rock, greenstone and hornblende, being the most common. The vallies which divide the hilly ridges were well clothed with grass, and in many places were seen hollows, that had contained fresh water, but now were entirely dried up. These spots were marked by a white crust, apparently caused by the saline quality of the soil.

Geese and wild ducks, and the red-bill (*Hæmatopus*), seem to be the only inhabitants of this island. The Indians sometimes visit it, for at the S.W. end we found remains of wigwams and shell-fish. Perhaps it is a place whence they communicate with the Patagonian natives, or they may in the season frequent it for eggs.

We anchored in Laredo Bay, and visited a lake about a mile from the beach, distinguished on the chart by the name of Duck Lagoon: it is very extensive, and covered with large flights of gulls, ducks, and widgeons. We shot one widgeon, which was a most beautiful bird, and of a species we had not before seen.*

Here the country begins to be clothed with the deciduous leaved Beech tree (*Fagus Antarctica*), which is stunted in growth, but very convenient for fuel. Though the hardiest tree of this region, it is never found of large size, the larger trees being the evergreen Beech (*Fagus betuloides*). We also met with several small plants common to Cape Gregory. One

* 'Anas Rafflesii,' Zool. Journ., vol. iv., and Tab. Supp., xxix.

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may consider Cape Negro to be the boundary of two countries, as entirely different from each other in geological structure and appearance, as they are in climate, to which last difference may be attributed the dissimilarity of their botanical productions.

Hence we returned to Port Famine. In our absence, a boat from the Beagle had crossed the Strait to Lomas Bay, where a party of natives had kindled fires of invitation.

The weather, since the sun crossed the equator, had been unusually fine; and, with the exception of one day's heavy rain, the sky was so clear (the wind being moderate from the N.E.) that all the heights were exposed to our view, and amongst them Mount Sarmiento stood pre-eminent.

Our preparations for sailing being nearly completed, the Hope was unrigged and hoisted in, and our temporary settlement on shore abandoned. It consisted of a marquée and a large bell tent. In the former was Mr. Harrison (mate), who had charge of the party, and of the meteorological instruments: the bell tent held the crew. Near them were the observatory, a sawpit, and a cooking place, where a cheerful fire was always blazing. The carpenter's shop, cooper's bench, and armourer's forge had each its place, as well as a rope-walk, close to which our rigging was refitted, and the sails were repaired. After working-hours the shore party roamed about the woods with guns, or at low water picked up shell fish,* by which they usually procured a fresh meal twice, but always once, a week. Meanwhile the ship was kept carefully clean and in order. The officers not immediately employed in active duty made excursions with their guns; and although the immediate vicinity of our tents was pretty well thinned of game, yet a walk of a few miles was always rewarded by ample sport. When opportunities offered, some of the men were permitted to amuse themselves on shore with their guns, for which many had provided themselves with powder and shot. Every Sunday, after divine service, which was performed as regularly as possible under our circumstances, such of the ship's company as desired per-

* Of these a species of mactra (*M. edulis Nob.*) was most abundant.

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mission to land obtained it. On one occasion, however, we had nearly suffered for this indulgence, which was conducive to the men's health, and seldom abused: for one of them having made a fire at a little distance from the tents, the flames spread, and the exertions of all hands, for three hours, only just prevented it from communicating to the tents. On another occasion, two men set out on a shooting excursion, intending to cross the river Sedger, against doing which there had been no particular orders, as such a proceeding was scarcely contemplated. Having reached the bank near its mouth, and searched for a fordable place unsuccessfully, they launched a log of wood, and sitting astride, without providing themselves with a pole or paddle, pushed off from the shore, supposing it would go across; but, on reaching the middle of the stream, it was soon carried, by the current, out of the river, into the bay. One man, Gilly, seeing that the log was still floating away with the ebb tide, plunged in, and just reached the shore south of the river, in a very exhausted state; the other, Rix, unable to swim, kept his place, and was carried out to sea on a voyage that might have been fatal, had he not been seen from the ship, and saved by a boat.

Before leaving Port Famine we hauled one of our boats ashore, and left her (as we thought) securely hidden among the trees.

Being now ready to sail, and only waiting for wind, the officers of both ships, twenty-seven in number, dined together on shore.

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CHAPTER VI.

Trees—Leave Port Famine—Patagonians—Gregory Bay—Bysante—Maria—Falkner's account of the Natives—Indians seen on the borders of the Otway Water, in 1829—Maria visits the Adventure—Religious Ceremony—Patagonian Encampment—Tomb of a Child—Women's employment—Children—Gratitude of a Native—Size of Patagonians—Former accounts of their gigantic height—Character—Articles for barter—Fuegians living with Patagonians—Ships sail—Arrive at Monte Video and Rio de Janeiro.

While detained by northerly winds, the carpenter and a party of people were employed in the woods selecting and cutting down trees to be ready for our next visit. After felling thirteen trees, from twenty-four to thirty-six inches in diameter, eight were found to be rotten at the heart; but by afterwards taking the precaution of boring the trees with an augur, while standing, much trouble was saved, and fifteen sound sticks of considerable diameter were cut down. We found one tree, an evergreen beech, too large for any of our saws: it measured twenty-one feet in girth at the base, and from the height of six feet to twenty it was seventeen feet in circumference; above this height, three large arms (each from thirty to forty inches in diameter), branched off from the trunk. It is, perhaps, the very tree described by Byron in his account of this place. We only once saw it equalled in size, and that was by a prostrate trunk, very much decayed.

In this interval of fine weather and northerly wind, we had the thermometer as high as 58°, and the barometer ranging between 29.80 and 30.00; but for two days before the wind shifted, the alteration was predicted by a gradual descent of the mercurial column, and a considerable increase of cold. On the 7th May, as there was some appearance of a change, we got under weigh; but were hardly outside the port, when a northerly wind again set in, and prevented our going farther than Fresh-

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water Bay, where we passed the night. At last, on the 8th, accompanied by the Beagle, we proceeded on our course with a strong south-westerly breeze, which carried us quickly up to Cape Negro, when it blew so hard that I anchored off Laredo Bay. At this anchorage we certainly felt the air much colder and sharper than at Port Famine, arising from our being in a more exposed situation, and from the approach of winter, as well as from the severe south-west gale which was blowing.

After the gale had abated, we proceeded with fair weather and a light breeze to the Second Narrow, when the wind fell; but the tide being in our favour, we passed rapidly through. On a hill near us we observed three or four Patagonian Indians standing together, and their horses feeding close to them. A fire was soon kindled, to attract our notice, to which signal we replied by showing our colours; and had we not already communicated with these people, we should certainly have thought them giants, for they "loomed very large" as they stood on the summit of the hill. This optical deception must doubtless have been caused by mirage: the haze has always been observed to be very great during fine weather and a hot day, arising from rapid evaporation of the moisture so abundantly deposited, on the surface of the ground, in all parts of the Strait.

As soon as the Patagonians found they were noticed, they mounted and rode along the shore abreast of us, being joined by other parties, until the whole number could not have been less than forty. Several foals and dogs were with them. Having anchored in Gregory Bay, where I intended remaining for two days to communicate with them, I sent up a rocket, burnt a blue-light, and despatched Lieutenant Cooke on shore to ask for a large supply of guanaco meat, for which we would pay in knives and beads. The boat returned on board immediately, bringing off four natives, three men and 'Maria.' This rather remarkable woman must have been, judging by her appearance, about forty years old: she is said to have been born at Assuncion, in Paraguay, but I think the place of her birth was nearer Buenos Ayres. She spoke broken, but intel-

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ligible, Spanish, and stated herself to be sister of Bysante, the cacique of a tribe near the Santa Cruz River, who is an important personage, on account of his size (which Maria described to be immense), and his riches. In speaking of him, she said he was *very* rich; he had many mantles, and also many hides ("*muy* rico, tiene muchas mantas y tambien muchos cueros"). One of Maria's companions, a brother of Bysante, was the tallest and largest man of this tribe; and though he only measured six feet in height, his body was large enough for a much taller man. He was in great affliction: his daughter had died only two days before our arrival; but, notwithstanding his sad story, which soon found him friends, it was not long before he became quite intoxicated, and began to sing and roar on the subject of his misfortunes, with a sound more like the bellowing of a bull than the voice of a human being. Upon applying to Maria, who was not quite so tipsy as her brother, to prevent him from making such hideous noises, she laughed and said, "Oh, never mind, he's drunk; poor fellow, his daughter is dead" (Es boracho, povrecito, muriò su hija); and then, assuming a serious tone, she looked towards the sky, and muttered in her own language a sort of prayer or invocation to their chief demon, or ruling spirit, whom Pigafetta, the companion and historian of Magalhaens, called *Setebos*, which Admiral Burney supposes to have been the original of one of Shakspeare's names in the "Tempest"—

> "——— his art is of such power
> He would controul my dam's god Setebos."*

Maria's dress was similar to that of other females of the tribe; but she wore ear-rings, made of medals stamped with a figure of the Virgin Mary, which, with the brass-pin that secured her mantle across her breast, were given to her by one Lewis, who had passed by in an American sealing-vessel, and who, we understood from her, had made them "Christians." The Jesuit Falkner, who lived among them for many years, has written a long and, apparently, a very authentic account

* Burney, i. 35 and 37.

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of the inhabitants of the countries south of the River Plata, and he describes those who inhabit the borders of the Strait and sea-coast to be, "Yacana-cunnees, which signifies foot-people, for they have no horses in their country; to the north they border on the Sehuau-cunnees, to the west on the Key-yus, or Key-yuhues, from whom they are divided by a ridge of mountains; to the east they are bounded by the ocean; and to the south by the islands of Tierra del Fuego, or the South Sea. These Indians live near the sea on both sides of the Strait, and often make war with one another. They make use of light floats, like those of Chilóe, in order to pass the Straits, and are sometimes attacked by the Huilliches and other Tehuelhets, who carry them away for slaves, as they have nothing to lose but their liberty and their lives. They subsist chiefly on fish, which they catch either by diving, or striking them with their darts. They are very nimble afoot, and catch guanacoes and ostriches with their bowls. Their stature is much the same as that of the other Tehuelhets, rarely exceeding seven feet, and oftentimes not six feet. They are an innocent, harmless people." *

To the north of this race, Falkner describes "the Sehuau-cunnees, the most southern Indians who travel on horseback; Sehuau signifies in the Tehuel dialect a species of black rabbit, about the size of a field rat; and as their country abounds in these animals, their name may be derived from thence: cunnee signifying 'people.'"

With the exception of their mode of killing the guanaco by bowls, or balls, the description of the Key-yus would apply better to the Fuegian Indians; and if so, they have been driven across the Strait, and confined to the Fuegian shores by the Sehuau-cunnees, who must be no other than Maria's tribe. The Key-yus, who are described to inhabit the northern shore of the Strait, between Peckett's Harbour and Madre de Dios, are probably the tribe found about the south-western islands, and now called Alikhoolip; whilst the eastern Fuegians, or Yacana-cunnees, who have also been turned off the conti-

* Falkner's Patagonia, pp. 110, 111.

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nent by their powerful neighbours, are now called Tekeenikas. Our knowledge of the names of these two tribes, Alikhoolip and Tekeenika, results from Captain Fitz-Roy's subsequent examination of the outer coast of Tierra del Fuego in the Beagle (1830). A Cacique, belonging to the nation of the Key-yus, told Falkner that he had been in a house made of wood, that travelled on the water. A party of the Indians, in four canoes, were met on the borders of the Otway Water by Captain Fitz-Roy in 1829, whose arms, implements, and every thing they had, were precisely like the Fuegian Indians, excepting that they had a quiver made from the skin of a deer, and were in form a superior race, being both stronger and stouter.

For want of better information upon the subject, we must be content to separate the natives into Patagonians and Fuegians. The sealing vessels' crews distinguish them as Horse Indians, and Canoe Indians.

These people have had considerable communication with the sealers who frequent this neighbourhood, bartering their guanaco skins and meat, their mantles, and furs, for beads, knives, brass ornaments, and other articles; but they are equally anxious to get sugar, flour, and, more than all, "aqua ardiente," or spirits. Upon the arrival of a boat from any vessel, Maria, with as many as she can persuade the boat's crew to take, goes on board, and, if permitted, passes the night. As soon as our boat landed, Maria and her friends took their seats as if it had been sent purposely for them. Not expecting such a visit, I had given no order to the contrary, and the novelty of such companions overcame the scruples of the officer, who was sent on shore to communicate with them. Their noisy behaviour becoming disagreeable, they were soon conducted from below to the deck, where they passed the night. Maria slept with her head on the windlass; and was so intoxicated, that the noise and concussion produced by veering eighty fathoms of cable round it did not awake her. The following morning, whilst I was at breakfast, she very unceremoniously introduced herself, with one of her companions, and

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seating herself at table, asked for tea and bread, and made a hearty meal. I took the precaution of having all the knives, and articles that I thought likely to be stolen, removed from the table; but neither then, nor at any time, did I detect Maria in trying to steal, although her companions never lost an opportunity of pilfering.

After breakfast the Indians were landed, and as many of the officers as could be spared went on shore, and passed the whole day with the tribe, during which a very active trade was carried on. There were about one hundred and twenty Indians collected together, with horses and dogs. It is probable that, with the exception of five or six individuals left to take care of the encampment, and such as were absent on hunting excursions, the whole of the tribe was mustered on the beach, each family in a separate knot, with all their riches displayed to the best advantage for sale.

I accompanied Maria to the shore. On landing, she conducted me to the place where her family were seated round their property. They consisted of Manuel, her husband, and three children, the eldest being known by the appellation of Capitan Chico, or "little chief." A skin being spread out for me to sit on, the family and the greater part of the tribe collected around. Maria then presented me with several mantles and skins, for which I gave in return a sword, remnants of red baize, knives, scissors, looking-glasses, and beads: of the latter I afterwards distributed bunches to all the children, a present which caused evident satisfaction to the mothers, many of whom also obtained a share. The receivers were selected by Maria, who directed me to the youngest children first, then to the elder ones, and lastly to the girls and women. It was curious and amusing, to witness the order with which this scene was conducted, and the remarkable patience of the children, who, with the greatest anxiety to possess their trinkets, neither opened their lips, nor held out a hand, until she pointed to them in succession.

Having told Maria that I had more things to dispose of for guanaco meat she dismissed the tribe from around me, and,

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saying she was going for meat (carne), mounted her horse, and rode off at a brisk pace. Upon her departure a most active trade commenced: at first, a mantle was purchased for a string of beads; but as the demand increased, so the Indians increased their price, till it rose to a knife, then to tobacco, then to a sword, at last nothing would satisfy them but 'aqua ardiente,' for which they asked repeatedly, saying "bueno es boracho—bueno es—bueno es boracho;"*—but I would not permit spirits to be brought on shore.

At Maria's return with a very small quantity of guanaco meat, her husband told her that I had been very inquisitive about a red baize bundle, which he told me contained "Cristo," upon which she said to me "Quiere mirar mi Cristo" (do you wish to see my Christ), and then, upon my nodding assent, called around her a number of the tribe, who immediately obeyed her summons. Many of the women, however, remained to take care of their valuables. A ceremony then took place. Maria, who, by the lead she took in the proceedings, appeared to be high priestess† as well as cacique of the tribe, began by pulverising some whitish earth in the hollow of her hand, and then taking a mouthful of water, spit from time to time upon it, until she had formed a sort of pigment, which she distributed to the rest, reserving only sufficient to mark her face, eyelids, arms, and hair with the figure of the cross. The manner in which this was done was peculiar. After rubbing the paint in her left hand smooth with the palm of the right, she scored marks across the paint, and again others at right angles, leaving the impression of as many crosses, which she

* It is good to be drunk, it is pleasant to be drunk.

† Two Portuguese seamen, however, who had resided some months with them, having been left behind by a sealing vessel, and taken off by us at a subsequent period of the voyage at their own request, informed us that Maria is not the leader of religious ceremonies. Each family possesses its own household god, a small wooden image, about three inches in length, the rough imitation of a man's head and shoulders, which they consider as the representative of a superior being, attributing to it all the good or evil that happens to them.

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stamped upon different parts of her body, rubbing the paint, and marking the crosses afresh, after every stamp was made.

The men, after having marked themselves in a similar manner (to do which some stripped to the waist and covered all their body with impressions), proceeded to do the same to the boys, who were not permitted to perform this part of the ceremony themselves. Manuel, Maria's husband, who seemed to be her chief assistant on the occasion, then took from the folds of the sacred wrapper an awl, and with it pierced either the arms or ears of all the party; each of whom presented in turn, pinched up between the finger and thumb, that portion of flesh which was to be perforated. The object evidently was to lose blood, and those from whom the blood flowed freely showed marks of satisfaction, while some whose wounds bled but little underwent the operation a second time.

When Manuel had finished, he gave the awl to Maria, who pierced his arm, and then, with great solemnity and care, muttering and talking to herself in Spanish (not two words of which could I catch, although I knelt down close to her and listened with the greatest attention), she removed two or three wrappers, and exposed to our view a small figure, carved in wood, representing a dead person, stretched out. After exposing the image, to which all paid the greatest attention, and contemplating it for some moments in silence, Maria began to descant upon the virtues of her Christ, telling us it had a good heart ('buen corazon'), and that it was very fond of tobacco. "Mucho quiere mi Cristo tabaco, da me mas," (my Christ loves tobacco very much, give me some). Such an appeal, on such an occasion, I could not refuse; and after agreeing with her in praise of the figure, I said I would send on board for some. Having gained her point, she began to talk to herself for some minutes, during which she looked up, after repeating the words "muy bueno es mi Cristo, muy bueno corazon tiene," and slowly and solemnly packed up the figure, depositing it in the place whence it had been taken. This ceremony ended, the traffic, which had been suspended, recommenced with redoubled activity.

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According to my promise, I sent on board for some tobacco, and my servant brought a larger quantity than I thought necessary for the occasion, which he injudiciously exposed to view. Maria, having seen the treasure, made up her mind to have the whole, and upon my selecting three or four pounds of it, and presenting them to her, looked very much disappointed, and grumbled forth her discontent: I taxed her with greediness, and spoke rather sharply, which had a good effect, for she went away and returned with a guanaco mantle, which she presented to me.

During this day's barter we procured guanaco meat, sufficient for two days' supply of all hands, for a few pounds of tobacco. It had been killed in the morning, and was brought on horseback cut up into large pieces, for each of which we had to bargain. Directly an animal is killed, it is skinned and cut up, or torn asunder, for the convenience of carrying. The operation is done in haste, and therefore the meat looks bad; but it is well tasted, excellent food, and although never fat, yields abundance of gravy, which compensates for its leanness. It improves very much by keeping, and proved to be valuable and wholesome meat.

Captain Stokes, and several of the officers, upon our first reaching the beach, had obtained horses, and rode to their 'toldos,' or principal encampment. On their return, I learned that, at a short distance from the dwellings, they had seen the tomb of the child who had lately died. As soon, therefore, as Maria returned, I procured a horse from her, and, accompanied by her husband and brother, the father of the deceased, and herself, visited these toldos, situated in a valley extending north and south between two ridges of hills, through which ran a stream, falling into the Strait within the Second Narrow, about a mile to the westward of Cape Gregory.

We found eight or ten huts arranged in a row; the sides and backs were covered with skins, but the fronts, which faced the east, were open; even these, however, were very much screened from wind by the ridge of hills eastward of the plain. Near them the ground was rather bare, but a little

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farther back there was a luxuriant growth of grass, affording rich and plentiful pasture for the horses, among which we observed several mares in foal, and colts feeding and frisking by the side of their dams: the scene was lively and pleasing, and, for the moment, reminded me of distant climes, and days gone by.

The 'toldos' are all alike. In form they are rectangular, about ten or twelve feet long, ten deep, seven feet high in front, and six feet in the rear. The frame of the building is formed by poles stuck in the ground, having forked tops to hold cross pieces, on which are laid poles for rafters, to support the covering, which is made of skins of animals sewn together so as to be almost impervious to rain or wind. The posts and rafters, which are not easily procured, are carried from place to place in all their travelling excursions. Having reached their bivouac, and marked out a place with due regard to shelter from the wind, they dig holes with an iron bar or piece of pointed hard wood, to receive the posts; and all the frame and cover being ready, it takes but a short time to erect a dwelling. Their goods and furniture are placed on horseback under the charge of the females, who are mounted aloft upon them. The men carry nothing but the lasso and bolas, to be ready for the capture of animals, or for defence.

Maria's toldo was nearly in the middle, and next to it was her brother's. All the huts seemed well stored with skins and provisions, the former being rolled up and placed at the back, and the latter suspended from the supporters of the roof; the greater part was in that state well known in South America by the name of charque (jerked beef); but this was principally horse-flesh, which these people esteem superior to other food. The fresh meat was almost all guanaco. The only vessels they use for carrying water are bladders, and sufficiently disagreeable substitutes for drinking utensils they make: the Fuegian basket, although sometimes dirty, is less offensive.

About two hundred yards from the village the tomb was erected, to which, while Maria was arranging her skins and

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mantles for sale, the father of the deceased conducted me and a few other officers.

It was a conical pile of dried twigs and branches of bushes, about ten feet high and twenty-five in circumference at the base, the whole bound round with thongs of hide, and the top covered with a piece of red cloth, ornamented with brass studs, and surmounted by two poles, bearing red flags and a string of bells, which, moved by the wind, kept up a continual tinkling.

A ditch, about two feet wide and one foot deep, was dug round the tomb, except at the entrance, which had been filled up with bushes. In front of this entrance stood the stuffed skins of two horses, recently killed, each placed upon four poles for legs. The horses' heads were ornamented with brass studs, similar to those on the top of the tomb; and on the outer margin of the ditch were six poles, each carrying two flags, one over the other.

The father, who wept much when he visited the tomb, with the party of officers who first went with him, although now evidently distressed, entered into, what we supposed to be, a long account of the illness of his child, and explained to us that her death was caused by a bad cough. No watch was kept over the tomb; but it was in sight of, and not very far from their toldos, so that the approach of any one could immediately be known. They evidently placed extreme confidence in us, and therefore it would have been as unjust as impolitic to attempt an examination of its contents, or to ascertain what had been done with the body.

The Patagonian women are treated far more kindly by their husbands than the Fuegian; who are little better than slaves, subject to be beaten, and obliged to perform all the laborious offices of the family. The Patagonian females sit at home, grinding paint, drying and stretching skins, making and painting mantles. In travelling, however, they have the baggage and provisions in their charge, and, of course, their children. These women probably have employments of a more laborious nature than what we saw; but they cannot be compared with

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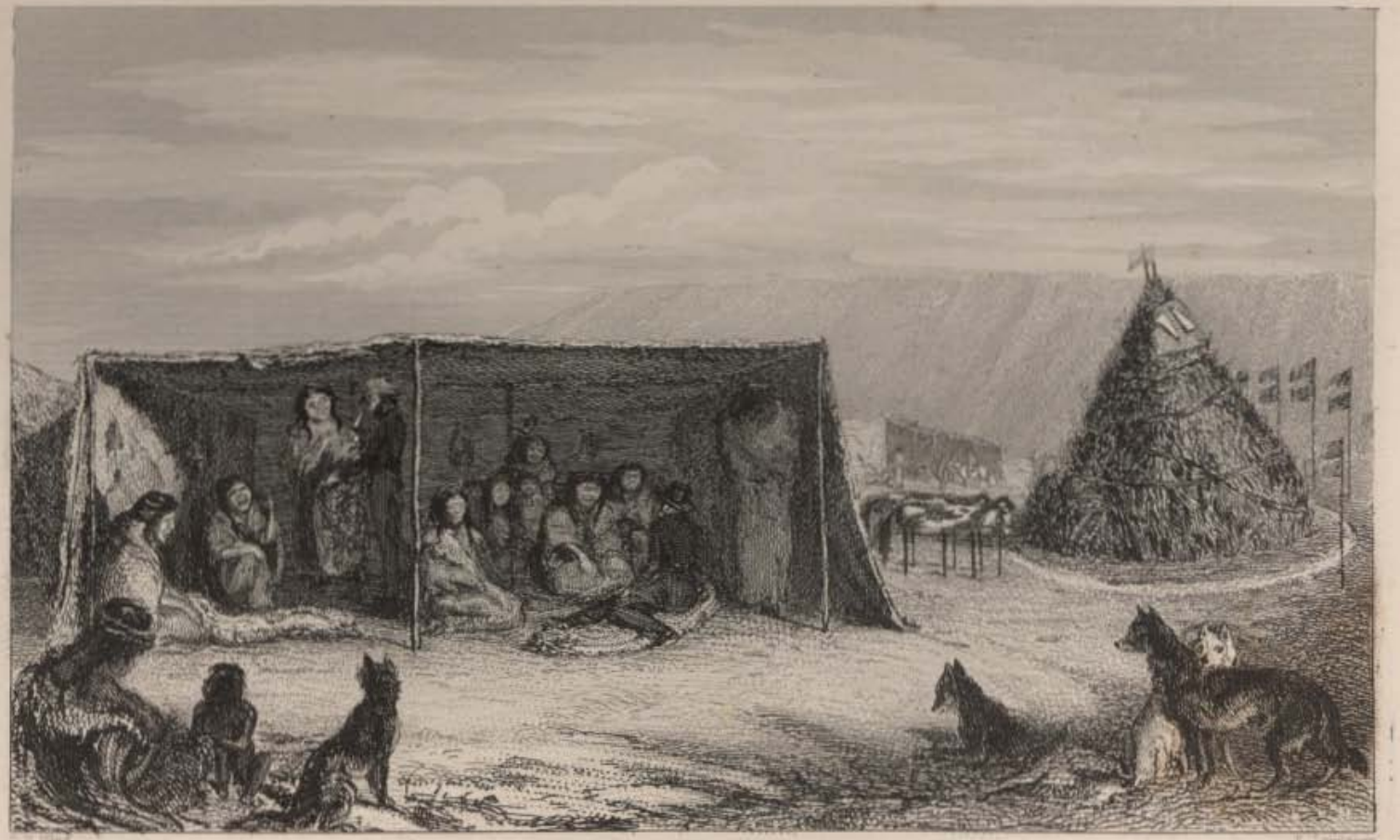

PATAGONIAN 'TOLDO' AND TOMB.

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those of the Fuegians, who, excepting in the fight and chace, do every thing. They paddle the canoes, dive for shells and sea-eggs, build their wigwams, and keep up the fire; and if they neglect any of these duties, or incur the displeasure of their husbands in any way, they are struck or kicked most severely. Byron, in his narrative of the loss of the Wager, describes the brutal conduct of one of these Indians, who actually killed his child for a most trifling offence. The Patagonians are devotedly attached to their offspring. In infancy they are carried behind the saddle of the mother, within a sort of cradle, in which they are securely fixed. The cradle is made of wicker-work, about four feet long and one foot wide, roofed over with twigs like the frame of a tilted waggon. The child is swaddled up in skins, with the fur inwards or outwards according to the weather. At night, or when it rains, the cradle is covered with a skin that effectually keeps out the cold or rain. Seeing one of these cradles near a woman, I began to make a sketch of it, upon which the mother called the father, who watched me most attentively, and held the cradle in the position which I considered most advantageous for my sketch. The completion of the drawing gave them both great pleasure, and during the afternoon the father reminded me repeatedly of having painted his child ("pintado su hijo.")

One circumstance deserves to be noticed, as a proof of their good feeling towards us. It will be recollected that three Indians, of the party with whom we first communicated, accompanied us as far as Cape Negro, where they landed. Upon our arrival on this occasion, I was met, on landing, by one of them, who asked for my son, to whom they had taken a great fancy; upon my saying he was on board, the native presented me with a bunch of nine ostrich feathers, and then gave a similar present to every one in the boat. He still carried a large quantity under his arm, tied up in bunches, containing nine feathers in each; and soon afterwards, when a boat from the Beagle landed with Captain Stokes and others, he went to meet them; but finding strangers, he withdrew without making them any present.

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In the evening my son landed, when the same Indian came down to meet him, appeared delighted to see him, and presented him with a bunch of feathers, of the same size as those which he had distributed in the morning. At this, our second visit, there were about fifty Patagonian men assembled, not one of whom looked more than fifty-five years of age. They were generally between five feet ten and six feet in height: one man only exceeded six feet—whose dimensions, measured by Captain Stokes, were as follows:—

	ft.	in.
Height	6	1¾
Round the chest.....	4	1½
Do. loins	3	4¾

I had before remarked the disproportionate largeness of head, and length of body of these people, as compared with the diminutive size of their extremities; and, on this visit, my opinion was further confirmed, for such appeared to be the general character of the whole tribe; and to this, perhaps, may be attributed the mistakes of some former navigators. Magalhaens, or rather Pigafetta, was the first who described the inhabitants of the southern extremity of America as giants. He met some at Port San Julian, of whom one is described to be "so tall, that our heads scarcely came up to his waist, and his voice was like that of a bull." Herrera,* however, gives a less extravagant account of them: he says, "the least of the men was larger and taller than the stoutest man of Castile;" and Maxim. Transylvanus says they were "in height ten palms or spans; or seven feet six inches."

In Loyasa's voyage (1526), Herrera mentions an interview with the natives, who came in two canoes, "the sides of which were formed of the ribs of whales." The people in them were of large size "some called them giants; but there is so little conformity between the accounts given concerning them, that I shall be silent on the subject."†

As Loyasa's voyage was undertaken immediately after the return of Magalhaens' expedition, it is probable that, from the

* Burney, i. p. 33. † Ibid. p. 135.

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impressions received from Pigafetta's narrative, many thought the Indians whom they met must be giants, whilst others, not finding them so large as they expected, spoke more cautiously on the subject; but the people seen by them must have been Fuegians, and not those whom we now recognise by the name of Patagonians.

Sir Francis Drake's fleet put into Port San Julian, where they found natives 'of large stature;' and the author of the 'World Encompassed,' in which the above voyage is detailed, speaking of their size and height, supposes the name given them to have been *Pentagones*, to denote a stature of "five cubits, viz. seven feet and a half," and remarks that it described the full height, if not somewhat more, of the tallest of them.* They spoke of the Indians whom they met within the Strait as small in stature.†

The next navigator who passed through the Strait was Sarmiento; whose narrative says little in proof of the very superior size of the Patagonians. He merely calls them "Gente Grande,"‡ and "los Gigantes;" but this might have originated from the account of Magalhaens' voyage. He particularises but one Indian, whom they made prisoner, and only says "his limbs are of large size:" ("Es crecido de miembros.") This man was a native of the land near Cape Monmouth, and, therefore, a Fuegian. Sarmiento was afterwards in the neighbourhood of Gregory Bay, and had an encounter with the Indians, in which he and others were wounded; but he does not speak of them as being unusually tall.

After the establishment, called 'Jesus,' was formed by Sarmiento, in the very spot where 'giants' had been seen, no people of large stature are mentioned, in the account of the colony; but Tomé Hernandez, when examined before the Vice-Roy of Peru, stated, "that the Indians of the plains, who are giants, communicate with the natives of Tierra del Fuego, who are like them.§

Anthony Knyvet's account‖ of Cavendish's second voyage

* Burney, i. 318. † Ibid, i. 324. ‡ Sarmiento, p. 244.
§ Sarmiento's Appendix, xxix. ‖ Purchas, iv. ch. 6 and 7.

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(which is contained in Purchas), is not considered credible. He describes the Patagonians to be fifteen or sixteen spans in height; and that of these cannibals, there came to them at one time above a thousand! The Indians at Port Famine, in the same narrative, are mentioned as a kind of strange cannibals, short of body, not above five or six spans high, very strong, and thick made.*

The natives, who were so inhumanly murdered by Oliver Van Noort, on the Island of Santa Marta (near Elizabeth Island), were described to be nearly of the same stature as the common people in Holland, and were remarked to be broad and high-chested. Some captives were taken on board, and one, a boy, informed the crew that there was a tribe living farther in-land, named 'Tiremenen,' and their territory 'Coin;' that they were "great people, like giants, being from ten to twelve feet high, and that they came to make war against the other tribes,† whom they reproached for being eaters of ostriches!"‡

Spilbergen (1615) says he "saw a man of extraordinary stature, who kept on the higher grounds to observe the ships; and on an island, near the entrance of the Strait, were found the dead bodies of two natives, wrapped in the skins of penguins, and very lightly covered with earth; one of them was of the common human stature, the other, the journal says, was two feet and a half longer.§ The gigantic appearance of the man on the hills may perhaps be explained by the optical deception we ourselves experienced.

Le Maire and Schouten, whose accounts of the graves of the Patagonians agree precisely with what we noticed at Sea Bear Bay, of the body being laid on the ground covered with

* Burney, ii. p. 106.

† The tribes described by this boy are the

1. Kemenites, inhabiting a place called Karay.
2. Kennekas..... Karamay.
3. Karaike ..... Morine.
4. Enoo, the tribe to which the Indians, whom they murdered, belonged.

‡ Burney, ii. 215. § Ibid. ii. 334.

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a heap of stones, describe the skeletons as measuring ten or eleven feet in length, "the skulls of which we could put on our heads in the manner of helmets!"

The Nodales did not see any people on the northern side of the Strait; those with whom they communicated were natives of Tierra del Fuego, of whose form no particular notice is taken.

Sir John Narborough saw Indians at Port San Julian, and describes them as "people of a middling stature: well-shaped. * * * Mr. Wood was taller than any of them." He also had an interview with nineteen natives upon Elizabeth Island, but they were Fuegians.

In the year 1741, Patagonian Indians were seen by Bulkley and his companions. They were mounted on horses, or mules, which is the first notice we have of their possessing those animals.

Duclos de Guyot, in the year 1766, had an interview with seven Patagonian Indians, who were mounted on horses equipped with saddles, bridles, and stirrups. The shortest of the men measured five feet eleven inches and a quarter English. The others were considerably taller. Their chief or leader they called 'Capitan.'

Bougainville, in 1767, landed amongst the Patagonians. Of their size he remarks: "They have a fine shape; among those whom we saw, not one was below five feet ten inches and a quarter (English), nor above six feet two inches and a half in height. Their gigantic appearance arises from their prodigiously broad shoulders, the size of their heads, and the thickness of all their limbs. They are robust and well fed: their nerves are braced and their muscles strong, and sufficiently hard, &c." This is an excellent account; but how different is that of Commodore Byron, who says, "One of them, who afterwards appeared to be chief, came towards me; he was of gigantic stature, and seemed to realise the tales of monsters in a human shape: he had the skin of some wild beast thrown over his shoulders, as a Scotch Highlander wears his plaid, and was painted so as to make the most hideous appearance I

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ever beheld: round one eye was a large circle of white, a circle of black surrounded the other, and the rest of his body was streaked with paint of different colours. I did not measure him; but if I may judge of his height by the proportion of his stature to my own, it could not be less than seven feet. When this frightful colossus came up, we muttered somewhat to each other as a salutation, &c."* After this he mentions a woman "of most enormous size;" and again, when Mr. Cumming, the lieutenant, joined him, the commodore says, "Before the song was finished, Mr. Cumming came up with the tobacco, and I could not but smile at the astonishment which I saw expressed in his countenance upon perceiving himself, though six feet two inches high, become at once a pigmy among giants, for these people may, indeed, more properly be called giants than tall men: of the few among us who are full six feet high, scarcely any are broad and muscular, in proportion to their stature, but look rather like men of the common bulk grown up accidentally to an unusual height; and a man who should measure only six feet two inches, and equally exceed a stout well-set man of the common stature in breadth and muscle, would strike us rather as being of a gigantic race, than as an individual accidentally anomalous; our sensations, therefore, upon seeing five hundred people, the shortest of whom were at least four inches taller, and bulky in proportion, may be easily imagined."†

This account was published only seven years after the voyage, and the exaggeration, if any, might have been exposed by numbers. There can be no doubt, that among five hundred persons several were of a large size; but that all were four inches taller than six feet must have been a mistake. The commodore says, that he "caused them all to be seated," and in that position, from the length of their bodies, they would certainly appear to be of very large stature.‡

* Hawksworth's Coll. i 28. † Ibid.

‡ See a letter from Mr. Charles Clarke, an officer on board the Dolphin, to Mr. Maly, M.D., secretary of the Royal Society, dated Nov. 3, 1766, read before the Royal Society on 12th April 1767, and published in the

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Shortly afterwards, Wallis, in the neighbourhood of Cape Virgins, communicated with the same people, and as the story of the Patagonian giants had been spread abroad, and was very much discredited, he carried two measuring rods with him; and says, in his narrative, "We went round and measured those that appeared to be the tallest. One was six feet seven inches high, several more were six feet five, and six feet six inches; but the stature of the greatest part of them was from five feet ten to six feet."

In the voyage of the Santa Maria de la Cabeza,* 1786, it is related that the height of one or two Patagonians, with whom the officers had an interview, was six feet eleven inches and a half (of Burgos), which is equal to six feet four inches and a half (English). This man wore a sword, on which was engraved "Por el Rey Carlos III.," and spoke a few words in Spanish, proofs of his having had communication with some of the Spanish settlements. It does not, however, appear from the account that there were many others, if any, of that height.

Of all the above accounts, I think those by Bougainville and Wallis the most accurate. It is true, that of the number we saw, none measured more than six feet two inches; but it is possible that the preceding generation may have been a larger race of people, for none that we saw could have been alive at the time of Wallis's or Byron's voyage. The oldest certainly were the tallest; but, without discrediting the accounts of Byron, or any other of the modern voyagers, I think it probable that, by a different mode of life, or a mixture by marriage with the southern or Fuegian tribes, which we know has taken place, they have degenerated into a smaller race, and have lost all right to the title of giants; yet their bulky,

the fifty-seventh volume of the Phil. Trans., part i. p. 75, in which an exaggerated account is given of this meeting. The men are described to be eight feet high, and the women seven and a half to eight feet. "They are prodigious stout, and as well and proportionably made as ever I saw people in my life." This communication was probably intended to corroborate the commodore's account.

* Ultimo Viage, p. 21.

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muscular forms, and length of body, in some measure bear out the above accounts; for had the present generation proportionate limbs, they might, without any exaggeration, justify the account of Commodore Byron. The Jesuit Missionary Falkner,* who, from an intercourse of forty years with the Indians of South America, must be considered as one of the best authorities, says, speaking of a Patagonian named Cangapol, "This chief, who was called by the Spaniards the Cacique Bravo,† was tall and well-proportioned; he must have been seven feet and some inches in height, because on tiptoe I could not reach the top of his head: I was very well acquainted with him, and went some journeys in his company: I do not recollect ever to have seen an Indian that was above an inch or two taller than Cangapol. His brother Sausimian was but about six feet high. The Patagonians or Puelches are a large-bodied people; but I never heard of that gigantic race which others have mentioned, though I have seen persons of all the different tribes of the Southern Indians."

This is an account in 1746, only twenty years before that of Bougainville. Taking all the evidence together, it may be considered, that the medium height of the males of these southern tribes is about five feet eleven inches. The women are not so tall, but are in proportion broader and stouter: they are generally plain-featured. The head is long, broad and flat, and the forehead low, with the hair growing within an inch of the eyebrows, which are bare. The eyes are often placed obliquely, and have but little expression, the nose is generally rather flat, and turned up; but we noticed several with that feature

* Falkner, according to Dean Funes, was originally engaged in the slave trade at Buenos Ayres; but afterwards became a Jesuit, and studied in the college at Cordova, where, to an eminent knowledge of medicine, he added that of theology. He is the author of a description of Patagonia, published in London after the expulsion of the Jesuits.—(*Ensayo de la Historia Civil del Paraguay, Buenos Ayres, y Tucuman, por el Doctor Don Gregorio Funes, iii. p.* 23, *note. Published at Buenos Ayres.* 8*vo.* 1817.)

† See Dean Funes's account of Buenos Ayres, and of the Indian tribes, vol. ii. 394.

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straight, and sometimes aquiline: the mouth is wide, with prominent lips, and the chin is rather large; the jaws are broad, and give the face a square appearance; the neck is short and thick; the shoulders are broad; the chest is broad, and very full; but the arm, particularly the fore-arm, is small, as are also the foot and leg; the body long, large and fat, but not corpulent. Such was the appearance of those who came under my observation.

As to their character, the Patagonians are friendly, without that disposition to quarrel, after the novelty of first acquaintance has worn off, which is so common among savages in general. This probably arises from interested motives, certainly not from fear, unless it be the fear of being avoided instead of visited by the ships which pass by, and from which they procure many useful articles, and many temporary gratifications.

Swords, long knives, tobacco, Paraguay tea, bits, saddles, guns, lead for balls, red cloth, beads (particularly of a sky-blue colour), flour, sugar, and spirits, are much desired in exchange for their peltry and guanaco meat; but they have no idea beyond that of satisfying the wants of the moment.

After a few pounds of tobacco had been distributed amongst them, although they are very fond of smoking, it became quite a drug, and it was necessary to produce something new to excite their attention. From Maria's influence, and the reference so constantly made to her, it would seem that she was considered as cacique of the tribe; but her apparent superiority may arise from her connexion with Bysante, of whom they all spoke as 'El Cacique Grande,' or from the attention paid to her by ships with whom they communicate.

The people of this tribe seemed to live together harmoniously; no bickerings or jealous feelings were observed, and certainly none were expressed by any one of our bulky friends on witnessing another receiving a valuable present, or a good exchange for his property.

At sunset our people were ordered to embark, upon which the price of Patagonian goods immediately fell, at least, a thousand per cent., though many held back in expectation of

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the next day. Maria put into the boat, after my refusal to let her go on board to pass the night, two bags, and asked me to send her flour and sugar. She was most importunate for aqua ardiente, which, however, I refused. Her constant cry was "It is very good to be drunk; I like drinking very much; rum is very good.—Give me some?" ('Muy bueno es boracho, mucho mi gusta, mucho mi gusta de beber, muy bueno es aqua ardiente.—Da me no mas?')

Among them was a Fuegian Indian; but it did not appear clearly whether he was living with them permanently, or only on a visit. Some of us thought we understood the account of one of the Patagonians, who seemed to be the most interested about him, to be, that a master of a sealer had left him amongst them. We knew him instantly by his squalid and comparatively diminutive appearance, and were confirmed in our ideas by his recognition of the words 'Hosay' and Sherroo.' The Patagonian name for a ship is 'Carro grande,' and for a boat 'Carro chico,' a mixture of their own and the Spanish language. All that I could understand of his history was, that he was Cacique of some Indian tribes at a distance: he was evidently a great favourite, and although Maria spoke generally with much contempt of the Fuegian Indians, she had patronised this stranger, for he lived in her toldo, and shared all the presents that were made to her.

The following morning it rained hard, and blew so fresh a gale, from the westward, that it would have been dangerous to send a boat on shore: and I was obliged to weigh without landing the things which I had promised. After we were under weigh, the weather cleared partially, when we observed Maria on the beach, mounted on her white horse, with others watching our departure, and when it was evident that we were really gone, she rode slowly back to her toldo, no doubt considerably vexed. I was very sorry to treat them in this way, for their conduct towards us had been open and friendly. All I could hope to do, to make amends, was to give something of value at my return.

We steered across the Bay of St. Philip, accompanied by

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the Beagle,* left the Strait of Magalhaens with a fair wind, and, after a favourable passage, reached Monte Video on the 24th April 1827.

From Monte Video we went to Rio de Janeiro, to procure stores, and prepare for another voyage to the Strait. On our arrival I received the Commander-in-chief's leave to apply to the Lord High Admiral for permission to employ a tender, to facilitate the surveys of the sounds and deep channels, in the neighbourhood of the Strait, and the inner sounds on the west coast; for which, neither the Adventure, nor the Beagle, were adapted; and I thought it best to delay our departure until an answer to my application was received.

* We left Gregory Bay in the morning, and passed Cape Virgins in the evening of the same day.

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CHAPTER VII.

Leave Rio de Janeiro—Santos—St. Catherine's—Monte Video—Purchase the Adelaide schooner, for a Tender to the Adventure—Leave Monte Video—Beagle goes to Port Desire—Shoals off Cape Blanco—Bellaco Rock—Cape Virgins—Possession Bay—First Narrow—Race—Gregory Bay—View—Tomb—Traffic with Natives—Cordial meeting—Maria goes on board—Natives intoxicated—Laredo Bay—Port Famine.

We were ready to resume our voyage early in September (1827); but not having received any communication by the packet, from the Admiralty, relative to the purchase of a tender, I determined to await the arrival of the next, early in October. I was again disappointed, and very reluctantly left Rio de Janeiro, on the 16th, for Monte Video; but that I might still benefit by the orders which were sure to be in the following packet, I determined upon calling at Santos, and St. Catherine's, for chronometrical observations; leaving the Beagle to wait for letters conveying the decision of his Royal Highness the Lord High Admiral.

We reached Santos on the 18th, and staid there until the 28th. In this interval I paid a short visit to St. Paul's, for the purpose of making barometrical observations.* At St. Cathe-

* On our passage from Santos to St. Catherine's, in latitude 28° south, we caught a 'dolphin' (*Coryphena*), the maw of which I found filled with shells, of *Argonauta tuberculosa*, and all containing the '*Octopus Ocythöe*' that has been always found as its inhabitant. Most of the specimens were crushed by the narrow passage into the stomach, but the smaller ones were quite perfect, and had been so recently swallowed that I was enabled to preserve several of various sizes containing the animal. To some of them was attached a nidus of eggs, which was deposited between the animal and the spire. The shells varied in size from two-thirds of an inch to two and a half inches in length; each contained an octopus, the bulk and shape of which was so completely adapted to that of the shell,

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MOLE, PALACE AND CATHEDRAL, RIO DE JANEIRO.

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rine's we remained eight days, and during the interval necessary for ascertaining the rates of the chronometers, I obtained magnetic observations.

After a tedious voyage of nineteen days from St. Catherine's, I arrived at Monte Video, and there received intelligence that the long-wished permission from the Lord High Admiral, to procure a tender, had been obtained. I accordingly purchased a schooner, which I named the Adelaide, and appointed Lieutenant Graves to the command. Five months' additional provisions for both vessels were purchased, and put into her; and on the 23d December, after running up the river to complete our water, we sailed out by the southern entrance, passing to the westward of the Archimedes' Shoal, and proceeded without farther detention to the southward.

On the 1st of January (in latitude 43° 17′ and long. 61° 9′), I was informed that we were close to a rock. Upon going on deck, I saw the object; but in a very short time I perceived it was a dead whale, upon whose half-putrid body large flocks of birds were feeding. Many on board were, however, sceptical, until, on passing to leeward, the strong odour testified the fact. Its appearance certainly was very like the summit of a dark brown rock, covered with weeds and barnacles, and the myriads of birds which surrounded it added to the deception. It could, however, be distinguished by its buoyancy; for the water did not break over it, as of course it would have done had it been a fixed body. Such is probably the origin of half the 'vigias' that are found on the charts. Whales, when struck by the fishers, frequently escape and perish; the carcass then floats on the surface of the sea, until decomposed or eaten by birds and fishes. A small vessel striking against such a mass, would probably be severely injured; and at night, the

shell, that it seemed as if the shell increased with the animal's growth. When so many learned naturalists have differed so materially as to the character of the inhabitants of the argonauta, it would be presumption in me to express even an opinion; I therefore merely mention the fact, and state that in no one specimen did there appear to be any connexion between the animal and the shell.

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body, from its buoyancy and the sea not breaking against it, would not be readily seen.

On the 4th, being about one hundred miles to the N.E. of Cape Blanco, I communicated with Captain Stokes, and gave him directions to proceed to Port Desire for chronometrical observations, and then follow me immediately to Cape Fairweather or Cape Virgins. We had light winds during the night, so that the Beagle made very little progress. In the afternoon, Cape Blanco, a long level-topped ridge, came in sight, of which good views are given in Lord Anson's voyage. We steered towards the land, and at six o'clock were in eighteen fathoms, the rocky hill at the extremity of the Cape bearing S. 10° E. thirteen miles; at seven o'clock, the same hill was six miles and a half off, bearing S. 3° E., when we observed a line of rippling water, extending from east to as far as we could see on the south horizon. The depth was seventeen fathoms, but as we proceeded it gradually decreased to twelve and ten, and soon afterwards to seven fathoms, when the Beagle was observed to be firing guns; but whether they were intended to warn us of danger, or as signals of her own distress, we could not determine, and I hauled to the wind to cross where the ripple appeared least violent. In passing through it we had not less than seven fathoms, and then it deepened to twelve and fifteen fathoms. We had now leisure to attend to the Beagle, and soon saw that her signals were only to warn us, for she had resumed her course under a press of sail.

After steering four miles to the S.E., we again found ourselves in the midst of ripplings, in which the water shoaled to six fathoms. It being then dark, and not knowing how to proceed, we shortened sail and brought to the wind, in order that if the ship struck it might be with less force; but happily we passed on without any further decrease of soundings. In going through the ripple, the Adelaide, though deeply laden, behaved well.

Commodore Byron passed over these shoals, which he describes as lying at a greater distance from the shore: it was to avoid them that we passed so near the land.

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During the following evening there was a very heavy dew, the never-failing prognostic of a northerly wind; the horizon, also, was very hazy, and the water perfectly smooth. We were not more than ten miles off shore, yet the land was completely distorted in appearance by mirage.

Next morning we were very close to the position assigned to the Bellaco, or St. Estevan's Shoal, the existence of which has been very much doubted. It was discovered by the Nodales, and in the diary of their voyage is thus described: "At five o'clock, or later in the evening, we discovered a rock a-wash ('una baxa que lababa la mar en ella') about five leagues from the shore, more or less. It is a very deceitful rock ('Es muy bellaco baxo'), because it is under water, over which, in fine weather and smooth water, the sea breaks. We sounded near it, and found twenty-six fathoms stony bottom. Its latitude is 48½°, according to our noon observation, and the course and distance we have since run."*

The late Don Felipe Bauza, one of the companions of Malespina, informed me, that on the voyage of the Descubierta and Atrevida, their boats were sent to look for it, but were unsuccessful.

At noon we were in lat. 48° 40′ S., long. 66° 6′, depth forty-two fathoms, but without any signs of the Bellaco. Sailing on, the coast was seen in the neighbourhood of Beachy Head (so named from its resemblance to the well-known promontory). Afterwards, Cape Fairweather came in sight, and on the 10th Cape Virgins, which we passed in the evening, and, half an hour afterwards, rounding Dungeness, we again entered the Strait of Magalhaens; and anchored near the northern shore.

In Possession Bay we were detained several days, although repeated attempts to pass the First Narrow were anxiously made.

One evening, clouds gathered, and the weather assumed such a threatening appearance, that I expected to be obliged to run to sea; but to our surprise, when the cloudy mass seemed on

* Nodales, p. 48.

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the point of bursting over us with a deluge of rain, it suddenly vanished, and was succeeded by a beautifully clear and fine night. This favourable appearance gave us hopes of being able to make good our entrance on the following day; but a fresh gale set in, and kept us at our anchorage.

Early on the 14th we made another fruitless attempt to pass the First Narrow. As the Adelaide sailed under our stern, Lieutenant Graves informed me that he had lost an anchor, and had only one left, to which he had bent his chain-cable; and that she had shipped so much water in attempting to beat through, that he was on the point of asking permission to bear up when we ourselves gave up the attempt. It blew too hard to give any assistance to the Adelaide, but next morning, when the weather was more moderate, I seized an opportunity of sending our two kedge anchors; and in the afternoon we supplied her with some water and other necessaries, so that she was comparatively well off, and my anxiety on her account much relieved.

Fires on the Fuegian side had been kept up since our arrival, but we could not distinguish any inhabitants; on the Patagonian shores we saw a great number of guanacoes feeding quietly, a proof of there being no Indians near them.

On the 16th, the weather appearing favourable, our anchor was weighed, and, with the Adelaide, we soon entered the sluice of the Narrow, proceeding rapidly, though the wind blew hard against us. The tide carried us to an anchorage, about four miles beyond the western entrance, and it was slack water when the anchor was dropped; but, no sooner had the stream turned, than we found ourselves in the midst of a 'race,' and during the whole tide, the water broke furiously over the ship. At slack water we got underweigh, but the Adelaide not being able (from the strength of the tide), to purchase her anchor, was obliged to slip the cable: it was fortunate that we had supplied her with our kedges, or she would then have been without an anchor. The night was tempestuous, and although we reached a much quieter birth, the Adelaide drifted considerably; had she remained at the morning's anchorage,

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in order to save her anchor and cable, we should probably never have seen her again.

The succeeding morning, after a hard beat to windward, both vessels anchored in Gregory Bay. No Indians were in the neighbourhood, or we should have seen their fires. In the afternoon the wind moderated, and as there was every appearance of fine weather, I remained to survey the coast.

On the summit of the land, about half a mile northward of the extremity of the Cape, while Lieutenant Graves and I were taking bearings, and making observations, two guanacoes came up and stood neighing at us; the observation, however, was of consequence, and as they were not disturbed, they remained watching us for some minutes before they took alarm and fled.

Lieutenant Wickham and Mr. Tarn made an excursion to the summit of the Table Land, previously described as extending from the low land behind the Second Narrow to the N.E., in the direction of Mount Aymond, and were amply repaid for a fatiguing walk, with the thermometer at 81°, by a magnificent view: Cape Possession to the eastward, and to the south the mountains near Mount Tarn, eighty miles distant, were plainly distinguished. The view to the westward, stretching over a large extent of grassy plains, was bounded by lofty ranges of snow-capped mountains; but to the north it was intercepted by another summit of the mountain upon which they stood. The country they passed over was covered with short grass, through which a mass of granite occasionally protruded. Neither trees nor shrubs were observed, excepting a few herbaceous plants, and the berberis; a goose, some ducks, snipe, and plovers were shot; and guanacoes were seen at a distance, but no ostriches, nor did they meet any Indians. Large fires were, however, kindled on both shores of the Strait, in answer to the fire which they made for cooking. In consequence of those on the Patagonian coast appearing so close to us, we expected a visit from the natives before night, but none made their appearance.

Next morning, Mr. Graves accompanied me in a boat to a

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station three miles within the Second Narrow on the north side, and in our way we found the geological structure of the cliffs to be of a decomposed clay-slate, arranged in strata, much distorted by the violent action of the water, and dispersed in vertical and inclined directions in very thin laminæ.

These cliffs are about one hundred feet high, the soil a sandy alluvium, of a sterile character, scantily covered with a wiry, stunted grass, and here and there a berberis bush, loaded with ripe fruit, which, from the poverty of the soil, was tasteless and dry; the ground was also, in many parts, over-run to a considerable extent with an insipid cranberry, scarcely worth the trouble of gathering.

We struck across the country, with the view of examining the place where the Indians were residing at our last visit, and the tomb which had then been erected. Grass had grown up, and effaced the traces of feet; but the tomb had suffered no farther alteration than the weather might have effected. We found that the place had been recently visited by the natives, for within a few yards of the entrance were strewed the ashes of a large fire, containing vestiges of the former decorations of the tomb, and the end of one of the flag-staffs, with the unburnt corner of one of the banners. Amongst the ashes, also, we found calcined bones; but whether they were human or not, we could not ascertain.

The discovery of the bones impressed us with the idea that the body had been burnt, and determined me to examine the tomb. The bushes that filled up the entrance appeared to be placed exactly as when we first saw them, and indeed the whole pile seemed to have remained quite undisturbed; but there was no appearance of the brass ornaments, or of the effigies of the horses.

Having effected an opening in the bushes, we found an inner covering, made of horse-skins. Having cut two holes opposite each other, for the admission of light, we saw nothing but two parallel rows of stones, three in each row, probably intended as a bier for the body or a covering for the grave; but the ground around and between them bore no appearance

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of having been disturbed for burial.* As we hourly expected the Indians would arrive (the place being in the direct line of their journey to the ships), and were unwilling to let them know we had disturbed the sanctuaries of their dead, we restored the former appearance of the tomb; and it was fortunate we did so, for three women on horseback, carrying their children in cradles, with a quantity of skins, provisions, and other merchandise, evidently the harbingers of the tribe, made their appearance, and immediately began to erect their tents.

When we next went on shore we found several Indians arrived, and divided into three groups, with mantles, ostrich-feathers, skins, and joints of guanaco meat displayed for sale.

As the meat appeared fresh, it is probable that, on seeing us, the women were despatched to place the toldos, while the men set out to provide guanaco meat, for they knew our partiality for this excellent food. When we landed, an active barter began.

From the haste and avidity shown in offering their goods, and closing the bargains, it seemed as if they were anxious to monopolize our articles of barter before the rest of their party, or tribe arrived. One old man attempted to cheat; but my interdiction of all farther traffic with him brought him to a sense of his error, and I then made him a present of some tobacco and allowed him to trade, which he afterwards did, with cheerfulness and honesty.

One of the party was the Fuegian chief, whom I previously noticed, as a squalid, meagre-looking man; but he was now enlarged to Patagonian dimensions, by his improved diet and more cheerful mode of life. The appearance of bad weather obliged us to suspend the barter and get on board. After we had reached the ship, successive parties of the tribe arrived,

* Falkner says, in his account of the burial ceremonies of the southern Patagonians—that, after a certain interval, the bodies are taken out of the tomb, and skeletons are made of them by the women—the flesh and entrails having been burnt. It is possible that in this case the body had been so treated, and that the fire near it was for the purpose of burning the flesh, and perhaps with it all the flags and ornaments of the tomb.

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and formed the encampment. Among them, mounted on her white horse, was Maria, who, duly escorted, paraded on the beach to challenge our recognition. In the centre of the encampment, a large flag suspended from a pole was a signal to us, and showed the position of her toldo.

The next morning being fine, we landed near the encampment, and were most cordially received. Maria was particularly attentive, and embraced me closely, while her companions chaunted in chorus a song of delight at our arrival.

When we reached her toldo, a mat was spread out for me to sit on. Maria and her family placed themselves in front of me, while the rest sat round. Almost the first question was an inquiry for my son Philip, whom they called Felipe,* and two or three skins were given to me for him. They then asked for our pilot on the former voyage, and were much disappointed to find he had left the ship. After a short conversation I returned the two bags (which I had so unwillingly carried away at our last visit), having filled them with flour and sugar, and then proceeded to deliver our presents. As each article was delivered into her hands, she repeated, in Spanish, "I'll pay for this;" but upon a bit for her horse being presented, a general burst of admiration followed, and it was handed round the tents, whilst each individual, as it passed on, looked, I thought, anxious to be its possessor.

Maria then began to consider what adequate requital she could possibly make me. The result was, a present of two mantles, one new, of guanaco skin, and the other well worn, of zorillo skin, besides two or three skins of the puma. She then produced a piece of paper, carefully wrapped up in canvas, containing a letter, or memorandum, left by Mr. Low, master of the Uxbridge sealer, addressed to any shipmaster passing through the Strait, apprising him "of the friendly disposition of the Indians, and impressing him with the necessity of treating them well, and not deceiving them; for they had good memories, and would seriously resent it."

The advice, no doubt, was good; but I think the fear of

* He was a great favourite with them.

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forfeiting advantages and comforts to be derived from traffic would induce them to restrain their resentment.

I brought no spirits; for which, after a short time, Maria asked, complaining that she was very ill, and had sore eyes, and for some time past had nothing but water to drink, and wood to smoke. Her illness was evidently assumed, but her eyes seemed highly inflamed; and no wonder, for the upper part of her face was smeared over with an ochrous red pigment, even to the very edge of her eyelids: indeed, the whole tribe had ornamented themselves similarly, in compliment, I suppose, to our visit.

As I prepared to return on board, Maria's importunity induced me to allow her to accompany me; upon which she began to muster up all her empty bags, old mantles, and skins, and, attended by her husband, her brother-in-law, his wife and daughter, got into the boat. While going on board, the spray washed the painted countenances of our visitors, much to their regret.

Upon reaching the ship, I ordered them to be regaled with meat and biscuit, of which they partook very sparingly, but took care to put what remained into their bags. Some spirits and water, too, which I thought would be soon dispatched, and which had been plentifully diluted to prevent their being made tipsy, they emptied into bottles to take on shore "for the evening," when, as Maria said, they would be "very drunk."

Among various things shown to amuse them was a musical snuff-box, which I had procured for the express purpose of exciting their astonishment; but I was surprised to find, that a penny-whistle produced a ten-fold greater effect upon their senses. This indifference to musical sounds I should not have suspected, because they frequently sing, though certainly in a monotonous manner.

As soon as their repast was concluded, the party, except Maria and the girls, commenced bartering their mantles and skins, and, by the time their stock was expended, they had amassed a large quantity of biscuit, and a bundle of various

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trifles, some of which they had attempted to get by pilfering. They made themselves so contented, that it was not without much difficulty we could persuade them to go on shore. Maria had made her mind up to pass the night on board, and so anxious were they all to remain, that it was only by giving Maria two bottles of spirits (which had been well diluted) that they were induced to get into the boat, and accompany me ashore. Being a lee-tide, and low water, the boat grounded at a considerable distance from the beach; seeing this, some of the Indians rode into the water, and taking us up behind them, conveyed us to the encampment, my place being behind Maria, the smell of whose zorillo-skin mantle was hardly bearable; but it was necessary to conceal our dislike of our companions as much as possible, for they are very sensitive, and easily offended.

While waiting for the tide, we witnessed a drunken scene at Maria's toldo. Fifteen persons, seated around her, shared the spirits she had obtained on board, until all were intoxicated. Some were screaming, others laughing, some stupified, and some bellowing. The uproar drew all the other Indians round the tent, who tendered their assistance to compose their friends, and we returned to the ship. When we visited them the next day, they were quite recovered, and gave us some guanaco meat, which had been brought in that morning. On communicating my intention of proceeding on the voyage, Maria wished to know when we should finish our "seal-killing," and come back. I told her "in five moons," upon which she endeavoured to persuade me to return in four, because she would then have plenty of skins to barter.

I wrote a few lines to Captain Stokes, who, I expected, would arrive in a day or two, communicating my desire that he should follow, as soon as possible, to Port Famine, and committed the letter to Maria's care, who promised to deliver it to him; then, taking leave of her and her companions, I embarked, and proceeded through the Second Narrow to an anchorage off Cape Negro.

Our visit to Gregory Bay, and communication with the

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Indians, furnished us with many additions to our zoological collection; among them was a tiger-cat, which seemed, from the description, to be the *Felis pajaros* of the Encyclopédie Méthodique (the "Chat de Pampa" of D'Azara). Maria gave me a very large bezoar stone, that was taken from the stomach of a guanaco. It is used medicinally by the Indians, as a remedy for bowel complaints.*

Whilst we were at the anchorage before Cape Negro, Mr. Tarn and Mr. Wickham visited the lake at the back of Laredo Bay, and saw two swans, which, from the colour of their plumage, seemed to be the black-necked swan of the River Plata and of the Falkland Islands† (Dom Pernettey, ii. p. 148). They brought on board with them a new species of duck, which is described in the proceedings of the Zoological Society as *Anas specularis* (Nob.), and a small burrowing animal, of the rat tribe, that, from the character of its teeth, is probably of a genus not hitherto noted: it approaches nearest to F. Cuvier's *Helamys*.

We next anchored in Port Famine, where the tents, &c. were replaced in their former positions, the ship was unrigged and secured for the winter, and all hands set to work, preparing the Adelaide for service.

* The medicinal property of this intestinal concretion is well known wherever the animal is found. Marcgrave, in his "Tractatus topographicus et meteorologicus Brasiliæ," folio, p. 36, says:—"Hæc animalia (guanacoes) generant lapides Bezoares in sinu quodam ventriculi, qui maximi æstimantur contra venena et febres malignos ad roborandum et refocillandum cor, aliosque affectus. Materia è qua generantur sunt herbæ insignis virtutis, quibus vescuntur naturæ instinctu ad sanitatem tuendum, aut morbos et venena superandum. Hi lapides inveniuntur in adultioribus hisce animalibus atque interdum tam grandes, ut unum in Italiam attulerim qui pendet uncias duas supra triginta."—Mr. Thompson, on Intestinal Concretions. See his Syn. of Chemistry, iv. 576.

† *Anser nigrocollis*. Encyc. Méthod., art. Ornithol. 108.

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CHAPTER VIII.

Find that the Cutter had been burned—Anxiety for the Beagle—Uxbridge Sealer—Beagle arrives—Her cruize—Bellaco Rock—San Julian—Santa Cruz—Gallegos—Adeona—Death of Lieutenant Sholl—Adelaide Sails—Supposed Channel of San Sebastian—Useless Bay—Natives—Port San Antonio—Humming-birds—Fuegians—Beagle sailed—Sarmiento—Roldan—Pond—Whales—Structure—Scenery—Port Gallant.

Port Famine bore evident marks of having been visited in our absence by the Indians, for a large fire, apparently recent, had over-run the grass, and burned the trees upon Point Santa Anna, particularly in that part where our boat had been so carefully concealed. Eager to know whether she had escaped the fire, I lost no time in hastening to the spot, directly after the Adventure anchored, and found, as our fears had anticipated, that she had been completely destroyed, scarcely a vestige of her wood remaining, and most of the iron-work having been carried away; for which, doubtless, the Indians had set her on fire.

The sheds for the cooper and armourer, which had been erected with some pains, were also entirely consumed, and every thing portable had been carried away. Those things which were of no use to them were either broken or burnt; but some of our station poles on Point Santa Anna were left uninjured; as well as the tablet erected to the memory of Mr. Ainsworth and the boat's crew; which was singular, because it was secured by iron hoops—of great value, in their eyes.

From the fresh traces of horses in the neighbourhood, we at first suspected the conflagration to have been caused by the Patagonians; but we soon found we owed our loss to the Fuegians, for in two new wigwams were strewed some remains of our boat.

The last winter appeared to have been milder than that preceding it, for last January, Mount Sarmiento and the hills to

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the southward, over Fitton Bay, were so covered with snow, that not a particle of the rock could be seen; but this year many bare spots were visible. Every thing else, however, indicated a bad season, and the berberis bushes and arbutus shrubs had scarcely any show of fruit; which was rather a disappointment, as the berries of the former plant proved an agreeable addition to our food last year. However, there was no scarcity of birds, and with the seine we procured plenty of fish.

The Beagle's long and unexpected absence caused us much uneasiness, and some apprehension for her safety. Her visit to Port Desire ought not to have occupied more than three days, and her superior sailing should have enabled Captain Stokes to rejoin us in the entrance of the Strait. People were sent daily to look out for her, and every succeeding day increased our anxiety.

A long succession of blowing and rainy weather much impeded our progress with the Adelaide; but the Hope was hoisted out, and prepared for service.

Before daylight on the 14th I was informed that the Beagle was seen in the offing. Blue lights were burnt, and lanterns immediately shown to guide her to the anchorage; but our disappointment was great when the stranger proved to be Mr. W. Low's schooner, the Uxbridge. He had been sealing since November in the neighbourhood of Noir Island, near the outer entrance of the Barbara Channel, and was on his way to Cape Gregory to meet his elder brother, who had been collecting sea-elephant oil at South Shetland. The Uxbridge had entered the Strait from the Pacific, by the Magdalen 'Channel,' which last year we thought a Sound, and had attempted to explore in the Hope, but had been deceived by the abrupt change in the direction of the Channel at Cape Turn.

At last (on the 28th), after the Beagle's absence had been protracted to more than a month beyond the time intended, we were relieved from painful anxiety, and much rejoiced, by Mr. Tarn's telling us he had just seen her, and in two hours afterwards she arrived.

Captain Stokes, to my great surprise, told me that he had

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been examining the whole coast between Port Desire and Cape Virgins, and for the last ten days had been detained in the Gallegos River by heavy gales of wind. He had sounded round, and fixed the position of the Bellaco Rock, or St. Estevan's Shoal, the existence of which had been so long doubted. He had also visited and partially surveyed, the harbours of Port San Julian and Santa Cruz, besides Coy Bay, and had made almost a complete survey of the River Gallegos, which he found to be a large and rapid river, whose entrance forms a spacious port: instead of being blocked up by a mound of shingle four or five feet above the level of the sea, and having so small a stream as to escape the notice of Mr. Weddell as he walked along the beach.* Cape Fairweather is so remarkable, and so correctly placed upon the chart, that Mr. Weddell, in his search for the river, must have very much deceived himself. I should think he must have mistaken the ravine described upon my former visit, since that is the only part which answers his description: it could not be Coy Bay, because that opening, although of minor importance, has a broad boat communication with the sea.

Captain Stokes described the tide at the anchorage, within the mouth of the Gallegos, as running at the rate of five knots, and rising forty-six feet. From Mr. Weddell's account, he was on the point of passing by without examining it; but the weather being fine, he determined to go in his boat and ascertain the truth of that description. It was soon evident that the river was large, and, returning to his ship, he lost no time in anchoring her within the entrance, where she rode out a heavy gale from S.W.

The Beagle left the Gallegos on the 23d, and reached Port Famine on the 28th, a very short passage, since she remained for a night and the greater part of a day at Gregory Bay, to communicate with the natives. When approaching the First Narrow, Captain Stokes observed a brig, apparently at anchor, under Cape Orange, and supposing her either to have found a good anchorage, or to be in distress, steered towards her.

* Weddell's Voyage.

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Before he had reached within two miles of her, the Beagle touched the ground, but was extricated from the danger most fortunately, because it was nearly high water; and had she remained a-ground during the tide, the consequences might have been serious—at least, she could not have been got off without lightening her considerably. The brig proved to be the Adeona (Mr. Low's vessel), on her way to meet the Uxbridge. In attempting to enter the narrow, she grounded on the shoals, and had been left dry. The following tide again floated her, and she was on the point of getting underweigh, when the Beagle hove in sight. Captain Stokes finding that the Adeona had received no damage, proceeded to Gregory Bay.

By the Beagle's arrival we were informed of the death of Lieutenant Robert H. Sholl, after an illness of ten days. His remains were interred at Port San Julian, where a tablet was erected to his memory.

This excellent young man's death was sincerely regretted by all his friends, and by none more than by me. He was appointed to the expedition, as a midshipman, solely on account of his high character.

During our voyage from England, he made himself conspicuously useful in saving the cargo of a vessel, which was stranded in Port Praya; and on our arrival at Rio de Janeiro, the Commander-in-chief appointed him to a vacant lieutenantcy on board the Beagle: an appointment which, up to the period of his lamented death, he filled zealously and most creditably.*

On the 1st of March we were surprised by the appearance of three Europeans, walking round Point St. Anna. A boat

* I cannot avoid noticing here the considerate conduct of the Commander-in-chief (Sir George Eyre) with respect to this appointment. By the tenor of my instructions the Adventure and Beagle were placed under the Admiral's orders; and the vacancy, had he wished to exercise his prerogative, might have been filled by one of his own followers. It was, however, given, at my request, to Mr. Sholl, as being more conversant with the duties of this peculiar service than any of the midshipmen of the flag-ship. The Admiral's conduct, on this occasion, calls for my warmest thanks.

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was sent for them, and we found they were deserters from the Uxbridge, who had come to volunteer for our ships.

The following day the Adeona and Uxbridge arrived, on their way to Port San Antonio, to boil their oil; but I recommended Bougainville, or (as the sealers call it) Jack's Harbour, as more convenient for their purpose, and more secure from storms, as well as from troublesome visits of the natives.

Upon my offering to restore the three deserters to the Uxbridge, Mr. Low requested me to keep them, and another, also, who was anxious to join the Adventure, to which I consented, as the Adelaide wanted men.

A few days after Mr. Low's departure, he returned in a whale-boat to ask assistance in repairing the Uxbridge's rudder. By our help it was soon made serviceable, and she was enabled to prosecute her voyage, which could not otherwise have been continued.

The Adelaide being ready for sea: her first service was to be an examination of the St. Sebastian Channel, which, from its delineation on the old charts, would seem to penetrate through the large eastern island of Tierra del Fuego. In the voyage of the Nodales (in the year 1618), an opening on the eastern coast, supposed to be the mouth of a channel, communicating with the Strait of Magalhaens, was discovered. After describing the coast to the south of Cape Espiritu Santo, the journal of that voyage states: "We found, in the channel of St. Sebastian, twenty fathoms clear ground. The north shore is a beach of white sand, five leagues in extent, stretching out from the high land that terminates at Cape Espiritu Santo, and giving the coast here the appearance of a deep bay; but, on a nearer approach, a projecting tract of low shore is observed. The south extremity of this low beach is a sandy point, round which the channel trends; the mouth is a league and a half wide. The south shore is higher than the land to the northward, and in the middle of the bay the depth is from fifteen to twenty fathoms clear ground, and a good bottom; but from mid-channel to the south shore the bottom is stony, and the water, of little depth, there being only six and seven fathoms. From

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hence the channel shows itself, and continues, as far as we could see, of the same breadth. It seemed to be a large sea. The latitude was observed to be 53° 16′." *

From the above account, and from the chart that accompanies it, in which this inlet is made to communicate with the Strait of Magalhaens by the opening round Cape Monmouth, our knowledge of the supposed St. Sebastian Channel was derived. That there is a deep bay, in the latitude of 53° 16′, not only appears from the account of the Nodales, who were within the heads, although it seems they did not proceed beyond the stony ground on the south side of the entrance; but also from the accounts of vessels who have lately seen it; and of one ship-master who was deterred from entering, by the formidable notice on our charts of its being "only navigable for small vessels," whence he conjectured that the tides would be very strong, and the channel occasionally narrow, as well as and shoal.

Sarmiento, Narborough, Byron, Wallis, Bougainville, and Cordova, have severally noticed an opening, which corresponds to this supposed channel, namely, that between Capes Monmouth and Valentyn; but the object of those voyagers having been to make the passage through the known Strait, to explore this opening was, in all probability, considered a waste of time; yet, that such a channel was supposed to exist, we must conclude from the conspicuous figure it makes in the charts of Tierra del Fuego.

Had there been a knowledge of its affording any communication with the sea, surely Sarmiento and Narborough, as well as the Nodales, who navigated the Strait from west to east, would have been induced to attempt to pass through; and avoid the dangers, as well as difficulties, of the channels to the northward.

Anxious to set the question at rest, I gave Captain Stokes orders to proceed to survey the western coasts, between the Strait of Magalhaens and latitude 47° south, or as much of

* Relacion del Viage, &c. que hicieron los Capitanes B. G. de Nodales y Gonzalo de Nodales, p. 59.

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those dangerous and exposed shores as he could examine, with the means at his disposal, and sailed myself, in the Adelaide, to explore the supposed St. Sebastian Channel. Every discretionary power was given to Captain Stokes to act as he pleased, for the benefit of the service; but he had strict orders to return to Port Famine by the 24th of July, when I hoped to move the Adventure to some other part of the Strait, and to recommence operations with the earliest days of spring, if the winter should be unfit for our work.

Having crossed over to the southward of Point Boqueron, we proceeded, on the 13th of March, to the N.E. (in which direction the opening trended), at no great distance from the northern shore; behind which the country seemed to rise gradually to the summit of a long ridge of table-land, terminating near the First Narrow, and appearing like that in the neighbourhood of Cape Gregory. It was inhabited; for here and there we observed the smoke of fires, perhaps intended as invitations for us to land.

The south side of the opening seemed (after forming a small bay under Nose Peak) to extend in a direction parallel to the northern coast of the bay, for three or four leagues, when it dipped beneath the horizon. Neither shore had any opening or indenture in its coast line, of sufficient size to shelter even a boat; so that a vessel caught here, with a south-westerly gale, would have little chance of escape; unless a channel should exist, of which, from the stillness of the water and the total absence of tide, we had very little hope. The soundings were variable between twenty and thirty fathoms, and the bottom seemed to be of shells, probably covering a substratum of clay or sand. As we stood on, a small rocky lump came in sight, which appeared to be the termination of the northern shore, and again we flattered ourselves with the expectation of finding a passage; but in less than half an hour afterwards, the bay was distinctly seen to be closed by low land, and the rocky lump proved to be an isolated mass of rock, about two miles inland. As every person on board was then satisfied of the non-existence of any channel, we put about to return, and

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by bearings of Mount Tarn, crossed by angles from Mount Graves, Nose Peak, and Point Boqueron, our position, and the extent of this bay, were determined. As it affords neither anchorage nor shelter, nor any other advantage for the navigator, we have named it Useless Bay. It was too much exposed to the prevailing winds to allow of our landing to examine the country, and its productions, or to communicate with the Indians; and as there was not much likelihood of finding anything of novel character, we lost no time in retreating from so exposed a place. Abreast of Point Boqueron the patent log gave for our run twenty-six miles, precisely the same distance which it had given in the morning; so that from five o'clock in the morning until ten, and from ten o'clock until four in the afternoon, we had not experienced the least tide, which of itself is a fact confirmatory of the non-existence of a channel.

From the fires of the natives in this part having been noticed at a distance from the beach, it would seem that they derive their subsistence from hunting rather than fishing; and as there are guanacoes on the south shore of the First Narrow, it is probable the people's habits resemble those of the Patagonians, rather than the Fuegians; but as they have no horses, the chase of so shy and swift an animal as the guanaco must be fatiguing and very precarious.*

Sarmiento is the only person on record who has communicated with the natives in the neighbourhood of Cape Monmouth. He calls them in his narrative a large race (Gente grande). There it was that he was attacked by the Indians, whom he repulsed, and one of whom he made prisoner.

We remained a night in Port Famine, and again set out in the Adelaide to survey some of the western parts of the Strait.

* Falkner describes the Indians who inhabit the eastern islands of Tierra del Fuego, to be 'Yacana-cunnees,' and as he designates those who inhabit the Patagonian shore of the Strait by the same name, it might be inferred that they are of the same race; but however closely connected they may have been formerly, they certainly are not so now, for Maria (the Patagonian) spoke very contemptuously of them, and disclaimed their alliance; calling them 'zapallios,' which means slaves.

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Bad weather forced us into Port San Antonio; of which Cordova gives so favourable an account, that we were surprised to find it small and inconvenient, even for the Adelaide.

He describes the port to be a mile and a half long, and three quarters of a mile broad: we found the length a mile and a quarter, and the mean breadth scarcely a quarter of a mile. It possesses no one advantage that is not common to almost every other harbour and cove in the Strait; and for a ship, or square-rigged vessel of any kind, it is both difficult to enter, and dangerous to leave. Besides the local disadvantages of Port San Antonio, the weather in it is seldom fair, even when the day is fine elsewhere. It lies at the base of the Lomas Range, which rises almost perpendicularly to the height of three thousand feet, fronting the great western channel of the Strait, whence it receives upon its cold surface the western winds, and is covered by the vapour, which is condensed from them, while in all other parts the sun may be shining brightly.

This port is formed by a channel, a quarter of a mile wide, separating two islands from the shore. The best anchorage is off a picturesque little bay on the south island, which is thickly wooded to the water's edge with the holly leaved berberis,* fuchsia, and veronica, growing to the height of twenty feet; over-topped and sheltered by large beech, and Winter's-bark trees, rooted under a thick mossy carpet, through which a narrow Indian path winds between arbutus and currant bushes, and round prostrate stems of dead trees, leading to the seaward side of the island. Upon the beach, just within the bushes, and sheltered by a large and wide-spreading fuchsia bush, in full flower, stood two Indian wigwams, which, apparently, had not been inhabited since the visit of poor Ainsworth. He had occupied these very wigwams for two days, having covered them over with the boat's sail; and remains of the ropeyarns that tied it down were still there: a melancholy memento.

In no part of the Strait did we find the vegetation so luxuriant as in this little cove. Some of the Winter's-bark and currant trees had shoots more than five feet long, and many of the

* Berberis ilicifolia.—Banks and Solander MSS.

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FUEGIAN WIGWAMS AT WOOD HARBOUR IN THE MAGHALEN CHANNEL.

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Winter's-bark trees were two feet in diameter. The veronica (I believe *V. decussata*) grows in the sheltered parts to the height of twenty feet, with a stem six inches in diameter. It was found too on the windward side of the island in abundance, and of large size, rooted in the very wash of the sea-beach, and exposed to the full force of the cold winds and hail-storms, which rush down the wide western reach of the Strait.

The fuchsia also grows to a large size; but it is a more delicate plant than the veronica, and thrives only in sheltered places. Many were observed six inches in diameter; the stems of the two last plants were used by us, during our stay, for fuel.

The day after our arrival, the gale subsided, and the weather became very fine indeed. The stillness of the air may be imagined, when the chirping of humming-birds, and buzzing of large bees, were heard at a considerable distance. A humming-bird had been seen at Port Gallant last year, and was brought to me by Captain Stokes, since which none had been noticed. Here, however, we saw, and procured several; but of only one species.* It is the same as that found on the western coast, as high as Lima; so that it has a range of 41° of latitude, the southern limit being 53½°, if not farther south.

The islets, at the north part of the port, were well stocked with geese and other birds, which supplied our people with fresh meals. The steamer duck we found difficult to shoot, from its excessive wariness, and power of remaining, for a great length of time, under water.

Our fine weather lasted but a few hours, and (no unusual occurrence in these regions) was succeeded by a week's rain and wind, during which we were confined to the small space

* The specimen that was found at Port Gallant was sent by me to Mr. Vigors, who considering it, although well known to ornithologists, as never having yet been named, describes it in the Zoological Journal (vol. iii. p. 432, Aug. 1827), as Mellisuga Kingii. Shortly afterwards M. Lesson published it in his Manuel d'Ornithologie (vol. ii. p. 80.), as *Ornismya sephaniodes*, as a discovery belonging to La Coquille's voyage, in the illustrations of which it is figured at plate 31. I rather think, however, that it is Molina's *Trochilus galeritus*.—(Molina, i. 275.).

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of the Adelaide; and for some days had three anchors down, owing to the violent squalls. Farenheit's thermometer ranged between thirty-six and forty-six degrees, and we had several snow storms, but the snow did not lie on the low grounds.

On the 28th the gale began to subside, and there was a change for the better; but we were again disappointed, and not until the 31st could we effect our departure from this dreary and confined little place.

The day before we sailed, three canoes, containing in all sixteen persons, of whom six only were men, came alongside.

For about an hour they had hesitated to approach; but when once near us, very little invitation was necessary to induce them to come on board. One was clothed in a duck shirt, which was recognised by one of our people, who had joined us from the Uxbridge, as having been given to them a few weeks before, when that vessel passed through Magdalen Channel: another wore a red flannel shirt, and in the canoe we observed an European boarding-pike, painted green, and a part of the iron-work of the cutter, burned at Port Famine during our absence; also some relics of the boat in which Mr. Ainsworth was drowned, which last they had doubtless found thrown up on the beach. Upon our inquiring how they became possessed of the iron-work, they pointed towards Port Famine; and I have no doubt they were concerned in the fire; but as we could not explain to them the mischief they had occasioned, it was thought better not to notice the affair, and the articles were returned to them. They could have had no idea of our being the owners of the boat, or they would have concealed all that belonged to her.

They conducted themselves very quietly during their stay on board, with the exception of one, who tried to pick my pocket of a handkerchief; the offender was ordered out of the vessel, and there was no further attempt to pilfer. They wished to go below; but this was not permitted, because the odour of their oily persons was scarcely tolerable, even in the open air. As to food, tallow-candles, biscuit, beef, plumb-pudding, were

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equally liked, and swallowed most voraciously. One of them was discovered taking the tallow out of the end of the deep sea lead and eating it, although mixed with sand and dirt.

Before sunset their canoes were despatched on shore to prepare the wigwams, during which operation three of the men remained on board; and as soon as the preparations were made they called for a canoe and went on shore. We obtained several spears, baskets, necklaces, bows and arrows from them in barter; but they seemed to have very few skins. Perhaps those they possessed were hidden in the bushes, because they had no wish to part with them.

One woman was covered with a guanaco mantle; another merely wore a seal-skin over her back and shoulders, which, while she crouched in the canoe, was sufficient to cover her person. One had a black stripe down the nose, but she was the only female among them who was so painted.

Next morning the Indians visited us with a fresh assortment of bows and arrows, in the manufacture of which they had evidently passed the night, for every one was quite new; the bows were of green wood, and the arrows not even pointed. They found, however, a ready sale. One of the party was a man who had been turned out of our vessel the preceding evening, for picking my pocket; but he was daubed over with a whitish pigment to deceive us, and would probably have escaped detection, but for the unusual ugliness of his person, which was not so easily disguised. He was much disconcerted by our recognition; and our refusal to barter with him made him angry and sullen.

The women had daubed their faces all over with bright red ochre; to add to their beauty, no doubt.

We sailed out of the port by the northern passage, and standing across the Strait, anchored in San Nicolas Bay. Mr. Graves went to Bougainville Harbour, to communicate with the Adeona, and take letters from me to Lieutenant Wickham. He brought back an account of all being well at Port Famine, and of the Beagle having sailed on the 17th.

When we left Port Famine my intention was to examine

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the Magdalen Channel; but, upon leaving San Nicolas Bay (1st April), the weather was so favourable for our proceeding to the westward, that I changed my mind and steered round Cape Froward in order to get to Port Gallant, whence, with a westerly wind, we might more easily survey the coast in returning. An easterly breeze carried us near Cape Holland, into Wood's Bay, where we anchored, and obtained a bearing of Mount Sarmiento, which, being clear of clouds, was a conspicuous, and even splendid object; for the sun's setting rays, shining upon the projecting snowy ridges on its western side, gave it the appearance of a mass of streaky gold. It had been in sight the whole day, as well as the preceding evening, when its bearings were taken from the islet in San Nicolas Bay.

The next day was so calm that we only reached an anchorage in Bradley Cove, on the west side of Bell Bay, of which a plan was made; an extensive set of bearings was also taken on the west point of the bay, evidently that called by Sarmiento Tinquichisgua.* The conspicuous mountain at the back of the bay, on its south-eastern side, is particularly noticed by him, and, according to his opinion, is the "Campana de Roldan" of Magalhaens.† Between Bradley Cove and Point Tinquichisgua are two coves, over which a high double-peaked mountain forms a conspicuous object upon rounding Cape Froward; and they were named in compliment to Mr. Pond, the late Astronomer Royal.

While at Point Tinquichisgua we were discovered by some natives to the westward, who immediately got into their canoes, and paddled towards us; but, as we had no arms in the boat, I did not think it prudent to await their arrival; and therefore, after taking the requisite angles, embarked and returned to the Adelaide, examining the inlets under Mount Pond on our way. Nothing more was seen of the Indians until the following morning, when, as we sailed out of the bay, they made their appearance, but we did not communicate

* Sarmiento, p. 213.

† Este monte es el que llaman las Relaciones antiguas la Campana de Roldan.—Sarmiento.

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with them. They were as vociferous as usual, and pointed to the shore, inviting us to land. One of them, who stood up in the canoe while we passed, was ornamented about the hair and body with white feathers.

This part of the Strait teems with whales, seals, and porpoises. While we were in Bradley Cove, a remarkable appearance of the water spouted by whales was observed; it hung in the air like a bright silvery mist, and was visible to the naked eye, at the distance of four miles, for one minute and thirty-five seconds before it disappeared.

A glance at the chart of this part of the Strait will show the difference of geological structure in the opposite coasts. The north shore, from Cape Froward to Port Gallant, forms a straight line, with scarcely a projection or bight; but on the opposite side there is a succession of inlets, surrounded by precipitous mountains, which are separated by ravines. The northern shore is of slate; but the other is principally of greenstone, and its mountains, instead of running up into sharp peaks, and narrow serrated ridges, are generally round-topped. The vegetation on both sides is almost equally abundant, but the trees on the south shore are much smaller. The smooth-leaved beech (*Fagus betuloides*) and Winter's-bark are the principal trees; but here and there a small tree was observed, like a cypress, which does not grow to the eastward, excepting on the sides of Mount Tarn, where it only reaches the height of three or four feet.

The scenery of this part of the Strait, instead of being as Cordova describes it, "horrible," is at this season exceedingly striking and picturesque. The highest mountains certainly are bare of vegetation; but their sharp peaks and snow-covered summits afford a pleasing contrast to the lower hills, thickly clothed with trees quite to the water's side, which is bordered by masses of bare rock, studded with ferns and moss, and backed by the rich dark-green foliage of the berberis and arbutus shrubs, with here and there a beech-tree, just beginning to assume its autumnal tints.

In working into the narrow entrance of Port Gallant, the

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schooner grounded upon a bank that extends off the mouth of the river; but the water being perfectly smooth, no damage was caused. As a secure cove, Port Gallant is the best in the Strait of Magalhaens; from the stillness of its waters, it is a perfect wet dock, and from its position it is invaluable. There are many coves as safe and convenient when once entered; but the prevailing steepness of the shores, as well as the great depth of water, are obstacles of serious importance. Here, however, is an exception: the bottom is even and the depth moderate; besides, Fortescue Bay, close by, is an excellent roadstead or stopping-place, to await an opportunity of entering.

For repairing a ship, Port Famine is more convenient, on account of the quantity and size of well-seasoned timber lying about the beach, and also from the open character of the country. At Port Gallant the trees are much stunted, and unfit for present use, while the shore, as is the case around almost every cove to the westward of Cape Froward, is covered with shrubs and brushwood, quite to the high-water mark; so that there is no possibility of walking easily to any distance from the sea-side. A shingle, or sandy beach, twenty or thirty yards in length, occasionally intervenes, but is scarcely preferable to a vessel's deck, for a walk.

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CHAPTER IX.

Detention in Port San Antonio—Humming-birds in snow showers—Fuegians—Geological remarks—Canoes—Carving—Birds—Fish—Shag Narrows—Glaciers—Avalanches—Natives—Climate—Winter setting in—Adelaide loses a boat—Floods—Lightning—Scurvy—Adelaide's survey—Bougainville Harbour—Indians cross the Strait, and visit Port Famine—Sealing vessels sail—Scurvy increases—Adelaide sent for guanaco meat—Return of the Beagle—Captain Stokes very ill—Adelaide brings meat from the Patagonians—Death of Captain Stokes.

Our stay at this port was prolonged beyond my intention by thick snowy weather and hard gales, which cut off our communication with the shore; for notwithstanding we were in so sheltered a place, and the vessel had three anchors down, we did not consider her quite secure against the violent squalls. We had been fortunate in procuring observations, and took advantage of our detention to lay down the operations of the preceding days on paper. Muscles were found in great abundance on the mud flats. There are three varieties, one of which has a bitter, disagreeable taste, but the others are exceedingly good and wholesome. One of the latter is of large size (*Mytilus Magellanicus* of the Ency. Méth.) The other is of a more globose form than the bitter sort, and has a very obtuse hinge and margin. The bitter kind contains pearls, which are valueless, because small, and of a bad colour.

At first there were plenty of sea-birds* in the cove, which took refuge at the head of the bay; till after two days, they deserted us altogether. There appeared to be an abundance of fish; but as we had not provided ourselves with a seine, and they

* Here we obtained a second species of the Steamer-duck, which is described in the Proceedings of the Zoological Society of London, as '*Micropterus Patachonicus*, Nob.' It differs from the *M. brachypterus* not only in colour but in size, being a smaller bird, and having the power of raising its body, in flight, out of the water. We called it the 'Flying Steamer.'

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would not take bait, we were confined for refreshments principally to shell-fish.

No traces of quadrupeds, excepting an Indian dog, were noticed. Here Wallis's people saw a large cloven-footed animal, which they described to be as "big as a jack-ass." It was probably a deer, one or two of which had occasionally appeared at Port Famine.(*e*)

It has been mentioned that we found many humming-birds at Port San Antonio, which we attributed to the sheltered situation of the place, and the luxuriant growth of fuchsias and other plants, upon the sweets of whose flowers they feed. Here, however, one of the same species was seen sporting about in a most exposed place and during the falling of a snow shower, a proof of the hardy character of this little bird, which, if it does migrate upon the approach of winter to a warmer clime, lingers, at least, as long as it possibly can. This was the middle of April, the winter had, in fact, already commenced, and all the mountains around us were clothed with snow, while the ground was also coated with the same dazzling covering. Mr. Graves intended to ascend the Mountain de la Cruz; but a heavy fall of snow prevented the attempt, and we lost the opportunity of obtaining a round of angles from that elevation, which would have materially assisted our operations. We should also have obtained a bird's-eye view of the Barbara Channel and the Sounds on the opposite side of the Strait, whose extent and nature we did not know; for Cordova's notice of San Simon's Bay, and a deep inlet which exists to the westward of it, is very unsatisfactory.

There were no signs of a recent visit from the Fuegians, though at the entrance of the cove we found three or four wigwams in good repair; whence it seems probable, that the place is one of their frequent haunts. When the Beagle came here last year, some station staves were left standing; but, before her return, every one had been removed; and when Captain Stokes went down the Barbara Channel, to the relief

(*e*) Or the animal called by Molina 'Huemul.'—R. F.

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of the Saxe Cobourg's crew, those staves were seen in the possession of the Indians.

A fine morning (11th) induced us to leave this quiet anchorage, to examine the openings of the south shore; and in the afternoon, the anchor was dropped in a convenient place, on the west side of the western inlet, named by us Warrington Cove. While crossing the bay from Point Elvira, the north extremity of Cayetano Island, several 'smokes' were observed on the low land, at the bottom of the inlet; and after we anchored two canoes visited us, containing six men, four women, and two or three children. They approached very cautiously, and could not be induced to come alongside. At last the men landed, and invited us to communicate with them. I therefore went on shore with two or three officers, and remained with them half an hour, during which they gradually lost the distrust they had at first evinced; but each man still carried a number of pebbles in the corner of his wrapper, ready to repel any attack we might make upon them; from the knowledge we have since obtained of their character, I think it probable that they had lately committed some act of aggression on a sealing-vessel, and were afraid of retaliation. Our conduct tended to assure them of our friendship; and, shortly after we left the shore, they came alongside in their canoes, and were very familiar, eagerly bartering their necklaces and baskets. In their way to us they had probably landed their more valuable goods, such as otter and seal-skins, as well as their weapons and dogs, without which they never go far.

The natives of this part are considered by the sealers to be the most mischievously inclined of any in the Strait, or Tierra del Fuego. The appearance of our visitors was certainly against them; but they did not commit themselves during our two or three days' communication, by any act which could make us complain, or cause suspicion of their honesty and friendship. We, however, kept too good a look-out, to enable them to take advantage of our seeming good-nature.

Among bushes behind the high beach were three wigwams, but the Indians had no intention of remaining with us for the

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night. They went away, to our great satisfaction, at an early hour, and returned to the bottom of the sound, where a large party of their countrymen was assembled. Their departure enabled us to look round, in the vicinity of our anchorage, and examine its productions, which differed in no way from those of other parts of the coast. Its geological structure is, however, different: the rocks are greenstone, or granite, without slate. Mount Maxwell, rising immediately over the cove, is the termination of a rocky mountain range, whose summits are crowned with snow. The verdant sides of the hill, interspersed at intervals with large masses of bare rock, produced, from a distance, rather a pleasing effect; but, upon examination, the verdure was found to consist principally of moss, or a stunted vegetation, covering a soft and swampy soil. The upper portions of the mount are so precipitous as not to be easily reached; and, indeed, many parts rise with a perpendicular ascent for more than a hundred feet. On the south side of Mount Maxwell is Smyth Inlet, which contains anchorage on the north shore, particularly one in Earle Cove; but in the centre the water is deep, and on that account, it is not an inviting place for a ship. During Mr. Graves's absence in Smyth Harbour, I examined the coast as far as Cape Edgeworth, where I obtained an extensive set of bearings. The afternoon was particularly favourable for the purpose, the snow-capped mountains of the north shore were perfectly distinct; and among them was a very high one, shaped like a Highland target, the peak of the mountain answering to the central spike of the shield. We never afterwards saw it, nor could I, on this occasion, fix its position better, than by estimating its distance. The rock is chiefly greenstone, accompanied by considerable masses of granite. A little islet, off Dighton Cove, is composed of granite, of a lamelliform structure. Mr. Graves brought me a specimen of lamelliform granite attached to a mass of greenstone.

The Indians visited us every day, their number being generally from twelve to sixteen, of which five or six only were men, the rest were women, and children of all ages. One of the latter could not have been more than three weeks old; yet the

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mother, apparently about sixteen years of age, was always occupied in the laborious employment of paddling the canoes. The child was secured in the mother's lap, with its head on her bosom, by a mantle, which was drawn tightly round both mother and child. Their canoes were similar to those of the eastern parts of the Strait, about ten feet long, holding four or five grown persons and two or three children, besides their dogs, implements, and weapons: they are formed of bark, and kept in shape by wooden cross supports secured to the gunwale, which is lined by a long, slender pole. They are divided into three compartments, the foremost occupying about one-third of the length, contains the spears, placed ready for immediate use; in the second are the grown persons, with the fire-place between them, the men sitting between the fire-place and the spears, to be ready to use them upon the approach of seals or porpoises; on the opposite side of the fire-place are seated the women who paddle the canoe, in which the men sometimes assist, when great expedition is necessary. Behind the women, in the third division, are the elder children and the dogs, the younger children being generally stowed away in the women's laps, for the sake of mutual warmth. The fire is made upon a layer of clay, several inches thick, at the bottom of the canoe; and above the fire, across the gunwales, are laid several pieces of half-burnt wood, for fuel.

During our communications with these visitors they conducted themselves peaceably, and made no attempt to pilfer, although there was some little roguery displayed by them in barter. One of the men having parted with all his disposable property, tendered one of his daughters, a fine girl of fourteen or fifteen years of age, for some mere trifle, and, being refused, became very pressing and importunate to close the bargain for the price that was jestingly offered; nor was it without difficulty that he was convinced we were not in earnest. They were as poor as the rest of their countrymen, very badly clothed, and possessing few skins to barter. Two of them exchanged their otter skin mantles for cotton shirts, which they continued to wear without complaining of cold.

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As their visits lasted all day they always brought their food, consisting of the blubber of seals and porpoises. The method used by them in cutting it up is nearly similar to that adopted by the Esquimaux Indians, as described by Sir Edward Parry in his second voyage, and also resembles the process of the natives of King George's Sound, which I have described in the account of my survey of Australia (vol. ii. p. 140): a piece of blubber being held in the left hand, a corner of it is taken between the teeth, and it is then cut by a knife, held underhanded, into strips backward and forward, without passing the instrument entirely through: so that when the operation is finished the piece draws out into a long band, about an inch thick, formed by the connected strips. The whole affair from first to last is most offensive to the sight; and the countenance of the carver is beyond description, for his eyes being directed to the blubber, squint shockingly, and give his ugly face a hideous appearance. The strip of blubber is next divided among the party, each of whom proceeds to extract its oily juices by drawing it through his teeth and sucking it, after which it is warmed in the fire to facilitate its division into small pieces, which are swallowed or bolted without mastication. Morsels of this dainty food were given not only to the elder children, but even to infants at the breast.

On the 14th, while preparing to weigh, the Indians came on board and helped to heave in the cable, but without rendering us much real assistance. When the sails were loosed, the women in the canoes began to chatter and scream for fear we should carry off their friends, and their alarm was no sooner given than the deck was cleared of our visitors, who seemed to be quite as much frightened for their safety as the women were. In a few minutes afterwards we were proceeding to the southward, and first tried to anchor in a bay on the south side of Smyth Harbour, but finding the depth too great, I sent Lieut. Graves to sound behind an islet where there were indications of a place of shelter, but he returned unsuccessful. During his absence I went to a very narrow passage, which he had discovered, leading to a large channel or sound; but finding it

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intricate, I deferred trying to enter with the vessel until a more favourable opportunity should offer, and we returned to the place south of Warrington Cove, called Dighton Bay, where we anchored off a sandy beach in twenty fathoms, and secured the vessel by laying the kedge on the shore. This sandy beach was the first we had found in the eastern part of the Strait. The sand is quartzose, of a white colour, and being a novelty, rendered the place interesting. A stream, supplied by the ravines of Mount Maxwell, runs over the beach into the sea, and from it an abundant supply of excellent water may be obtained without difficulty.

We observed no quadrupeds; but, of the feathered tribe, we found woodpeckers, kingfishers, and woodcocks, and in the sheltered nooks several humming-birds were darting about the flowery underwood of berberis, fuchsia, and arbutus. In the tide-way, at the narrow passage, the sea teemed with fish; over which hovered corvorants and other sea-fowl, preying upon the small fry that were trying to elude their voracious enemies, the porpoises and seals, thousands of which were seen sporting about as we proceeded on our way. Whales were also numerous in the vicinity, probably because of an abundance of the small red shrimp, which constitutes their principal food.

I went again to examine the passage, and the tide being against us, we were obliged to pull close to the western shore to benefit by the partial eddies, otherwise we could not have proceeded until the turn of the tide.

These narrows, named 'Shag' Narrows, from the quantity of birds there so called by seamen, are not a hundred yards wide. The south end is fronted by an island, from whose summit, about four hundred feet high, I hoped to obtain a good view southward, and after passing the narrows we landed and reached the summit. While looking around at the view, and preparing the theodolite, a woodcock started up from the long grass and walked away so leisurely, that Mr. Tarn nearly succeeded in striking it with a stick. This bird afforded us a name for the station, which we found to be at the northern side of a large basin, ten miles wide, and six long, terminated at

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its south end by a channel leading to the open sea, but crowded with islands and rocks. A deep inlet or chasm in the land, at the N.W. corner of this basin, was filled with masses of floating ice, broken from an enormous glacier.

After obtaining all the bearings and embarking, we pulled three miles to the westward, and took a round of angles at Point Cairncross, the south-west point of Field's Bay, and again another set at the south head of Icy Sound, near Dinner Cove, where we found a very convenient anchorage for small vessels. Through Icy Sound we found some difficulty in penetrating, as the channel was much obstructed by ice.

Three miles within this sound the rocky shore became more precipitous, and at two miles farther, where the width across was not more than one hundred and fifty yards, the rocks rise perpendicularly on each side to the height of seven or eight hundred feet. Beyond this remarkable part the channel opens out to a basin about half a mile in diameter, bounded by a sloping glacier, from which immense masses of ice broke off frequently, and falling with a noise like the discharge of a ship's broadside, threw up the foaming water with terrific violence.

As we entered the basin, we were startled by a sudden roar, occasioned by the fall of one of these avalanches, followed by echoes which reverberated round the basin and among the mountains. We remained for half an hour afterwards waiting for another fall, but were not gratified. Several were heard at a distance, probably high up the sides of the glacier. The examination of Icy Sound occupied us until dark, when we returned to the schooner.

During our absence, Indians had again visited the Adelaide, the greater number of whom were strangers. We had also seen a party in a canoe close to Mount Woodcock, who were striking seal, and too intent upon their object to pay much attention to any thing else.

On the 16th, the term of our absence having expired, we left Dighton Bay on our return: at night we anchored in St. Nicholas Bay, and the day after arrived at Port Famine.

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Natives had discovered and visited the ship while I was away, but Lieut. Wickham did not encourage them to remain; and two or three attempts to pilfer being detected, they were treated with very little ceremony; so finding their company was not desired, they went across the Strait to Lomas Bay, where for several days afterwards the smoke of their fires was seen. They were the same Indians whom we had met at Port San Antonio.

That these Indians should be received so coolly, may seem to have been impolitic on our side, when it is considered that our smaller vessels and boats might be met with, and their crews ill-treated by way of retaliation. It was, however, time that they should know our superiority; for, of late, several very treacherous attacks had been made by them on sealing vessels, and this party was the most forward and insolent we had seen. One of them was teazing several of the men to box, an accomplishment he had probably learnt from the crews of sealing vessels; among others, he fixed upon the serjeant of marines, who very unceremoniously pushed him over the side, and made him return to his canoe, which he resented by pushing off from the ship's side, and throwing a stone at the serjeant, who was standing at the gangway. As it missed him, and did no harm, no notice was taken of his mischief. We afterwards heard that the same party had visited Bougainville Harbour, where the Adeona was at anchor; but as Mr. Low neither gave them encouragement to remain, nor permitted them to go on board his brig, they very soon went away.

The difference between the climates of the western and eastern portions of the Strait was very striking. To the westward the country, being principally clothed with evergreens, such as the smooth-leaved beech, and Winter's-bark, with an underwood of arbutus and berberis, seems to possess a constant verdure, nor until the snow covers all, does it assume any thing like the appearance of winter. To the eastward, evergreens are less common, their place being occupied by the beech (*Fagus Antarctica*), whose leaves fall very early. Snow had also begun to cover the lower grounds, giving signs of winter. April termi-

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nated with finer weather than we had experienced for some weeks, but May set in with north-easterly winds and much rain, succeeded by a heavy fall of snow.

"Tristis hyems montes niveo velamine vestit."

As yet the thermometer had not been very low. On one or two occasions it had fallen during the night to 28°, but generally it ranged between 45° and 38°.

The Adelaide was again despatched on the 30th April, to carry on an examination of the openings on each side of Cayetano Island; but she returned on the 21st of May, with the disagreeable intelligence of having had her only serviceable boat stolen by the Indians. This was a serious loss, not only on account of so much time being thrown away, but also because we had no other boat to substitute for her. To prevent delay, I sent to Mr. Low, at Bougainville Harbour, requesting that he would sell one of his boats; but he was himself so badly off, from similar losses, that he could only assist us by lending one for a few weeks, and as it was the only boat he possessed, it could not be spared to go far from his vessel. I, therefore, despatched Mr. Graves, in the Adelaide, to Bougainville Harbour, to employ himself in examining the coast thence to Cape Froward, and in the mean time began to build a whale-boat, to be ready for the Adelaide's use as soon as winter had passed over; for, from Mr. Graves's report of the state of the climate to the westward, very little could be done during the winter months.

The following is Lieut. Graves's account of the loss of his boat:—Upon leaving Port Famine he proceeded at once to Port Gallant, and surveyed Cordes Bay; after which he crossed the Strait to St. Simon's Bay, and anchored in Millar Cove, on its western side, immediately to the north of Port Langara, from which it is only separated by a narrow neck of land. The Adelaide remained there at anchor while Mr. Graves visited the different parts of the bay. Her presence had attracted a large party of Indians, who, occupying several wigwams near the entrance of the cove, paid daily visits to

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our people, and were apparently very familiar and well-disposed.

But they had cast a longing eye on the whale-boat, which, when equipped for service, contained many things very useful to them, and they laid a plan to carry her off, which succeeded. One evening she was prepared for going away at an early hour the following day, and, to save time, every thing that might be required was placed in her, and she was made fast for the night. Two or three Indians were then on board, and observing what was done, laid their plan, and at sunset took their leave as usual. The night was pitchy dark, and at nine o'clock the boat was missed from alongside. The alarm was given, and instant search made at the wigwams of the Indians, who had all decamped, without leaving the least trace of themselves or the boat. The 'painter,' or rope by which she had been fastened to the vessel, had been cut through with some sharp instrument, most probably a knife, which our people had sharpened for them on the grindstone that very day.

Every possible search was made next morning, but without success; the boat that was left was one which could not be used with any advantage, and Mr. Graves returned to Port Famine. Vexatious as the accident was, I could not blame him for what had occurred, for no one had suspicions of such conduct from the Indians, who, on all other occasions, had kept at a distance from us after night-fall. The boat was properly secured alongside, and the night was so cold that no person would have thought the Indians would expose themselves to such a temperature (28°); for they must have swum alongside to cut her adrift, and then must have towed her away very gradually, to prevent the theft being discovered, for there were two persons walking the deck at the time.

Mr. Tarn, who accompanied Mr. Graves on this occasion, brought me a very fine sea-eagle (*Polyborus Novæ Zealandiæ*), and some other birds, and a specimen from a shrub which we had not before observed, a species of *Desfontanea*.

In order to prevent a similar loss in future, the Adelaide

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was forthwith fitted with cranks outside, for hoisting up her boats when in harbour.

Winter advanced rapidly; the ground was constantly covered with snow, from one to two feet deep, and every night more fell. In the early part of June we had a gale of wind from the N.W., which flooded the low ground upon which our tents stood; but fortunately the large tent had been accidentally placed on a higher part, and escaped. This flood filled, and, of course, spoiled the water in all the ponds about the tents; and we had afterwards to procure our supplies from a considerable distance.

On the 8th of June much lightning was observed to the northward, and repeated rumbling noises were heard, which continued for long periods; one lasted distinctly for the space of twenty minutes. At first, they were thought to be eruptions of some distant volcano; but, from the frequent lightning, they were probably echoes of thunder, reverberating through the deep ravines that intersect the rocky ridges of the Cordillera, from which we were distant at least one hundred and fifty miles.

A succession of bad weather followed, during which the barometer fluctuated rapidly. On the 14th, the mercury fell to 28. 17. inches, after which it gradually rose, with fine settled weather, until it reached 30. 50., when bad weather again set in. The people at the tents experienced another inundation. Had the water risen six inches more, it would have carried every thing away; and as the wind was blowing dead upon the shore, while a heavy surf was beating upon the beach, we could have rendered them very little assistance from the ship.

The severity of the weather brought a most disagreeable accompaniment. Scurvy appeared, and increased; while the accidental death of a seaman, occasioned by falling down a hatchway, followed by the decease of two others, and also of Mr. Low, of the Adeona, whose body was brought to me for burial, tended to create a despondency amongst the crew that I could in no way check. The monotony of their occupations, the chilling and gloomy appearance of the country, and the severity of the climate, all tended to increase the number of the

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sick, as well as the unfavourable symptoms of their disease. The Beagle's term of absence was, however, drawing to a close, and I caused a rumour to be spread, that upon her appearance we should quit Port Famine. To give a semblance of reality to this report, the topmasts were ordered to be fidded, and the ship otherwise prepared for sea, which had a manifest effect upon the scorbutic, of whom several were in a bad stage of that horrid disease, and many others were just attacked. We found ourselves now, too, thrown on our own resources for fresh food: scarcely a fish was taken with the hook, and the seine, although frequently shot, never caught anything. Of birds, only a few hawks and small finches were procured, which were all reserved for the sick, the greater number of whom lived on shore, at the tents, where they might walk about, and amuse themselves as they pleased.

The Adelaide returned from Bougainville Harbour on the 18th of June, having succeeded in the object for which she was sent. The extremity of Cape Froward, a bluff head, over which is a round-topped hill (precisely the French 'Morre') is what Sarmiento called the Morro de Santa Agueda. Any name given by this excellent old navigator is too classical and valuable to be omitted; therefore, while the extremity itself may retain the modern appellation of Cape Froward, the mountain by which it is formed may still be allowed to keep his distinction. Behind it, the land rises to a higher ridge, the edge of which is remarkably serrated, and probably of a slaty character.

The specimens procured from the Cape were clay-slate, much intermixed with iron pyrites, and crossed by small veins of white quartz. Of the anchorages examined by Mr. Graves, Bougainville Harbour, better known to sealers by the name of Jack's Cove, or Harbour, is the most sheltered.

It is surrounded on all sides by high precipitous hills, thickly clothed with trees. The depth is moderate, and the water so beautifully clear, that the anchors, and even shells and stones, were distinctly seen upon the bottom. It was here that Bougainville procured wood for the use of the settlement

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at the Falkland Islands. Captain Stokes says of this place: "After seeing the abundant supplies of timber which Freshwater Bay and Port Famine afford, I had shared in the surprise which Byron expresses, that any one should have come so far up the Strait to get it; but on examining the spot, I found that a happier selection could not have been made. It is a little cove, just round the eastern point of the Bay of San Nicolas, about a hundred yards wide and three times as long. Here, moored to the shore, a ship may lie in eight fathoms, perfectly sheltered from any wind, the water as smooth as in a wet-dock. Shapely trees, of all dimensions, are growing within a few yards of the shore; and the wood, when felled, may be hoisted on board from the beach, by tackles from the yard-arms. Here, too, with very little trouble, a supply of water may be got from the many streams that make their way through the underwood which skirts the cove. As we pulled up this sequestered nook, the unusual sound of our oars and voices put to flight multitudes of birds, and the surface of the water was broken by the jumping of fine fish. Some very eatable geese were shot. Our stay was too short to admit of hauling the seine; but my boat's crew contrived to half-fill the boat with excellent muscles and limpets, which are found here in great plenty."

The geological character of the coast between Cape St. Isidro and San Nicolas Bay is clay-slate; near the beach, however, this rock is not visible, since it is there covered with a kind of breccia of rounded pebbles, in an indurated sandy rock, of green colour. The pebbles are principally of slate; but some were found to be of granite and other quartzose rock, perhaps greenstone.

One of the headlands, called by M. Bougainville Cape Remarquable, was examined by Mr. Graves for fossil shells, of which the French navigator speaks. Half the rock was beaten to pieces, without detecting anything like organic remains. Living shells were in the greatest abundance about the base of the Cape, but that is the case every where. The species generally found are limpets and muscles, but with little variety and no novelty.

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On the 21st of June, after a heavy north-east gale, we had an unusually fine day. The hills at the bottom of Magdalen Channel were more distinct than we had ever noticed them, and Mount Sarmiento was particularly clear; indeed its outline was so sharply defined, that the distance did not appear to be more than ten miles. This extraordinary transparency of the air was at first considered a presage of wet weather; yet the clear and sharp appearance of the distant land was unlike that which usually precedes a fall of rain. The long series of rainy weather we had experienced made us look for a good result from such an unusual atmosphere, and we were not deceived. The following day our hopes were still further confirmed by seeing three Indian canoes, coming across the Strait, towards us, from Lomas Bay, which they would not have attempted had they not been sure of its continuing fine; for their canoes are ill adapted to encounter the short cross sea found during bad weather in mid-channel of the Strait.

Although the presence of the natives did not in general please me, because it naturally put a stop to all work; yet, on this occasion it was agreeable, as it tended in some measure to enliven the monotonous manner in which we passed our days.

Upon reaching the bay, the Indians did not approach the ship, but paddled into the coves under Point Santa Anna, where our boat was employed watering. Mr. Graves went to them, to prevent mischief, and found they were the same party who had before visited us. When our boats returned, they paddled over to the wigwam at the head of the port, about a quarter of a mile beyond our tents, and began to repair it, and by sunset were housed and sheltered for the night. We had, however, so lately experienced their treacherous disposition, that no confidence was placed in appearances. Sentinels were posted at the tents, to give the alarm, should any of them approach; and at eight o'clock a volley of musketry was fired, by way of intimidation, and to impress them with the idea that we kept a watch upon their movements, and were prepared.

While the wigwams were repairing, a few of the Indians visited our tents; but were not allowed to pass within a rope

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that, by my orders, was stretched around our property, a restriction which they did not attempt to evade. At sunset all were told to go away, and they immediately, as well as cheerfully, complied.

The next morning, and indeed throughout the whole day, the neighbourhood of the wigwams exhibited the appearance of a fair. I visited them, and found that they had not only repaired an old wigwam, but erected another. Both together contained the whole party, consisting of twenty-six individuals, among whom were an old man, and two old women. They had brought over a collection of baskets, bows and arrows, stone heads of knives, &c. to sell to our people, who had always shown eagerness to possess these curiosities. The knife-heads were made generally of pitch-stone; but the greater number were of broken glass bottles, which they had collected when they visited us last year. A few strings of beads purchased all their riches; after which they sold their dogs, and Mr. Graves procured one of them for a knife and a string of beads. It was a remarkably fine animal, and showed great reluctance to be handled by our people, several of whom were bitten in their attempts to take him to the boat.

At night one of the canoes was despatched to collect shell-fish, probably sea-eggs, from the reef of Rocky Bay. The following morning all their goods were embarked, and then they paddled their canoes to the beach, near the tents, where some of their men landed. They had nothing to offer in exchange for several things which tempted them, and were beginning to grow troublesome. One of them, the individual who threw a stone at the sergeant, persisting to pass the boundary that was marked upon the ground, which no one of them had before presumed to do, was pushed back by the sentinel; upon which he ran to his canoe and took out several spears, doubtless intending to try to force a passage; but the appearance of two or three muskets brought him to his senses, and the spears were returned to the canoe; after which he became familiar, and apparently friendly. This affair, however, was soon followed by their departure, which gave me much satis-

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faction. They went southward, landing for the night in Voces Bay, and the following day went to the Adeona, in Bougainville Harbour, where they remained some days.

The day after the Indians left us, a boat came from the Adeona, to acquaint us that, in a day or two, she and her companions, the Uxbridge and Mercury, intended to leave the Strait for the Falkland Islands; upon which I prepared letters for England, and a report of my proceedings for the Secretary of the Admiralty. The ships passed by on the 30th, and took my letters.

This last month (June) set in with snow or rain, which continued until the 11th, when the weather assumed a very threatening appearance. On the 14th the barometer fell to 29. 27, and the wind blew a hard gale from N.E.; but in the afternoon it veered round to S.W., and the mercury rose rapidly. A gale from S.W. followed, and then to the end of the month we had a series of moderate weather, but much snow. The mean temperature for June was 32°,97 the range being between 19°,2 and 48°,7.

July commenced with an unusually low temperature and a high barometer; the former, on the 4th was 12°,2, and the latter, at the same time, at 30,5 inches, having risen since the 14th of June 1.82 of an inch. After this we had a few mild and fine days, but paid dearly for them; a northerly gale set in, bringing with it unwholesome damp weather, in which the temperature rose to between 35° and 42°, and melted much of the snow that had covered the ground, quite to the water's edge, during the last two months. Our sick-list, particularly of cases of scurvy, increased so much, during this damp, trying weather, that I determined upon sending the Adelaide to the northward, to procure a supply of fresh meat from the Patagonians; and, at the same time, to survey that part of the Strait lying between Cape Negro and the Second Narrow.

Lieutenants Graves and Wickham, and Mr. Tarn, went upon this service, the latter being most anxious to procure some change of diet for the sick under his care, for some of whom he was much alarmed. The appearance and severity of this dis-

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ease, although every precaution had been used, and subsequent attention paid to their diet, are not easy to account for: fresh provisions, bread baked on board, pickles, cranberries, large quantities of wild celery, preserved meats and soups, had been abundantly supplied; the decks were kept well-aired, dry, and warm, but all to no purpose; these precautions, perhaps, checked the disease for a time; but did not prevent it, as had been fully expected.

The Adelaide sailed on the 16th of July, with every prospect of fine weather. The same evening, an American sealing schooner anchored near us, on her way to Staten Land. She had entered the Straits by Cutler and Smyth Channels, and in forty-eight hours arrived at Port Famine. After obtaining some trifling assistance from our forge, she sailed.

On the 25th, three new cases of scurvy appeared, one being the assistant-surgeon, which increased our sick-list to fourteen. Feeling the necessity of doing something, I ordered the hands to be turned up, 'Prepare ship for sea!' No sooner had the words escaped the boatswain's lips, than all was life, energy, and delight. The preliminary preparations were made, and every one looked forward with pleasure to the change, except myself. I had hoped to pass the twelve months at Port Famine, with the intention of completing a meteorological journal, for which this place afforded peculiar advantages. My plan was, on the Beagle's return, to despatch her and the schooner along the West Coast, and join them in the Adventure at Chilóe.

As our departure was now supposed to depend on the Beagle's arrival, every eye was on the stretch to watch for her, and every morning some one of our party ascended the heights, to look out. On the 27th she was seen, beating up from the southward; but as the wind was contrary, she did not anchor in the bay until the evening. Her return was greeted with three most hearty cheers; but on passing under our stern, Lieutenant Skyring informed me that Captain Stokes was confined to his cabin by illness, and could not wait on me. I therefore went to the Beagle, and found Captain Stokes looking very ill, and in low spirits. He expressed himself much distressed by the hard-

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ships the officers and crew under him had suffered; and I was alarmed at the desponding tone of his conversation. He told me that the Beagle had been up the western coast as high as Cape Tres Montes, in latitude 47°, had surveyed the Gulf of Peñas and other portions of the coast, particularly Port Henry, at Cape Three Points, the entrance of the Gulf of Trinidad, and Port Santa Barbara, at the north end of Campana Island.

During the survey of the Gulf of Peñas they had experienced very severe weather, both stormy and wet, during which the Beagle's crew were incessantly employed, and had consequently suffered greatly. Captain Stokes seemed not to have spared himself. He appeared much gratified by my visiting him, and before we parted he was for a time restored to his usual energy, detailing the circumstances of the voyage, and conversing upon the plan of our future operations with considerable animation.

The return of the Beagle cheered our ship's company, and on the 30th the Adelaide came back, with a large quantity of guanaco meat, which had been procured from the Patagonian Indians at Peckett's Harbour.

When the Adelaide anchored there, about thirty natives appeared on the shore. Mr. Tarn landed, and communicated our wants, saying that he would give tobacco and knives for as much guanaco meat as they could procure; with them was the Fuegian, who seemed to be a leading man, and to have become one of the most active of the party. He was the principal spokesman, and upon commencing the hunt he pointed to the snow upon the ground, and called it 'bueno' (good), because it would show the traces of the animals, and the direction they had taken. Mr. Wickham thus described to me the manner in which they hunted: Two men ascended a hill, placed themselves one at each end of its summit, and stood motionless for some time, on the look-out. As soon as guanacoes were seen, their position and movements were communicated, by signs, to the men in the valley, who were thus enabled to approach their game unawares. The guanacoes are taken with the bolas, which entangle their legs and throw them down. As soon as they are killed,

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they are skinned and cut up. The first night seven hundred pounds of meat were brought, and two thousand and forty-six pounds were obtained in a few days.

This ample change of diet inspired me with the hope that our sick, at least those affected by scurvy, would recover, and that after another large supply, which we now knew how to obtain, we might be enabled to prosecute our voyage as was first intended. All hands were therefore allowed fresh meat for a week, and the residue was placed at the disposal of the surgeon, for the use of the sick, but all ineffectually; the list still increased, and Lieutenant Wickham, with a violent cold, and Mr. Rowlett, with scurvy, were added to it. The assistant-surgeon's became the worst case of scurvy on board; and our people, finding that the preparations for quitting the place were not going on, began to despond again. Captain Stokes was anxious to prepare his vessel for another cruize, being very averse to giving up our plans and returning to Monte Video, since he thought the crews, from utter disgust at the privations and hardships they had endured, would not be persuaded to go on another voyage; but that if they were to go to Chiloé or Valparaiso, to refresh, they might recover their strength and spirits, and be willing to renew the survey; which, however, he himself seemed to dread, for he never mentioned the subject without a shudder. He was evidently much excited, and suspicions arose in my mind that all was not quite right with him. I endeavoured to prevail on him to give his people a longer rest, but he was the more anxious to make preparations. On the 31st July he sent an application for provisions, and in the evening I received a note from him, which was written in his former usual flow of spirits. The officers, however, knew more of the diseased state of his mind than I did; and it was owing to a hint given to me, that I desired Mr. Tarn to communicate with Mr. Bynoe, and report to me whether Captain Stokes's health was sufficiently restored to enable him to commence another cruize. This was on the 1st of August. The provisions had been sent, in compliance with his application, and the surgeons were on board the Adventure,

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considering upon their report, which was, as I afterwards found, very unfavourable, when a boat came from the Beagle, with the dreadful intelligence that Captain Stokes, in a momentary fit of despondency, had shot himself.

The surgeons instantly repaired on board, and finding him alive, had recourse to every means in their power, but without hope of saving his life. During the delirium that ensued, and lasted four days, his mind wandered to many of the circumstances, and hair-breadth escapes, of the Beagle's cruize. The following three days he recovered so much as to be able to see me frequently; and hopes were entertained by himself, but by no one else, that he would recover. He then became gradually worse, and after lingering in most intense pain, expired on the morning of the 12th.

Thus shockingly and prematurely perished an active, intelligent, and most energetic officer, in the prime of life. The severe hardships of the cruize, the dreadful weather experienced, and the dangerous situations in which they were so constantly exposed—caused, as I was afterwards informed, such intense anxiety in his excitable mind, that it became at times so disordered, as to cause the greatest apprehension for the consequences. On the return of the Beagle he got better; and the officers were so sanguine in hoping for his complete restoration to health, on account of his progressive recovery, that nothing which had transpired was communicated to me until after his decease.

His remains were interred at our burial-ground, with the honours due to his rank, and a tablet was subsequently erected to his memory.

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CHAPTER X.

Account of the Beagle's cruize—Borja Bay—Cape Quod—Stuart Bay—Cape Notch—Remarks on weather, and errors of Chart—Evangelists—Santa Lucia—Madre de Dios—Gulf of Trinidad—Port Henry—Puma's track—Humming-birds—Very bad weather—Campana Island—Dangers—Gale—Wet—Sick—Santa Barbara—Wager's beam—Wigwams—Guaianeco Islands—Cape Tres Montes—St. Paul's—Port Otway—Hoppner Sound—Cape Raper.

THE following account of the Beagle's cruize is drawn up from Captain Stokes's unfinished journal, and from detached memoranda, which were found amongst his papers.

It will be recollected that, on my departure from Port Famine, in the Adelaide, in the month of March, to survey portions of the southern side of the Strait, I left instructions with Captain Stokes to proceed in the execution of his orders as soon as the Beagle was ready. The details of those orders it is unnecessary to repeat here, as they were performed to my entire satisfaction; it will be merely requisite, as briefly as possible, to follow him through a most arduous and distressing service. It is the sequel that embitters the record.

"On the 18th of March, I sailed from Port Famine, and next day reached Port Gallant.

"On the 23d, we anchored in the little cove called Borja Bay, which, though very confined, and rather difficult of access, suited our purpose extremely well. (See Sailing Directions). While there we measured the height of one of the principal hills in the neighbourhood, and found it 1,800 feet.

"Bad weather detained us until the 26th, when we passed Cape Quod, and reached Stuart Bay. Many places were left unexamined, because my object was to hasten westward before the year was farther advanced.

"(27th.) We left Stuart Bay, and continued our progress to the westward, with westerly winds, thick weather, and rain.

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The shores of the Straits were seldom visible to us, from a thick mist with which they were clouded: it is, however, a bold coast on each side, otherwise the Strait would be utterly unnavigable in such weather. Near Cape Notch the mountains spire up into peaks of great height, singularly serrated, and connected by barren ridges. About their bases there are generally some green patches of jungle; but, upon the whole, nothing can be more sterile and repulsive than the view. This afternoon we passed Playa Parda, and in the evening anchored in Marian Cove.

"In the course of the next day the wind freshened to a strong and squally gale from the W.N.W., with much rain; the weather was so thick that we could scarcely make out the coast. In this kind of weather, the lower parts of the shore are screened from view by mist, and the upper ones are seen looming through it in lofty masses, in a manner which would lead a stranger to believe that the ship was completely environed with islands.

"In the evening we anchored in the little cove called Half Port Bay, and next morning resumed our daily struggle against wind, tide, and weather.

"We crossed the mouth of a deep sound on the north shore,* where no tide or current was remarked: the delineation of the coast about this point is particularly defective in the old charts; fortunately, however, for the navigator, he has here to deal with shores where the omission of a whole island, or even the addition of a few that do not exist, is of less consequence to his safety than the exact limit of one sand-bank in other parts of the world. This night we anchored in Upright Bay, which, though affording excellent shelter from the prevailing winds, is bad with a southerly one; as, from the steepness of the bottom requiring a vessel to anchor close to the shore, sufficient scope is not left for veering cable.

"Sheltered by the high land under which we were anchored,

* Afterwards examined by Capt. Fitz Roy. It was called Xaultegua by Sarmiento, who very correctly describes it.—(Sarmiento's Voyage, p. 208.)

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with the exception of occasional gusts down the ravines and sounds, we had the wind light at W.S.W.; but the rapid travelling of the scud over-head showed that the usual weather prevailed. We weighed early next morning (30th), and by noon had reached so far to the westward that the easternmost of the round islands in Cape Tamar Bight bore north about two miles. By nightfall we were off Cape Cortado; but the weather seeming settled and the wind drawing to the southward, I resolved to keep under weigh, and try to get out to sea that night. Circumstances favoured us; the weather was fine, the moon remained unclouded, and the wind held at S.S.W. An hour after midnight Cape Pillar bore W.S.W., distant about two miles, and thence we shaped our course for the Evangelists, which we passed at the distance of a mile.

"The Evangelists, as they are called by the early Spanish voyagers, or as they were afterwards named (1670) by Sir John Narborough, the Isles of Direction,* are a group of four rocky islets, and some detached rocks and breakers, occupying altogether a space of three miles; they are exceedingly rugged and barren, and suited only to afford a resting-place for seals and oceanic birds. From the heavy sea prevalent there, and the raging surf that generally breaks around, landing on them can be rarely practicable; yet sealers effect it. The mate of a sealing vessel told me that he had landed on the largest in a whale-boat, and killed several thousand seals. The Evangelists are of sufficient height to be seen in clear weather from a ship's deck, at the distance of six or seven leagues, but the superior elevation of the coast on both sides will usually render it visible, before these islands can be observed.

"Immediately on rounding the Evangelists a cape was distinguished, appearing to terminate the northern coast line, which we made out to be 'Cape Isabel' of the Spanish charts. It is a steep, rocky promontory of great height, having at its base some detached columnar masses of rock, and at its summit a peak, and a serrated ridge; off it is a steep-sided island,

* Because they formed a capital leading mark for the Strait of Magalhaens.

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which proved to be that (Beagle Island) of which Lieut. Skyring and I took the bearing last year, when we were on the summit of Cape Victory.

"Northward of Cape Victory the land forms a deep bight, of which Cape Santa Lucia is the north-eastern headland. The coast in the interval is exceedingly rugged and mountainous. Cape Santa Lucia may be distinguished by a portion of flat table-land, about one-third of the altitude of the mountain from which it proceeds, and terminating at its outer face with a perpendicular precipice.

"The coast between Capes Isabel and Santa Lucia is dangerous to approach nearer than ten miles, for there are within that distance many sunken rocks, on which the sea only occasionally breaks. Some of these breakers were seen to seaward of us, as we proceeded along the coast, at the distance of five or six miles. When off Santa Lucia, whales were very numerous around us.

"The general aspect of this portion of the coast is similar to that of the most dreary parts of the Magalhaenic regions: bare, rugged, rocky, and mountainous, intersected by inlets, and bordered by islets, rocks, and breakers.

"The information we possessed respecting the prevalent winds on this coast was very scanty; yet, since all we could procure represented them as prevailing from the northward and north-westward, I considered it advisable to take advantage of the present southerly wind to proceed to the northern part of the coast assigned for our survey, instead of stopping to explore the bight between Cape Isabel and Cape Santa Lucia.

"From the bearings at sunset,* we ran along the land with bright moonlight, sounding every hour; and at daylight were about ten miles from the Island of Madre de Dios.

"We closed the land and proceeded to the northward, keeping at a distance of about three miles off shore, sounding

* Beagle Island N. 71°. E., Cape Isabel N. 32°. E., a remarkable mountain in the bight between Cape Santa Lucia and Cape Isabel N. 11°. W. Cape Santa Lucia N. 33°. W.; distance off shore three leagues; and soundings fifty fathoms, sandy bottom.

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between twenty-eight and thirty-three fathoms, sandy bottom. The weather was clear and fine, and we were enabled to make observations, and take the bearings and angles, necessary for laying down the coast satisfactorily.

"At noon we were in latitude 50° 12′ south, and in the meridian of Cape Tres Puntas, between which and a cape bearing from us N. 13° E. (magnetic), distant eight miles, there was evidently an inlet: this cape is marked on the chart as Cape William. The character of the land is the same with that which we had hitherto passed, bare, rugged, rocky mountains, with peaks, and sharply serrated ridges. From daylight to noon we had run twenty-one miles along the coast; in that interval only one inlet was seen, which was in the latitude of 50° 27′ south, agreeing well with the 'West Channel' of the Spanish chart. It was four miles wide at its mouth, and appeared to follow a winding course to the eastward. The land of Cape Tres Puntas curved in to the eastward, until it closed with Cape William; at dusk we were abreast of Cape William, and two leagues off shore, where we lay-to till daylight, as I wished to examine the inlet between it and Cape Tres Puntas, which subsequently proved to be Sarmiento's Gulf of Trinidad. The old navigator thus describes its discovery:

"'At daylight, 17th of March, 1579, in the name of the most holy Trinity, we saw land, bearing E.S.E., ten leagues distant, towards which we steered to explore it. At mid-day, being near the land, we observed the latitude 49½°, but Hernando Alonzo made it 49° 9′. In approaching the shore we saw a great bay and gulf, which trended deeply into the land towards some snowy mountains. To the south there was a high mountain, with three peaks, wherefore Pedro Sarmiento named the bay 'Golfo de la Sanctisima Trenidad.' The highest land of the three peaks was named 'Cabo de Tres Puntas ó montes.' This island is bare of vegetation, and at the water-side is low and rugged, and lined with breakers; on the summit are many white, grey, and black-coloured portions of ground, or rock. Six leagues to the north of Cape Tres Puntas is the opposite side of the gulf, where it forms a large high mountain, backed

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to the north by low land, and fronted by many islands. This high mountain, which appears to be an island from the offing, was called 'Cabo Primero.' "*

"The following night was clear, and the wind moderate from S.E., but in the course of next morning it shifted to N.E., with squalls, rain, and thick weather; we worked into the inlet notwithstanding, and by noon had reached three miles within its S.W. head-land, Cape William, and were abreast of a bay, into which I sent a boat to look for anchorage. On her return we stood into it, and anchored in the excellent harbour, afterwards named Port Henry, where we remained from the 2d to the 5th of April, employed in making a correct survey of the harbour and its adjacencies, and determining the latitude and longitude.†

"The inner harbour, distinguished in the plan by the name of 'Aid Basin,' is perfectly land-locked, and sufficiently spacious to contain a numerous squadron of the largest ships in twenty fathoms water, over a mud bottom, and as completely sheltered from the effects of wind and sea as in wet-docks. At the south-west side of the basin is a fresh-water lake, which discharges itself by a small stream, whence casks might be conveniently filled by means of canvas hoses, and the shores around have wood for fuel in abundance; but, from the lofty surrounding mountains, some rising almost perpendicularly to an elevation of two thousand feet, the thick clouds with which this basin was generally overhung, and the dense exhalations that arose from it during the rare intervals of sunshine, together with the exceeding prevalence of heavy rain on this coast, this place must be disagreeable and unhealthy. Such objections do not apply to the outer harbour, for while its shores afford shelter, they do not obstruct a free circulation of air. It is sufficiently large to afford convenient and secure anchorage for five or six frigates.

"We hauled the seine with very poor success, as a few smelt only were taken; we had no better luck with our fishing-lines;

* (Sarmiento, p. 65.)

† The description of Port Henry is given in our Sailing Directions.

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but the trial might have been more profitable at another season, judging from the number of seals we saw on the rocks off the Port, which live principally upon fish. Muscles, limpets, and sea-eggs abound here, and are good and wholesome of their kind. Birds are few in number, and of the species most common in these regions. No quadruped of any kind was seen; but the purser told me that he had observed, near the sandy beach, traces of a four-footed animal, resembling those of a tiger: he followed them to a cavern, and thence to the jungle. He also said that he had seen several humming-birds.

"With the exception of wild celery and the arbutus berry, I know not of any useful vegetable production that this place affords, unless the 'Winter's-bark tree' may be mentioned. Some coarse grass, fit perhaps for animals, may be there procured. The only signs of inhabitants were some wigwams on the western point, which seemed to have been long forsaken: in their construction they were precisely similar to those erected by the migratory tribes in the Straits of Magalhaens; and the shells of muscles, limpets, and sea-eggs, within and about them, showed that the former tenants of these hovels drew, like the Magalhaenic tribes, a principal part of their subsistence from shell-fish.

"Around the harbour are granite mountains, perfectly bare at their summits and north-western sides, but the lower parts are thickly covered in sheltered places and ravines, partly with trees, and partly with brushwood: among the trees growing here we observed, as usual, two kinds of beech, a tree like the cypress, but of small size, and the Winter's-bark. The underwood is composed of all the various shrubs we had met with in the Straits of Magalhaens; and this brushwood is so thickly spread over the lower parts of the shores of the harbour, that it is only by crawling over it that the distance of a few yards from the rocks can be gained; and being generally of insufficient strength to support a man's weight, it frequently gives way beneath him, and he is so completely buried, as to make it difficult for him to extricate himself.

"Scarcely any of the trees attain a size to render them fit

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for any thing but firewood; of those we felled there was scarcely one that was not more or less rotten at the heart, a defect probably caused by the extreme humidity of the climate.

"During our stay, the master, accompanied by our boatswain's mate,*(f)* an experienced sealer, went to take seal on the rocks, and returned in a few hours with some of the inferior sort, called 'hair seal,' which were numerous; but the surf was in most places too heavy to allow them to land without much risk. The fry of the young seals we thought extremely good, not exceeded even by the finest lamb's fry.

"On the morning of the 5th we worked to the westward, to clear the land on each side of the inlet; and at sunset, Cape Tres Puntas bore N. b. W. ½ W., distant two leagues. The northerly breeze, which we had worked with since leaving Port Henry, increased rapidly to a hard gale, and by 8 P.M. we were reduced to the close-reefed main-topsail and reefed foresail. The gale continued with unabated violence during the 6th, 7th, and 8th, from the north, N.W., and S.W., with a confused mountainous sea. Our decks were constantly flooded, and we could rarely show more than the close-reefed main-topsail and reefed foresail. Only two accidents occurred: the little boat which we carried astern was washed away by a heavy sea that broke over us, while hoisting her in-board; and the marine barometer was broken by the violent motion of the vessel. At noon, on the 8th, Cape Corso bore from us, by account, S.E. (true), distant fifty-five miles. I had tried to gain a wide offing to get a less turbulent sea, and because not even an outline of the sea-coast of Campana Island was drawn in the chart. We had not, during these three days, a glimpse of the sun or of a star, for it blew a constant gale, accompanied by squalls, thick weather, and rain. According to the time of year, the season of winter had not arrived, but the weather seemed to say it was already come—

> Sullen and sad, with all it's rising train
> Of vapours, clouds, and storms.

(f) Thomas Sorrell, now boatswain of the Beagle (1837). He was boatswain of the Saxe Cobourg, when wrecked in Fury Harbour.—R. F.

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"The wind abated at daylight on the 9th, and drew to the southward, and thence to the S.E. (the fair weather quarter of this coast). We bore up to make the land, and at about 10 A.M. the 'loom' of it was seen from the mast-head. At noon, high mountains were visible from the deck; our latitude, by observation, was 48° 51′, and our longitude, by chronometer, 00° 27′ west of Port Henry. No soundings were obtained with one hundred and ten fathoms of line. Hence we steered east (magnetic) towards a remarkable mountain, which, from our being nearly in the parallel of it at noon, has been marked in the chart as Parallel Peak. The coast we were upon was that of the Island 'Campana,' and, in its general appearance, did not differ from that of Madre de Dios. It was late before we got very close to the land; but, for a couple of leagues to the northward, and about a league to the southward of the parallel of our latitude at noon, we could distinguish rocks and breakers skirting the coast to a distance of two leagues from the shore.

"At dusk we hauled off for the night; but instead of being able to resume the examination of the coast next morning, we had to encounter another gale of wind from the N.W., which, before noon, reduced us to close-reefed main-topsail and reefed foresail. This gale suddenly subsided in the western quarter, which was singular; for those we have experienced generally commenced at north, thence drew round to the westward, from which point to S.W. they blew with the greatest fury, and hauling to the southward, usually abated to the eastward of south.

"During the afternoon, we again made the land near Parallel Peak, but could not close it. Next morning (11th), with fine weather, and a fresh breeze at S.W. b. W., we once more saw the land about Parallel Peak; and when distant from the shore about eight miles, steered N. b. E. along the coast. At noon our latitude was 48° 47′.

"Throughout our run along the coast this day, we skirted a number of rocky islets, rocks, and breakers, lying off shore at the distance of three or four miles. Some of the islets were elevated several feet above the surface of the sea; others were

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a-wash, and there were breakers that showed themselves only occasionally. Along this line the surf beat very heavily, and, outside, a long rolling sea prevailed, in which the ship was very uneasy.

"This line of dangers is not altogether continuous; for there is an opening about two miles wide, abreast of Parallel Peak, to the southward of which is a bight, where possibly a harbour may exist; but, considering the prevalence of heavy westerly gales and thick weather, if there be one, few vessels would venture to run for it; and this line must, I should think, be considered as a barrier that they ought not pass. As seal are found on the rocks, vessels engaged in that trade might not, perhaps, be deterred by these dangers, but every other would give all this extent of coast a wide berth. We ran past the breakers at the distance of about a mile, having rocky soundings, from thirty to twenty-three fathoms.

"The termination of the coast line northward was a high, rugged island, with a small peak at the north end. The extremity of the main land was rather a high bluff cape, whence the coast extends southward, with craggy, mountainous peaks and ridges, as far as Parallel Peak. At sunset, the N.W. end of Campana bore north (magnetic), distant three leagues, and from the mast-head I could see very distinctly the belt of rocks and breakers extending uninterruptedly to the northward, as far as the end of Campana.

"We hauled off for the night, and had light variable airs, or calms, until 2 A.M. of the 12th, when a breeze from the northward sprung up, and freshened so rapidly, that by noon we were again reduced to a close-reefed main-topsail and foresail. The gale was accompanied, as usual, by incessant rain and thick weather, and a heavy confused sea kept our decks always flooded.

"The effect of this wet and miserable weather, of which we had had so much since leaving Port Famine, was too manifest by the state of the sick list, on which were now many patients with catarrhal, pulmonary, and rheumatic complaints. The gale continued undiminished until the morning of the 13th,

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when, having moderated, we bore up and steered N.E. to close the land. At noon a good meridional altitude gave our latitude 48° 30′ south, and about the same time we saw the land bearing N.E. b. E., which we soon made out to be Parallel Peak. After allowing amply for heave of sea, and lee-way, we were considerably southward of our reckoning, which indicates a southerly current; but under such circumstances of wind and weather its exact direction, or strength, could not be ascertained.

"We proceeded along the land, taking angles and bearings for the survey, and at sunset the N.W. end of Campana bore from us north (magnetic), distant five leagues. Being now off the N.W. end of the island of Campana, which forms the south-western headland of the Gulf of Peñas, I considered that, before I proceeded to examine its inlets, I ought to look for the Harbour of Santa Barbara, which has been placed on the old charts in this neighbourhood. Accordingly we lay-to during the night, and at 4 A.M. bore up to close the land; at daylight the extremes of it were seen indistinctly through a very cloudy and hazy atmosphere, from N. 39° E. to S. 53° E. About noon the weather cleared off, and we got the meridian altitude of the sun, which gave our latitude 48° 09′ south.* We directed the course for the Dundee Rock, and when abreast of it, steered N.E. (compass) for an opening in the low part of the coast ahead, backed by very high mountains, which we found was the entrance of Port Santa Barbara. The coast to the southward was lined with rocky islets, rocks, and breakers, extending a league to seaward, and there were others to the northward. We were in a channel half a mile wide, through which we continued our course, sounding from fifteen to eleven fathoms, and in the evening anchored near the entrance of the harbour.

* The N.W. end of the Island de la Campana bearing N. 71°. 40′. E. Two distant hummocky islands (answering pretty well in position with the Guaianeco Islands of the Spanish charts) N. 53°. 30′. E., and N. 55°. 48′. E., and a remarkable rock, the 'Dundee' of Bulkeley and Cummings, about forty-five feet high, rising like a tower from the sea, distant off shore five miles, bearing east of us, distant one mile.

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"As our present situation was completely exposed to westerly winds, I went to examine a deep bight in the southern shore, which proved to be a good harbour, perfectly sheltered from all winds, with a depth of three and a half fathoms over a fine sandy bottom. In the afternoon we weighed anchor and warped into a berth in the inner harbour, where we moored in three fathoms. I found lying, just above high-water mark, half buried in sand, the beam of a large vessel.* We immediately conjectured that it had formed part of the ill-fated Wager, one of Lord Anson's squadron (of whose loss the tale is so well told in the narratives of Byron and Bulkeley): the dimensions seemed to correspond with her size, and the conjecture was strengthened by the circumstance that one of the knees that attached it to the ship's side had been cut, which occurred in her case, when her decks were scuttled to get at the provisions; all the bolts were much corroded; but the wood, with the exception of the outside being worm-eaten, was perfectly sound. Our carpenter pronounced it to be English oak.

"The land about this harbour is similar to that about Port Henry. Its shores are rocky, with some patches of sandy beach, but every where covered with trees, or an impervious jungle, composed of dwarfish trees and shrubs. The land, in most places, rises abruptly from the shore to mountains, some of which attain an altitude of more than two thousand feet, and are quite bare at their summits and on their sides, except in sheltered ravines, where a thick growth of trees is found. These mountains, or at least their bases, where we could break off specimens, were of basalt, with large masses of quartz imbedded in it; but on some parts of the shores the rocks were of very coarse granite.

"As in the vicinity of Port Henry, the thickness of the jungle prevented our going far inland; the greatest distance was gained by Lieut. Skyring, who, with his wonted zeal to prosecute the survey, ascended some of the mountains for the

* Length twenty feet five inches and a half, sided twelve inches, and moulded eight inches and a half.

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purpose of obtaining bearings of remote points: he remarked to me, 'that many miles were passed over in ascending even moderate heights; the land was very high and very irregular; the mountains seemed not to lie in any uniform direction, and the longest chain that was observed did not exceed five miles. The flat land between the heights was never two miles in extent: the ground was always swampy, and generally there were small lakes receiving the drainage of mountain-streams. Indeed the whole country appeared broken and unconnected.'

"Some of the mountains were ascertained to be 2,500 feet high, but the general height was about 2,000 feet. A large island, on the northern side of the harbour, is an excellent watering-place, at which casks may be conveniently filled in the boat. It is also an object of great natural beauty: the hill, which forms its western side, rises to seven or eight hundred feet, almost perpendicularly, and when viewed from its base in a boat, seems stupendous: it is clothed with trees, among which the light-green leaves of the Winter's-bark tree, and the red flowers of the Fuchsia, unite their tints with the darker foliage of other trees. This perpendicular part extends to the northward till it is met by the body of the mountain, which is arched into a spacious cavern, fifty yards wide and a hundred feet high, whose sides are clothed with a rich growth of shrubs; and before it a cascade descends down the steep face of the mountain.

"On the shore we found two Indian wigwams and the remains of a third; but they had evidently been long deserted, for the grass had grown up both around and within them to the height of more than a foot. These wigwams were exactly similar to those in the Strait of Magalhaens: one was larger than any I had met with, being eighteen feet in diameter. The only land birds I saw were two owls, which passed by us after dusk with a screeching noise.

"On the patches of sandy beach, in the inner harbour, we hauled the seine, but unsuccessfully; we expected to find fish plentiful here, from seeing many seals on the rocks outside, and from finding the water quite red with the spawn of cray-

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fish. Muscles and limpets were pretty abundant, and the shells (*Concholepas Peruviana*) used by the Magalhaenic tribes as drinking cups, were found adhering to the rocks in great numbers.

"Nothing could be worse than the weather we had during nine days' stay here; the wind, in whatever quarter it stood, brought thick heavy clouds, which precipitated themselves in torrents, or in drizzling rain. We were well sheltered from the regular winds; but many troublesome eddies were caused by the surrounding heights, while the passing clouds showed that strong and squally north-west winds were prevalent.

"On the morning of the 24th, we put to sea with a southerly breeze. The extent of coast from the eastern part of Port Santa Barbara to the outer of the Guaianeco Islands presents several inlets running deep into the land; but it is completely bound by rocks and rocky islets, which, with its being generally a lee-shore, renders it extremely unsafe to approach. Observing an opening between some islets, of which we had taken the bearing at noon, we stood in to see whether it afforded anchorage; and approaching the extremity of the larger island, proceeded along it at the distance of only half a mile, when, after running two miles through a labyrinth of rocks and kelp, we were compelled to haul out, and in doing so scarcely weathered, by a ship's length, the outer islet. Deeming it useless to expend further time in the examination of this dangerous portion of the gulf, we proceeded towards Cape Tres Montes, its north-western headland.

"At sunset Cape Tres Montes bore N. 25° W., distant eighteen miles. In this point of view the cape makes very high and bold; to the eastward of it, land was seen uninterruptedly as far as the eye could reach. We stood in shore next morning, and were then at a loss to know, precisely, which was the cape. The highest mountain was the southern projection, and has been marked on the chart as Cape Tres Montes: but none of the heights, from any point in which we saw them, ever appeared as 'three mounts.' The land, though mountainous, seemed more wooded, and had a less

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rugged outline than that we had been hitherto coasting, since leaving the Strait. We steered along the western coast of the land near Cape Tres Montes, and at noon, being three miles from the shore, observed, in latitude 46° 5. south, the cape, bearing N. 80° E. (mag.), distant seven miles. The northernmost cape in sight N. 26° W., distant ten miles, soundings ninety-seven fathoms. Shortly afterwards another cape opened at N. 37° W. (mag.).

"The parallel of forty-seven degrees, the limit assigned for our survey, being already passed, I did not venture to follow the coast further, although we were strongly tempted to do so by seeing it trend so differently from what is delineated on the old charts. An indentation in the coast presenting itself between mountainous projections on each side of low land (of which the northernmost was the cape set at noon), we hauled in to look for an anchorage; but it proved to be a mere unsheltered bight, at the bottom of which was a furious surf. We then stood to the southward, along the land of Cape Tres Montes, with the view of examining the north side of the Gulf of Peñas.

"The following morning was fine: Cape Tres Montes bore N.E., distant about three leagues. We lay off and on during the day, while the master went in the whale-boat, to examine a sandy bay (of which Cape Tres Montes was the easternmost point) for anchorage: he returned about sunset, and reported that it did afford anchorage; but was quite unsheltered from wind, and exposed to a great swell. The boat's crew had fallen in with a number of seals, and the quantity of young seal's fry they brought on board afforded a welcome regale to their messmates and themselves.

"At daylight (27th) we were four leagues from Cape Tres Montes, bearing N. 68° W. (magnetic) a remarkable peak, marked in the chart the 'Sugar Loaf,' N. 19° E., distant twenty-four miles, and our soundings were sixty-eight fathoms. This peak resembled in appearance, the Sugar Loaf at Rio de Janeiro: it rises from a cluster of high and thickly-wooded islands, forming apparently the eastern shore of an inlet, of which

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the land of Cape Tres Montes is the western head. Further to the N.E. stands a lofty and remarkable mountain, marked in our chart as 'the Dome of Saint Paul's.' It is seen above the adjacent high land. The height of the Sugar Loaf is 1,836 feet, and that of the Dome of Saint Paul's, 2,284 feet.

"During the day we worked up towards the land, eastward of Cape Tres Montes, and at night succeeded in anchoring in a sandy bay, nine miles from the Cape, where our depth of water was twelve fathoms, at the distance of a cable and a half off shore. We lay at this anchorage until noon the following day, while Lieut. Skyring landed on some low rocks detached from the shore, where he was able to take some advantageous angles; and on his return we weighed and worked up the gulf, between the eastern land of Cape Tres Montes, and high, well wooded islands. The shores of the main land, as well as of the islands, are bold, and the channel between them has no dangers: the land is in all parts luxuriantly wooded. About a mile and a half to the northward of the sandy beach which we had left, lies another, more extensive; and a mile further, a considerable opening in the main land, about half a mile wide, presented itself, having at its mouth two small thickly-wooded islands, for which we steered, to ascertain whether there was a harbour. The water was deep at its mouth, from thirty-eight to thirty-four fathoms; but the comparative lowness of the shores at its S.W. end, and the appearance of two sandy beaches, induced us to expect a moderate depth within. As we advanced, a long white streak was observed on the water, and was reported from the mast-head as a shoal; but it was soon ascertained to be foam brought down by the tide, and we had the satisfaction of anchoring in sixteen fathoms over a sandy bottom, in a very excellent port, which we named Port Otway, as a tribute of respect to the Commander-in-chief of the South American Station, Rear Admiral Sir Robert Waller Otway, K.C.B."

* * * *

A deficiency here occurs in Captain Stokes's journal, which the Beagle's log barely remedies. From the 30th of April to

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the 9th of May there was a succession of stormy weather, accompanied by almost incessant and heavy rain, which prevented the ship being moved; but proved, in one respect, advantageous, by affording a very seasonable cessation from work to the fatigued crew, and obliging Captain Stokes to take some little rest, which he so much required; but regretted allowing himself, and submitted to most reluctantly. He continues his journal on the 9th of May, stating that, "Among the advantages which this admirable port presents to shipping, a capital one seems to be the rich growth of stout and shapely timber, with which its shores, even down to the margin of the sea, are closely furnished, and from which a frigate of the largest size might obtain spars large enough to replace a topmast, topsail-yard, or even a lower-yard. In order to try what would be the quality of the timber, if, in case of emergency, it were used in an unseasoned state, I sent the carpenter and his crew to cut two spars for a topgallant-mast and yard. Those they brought on board were of beech-wood; the larger being thirteen inches in diameter, and thirty feet in length.

"On the 10th, the weather having improved, the Beagle was moved to the head of the inlet, to an anchorage in Hoppner Sound, and on the 11th I went with Lieut. Skyring to examine the opening, off which we were anchored.

"On each side of it we found coves, so perfectly sheltered, and with such inexhaustible supplies of fresh water and fuel, that we lamented their not being in a part of the world where such advantages could benefit navigation. The depth of water in mid-channel was generally forty fathoms; in the bights, or coves, it varied from sixteen to twenty-five fathoms, with always a sandy bottom. We saw a great many hair seals, shoals of pie-bald porpoises, and birds of the usual kinds in considerable numbers. On several points of the shores were parts of the skeletons of whales; but we no where saw a four-footed animal, or the slightest trace of a human habitation. The unusual fineness of the morning, the smoothness of the water, and the proximity of the adjacent lofty mountains, clothed almost to their summits by the fullest foliage, with every

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leaf at rest, combined with the stillness around to give the scene a singular air of undisturbed repose. We reached the extremity of the inlet, which we found was about six miles from its mouth; and thinking that it was the inner shore of an isthmus, of no great width, curiosity prompted us to endeavour to see its outer shore: so we secured the boat, and accompanied by five of the boat's crew, with hatchets and knives to cut their way, and mark the trees to guide us on our way back, we plunged into the forest, which was scarcely pervious on account of its entangled growth, and the obstructions presented by trunks and branches of fallen trees.

"Our only guide was an occasional glimpse, from the top of a tree, of the ranges of mountains, by which we steered our course. However, two hours of this sort of work were rewarded by finding ourselves in sight of the great South Sea. It would be vain to attempt describing adequately the contrast to the late quiet scene exhibited by the view we had on emerging from this dark wood. The inlet where we left our boat resembled a calm and sequestered mountain lake, without a ripple on its waters: the shore on which we now stood was that of a horrid rock-bound coast, lashed by the awful surf of a boundless ocean, impelled by almost unceasing west winds

"Our view of the coast was limited on each side by rocky mountainous promontories: off the northernmost, which I called Cape Raper, were rocks and breakers, extending nearly a mile to seaward. Having taken the few bearings our situation enabled us to obtain, we retraced our steps to the boat, and by aid of the marks we had left on the trees, reached her in an hour and forty-three minutes.

"Some of the beech-trees of this wood were fifteen feet in circumference; but I noticed none differing in their kind from those already observed about Port Otway. A few wrens were the only living creatures we saw; not even an insect was found in our walk. In the beds of some of the streams intersecting the woods was a singularly sparkling sand, which had so much the appearance of gold, that some of our party carried

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a bag-full on board to be tested. The shining substance proved to be, as I had supposed, the micaceous particles of disintegrated granite. It was not our good fortune to discover streams similar to those sung of by the poet,

"Whose foam is amber, and whose gravel gold."

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CHAPTER XI.

Leave Port Otway—San Quintin's Sound—Gulf of Peñas—Kelly Harbour—St. Xavier Island—Death of Serjeant Lindsey—Port Xavier—Ygnacio Bay—Channel's mouth—Bad weather—Perilous situation—Lose the yawl—Sick list—Return to Port Otway—Thence to Port Famine—Gregory Bay—Natives—Guanaco meat—Skunk—Condors—Brazilians—Juanico—Captain Foster—Changes of officers.

The Beagle returned to Port Otway the following day, and in an interval of better weather obtained the observations necessary for ascertaining the latitude and longitude of the port, and for rating the chronometers.

Captain Stokes's journal continues on the 19th of May: "We left Port Otway, and as soon as we had cleared its entrance, steered E.N.E. across the gulf; leaving to the northward all that cluster of islands, distinguished in the chart as the 'Marine Islands,' and went to within a mile from the eastern shore. Thence we ran four miles and a half parallel with the direction of coast E.S.E. (mag.), at the mean distance of a mile off shore. The aspect of the eastern and western portions of this gulf is very different, and the comparison is much to the disadvantage of the eastern. Ranges of bare, rugged, rocky mountains now presented themselves, and where wood was seen, it was always stunted and distorted. A long swell rolled in upon the shore, and every thing seemed to indicate a stormy and inclement coast. There are a few bays and coves, in which is anchorage depth, with a pretty good bottom of dark coarse sand: but rock-weed in large patches, seen in some of them, denoted foul ground; and they are all more or less exposed, and extremely unsafe. As night advanced, the weather became rainy and thick; so having reached a bight which seemed less insecure than others that we passed, I hauled in, and at about seven P.M., guided only by the gradual decrease of our soundings, from

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fourteen to eight fathoms, and the noise of the surf, came to an anchor.

"Next morning (20th) we found that we had anchored in a small bay, at about half a mile from a shingle beach, on which a furious surf was breaking so heavily as to prevent our landing any where. We were completely exposed to S.W. winds, with a heavy rolling sea; and the surf on all points cuts off communication with the shore. A breeze from the S.W. would have rendered it difficult to get out, and would have exposed us to imminent hazard. It is called on the chart Bad Bay. We left it eagerly, and proceeded to trace the coast to the E.S.E., until we were nearly abreast of a moderately high and thickly-wooded island, called Purcell Island. We passed to the northward of Purcell Island, leaving on the left a rock only a few feet above the surface of the sea, which lies about midway between that island and the main land. As we advanced to the eastward, a large and very remarkable field of ice was seen lying on the low part of the coast, which, at a distance, we took for a dense fog hanging over it, as nothing of the kind was observable in any other part. When nearly abreast of San Xavier Island, a deep sound was observed to the left, or north, which we concluded was the San Quintin Sound of the Spanish chart: it seemed to be about five miles in breadth, and following a westerly direction. We kept sight of the Sugar Loaf, and other points we had fixed, until more could be established, which enabled us to chart the coast as we went along. My next object was to trace the Sound of San Quintin to its termination, and at nightfall we succeeded in getting an anchorage at the entrance.

"On the 21st we proceeded up the sound, passing to the northward of Dead Tree Island. Our soundings, until abreast of it, were from sixteen to ten fathoms, on a mud bottom; it then shoaled to four fathoms, and after running about three miles in that depth, we came to an anchor at the distance of a mile from the north shore of the sound, in four fathoms.

"Exceedingly bad weather detained us at this anchorage. From the time of our arrival, on the evening of the 21st,

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until midnight of the 22d, it rained in torrents, without the intermission of a single minute, the wind being strong and squally at W., W.N.W., and N.W.

"When the weather improved, on the 23d, we weighed, and made sail along the northern side of the sound, for the purpose of ascertaining whether it admitted of a passage to the northward. We kept within a mile of the shore, sounding from eight to fifteen fathoms, generally on a sandy bottom; and a run of seven miles brought us within three miles of the bottom of the inlet, the depth of water being four fathoms, on sand. The termination of this sound is continuous low land, with patches of sandy beach, over which, in the distance, among mountains of great height, we were again able to make out and take the bearing of that remarkable one, named the 'Dome of St. Paul's.' The shores of this inlet are thickly wooded; the land near them is, for the most part, low, but rises into mountains, or rather hills, from twelve to fifteen hundred feet in height, from which many streams of water descend. As soon as a ship has passed Dead Tree Island, she becomes land-locked; and as in all parts of the sound there is anchorage depth, with a muddy or sandy bottom, the advantages offered to shipping would be of great consequence in parts of the world more frequented than the Gulf of Peñas.

"Whales were numerous, and seals were seen in this inlet, now called the Gulf of San Estevan.

"Hence we went to Kelly Harbour, at the north-eastern side of the Gulf of Peñas, four miles N.E. of Xavier Island. The land around it is rocky and mountainous, but by no means bare of wood. Near the entrance it is low, as compared with the adjacent land; but in the interior are lofty snow-capped mountains.

"A large field of ice, lying on the low land near Kelly Harbour, was remarkable. There was none on the low grounds at the other (southern) side of the port, though it was almost the winter solstice at the time of our visit.

"Another day and night of incessant rain. In the morning of the 25th we had some showers of hail, and at daylight found

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that a crust of ice, about the thickness of a dollar, had been formed in all parts of the harbour. The water at our anchorage being fresh at half-tide, was, no doubt, in favour of this rapid congelation. Lieutenant Skyring having completed the examination of the harbour, we left it and steered between St. Xavier Island and the mainland, through a fine bold channel, nearly four miles wide, with a depth of more than thirty fathoms. The land on both sides is closely wooded, and rises into high mountains. About dusk we stood into Port Xavier, a little bight, with a sandy beach, on the eastern side of the island; and, at a distance of two cables' length from the beach, anchored for the night in seventeen fathoms.

"(26th). This sandy beach extended about half a mile between the points of the bay, and, at fifty yards from the water, was bounded by thick woodland, which rose with a rapid ascent to the height of a thousand feet. The trees were like those in the neighbourhood of Port Otway, and were stout and well-grown. A tree, large enough for a frigate's topmast, might be selected close to the shore. The Winter's-bark tree attains here a greater size than I had before seen. One, which was felled by our wood-cutters, measured eighty-seven feet in length, and was three feet five inches in circumference. All the trees were in full foliage and verdure, though the season corresponded to the latter part of November in our northern latitudes. At the south end of the sandy beach was a stream of fresh water, several yards in width, and various waterfalls descended from the mountains. The shore to the southward was composed of fragments of granite, lying at the base of a lead-coloured clay cliff, at least three hundred feet in height. In this cliff the mountain-torrents had formed deep chasms, and strewed the beach with its débris, and with uprooted timber. The only living creatures seen were steamer-ducks, king-fishers, and turkey-buzzards.

"While on shore, I received a melancholy message, announcing the death of Serjeant Lindsey, of the Royal Marines. During the last few days he had suffered from inflammation of the bowels, which brought his existence to a close.

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"The following day (27th) a grave was dug, and we discharged the last sad duties to our departed shipmate. A wooden cross was erected at the head of his grave, on which was an inscription to his memory: we also named the south point of the bay after him. About noon we left Port Xavier, and coasted the island, at the mean distance of a mile, examining it for anchorages, until, after a run of eight miles, we reached its south point. For the first four or five miles of that distance, the coast of the island consisted of a high steep cliff, having at its base a narrow beach, composed of various-sized masses of rock. In the interior there were heights, rising twelve or fourteen hundred feet, wooded nearly to the summits, with many streams of water descending from them; but for the remainder of the distance the coast was low, and the wood stunted and scanty. All along the shore rolled a heavy surf, that would have rendered any attempt to land exceedingly hazardous; there was no place fit for anchorage, except a small bight, near the extreme south point, into which we stood, and with some difficulty succeeded in anchoring at a cable's length from the shore. The bay proved to be that called by the Spanish missionary voyagers 'Ygnacio Bay.' Over the south point,—a narrow tongue of land, about five hundred yards across, with rocks and breakers stretching off shore, to the distance of two miles,—we took bearings and angles to various fixed points in the northern part of the gulf. The latitude, chronometric differences of longitude, and magnetic variation, were determined on shore at this southern point.

"Our observations being completed, we left this anchorage; and as it is little likely to be visited again, it will be enough to say that it is exceedingly dangerous. Nothing would have induced me to enter it, but the duty of examining the coast for anchorage, and the danger of remaining under sail close to an unexplored shore.

"Under an impression that the island of St. Xavier* was the

* Xavier's Island is certainly the Montrose Island of Byron's Narrative. The Wager was lost, as will be seen, more to the southward, on the Guaianeco Islands.

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scene of the Wager's wreck, I wished to examine its western side; but a strong N.N.E. wind did not permit my doing so, without risking the loss of more time than could be spared for an object of mere curiosity. I steered, therefore, to the south-eastward for an inlet, which proved to be the Channel's Mouth of the Spanish charts, and reached it, after running seventeen miles from the south end of Xavier Island. We got no soundings with ninety fathoms of line, when at its entrance; but making no doubt that we should get anchorage within, we left, at the distance of half a mile, the islets of the northern point; passed between two others distant apart only one-fifth of a mile, and shortly after anchored in twenty fathoms, sheltered by an island to the westward, but with rocky islets around us in all directions, except the S.E., some of which were less than a cable's length from us.* Here we were detained until the 10th of June by the worst weather I ever experienced: we rode with three anchors down and the topmasts struck; and though we lay within a couple of hundred yards of the islands and rocks, and less than half a mile from the shores of the inlet, such a furious surf broke on them all, that it was but rarely a boat could land, even in the least exposed situations the inlet afforded. The evening of our arrival was fine, and we put up the observatory tent, on the island to the westward of us; but the weather was so bad, during the next day, that we could effect no landing to remove it, although we anticipated the result that followed, namely, its being washed away.

"In the short intervals of the horrible weather that prevailed, boats were sent to the northern shore of the inlet, for the purpose of procuring water and fuel; but though they sometimes succeeded, by dint of great perseverance, in landing through a raging surf, it was but seldom they could embark the small casks (barecas) which had been filled, or the wood they had cut.

"Upon this shore the master observed remains of some Indian wigwams, that seemed to have been long forsaken, and

* This group was afterwards called Hazard Isles.

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he described them to be exactly like those we had hitherto met to the southward.

"This was the northernmost point at which we noticed traces of human beings.

"Finding the boats' crews suffer much from their unavoidable exposure during continually wet weather, I ordered some canvas to be given to each man for a frock and trowsers, to be painted at the first opportunity, as a protection against rain and spray.

"Nothing could be more dreary than the scene around us. The lofty, bleak, and barren heights that surround the inhospitable shores of this inlet, were covered, even low down their sides, with dense clouds, upon which the fierce squalls that assailed us beat, without causing any change: they seemed as immovable as the mountains where they rested.

"Around us, and some of them distant no more than two-thirds of a cable's length, were rocky islets, lashed by a tremendous surf; and, as if to complete the dreariness and utter desolation of the scene, even birds seemed to shun its neighbourhood. The weather was that in which (as Thompson emphatically says) 'the soul of man dies in him.'

"In the course of our service since we left England, we have often been compelled to take up anchorages, exposed to great risk and danger. But the Beagle's present situation I deemed by far the most perilous to which she had been exposed: her three anchors were down in twenty-three fathoms of water, on a bad bottom of sand, with patches of rock. The squalls were terrifically violent, and astern of her, distant only half a cable's length, were rocks and low rocky islets, upon which a furious surf raged.

"I might use Bulkeley's words in describing the weather in this neighbourhood, and nearly at this season: 'Showers of rain and hail, which beat with such violence against a man's face, that he can hardly withstand it.'

"On the 10th, the wind being moderate, and the weather better, preparations were made to quit this horrid place. We put to sea, with a moderate breeze from N. b. W., which

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increased rapidly to a strong gale; and scarcely were we fairly freed from the channel, than we found ourselves in a heavy confused sea. Anxious to clear the entrance, I had not waited to hoist in the yawl, with which we had weighed one of our anchors, expecting to find smooth water as we went out; but the sea we met made it unsafe to tow her, and while hauling up to hoist her in, she was so badly stove by blows received from the violent motion of the ship, that we were obliged to cut her adrift. This was a heavy loss. She was a beautiful boat, twenty-eight feet in length,—pulled and sailed well, and was roomy, light, and buoyant; her loss was second only to that of the ship.

"We endeavoured to clear the Guaianeco Islands, by carrying a heavy press of sail, but soon after midnight were obliged to furl the reefed mainsail. Before daylight the wind shifted suddenly to W. b. N., taking us aback by a violent squall, with much vivid lightning and heavy rain. Our admirable little vessel paid off without sustaining any damage; but for a minute her situation was critical. At daylight, the land of Cape Tres Montes bore W. $\frac{1}{2}$ N. (magnetic), distant four leagues. The violence of the gale we had just had put it out of our power to clear the gulf; and, from the state to which we were reduced by the loss of our yawl, both gigs being in bad condition, and our cutter so much stove as to be useless, I considered that it would not be justifiable to attempt proceeding in a lone ship to an unknown and most stormy coast, without a single efficient boat; so I resolved to hasten to Port Otway, and put the boats into an effective state. We had baffling winds all day; but in the evening succeeded in reaching the harbour, and anchoring nearly in our old berth. On the 13th and 14th, we had a continued hard gale, with the usual accompaniment of heavy rain. The carpenters were, however, kept constantly at work to render the cutter effective. On the 15th, the state of the sick list caused me to require from the surgeon, his opinion as to the 'necessity of a temporary cessation of surveying operations.' Mr. Bynoe's reply stated 'that in consequence of great exposure to a long-continued succession of

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incessant and heavy rain, accompanied by strong gales, the health of the ship's company had been seriously affected, particularly with pulmonic complaints, catarrhal, and rheumatic affections; and that, as a recurrence of them would probably prove fatal in many instances, a temporary cessation would be of the greatest advantage to the crew, by affording an opportunity of recruiting their health.'

"On receiving the above communication from the surgeon, I ordered the yards and topmasts to be struck, and the ship covered over with sails. Precaution was used to prevent the people from being subjected to frequent exposure, by not employing any of them in boats, except once a day in procuring muscles, and every thing was avoided that could in the least interfere with the recovery of their health: but this place is exceedingly ill adapted for the winter quarters of a ship's company, as the woods that surround it, down even to the water's edge, allow no space for exercise on shore, and there is neither game nor fish to be procured, except shell-fish; of which, fortunately (muscles and clams), we found an abundance, and they proved useful in removing symptoms of scurvy, besides affording a change of diet. The place being destitute of inhabitants, is without that source of recreation, which intercourse with any people, however uncivilized, would afford a ship's company after a laborious and disagreeable cruise in these dreary solitudes. Every port along this coast is alike ill suited for a winter's residence, and it was only our peculiar situation that induced me to determine on making a short stay at this place."

Here poor Captain Stokes's remarks and notes end. Those who have been exposed to one of such trials as his, upon an unknown lee shore, during the worst description of weather, will understand and appreciate some of those feelings which wrought too powerfully upon his excitable mind.

The Beagle remained quiet until the 29th of June, when the surgeon reported "the crew sufficiently healthy to perform their duties without any material injury to their constitutions."

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Leaving Port Otway, she steered along the coast with, strange to say, easterly winds and fine weather, which enabled Lieut. Skyring to add much to the survey of the coast of Madre de Dios. Captain Stokes now began to show symptoms of a malady, that had evidently been brought on by the dreadful state of anxiety he had gone through during the survey of the Gulf of Peñas. He shut himself up in his cabin, becoming quite listless, and inattentive to what was going on; and after entering the Strait of Magalhaens, on his return to Port Famine, he delayed at several places without any apparent reason; conduct quite opposite to what his would naturally have been, had he then been of sound mind. At last, want of provisions obliged him to hasten to Port Famine; and the day on which he arrived every article of food was expended.

The fatal event, which had cast an additional gloom over every one, decided our quitting the Strait. Both ships were immediately prepared, and we sailed on the 16th August; but previously, I appointed Lieutenant Skyring to act as commander of the Beagle; Mr. Flinn to be master of the Adventure; and Mr. Millar, second master of the Adventure, to act as master of the Beagle. The day we sailed, Mr. Flinn was taken ill; and, Lieutenant Wickham being on the sick list, I was the only commissioned officer able to keep the deck. As the wind was from the N.W., we were obliged to beat to windward all night, and the next morning were off Sandy Point; but it blew so very strong from the westward, and the weather was so thick from snow-squalls, which passed in rapid succession, that we bore up, and anchored in Freshwater Bay, where the ships were detained by northerly winds until the 21st, when we proceeded; the wind, however, again opposing, we anchored about half a mile from the shore, in a bight, seven miles southward of Sandy Point. The following day we were underweigh early, and reached Gregory Bay. When off Elizabeth Island, I despatched the Beagle to Pecket's Harbour to recall the Adelaide, in which Lieutenant Graves had been sent to procure guanaco meat. The Beagle worked through, between Elizabeth Island and Cape Negro, and was seen by

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us at anchor off Pecket's Harbour before we entered the Second Narrow.

Upon our anchoring under Cape Gregory, two or three Patagonians were seen on the beach, and before half an hour had elapsed others joined them. By sunset several toldos, or tents, were erected, and a large party had arrived. When the Adelaide first went to Pecket's Harbour, Mr. Tarn told the Indians that the Adventure would be at Gregory Bay in twenty-five days, and, accidentally, we arrived punctually to the time. The Patagonians must have been on their way to meet us, for they could not have travelled from Pecket's Harbour in the short space of time that we were in sight. To their great mortification, however, we held no communication with them that evening, and the next day the weather was so bad we could not even lower a boat. At noon the wind blew harder than I had ever witnessed; but since we were on good holding-ground, and the water was smooth, no danger was anticipated.

As the snow-squalls cleared off, we looked towards the Patagonians, with the full expectation of seeing their huts blown down:—to our astonishment, they had withstood the storm, although placed in a very exposed situation. We counted twelve or fourteen of them, and judging by our former experience of the number belonging to each, there must have been, at least, one hundred and fifty persons collected. During the gale they kept close; and it was only now and then that a solitary individual was observed to go from one toldo to another.

The weather having moderated, the Beagle and Adelaide joined us on the following day. They rode the gale out, without accident, off the entrance of Pecket's Harbour. The next morning being fine, we prepared to proceed; but previous to weighing I landed, and communicated with our old acquaintances. Maria was with them, and, if possible, dirtier, and more avaricious than ever. We collected the guanaco meat they had brought for us; distributed a few parting presents, and then returned on board.

The Adelaide brought sixteen hundred pounds of meat, which, with what was first obtained, amounted to four thousand

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pounds weight; and cost altogether ten pounds of tobacco, forty biscuits, and six pocket-knives. At first a biscuit was considered equivalent to forty or fifty pounds of meat; but as the demand increased, the price rose four or five hundred per cent. With the Patagonians were two of Mr. Low's crew, who had left him. They were Portuguese, in a miserable state, and appeared to be thoroughly ashamed of being the companions of such a dirty set: they could not speak English, and could give us very little information. They had not then assumed the Indian garb, although, from the state of their clothes, they would very soon be obliged to adopt it.

At Pecket's Harbour a few words of the native language were collected, which are very different from those given by Falkner, in his description of the Patagonian natives: he says himself, that the language of the northern Indians differs materially from that of the 'Yacana Cunnees.'

During Lieutenant Graves's communication with the natives, at Pecket's Harbour, he obtained some interesting information respecting these Indians, which will be given in a subsequent part of the work.

The Adelaide brought me a few very gratifying additions to my zoological collection, among which was the Zorillo, or Skunk, of the Pampas; differing in no way whatever from the species found about the River Plata, in such numbers as to impregnate the air with their disagreeable odour for many miles around.

I have frequently found the scent of this offensive little animal distinctly perceptible when I was on board the Adventure, lying at anchor about two miles from Monte Video, with the wind blowing from the land.*

* D'Azara, in his Essai sur l'Histoire Naturelle des Quadrupèdes de Paraguay, gives the following account of this animal, which he calls Yagouaré. It burrows in the ground, eats insects, eggs, and birds, when it can surprise them, and moves about the plains and fields both by day and night in search of food; brushing the ground with its body, and carrying its tail horizontally. It regards not the presence of man or beast; unless an attempt be made to injure or take it, when it gathers up its body, bristles up the hairs of its tail, erecting it vertically; and in this

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A very large condor was shot by one of the Adelaide's party, which measured, in length, four feet three inches and a half, and nine feet two inches between the extremities of the wings. It was presented to the British Museum. Many exaggerated accounts of this bird have been given by old voyagers; but the largest dimensions stated, of whose accuracy there exists no doubt, are those of one that was preserved in the Leverian Museum, which measured thirteen feet one inch, from wing to wing. This, however, must have been an old bird; for the one we killed is larger than the usual size of specimens which have been obtained. Molina states, in his account of this bird, vol. i. p. 298, that the largest he ever saw measured fourteen feet and some inches (Spanish measure), from the tip of one wing to that of the other. M. Humboldt also gives a detailed description.

"It is with the condor," says this celebrated voyager, "as with the Patagonian, and many other objects of natural history; the more they are examined, the more they diminish in size." They inhabit the highest mountains of the Andes, and only descend to the plains when pressed by hunger. Frequently, in troops, they attack cattle, deer, guanacoes, and even the puma, and always succeed in killing them; but their principal food is carrion, of which, in a country so abundantly stocked with quadrupeds, there is probably no want.

Our departure from the Strait was attended with beautiful weather; the moon was full, and the wind fair and moderate.

this position awaits the approach of its enemy, at whom it ejects its urine, which produces so unbearable a smell, that neither man, dog, nor tiger, will attempt to touch the animal.

The yagouaré moves very slowly, and cannot run. It produces two young ones, which are placed at the bottom of its burrow. The unconquered Indians of the Pampas make mantles with the furs of the fox, cavia, or other animals, and border them with the skins of the yagouaré, which are very soft and fine, and would be fit for being employed by the furrier were it not for the disagreeable odour which they impart to every thing they touch. The Indians eat the flesh of this animal, which they irritate until its only means of defence is unavailing, and it can be captured without offensive consequences.

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Cape Virgins was passed soon after sunset, and we proceeded on our course with rapidity.

The timely supply of guanaco meat had certainly checked the scurvy, for we had no new cases added to the number of the sick, now amounting to twenty. The Beagle was not so sickly; but, during the last cruise, upwards of forty cases, principally pulmonic, had occurred, and several were not yet recovered. On the passage, a man fell overboard from the Beagle, at night, and was drowned.

In latitude 45° S. we were delayed three days, by northerly winds and damp foggy weather, after which a fresh S.W. gale carried us into the River Plata. Having obtained good chronometer sights in the afternoon, we steered on through the night, intending to pass to the westward of the Archimedes Shoal; which would have been rather a rash step, had we not been well assured of the correctness of our chronometrical reckoning. At this time Brazil and Buenos Ayres were at war, and some of the blockading squadron of the former were generally to be met with in the mouth of the river; but we saw none, until half-past two in the morning, when several vessels were observed at anchor to leeward, and we were soon close to a squadron of brigs and schooners, whose number was evident by a confusion of lights, rockets, and musketry, on board every vessel. I bore down to pass within hail of the nearest, which proved to be the Commodore's, the Marañao of eighteen guns; and on approaching, explained who and what we were; but they were so confused, I could not even make myself understood. The breeze, at the time, had fallen so light, that, fearing to get foul of the brig, the ship was hove up in the wind, and the anchor ordered to be let go. Unluckily a stopper was foul, and before another bower could drop, the Brazilians had fired several muskets into us, happily without doing any mischief; and threatened us, if we did not immediately anchor, with a broadside, which, in their utter confusion, I am astonished they did not fire. Having anchored, and lowered the topsails, I sent a boat to inform the Brazilian who we were, and to request, that in consequence of the number of

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MONTE VIDEO.—CUSTOM HOUSE.

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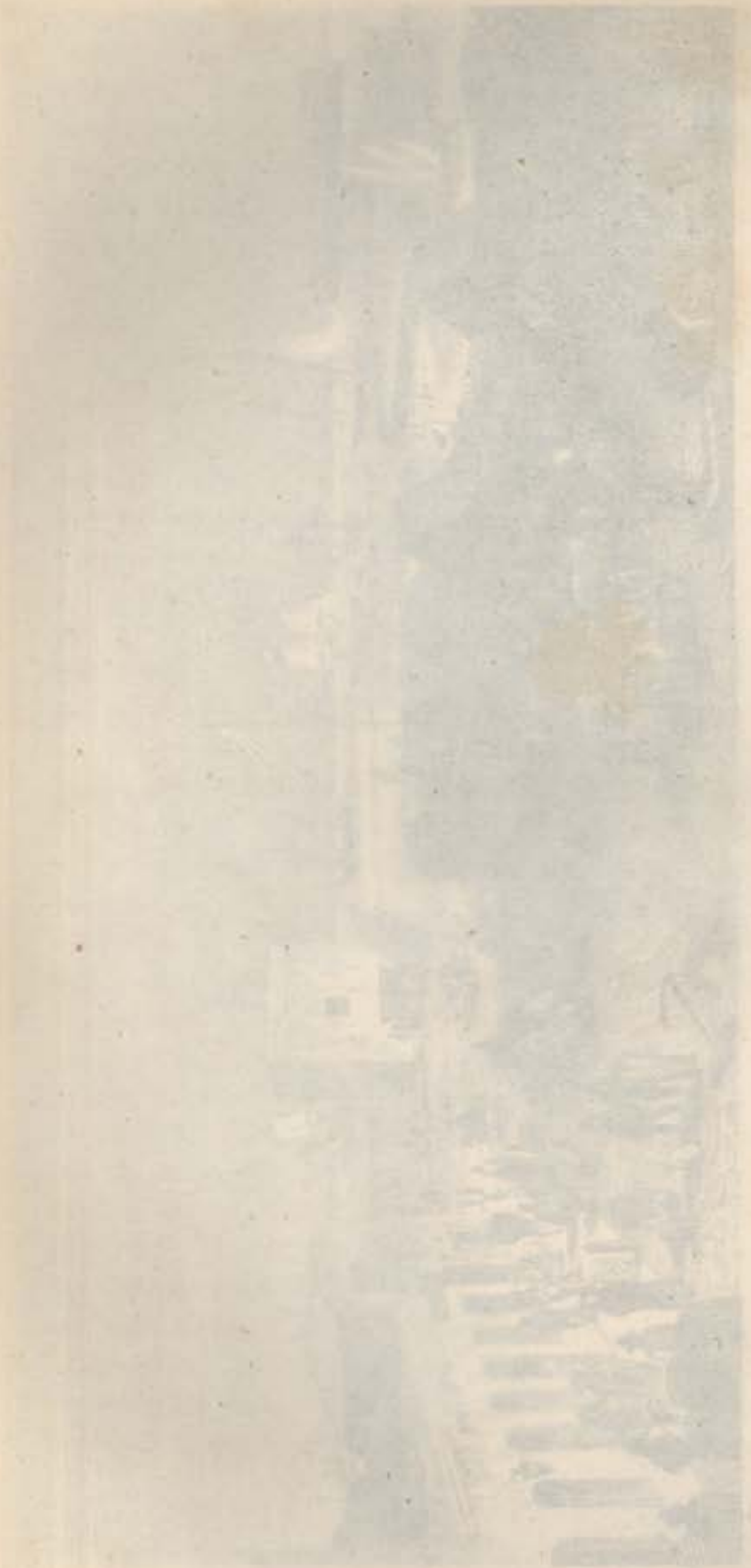

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our sick (we had only ten serviceable men on deck), we might not be detained, as even a few hours might prove of serious consequence; but all I could urge was unavailing, and we were detained until daylight with trifling excuses. We were so situated, that unless the brig veered her cable, or dropped out of our way, we could not move without getting foul of her, else I should have proceeded without permission. After daylight, the brig gave us room, by tripping her anchor; and upon an officer coming on board to release us, I told him my opinion of the affair, and said I should report the captain's conduct to his admiral. This report was afterwards made, in a very spirited manner, by Captain Henry Dundas, of H.M.S. Sapphire; but the admiral defended the conduct of his officer by saying that he had merely acted, "magna componere parvis," as an English blockading squadron would have done in a similar case.

Whether the act was borne out, or not, by the law or custom of blockade, it was very uncivil; and one for which, after the explanation given, and the proofs offered, there could not be the slightest occasion. Owing to this detention, we did not reach the anchorage at Monte Video until too late in the day to procure refreshments for the sick. We found, to our sorrow, that fresh provisions were so extremely scarce, owing to the war, that none could be procured for our ships' companies; and had it not been for the kindness of Señor Juanico, a well-known, and highly esteemed resident at Monte Video, who supplied us plentifully with bitter (Seville) oranges, we might have been much distressed. The free use, however, of this fruit alone caused a rapid change in the health of those affected by scurvy, and in less than a week every man was at his duty.

A few days after our arrival, through the intervention of the British minister, a peace was concluded between the belligerents, in which Buenos Ayres gained all it had contended for, and Brazil gave up what she had so imperiously demanded.

I was extremely gratified by meeting, at this port, the late Captain Henry Foster, in H.M.S. Chanticleer, on his pendulum voyage. He was established at an observatory on a small island, called Rat, or Rabbit Island, whither I lost no

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time in proceeding, and found him deeply engaged in that series of observations which has reflected so much honour upon his memory.

Before he sailed, I made an arrangement to meet the Chanticleer, either at Staten Land or Cape Horn, for the purpose of supplying her with provisions, to enable him to proceed thence to the Cape of Good Hope, without returning to Monte Video.

On the 13th of October, we sailed for Rio de Janeiro to procure some stores, which had been sent from England for our use, and to be caulked and refitted. The Beagle remained at Monte Video, to prepare for our next cruise. Before we were ready to leave Rio de Janeiro, the Commander-in-chief, Sir Robert Otway, arrived from Bahia, in his flag-ship, the Ganges. Sir Robert acquainted me, that he considered it necessary for the Beagle to be hove down and repaired;—that he intended to supersede Lieutenant Skyring; and had sent the requisite orders to Monte Video. When the Beagle arrived, Lieutenant Robert Fitz Roy, flag lieutenant of the Ganges, was appointed as commander; Mr. J. Kempe, mate, as lieutenant; and Mr. M. Murray, second master of the Ganges, as master.

Although this arrangement was undoubtedly the prerogative of the Commander-in-chief, and I had no reason to complain of the selection he had made to fill the vacancies, yet it seemed hard that Lieutenant Skyring, who had in every way so well earned his promotion, should be deprived of an appointment to which he very naturally considered himself entitled.

The conduct of Lieutenant Skyring, throughout the whole of his service in the Beagle,—especially during the survey of the Gulf of Peñas, and the melancholy illness of his captain,—deserved the highest praise and consideration; but he was obliged to return to his former station as assistant surveyor: and, to his honour be it said, with an equanimity and goodwill, which showed his thorough zeal for the service.

Captain FitzRoy was considered qualified to command the Beagle: and although I could not but feel much for the bitterness of Lieutenant Skyring's disappointment, I had no other cause for dissatisfaction.

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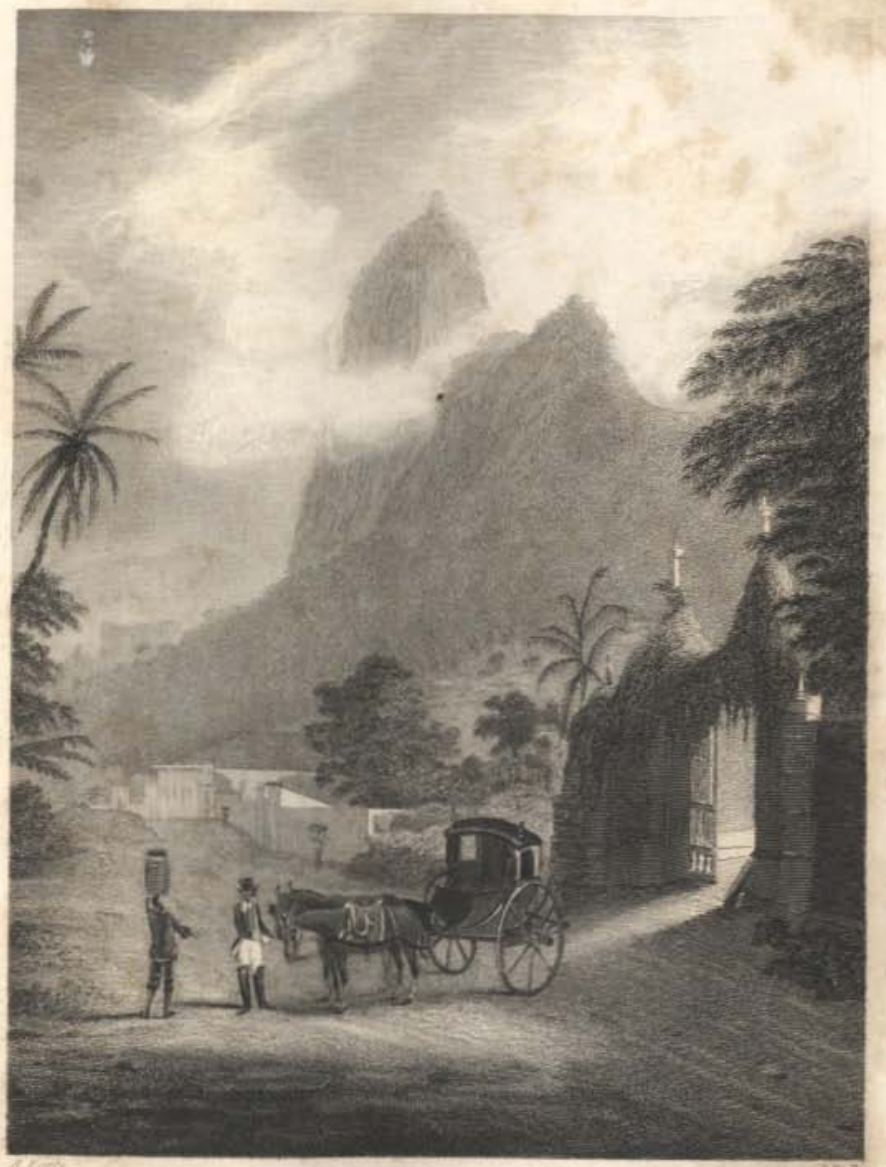

CORCOVADO MOUNTAIN, RIO DE JANEIRO.

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CHAPTER XII.

Adventure sails from Rio de Janeiro to the River Plata—Gorriti—Maldonado—Extraordinary Pampero—Beagle's losses—Ganges arrives—Another pampero—Go up the river for water—Gale, and consequent detention—Sail from Monte Video—Part from our consorts—Port Desire—Tower Rock—Skeletons—Sea Bear Bay—Fire—Guanacoes—Port Desire Inlet—Indian graves—Vessels separate—Captain Foster Chanticleer—Cape Horn—Kater's Peak—Sail from St. Martin Cove—Tribute to Captain Foster—Valparaiso—Santiago—Pinto—Heights—Chilóe—Aldunate.

The Adventure sailed from Rio de Janeiro on the 27th of December 1828, leaving the Beagle to complete her repairs, and follow to the River Plata. The day before our arrival at Maldonado, we were overtaken by the Commander-in-chief, in H.M.S. Ganges, and entered the river in company. The Ganges proceeded to Monte Video; but we went into Maldonado Bay, where I had determined to wait for the Beagle.

Since our last visit to this place, the Island of Gorriti had been occupied by Brazilian troops, who, before going away, set fire to the buildings, and destroyed all the wood-work. As one object of my stay was to obtain observations for the latitude and longitude, I erected our portable observatory, and set up an azimuth altitude instrument.

On the 30th of January, after some intensely hot and sultry weather, we experienced a very severe 'Pampero.' It was preceded by the barometer falling to 29·50, and by a strong N.W. wind, which suddenly veered round to S.W., when the pampero burst upon us. Our ship and boats fortunately escaped any bad effects from the violence of the squall, which was so strong as to lay the former, at anchor, upon her broadside; but on shore our tent was blown down, and a boat that had been lately built, and fresh painted, on the Island Gorriti, was completely destroyed. The part above the thwarts, was torn away from the bottom of the boat, and carried, by the violence of the wind, for two hundred yards along the beach. A boat, also,

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on the opposite shore, was blown to atoms. When the squall commenced, one of our boats was coming off from the island; the officer being quite unconscious of the approaching hurricane, and as she was overloaded with people, I felt very uneasy until after the squall cleared away, when I observed her beached on the opposite shore, many yards above high water mark, to which position she had been driven by the force of the wind. The violence of this pampero, during the twenty minutes it lasted, was terrific. Old inhabitants of Maldonado declared, that they had experienced nothing like it for the last twenty years. The spray was carried up by whirlwinds, threatening complete destruction to every thing that opposed them. In less than half an hour it had diminished to a strong S.W. gale, which lasted during the night.

Just before the pampero commenced, L'Aréthuse, French frigate, was observed over the point of land under all sail; but not being seen after the squall cleared off, we were much alarmed for her safety. At daylight, however, the next morning, she was seen at anchor under Lobos Island, and near her was our consort, the Beagle, of whose approach we had known nothing; bnt she appeared to be lying quietly, with topmasts struck, under the lee of the island. L'Aréthuse slipped her cable in the afternoon, and ran out to sea.

On the 1st of February the wind moderated, and enabled the Beagle to join us, when we found that she had been nearly capsized by the pampero; and had suffered a considerable loss of sails and masts, besides injury to her boats. Both topmasts, and jib-boom, with all the small spars, were carried away; and her jib and topsails, although furled, were blown to pieces. The vessel was on her beam ends for some time; but letting go both anchors brought her head to wind and righted her, which prevented the necessity of cutting away the lower masts. To add to their misfortune, two men were blown overboard, from aloft, and drowned.

These severe losses caused considerable detention; but, fortunately, the Ganges arrived, and rendered every assistance in repairing and replacing the Beagle's damages.

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On the night of the 2d of February we experienced another very severe pampero, during which one of the Beagle's boats, hauled up on shore, was blown to atoms. The barometer had previously fallen to 29·39.

On the 9th of February, we went to Monte Video, and on the 17th ran up the north side of the river for water; but did not find it fresh until we were within four miles of Cape 'Jesus Maria.' The wind was against our return, so that we had to beat down the river, in doing which the Adelaide grounded, but without receiving any injury. We anchored twice in our passage out, and, at the second anchorage,* experienced a very heavy westerly gale. In attempting to weigh at its commencement, our windlass was so much injured, that we were obliged to ride the gale out, which we did by veering to one hundred and ten fathoms of chain cable; and the Beagle, to one hundred and fifty fathoms. Owing to a short heavy sea, in which the Adventure frequently pitched her bowsprit and stern alternately under water, her jolly-boat was washed away. This loss we could ill afford, as we were already three boats short of our establishment, and wants; and as the Adelaide had suffered severely, by losing her topmast and jib-boom, and carrying away the head of her bowsprit, we were obliged to return, very reluctantly, after the gale had subsided, to Monte Video; whence we finally sailed on the 1st of March. On the 5th a S.S.E. gale separated us from our consorts, our course, therefore, was directed for the first rendezvous, at Port Desire.

When off Cape Blanco, the high land of Espinosa, in the interior, was clearly distinguished at a distance of sixty miles, and might probably be seen twenty miles further; so that its height must be, at least, four thousand feet. This range is of irregular form, and has several peaked summits, so very different from the general features of this coast, where the heights are either flat-topped, or of an undulating outline, that I suppose the rock to be of a character unlike that of the porphyry hills common hereabouts.

* From which the Mount (at Monte Video) bore N. 11°. W., distant eight leagues.

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On anchoring off Port Desire (14th), we found that the Beagle had arrived, but had not met the Adelaide. The following afternoon I landed to examine the Tower Rock, a very conspicuous object, on the south side of this harbour, having the appearance of an enormous dead tree with its branches lopped off. On our way to it we passed over an undulating plain, composed of a sandy light soil, lying on a rocky basis, which in many parts protruded. The soil was so poor, as only to produce a few tufts of grass, and here and there a straggling bush of Berberis, or Piccoli, a dwarf woody shrub, which is much esteemed as firewood by the sealers who frequent the coast. Sir John Narborough, in describing this place, says, "The soil is gravelly and sandy, with tufts of dry seared grass growing on it;" again: "from the tops of the hills I could see a great way into the land, which is all hills and downs, like Cornwall, toilsome travelling to those who were not used to it."

The Tower Rock is evidently the remains of what was once probably a considerable rocky mass, which has either been partially destroyed by some convulsion, or, more probably, has been gradually worn away by the effect of weather. Like all the débris around, it is of a fine-grained red porphyritic claystone, much decomposed, but very hard, and difficult to break.*

It stands erect at the summit of a mound or heap of broken stones, of all sizes, some being very large blocks, from ten to twenty, or thirty tons weight. It is about forty feet high, and twelve in diameter, having its upper portion cleft, as it were, for about one-third down the middle, which gives it a resemblance to the forked branch of an immense tree. It is covered with moss and lichen, and, from its peculiar shape and prominent situation, presents a very remarkable object.

Near it we observed traces of an Indian visit, among which was a horse's skull. From the sterility of the soil and absence of fresh water, it is probable that it is but little frequented by them. Port Desire is celebrated as being the place where

* Specimens of this rock are deposited in the Geological Society's Museum, Nos. 3 and 3—1.

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Schouten, the Dutch navigator, is said to have found skeletons measuring eleven or twelve feet in length!

Captain Fitz Roy informed me that he had not seen the Adelaide since we separated. The Beagle had lost another boat in the gale; the eleventh we have lost in the expedition since leaving England. As the Adelaide did not make her appearance, I determined upon proceeding in the Adventure to Sea Bear Bay, a few miles to the southward of Port Desire, to await her arrival with the Beagle. While standing into the bay, we were amused by a chase of a novel description: a guanaco was observed following a fox, which had much difficulty in keeping his pursuer at a distance. As the guanaco is not carnivorous, it may have been in playfulness: Reynard, however, by his speed, and anxiety to escape, did not seem to think it an amusement. How the chase terminated we did not see, for they disappeared in a valley.

While the ship was being moored, I landed to examine some wells near the outer point, which have been said to afford some tuns of good water. I found them to be deep holes in the solid rock, within the wash of a heavy surf, and large enough to contain two hundred gallons of water; but in one only was the water fresh, the sea having broken into the others, and, of course, spoiled their contents. They receive the rain from the ravines, and are much depended upon by sealing vessels which frequent this coast.

Sea Bear Bay was discovered in the voyage of the Nodales, in the year 1618; they describe the place, but give it, as it deserves, a very poor character. "The port," they say, "for a short stay, is not bad, since it affords a good depth of water and a clear bottom; but otherwise it possesses nothing to make it worth a ship visiting it, for there is neither wood nor water, which are what ships most require." Nodales called the bay 'Sea Lion,' from the multitude of sea-lions (*Phoca jubata*) found on Penguin Island. Why it has been changed to Sea Bear Bay I cannot determine.

In one of Mr. Tarn's excursions into the country, he observed a sail in the offing, which he thought was a whale-boat; and

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supposing it might be in distress, if not one of the Adelaide's, kindled a fire to attract attention. As the grass was very dry, it blazed furiously, and spread rapidly around, yet without exciting fear that it could do us any injury; but the next morning flames being observed on the crest of the hills, behind the valley in which our tent had been erected, a boat was sent to save it, and remove the instruments. Our men had just left the ship, when, fanned by a land breeze which rose with the sun, the flames flew on with rapidity, descended the valley, and before the boat reached the shore, had consumed every vestige of the tent, and several articles of minor consequence. The sextant and artificial horizon, lying on the ground, escaped destruction, and the dipping-needle had fortunately been taken on board. Before the fire burned itself out, the whole country for fifteen or twenty miles around was completely over-run, so that all hope of procuring guanacoes was destroyed. Previous to the fire, Mr. Tarn had shot one; but being young, the carcase only weighed one hundred pounds, and was scarcely worth the trouble of sending fifteen miles for; however, as an amusement to the people, I sent a party to bring it on board, and it proved sufficient to furnish the ship's company with a fresh meal.

We had seen several herds within four miles of the ship before the conflagration; but the country was so very level and open, that these shy animals were always warned of the approach of our people by their vigilant scouts. So watchful and attentive is the look-out at his post, that he never drops his head even to feed, and it is only with the greatest cunning and care a man can get near the herd. The best way is, to lie concealed near the water holes, and await their coming to drink. A small stream of fresh water trickled over the beach into the bay, fringed by a patch of grass which the fire had spared, at which having once observed a guanaco drinking, we set a watch; but whether the animals were aware of it or not, none came until the morning we sailed, when a small herd walked down to the place quite unconcernedly, having no doubt first ascertained that there was no danger.

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The little vessel Mr. Tarn saw was an American sealer, which anchored in the bay next morning.

Besides the guanacoes, and fox, above-mentioned, we saw no quadrupeds, although two or three sorts of cavia and the puma are common in this neighbourhood. Of birds, nothing interesting was seen, except a plover (*Totanus fuscus?*), oyster-catcher (*Hæmatopus niger, rostro rubro, pedibus albis*), and one of the night bitterns, very much resembling the young of the European bird;* but these three species had previously been found at Port Famine. Several lizards were taken, and preserved.

This extremely sterile and barren country is very unfavourable for animals of any kind. The soil is like that already described about Port Desire. The rock is of the same character as at Port St. Elena and Port Desire: red porphyritic claystone.†

On the 23d of March, a week having passed since we came to Port Desire, my anxiety for the Adelaide's safety was much increased; especially as both wind and weather had been favourable for her approach to this rendezvous. I therefore despatched Lieut. Wickham overland to Port Desire to order the Beagle to join us, and proceed with us to the other points of rendezvous, Port San Julian and Cape Fairweather. Lieut. Wickham reached Port Desire after a fatiguing walk, and early next morning the Beagle was beating into Sea Bear Bay against a very strong wind which increased, and detained us. I seized this opportunity of completing our consort's provisions to five months. Captain Fitz Roy informed me that he had taken advantage of his stay at Port Desire, to ascend the inlet to the head. It extended for thirty miles, and the water was salt to its very extremity; but, from the height of the old banks on each side, it appeared likely that at times there may be considerable freshes. At the head of the river he lighted a fire,

* See Zoological Journal, vol. iv. p. 92.

† Nos. 1 and 2 in the Geological Society's Museum. A new species of Solen (*Solen Scalprum*, nob., Zool. Journ. V. 335. No. 5.) was found on the beach; and the camerated nidus of *Buccinum muriciforme*, nob., Zool. Journal, l. c. No. 62.

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which spread, and soon joined that which Mr. Tarn had made. Their union probably burned many square leagues of country.

On the 27th, we were still detained by a southerly gale. Captain Fitz Roy accompanied me in search of Indian graves, which are described to be on the summits of the hills. We found the remains of two, one of which had been recently disturbed, but the other had been opened a considerable time.

No vestiges of bones were left. It is said that the corpse is extended in an east and west direction, on the top of the highest pinnacle of the hill, and then covered over with large stones until secure from beasts of prey. Decomposition takes place, or the flesh is consumed by small animals or insects, without the bones being removed, so that complete skeletons are formed. According to Falkner, the bones are collected at a certain period, and removed to some general cemetery, where the skeletons are set up, and tricked out with all the finery the Indians can collect. The avidity they evince for beads and other ornamental trifles is, perhaps, caused by this desire of adorning the remains of their ancestors.

The next morning we left Sea Bear Bay and proceeded to San Julian, off which we anchored for a few hours, while Captain Fitz Roy entered the port to look for the Adelaide, or for some vestige of Lieutenant Graves's visit. Finding nothing in the port, nor any tracks upon the shore, we went on towards Cape Fairweather, and in our way met the Adelaide. After parting from us during the gale in which all her sails were split, she went to Port Desire, where she arrived first, and, not seeing us, proceeded to the two other places of rendezvous, and had been lying at anchor eight days off Cape Fairweather. Finding we were not there, she was returning to Port San Julian, when we met her.

The weather being calm, so good an opportunity of supplying the Adelaide with provisions was not lost, and she was completed to six months.

On the 1st of April we were off Cape Virgins, and parted from the Beagle and Adelaide; Captain Fitz Roy having previously received orders from me to proceed through the Strait of Magalhaens, and despatch the Adelaide to survey the Mag-

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dalen and Barbara Channels, while he was to survey part of the south shore of the Strait and the Jerome Channel, and then proceed, in company with the Adelaide, to Chilóe.

The Adventure then proceeded along the coast of Tierra del Fuego towards Staten Land, for the purpose of communicating with the Chanticleer, or obtaining some intelligence of her. The appointed rendezvous was New Year's Harbour, and the day on which I had promised to be there was past.

It was so foggy that no part of the coast of Tierra del Fuego could be seen; but as any detention might cause Captain Foster inconvenience, I did not wait for fair weather, but went at once to the place appointed.

When crossing Strait le Maire, we were very nearly drifted through by the tide, which, however, changed just in time to admit of our keeping on the north side of Staten Land.

With a strong squally breeze we entered New Year's Harbour, and seeing nothing of the Chanticleer, should have sailed without further investigation, had we not observed a cleared white space on one of the islands, which being near the place where I had requested Captain Foster to leave a document, I concluded was intended to attract our attention. The anchor was therefore dropped in twenty-five fathoms (the island bearing from N. to N.W. ¼ W.), nearly in the spot where Captain Cook anchored, and a boat was sent to the white mark, near which a flag-staff was observed, at whose foot was a tin canister, containing a letter from Captain Foster, which informed me of his having been obliged, in consequence of a longer detention here than he had anticipated, to alter his arrangements, and requesting me to meet him at St. Martin's Cove, near Cape Horn, about this day. We therefore lost no time in getting under weigh, but in doing so, broke an anchor. We passed round Cape St. John, and with a fair wind made rapid progress to the westward. At noon, the next day, being seventy-five miles from Cape Horn, bearing W. by S., the high mountains on the S.E. end of Tierra del Fuego came in sight, among which the 'Sugar Loaf' *(g)* was a conspicuous object.

(g) Campana, or Bell Mountain.—R. F.

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By an angular measurement of its altitude, and the distance given by the chart, its height must be nearly five thousand feet, and the average height of its neighbouring mountains full three thousand.

A south-west gale now set in, and delayed our reaching Cape Horn until the 16th, when we anchored off the entrance of St. Martin's Cove and found the Chanticleer moored within. A boat soon after came with the welcome information of all being well on board her. We were not able to warp into the Cove until next day, and in doing so found much difficulty, owing to the violence of the squalls, which repeatedly obliged us to slacken the hawsers quickly, else we should have carried them away.

The Adventure was moored in seventeen fathoms, about a cable's length within the low green point on the south side: and the Chanticleer lay in ten fathoms near the head of the Cove. The summit of Cape Horn being in a line with the south point of entrance, we were quite land-locked, and perfectly sheltered from all winds, excepting the williwaws, or furious gusts from off the high land, which sometimes suddenly struck the ship, and threw her on her broadside; but being as momentary in duration as they were sudden in approach, we found them more disagreeable than dangerous.

During our stay here I made a partial survey of the Bay of St. Francis, which has since been completed by Captain Fitz Roy. St. Joachim's Cove, to the southward of St. Martin's Cove, is more exposed than the latter, but is of easier depth. These coves are separated from each other by a steep and precipitous mass of hills of greenstone, which in many parts appear to be stratified, the dip being to the westward, at an angle of 40°. I landed at the point, and ascended the hill, which I found more difficult to do than I supposed, the whole surface being covered with stunted beech bushes, so thickly matted or interwoven together, that I was obliged to walk or crawl over their tops. Among them were occasionally seen the berberis ilicifolia and veronica, the latter of very small size. Another day, Lieutenant Kendall, of the Chanticleer, accompanied me

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to Weddel's Port Maxwell, which is evidently St. Bernard's Cove of D'Arquistade.*(h)* Port Maxwell is contained between Jerdan Island, Saddle Island, and a third island, forming a triangle. It has four entrances, the principal one being to the north of Jerdan Island, and affords tolerable anchorage in the centre, in nineteen and twenty fathoms, sand ;* nearer the shores of the island the depth is more moderate, but the bottom is very rocky.

The summit of Saddle Island, which I ascended for bearings, is composed of large blocks of greenstone rock, on one of which the compass (Kater's Azimuth, without a stand) was placed; but the needle was found to be so much influenced by the ferruginous nature of the rock, composed of quartz and feldspar, thickly studded with large crystals of hornblende, that the poles of the needle became exactly reversed. An experiment was then made, by taking bearings of a very distant object, at several stations around, about fifty yards from the magnetic rock, when the extreme difference of the results amounted to 127°. The block upon which the compass stood, in the first instance, is now conspicuously placed in the museum of the Geological Society.†

Saddle Island, like the others near it, is clothed with low stunted brushwood of beech, berberis, and arbutus, and the ground is covered with a species of chamitis, and other mountain plants. While Mr. Kendall and I were absent from the boat, the crew caught several kelp fish, which are very delicate and wholesome food. On the following day, while going with Mr. Kendall to Wollaston Island, we passed a great many whales, leaping and tumbling in the water. A blow from one

(h) I do not think the bay adjacent to Cape Horn is that which was named by D'Arquistade 'St. Francis,' and, if my supposition is correct, Port Maxwell is not the place which was called 'St. Bernard's Cove.' See Second volume.—R. F.

* According to Capt. Fitz Roy the best berth is in sixteen fathoms. (Sail. Directions.)

† Nos. 268 to 271, Geo. Soc. Museum.

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of them would have destroyed our boat, and I was glad to cross the Sound without getting within their reach. We returned by the west side of Jerdan Island, where there are bights which might afford shelter to a small vessel.

The Sound that separates Wollaston Island from the Bay of St. Francis, I named after Sir John Franklin, and the harbour to the east of the point on which we landed, after Lieutenant Kendall, who was one of Sir John Franklin's companions in his last journey to the north-west coast of America.

On the west point of Kendall Harbour, I observed a magnetic property in the rock, which is of the same character as that on Saddle Island. Weddel noticed the same at St. Martin's Cove; but I placed the compass in various parts of that cove, without observing any difference from the correct bearing. This was, perhaps, owing to the rock being much covered with soil; for, being of the same character with that of the places above-mentioned, it should cause a similar effect.

The next day S.W. gales and thick weather set in, and confined us almost to the ship. Taking advantage of a short interval of more moderate weather, I ascended the highest peak on the south side of the cove, immediately over the anchorage, taking two barometers, one of the Englefield construction, and the other a syphon barometer, on M. Gay Lussac's plan, made by Bunten, of Paris. Mr. Harrison accompanied me, taking charge of one barometer, whilst I carried the other. My coxswain carried a theodolite. On landing, the barometers were set up at the edge of the water and read off, and at the same moment the barometer on board was read off. We then ascended, but the rise was so precipitously steep as to offer very great impediments; and had it not been for a water-course, in whose bed we climbed for the first part, the ascent, with delicate instruments, would have been almost impracticable. We had ascended but little way, when the unfortunate theodolite escaped from my coxswain, rolled down the ravine, and was much damaged. It was an excellent magnetic transit, and for that purpose was irremediably injured; but, as a theodolite, it was yet useful. The first third of the ascent, from the com-

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parative facility offered by the water-course, was only impeded by loose stones, which frequently yielded to the foot, and rolled down the gully, to the great danger of those who followed. The banks of the ravine were saturated with water, and covered either with spongy moss, or matted with plants,* which afforded no assistance; had it not therefore been for straggling shrubs of arbutus, or veronica, and tufts of rushes, growing on the steeper parts, we should have had many a fall; and however unimportant we might think bruises and scratches, a broken barometer would have been a serious accident, and much care was required to avoid it. We had to leave the bed of the torrent, when it became full of wood, and then our difficulty increased much; for in many places we had to scramble over the thickly-matted and interwoven branches of the stunted bushes of beech which frequently yielded to our weight, and entangled our legs so much, that it was no easy matter to extricate ourselves.

At the height of one thousand feet, vegetation became much more stunted; we found the plants and shrubs of very diminutive size, consisting principally of the deciduous-leaved beech, one plant of which, though not more than two inches high, occupied a space of four or five feet in diameter, its spreading branches insinuating themselves among wild cranberry, chamitis, donacia, arbutus, and escalonia, so closely matted together, as to form quite an elastic carpet. For the last two hundred feet, we walked over the bare rock, on which no other vegetation was observed than lichens. The summit of the peak is formed by a loose pile of green-stone rock, in which the hornblende appears in very varied forms, sometimes in large crystals, and again so small and disseminated, as to be scarcely visible; on the summit it is seen, in very long, narrow (? filiform) crystals, and the feldspar predominating, gives it a white appearance.†

The only living creatures we saw were a solitary hawk and

* A species of Gunnera (*Dysemore integrifolia*, Banks and Solander), and the green-stemmed Cineraria (*Cin. leucanthema*. Banks and Solander).

† Nos. 283 to 286, in Geol. Soc. Museum.

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one insect, a species of Oniscus. Nothing, in fact, could be more desolate, and we had only the satisfaction of a good observation for the height, and an excellent bird's-eye view of the surrounding islands and channel, to repay us for the labour of the ascent. On reaching the top, the barometers were suspended under the lee of the rock, twelve feet below its summit, and I then proceeded to set up the theodolite, which I found more damaged than I had anticipated; but not so much as to deprive me of a very extensive round of angles, in which were contained bearings of the Ildefonso Islands. We were thus occupied about an hour and half, which afforded me an opportunity of obtaining two good readings of the barometer.

The view to the N.W. was very extensive, and bounded by long ranges of snow-clad mountains of great height; the atmosphere was remarkably clear, and every object unusually distinct. Bearings of the islands of Diego Ramirez would have been taken, but for the extreme force of the wind, which more than once blew me from the theodolite, and once actually threw me on the ground. The temperature was not below 38°; but, owing to the wind, the cold was intense, and the rapid evaporation produced the most painful sensations, particularly in our feet and legs, which were thoroughly wet when we reached the top.

Our descent was not effected in less than an hour and twenty minutes, owing to the difficulty of passing through the beech thickets; but we reached the base without injury to the barometers, which was being more fortunate than I expected. They were again set up on the beach, and read; after which we returned on board, amply gratified and rewarded for our fatigue.

The height of the peak, which, from its vicinity to the station selected by Captain Foster for the pendulum experiments, could not receive a more appropriate name than Kater's Peak, was found to be 1,742 feet above the high-water mark.*

* The changes of pressure, during the intervals of ascent and descent, were obtained by registering the ship's barometer, which was done by signal from the stations on shore, when the readings were taken. During the

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The next day, after a beautifully clear and mild morning, with a fresh northerly breeze, the weather became cloudy, and the wind veered to the S.W. blowing excessively hard, with hail and rain. The gusts, or williwaws, rushed through the valley of the cove with inconceivable violence, heaving the ship over on her broadside every minute, so that we were obliged to have every thing lashed as if at sea. Fortunately, we had completed wood and water, and now only waited for observations, to rate the chronometers, for our run to Valparaiso, whither it was my intention to proceed. Days, however, passed without a glimpse of the stars, and the sun only appeared for a few minutes above the hills. Captain Foster had completed his observations, and embarked all his instruments, excepting the transit, which remained for taking the passages of stars; but the bad weather continued, with little intermission. On the 3d, the gale was most violent, and the williwaws became short hurricanes, in some of which the ship drifted and fouled her anchors. On the 10th, we had a dry and fair day, which permitted us to sight the anchors and moor again.

The fine weather was of only a few hours duration, when the gale again sprung up, and lasted, with little intermission, until the day of our departure (the 24th). From the 4th to the 22d the sky was so perpetually clouded, that the only transits obtained in that interval were, one of Antares, one of Regulus, and one of the limb of the moon, though Captain Foster even slept close to the telescope, in the greatest anxiety to obtain observations. On the night of the 22d four stars were

the ascent the column fell 0·039 inches, and during the descent rose 0·041 inches. Corrections were made for the dew point, as observed by Daniell's hygrometer at the base and summit, and the calculations were made according to the formula in Daniell's Meteorological Essay.

The following is the result:

	By Bunten's Syphon.	By Jones 509.
Ascent	1743·4	1749·3
Descent	1738·	1739·1
Mean	1741.	1744·2

Mean of the two instruments 1742·4 feet.

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observed, by which the error of the clock was satisfactorily ascertained.

Captain Foster's pluviameter, a cubic foot in size, placed on a stand two feet above the ground, at an elevation of forty-five feet above the sea, contained eight inches and a quarter of rain, after standing thirty days; therefore, with the quantity evaporated, at least twelve inches must have fallen. The day after the above was registered, the vessel only contained seven inches and a quarter; so that in twenty-four hours one inch had evaporated, by which an idea may be formed of the sort of weather we experienced, and of the humidity of the climate.

With respect to the geological features, I can only add, that all the islands on which I landed, and, I believe, all the others, are composed of green-stone of various characters. The lower portion, or base, being less decomposed, is a fine-grained green-coloured rock, in which the component parts are so blended as not to be distinguished from each other. It appears sometimes in strata, dipping at various angles, from 20° to 45° from the vertical; and is very similar to the rock which alternates with granite in the Straits of Magalhaens, at the entrance of the Barbara; and also to that about Pond Harbour, and Bell Bay. At a greater elevation the feldspar predominates, the hornblende is observed in distinct crystals,* and the rock contains a considerable quantity of iron, which is observed in the reddish tinge of its surface. I have before noticed the magnetic property of this rock, which was more or less according to the quantity of hornblende: the beach-stones are different sorts of green-stone.

The lower parts of the hills, around St. Martin's Cove, are thickly wooded with the smooth-leaved, evergreen beech, which I have before described. Its leaves were as fresh and vivid, when we sailed, as if it were the height of summer; but those of the deciduous-leaved beech had assumed their autumnal tint, and were falling fast. Neither species attained a greater size, in diameter, than six or eight inches. The Winter's-bark was

* This rock is very similar to the boulders and pebbles which we found on the beach at Point St. Mary (Freshwater Bay).

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found in sheltered places, but not larger in dimensions than the beech.* Where no trees are produced, the ground is covered with tufts of chamitis and donacia, which, being of a bright-green colour, give the sides of the hills a lively and verdant appearance. Had the state of the weather permitted our boats to leave the neighbourhood of the cove, or had the woods afforded any addition to collections for natural history, our detention would have been more agreeable; but, with the exception of a few corvorants, divers, and 'steamers,' with now and then a solitary hawk, or a Patagonian 'warbler,' we saw no traces of animal life. No Indians came near us, having been frightened away by the Chanticleer; for when Captain Foster was absent at night, after attempting to land at Cape Horn, several rockets were fired off as signals, and a few Indians who were then in the cove were so much alarmed, that they went away next day, and never afterwards showed themselves, although I dare say we were very narrowly watched by them.

Having supplied the Chanticleer with the provisions she required, we prepared to leave St. Martin's Cove. On the 24th the Chanticleer sailed, and in two hours after we also left this dismal cove, in which we experienced a succession of very bad weather, an almost constant S.W. wind, and for the last month a scarcely ceasing fall of either rain, hail, or snow. The Chanticleer bore away round Cape Horn, and was soon out of sight.

This was my last meeting with Captain Foster, who, the night before we sailed, communicated to me a presentiment, which he could not shake off, that he should not survive the voyage. I cannot now resist indulging in the melancholy satisfaction of saying a few words to the memory of my late excellent

* The underwood is composed chiefly of *Arbutus rigida*—*Berberis parvifolia* and *ilicifolia*—(*sempervirens* of Banks and Solander). *Veronica* (*decussata?*) and, in moist places, *Cineraria leucanthema*, and *Dysemore integrifolia*; both of which are found in all the sheltered corners of Tierra del Fuego. No *Fuchsia* was seen, but Mr. Anderson gathered the sweet-scented *Callixene marginata*, and a species of *Escalonia*, on the hill sides.

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friend, and lamenting, with many others, the severe loss which science suffered in his death. He was a fellow of the Royal, and Astronomical Societies, and to the former had contributed, to use the words of His Royal Highness the Duke of Sussex, as President of the Royal Society, a most valuable and extensive series of observations upon the diurnal variation, diurnal intensity, and dip of the magnetic needle; and upon other subjects connected with the terrestrial magnetism and astronomical refraction, which formed an entire fourth part of the Philosophical Transactions for the year 1826. For these papers he received the Copley medal; and the Lords of the Admiralty acknowledged their sense of the honour which was thus conferred upon the profession to which he belonged, by immediately raising him to the rank of Commander, and by appointing him to the command of the Chanticleer, upon a voyage of discovery and observation in the South Seas. The address of the President of the Royal Astronomical Society, at the anniversary meeting,* also bears ample testimony to his active and useful services in the expedition, under Captain Parry, towards the North Pole; as well as to his ardent zeal, very great attention, and accuracy, in every thing which he undertook for the promotion of science; and concludes the notice of his death in the following words: "In the premature death of this young and accomplished officer, the Society has to deplore the loss of a zealous and active votary to science; and his memory will be long held dear by those who were more intimately acquainted with him in the relations of private life." Captain Foster was unfortunately drowned, near the close of his voyage, while descending the River Chagres in a canoe.

No sooner had we cleared the land, than we found a strong westerly wind, and a heavy sea; so that if we had entertained any expectation of making a quiet passage to the westward, we should have been disappointed.

The land of Hermite Island, and its vicinity, has a most remarkable appearance when seen from the south. Its outline is a series of peaks, following each other in regular succession,

* Ann. Meeting, 30th Nov. 1832.

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and resembling the worn teeth of an old saw. Mount Hyde is made sufficiently distinct by its rounded apex, and by being higher than any land near it. Kater's Peak also is remarkable in this view, from its conical form and very pointed summit, and from being situated at the eastern end of the island. The 'Horn' itself needs no description; it cannot easily be mistaken.*

Westerly winds carried us as far as 60° south latitude before we could make any westing, and then we had a slant from the eastward, followed by variable winds. Our run to Valparaiso was much like all other voyages in this climate; we had the usual quantity of foul and fair winds, with a share of tempestuous weather, and arrived at Valparaiso Bay on the 22d of June. While remaining here our chronometers were cleaned, and some of them repaired; and the ship was refitted and provisioned, with a full supply for the Beagle and Adelaide as well as herself.

At the latter end of July, Lieutenant Wickham accompanied me to Santiago, the capital of Chile, ninety miles from the port, for the purpose of waiting upon General Pinto, the Director; and communicating to him the purpose of our voyage, to prevent exciting suspicion, or receiving any interruption on the part of the authorities of places we might visit, particularly Chiloé, where our stay might be viewed with distrust or apprehension; for rumour had already said that the English were about to take that island. Ridiculous as such a report was, I deemed it sufficiently important to induce me to explain to the Chilian Government our views and orders, which could be done better by personal explanation than by a correspondence.

We commenced our journey early on the 11th of July, travelling in a covered chaise, drawn by three horses, one in

* The Survey of this part now presents the navigator with the means of ascertaining his position, to a nicety, by angles taken with a sextant between Cape Horn summit and Jerdan's Peak, or Mount Hyde, and Kater's Peak; and if Jerdan's Peak and Mount Hyde be brought in a line, and an angle taken between them and Cape Horn summit, the operation will be still more simple.

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the shafts, and the others outside, attached to the carriage by a single trace of hide; and preceded by a drove of horses, from which, at the end of every stage of twelve or fifteen miles, we selected a relay. The day was so very stormy, that we saw but little of the country. Immediately after leaving the Almendral, or suburbs of Valparaiso, we ascended twelve hundred feet, and then descended about four hundred feet to an extensive plain, reaching to the Cuesta de Zapato, the summit of which, at least the highest part of the road over it, we found by barometrical measurement to be 1,977 feet above the sea. In the interval we passed through the village of Casa Blanca, lying eight hundred and three feet above the sea. After passing the Cuesta de Zapato, between it and the Cuesta de Prado, is another extensive valley, through which runs the River Poangui. At Curacavi, where we crossed the river, the height above the sea is six hundred and thirty-three feet;* and the road proceeds by a gentle ascent to the foot of the Cuesta de Prado, near which is the village of Bustamente, eight hundred and eight feet above the sea.

This 'cuesta' is passed by a very steep road, and is ascended by twenty-seven traverses, which carry one to a height of 2,100 feet above the plain, or 2,950 feet above the sea. When we reached the summit of this mountain the weather was so cloudy, that the Andes were almost concealed from view. Beneath us was the extensive plain of Maypo, with the city of Santiago in the distance, a view of considerable extent, and possessing very great interest; but from the state of the weather, its beauty would not have been seen to advantage, had not portions of the towering Andes, raised by optical deception to apparently twice their height, appeared at intervals among the clouds. On

* Miers, in his account of Chile, gives a table of barometrical measurements of the heights of the land between Valparaiso and Mendoza, from which it appears that he has deduced the height of Curacavi to be 1,560 feet. As my determinations are the results of observations made on my way to and from Santiago, I have no doubt of their correctness, and think that the registered height of Miers's table should be 29·355 instead of 28·355.

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a fine day, when the range of mountains is uncovered, the view is grand; but not so imposing as when their lower portions are concealed, and their summits partially exposed. This part of the Andes rises about 11,000 feet above the plain, and is covered half way down the sides with snow, the lower edge of which is regularly defined, and presents a change of colour so abrupt and horizontal as to appear unnatural, and therefore diminish the grandeur of the scene very much. But under whatever circumstances this view is seen from the Cuesta de Prado, it is magnificent, and produces an effect beyond description. The road descends down the eastern side of this Cuesta, to a plain about 1,100 feet below the summit. So much rain had fallen during the two preceding days, and last night, that our driver expressed some doubt whether we should be able to cross the Podaguel, a river which is frequently impassable from the strength of its current. The idea of spending a night at the miserable hovel we were leaving was enough to induce us to run a considerable risk, and we set off to make the attempt. The water was very deep, and the current sufficiently strong to render it a performance of some danger; but, this difficulty being passed, we soon reached the city of Santiago, and in the house of Mr. Caldcleugh, enjoyed the hospitality and society of a warm-hearted friend.

I waited on the Director (Pinto), who received me with the greatest politeness. He entered into the particulars of our past voyage with much interest, assuring me that every facility should be afforded, and every assistance rendered, whenever it might be required; and in this assurance we never found ourselves deceived, for on all occasions the conduct of the executive authorities towards us was marked in attention, and even kindness. I make this observation with the more pleasure, as it was very unusual in our communications with the authorities of those governments we had previously visited, to find the objects of our voyage considered in the least interesting.

Although the weather, during our visit to Santiago, was not there considered fine, we left the city and its neighbourhood with a strong impression of the salubrity of the climate, and the

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mildness of its temperature, which even in the middle of winter, and at the height of nearly 2,000 feet above the sea, ranged no lower than 45° Fahrenheit, and during the day the maximum height of the thermometer never exceeded 62°.*(*k*)

We returned to Valparaiso on the 26th of July, and made preparations to sail; but were detained by a strong northerly gale for many days, in which we were enabled to render assistance to a large Indian trader that would otherwise have been wrecked. On the 10th of August, we sailed for Chilóe; and on our way were greatly delayed by southerly winds, which carried us in sight of the island of Juan Fernandez. We reached our destination on the 26th, and found the Beagle, to our great delight, arrived, and all well. Captain Fitz Roy came on board before we anchored, and gave me an outline of his proceedings, and those of the Adelaide, which had not

* The following are the results of the barometrical determination of the height of various points on the road between Valparaiso and Santiago:—

	Feet above the sea.
Casa Blanca, ten leagues from Valparaiso	803
Highest point of the road over the Cuesta de Zapata	1,977
Inn at Curacavi	633
Plain near Bustamente	808
Summit of Cuesta de Prado (not certain to 200 feet)	2,949
Inn, or post-house, at the base of the east side of the Cuesta de Prado	1,804
Santiago, by mean of numerous observations	1,821

Miers makes the above places above the sea as follows:—

	Feet above the sea.
Casa Blanca	745
Summit of Cuesta de Zapata	1,850
Curacavi	1,560
Summit of Cuesta de Prado	2,543
Post-house, Prado	1,773
Santiago, mean of two observations	1,691

Do. by Malespina.... 2,463 } Spanish ..... { 2,254 } English.
Do. Mercurio Chileno 1,693¼ } { 1,550 }

(*k*) Sharp frosts sometimes occur.—R. F.

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returned, but was daily expected, having been despatched to survey some interior channels on her way to Chilóe. Our anchorage was off Point Arenas, which is not only the best in the bay, but appeared to be well adapted to our wants. The Beagle had arrived early in July, and had sent to Valparaiso for stores with which to refit, and make preparations for another cruize to the south.

The harbour master, Mr. Williams, an Englishman, visited us soon after our anchoring, and by him I forwarded to the Yntendente (or governor), Don José Santiago Aldunate, the letters brought for him from Chile.

In the afternoon I received his acknowledgments, and offers of all the assistance in his power to render. As it was probable that our stay would occupy some weeks, I established myself at a house in the town, obtained by his kindness; and there fixed my portable observatory, and set up an azimuth altitude instrument.

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CHAPTER XIII.

Beagle and Adelaide anchor in Possession Bay—Beagle passes the First Narrow—Fogs—Pecket Harbour—Adelaide arrives with Guanaco-meat—Portuguese Seamen—Peculiar light—Party missing—Return—Proceed towards Port Famine—Fuegians—Lieut. Skyring—Adelaide sails to survey Magdalen and Barbara Channels—Views—Lyell Sound—Kempe Harbour—Cascade Bay—San Pedro Sound—Port Gallant—Diet—Rain—Awnings—Boat cruise—Warning—Jerome Channel—Blanket bags—Otway Water—Frequent rain—Difficulty in lighting fires.

THE following is an account of the Beagle's and Adelaide's operations, after separating from the Adventure, on the 1st of April, at the entrance of the Strait of Magalhaens.

Light northerly winds were favourable for their entering the Strait, and they reached Possession Bay the first night. The following day was foggy, and almost calm, until the afternoon, when both vessels weighed, and proceeded with the tide. At sunset the Adelaide anchored on the north shore; but the Beagle stood on, and entered the Narrow. After dark, when within it, with a rapid tide running, the wind fell light, and an anchor was let go, under the north shore, in eight fathoms; but the cable being accidentally checked too soon, snapped like a small rope, and the vessel was hustled out into deep water. As it would have been both useless and imprudent to let go another anchor, the Beagle was kept underweigh, and worked to the westward, aided by a very powerful tide, which speedily carried her through the Narrow, without accident, although the night was dark; and they had no guide but the chart and lead. At eleven o'clock she was anchored within the Narrow, in twelve fathoms, soon after which the tide turned, and ran with great strength; but the night was calm, as well as the next morning.

While waiting for wind, and the change of tide, several Patagonian Indians were observed on horseback hunting gua-

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nacoes. A very large dead cod-fish was also seen, floating past, which was taken on board; on its skin were several parasites.*

With the evening tide the Beagle reached Gregory Bay; and the next day (April 4th) worked through the Second Narrow, and anchored in Pecket Harbour.

As soon as she arrived people were sent on shore to make a large fire, to show the natives where the ship was, and attract them to her. Next morning, the 5th, it had spread very much, and overrun several acres of ground, which showed either a very dry soil, or that there had not been much rain for some time. The ground was covered with cranberries; so much so, that it had quite a red tinge; they were very good. Plenty of wild celery was found, but no wood of any kind. Water was obtained in small quantities, from a spring about eighty yards from the beach, abreast of the anchorage: it may also be procured by sinking wells. Early on the 6th of April the Adelaide anchored near the Beagle. Captain Fitz Roy went on board, and found that Lieutenant Graves had seen the Indians in Gregory Bay; and had anchored there for the purpose of obtaining guanaco meat, of which he got about nine hundred pounds weight. Thick fogs had prevented his getting through the First Narrow until the 4th. At Gregory Bay, Lieutenant Graves took three Portuguese seamen on board, who claimed his protection, having been left by an English sealing vessel nearly a year before. One of them asked to be again put ashore, and was landed on Quoin Hill to carry a message to the Indians, from whom he promised to bring a supply of meat in two days. The other two were entered on the books as supernumeraries, and employed in the Adelaide. Having given the Beagle two-thirds of the meat, the Adelaide weighed; and in two hours was out of sight, on her way to Port Famine.

* Probably they are the same as we observed on the fish taken by us off Cape Fairweather, and which, I believe, to be nearly allied to the one that is figured in Cuvier's Règne animal, Plate XV. figure 5, a species of *Lernæa*, or *Entomoda* of Lamarck, iii. 233. The species is new.

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The following are extracts from Captain Fitz Roy's journal of this cruise of the Beagle.

"Monday 7th April. Several of our people were employed in gathering cranberries, and preserving them for future use; they are anti-scorbutic, as well as the wild celery, much of which has been used with our guanaco soup.

"Wednesday, 8th. I went to Oazy Harbour with Lieutenant Skyring, who surveyed the harbour while I examined the cove to the northward.

"Oazy Harbour appears large, but the part where there is anchorage is very small, and a strong tide sets in and round it, by which a bank is thrown up, a short distance inside the entrance; there is very little wood, and some difficulty in obtaining fresh water, even in a small quantity. The anchorage outside might be more convenient for procuring guanaco meat from the Indians than Gregory Bay, but it is exposed to winds between W.S.W. and S.S.E.

"At my return to the Beagle, I was much surprised to find that Lieutenant Kempe, Mr. Bynoe, and a boy, had not yet come back from a shooting excursion. A boat had been to the appointed place at sun-set, and had waited an hour without seeing them. At seven, a light was seen on the top of Quoin Hill, and I sent a boat to the spot, with cautions about landing, being in doubt whether it was shown by them or by the Indians; but the boatswain, who went with her, could find no person, nor any light. He waited some time, and returned on board.(*l*) A similar light was again seen, more than once, during the dark and gloomy weather, with small misty rain falling, and a light breeze from the westward, which we had all night.

"Thursday, 9th. No signs of our officers, nor any appearance of the Indians. Fearing that some accident had happened, I sent two boats away, with arms and provisions, to look for them all round the harbour, and the large lagoon which communicates

(*l*) This was a remarkable instance of what I often observed afterwards in those regions, a kind of 'ignis fatuus,' which sometimes was stationary, like the light of a lanthorn, and at others suddenly flitting, like the flashes of pistols, at a distance. It was only seen upon the lower hills.—R. F.

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with it. Both boats were thoroughly cautioned about the Indians, for I had thoughts of their treachery. Just as the boats got out of sight, three people were observed on the ridge of a hill, about six miles distant; and, at the same time two other persons appeared, much nearer the ship, on the east side of the harbour. Which was our party, and who the others were, it was perplexing to say. Both disappeared again for about two hours, when our stragglers came over a hill, very near the ship. Upon their arrival on board, they were scarcely able to move: they had been on their legs, almost without food, and without shelter from the rain, since they left the ship. Their intention had been to walk round the harbour, which appeared an employment for two hours only; but at its head they found a lake, and beyond that lake a much larger one, joined to the first by a passage, which they could not cross. When they arrived at this passage, it was too late to return by the way they went, and their best chance seemed to be going on. After dark, they tried to make a fire, but the rain prevented them. It was too dark to see their way, and the cold rain obliged them to keep moving about, though in one place. When daylight came, they travelled on, and until they reached the ship at two o'clock, were constantly walking.

"The other people seen by us must have been Indians; none were met by our wanderers, but several places were passed where fires had been made by them.

"April 10th. Directly our boats returned, we weighed and made sail; but the wind soon failed, and the tide setting against us, obliged me to anchor.

"April 11th. Made sail towards the passage between Elizabeth Island and Cape Negro, and anchored there to wait for the tide, which ran past us when at anchor, at the rate of three knots an hour. About Cape Negro the appearance of the land entirely changes. A low barren country gives way to hills covered with wood, increasing in height, and becoming more rocky and mountainous as you go southward.

"On the 13th, when working near the land, against a light southerly breeze, we saw a small canoe paddling along shore,

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and some people walking on the beach. While the ship was standing off, I went to them, being the first savages I had ever met. In the canoe were an old woman, her daughter, and a child, and on shore were two Fuegian men with several dogs. Their figures reminded me of drawings of the Esquimaux, being rather below the middle size, wrapped in rough skins, with their hair hanging down on all sides, like old thatch, and their skins of a reddish brown colour, smeared over with oil, and very dirty. Their features were bad, but peculiar; and, if physiognomy can be trusted, indicated cunning, indolence, passive fortitude, deficient intellect, and want of energy. I observed that the forehead was very small and ill-shaped; the nose was long, narrow between the eyes, and wide at the point; and the upper lip, long and protruding. They had small, retreating chins; bad teeth; high cheek-bones; small Chinese eyes, at an oblique angle with the nose; coarse hair; wide ill-formed mouths, and a laugh as if the upper lip were immoveable. The head was very small, especially at the top and back; there were very few bumps for a craniologist. They asked earnestly for 'tabac, tabac,' but seemed very timid. We bartered some biscuit and old knives for a few of their arrows, skins, spears, &c.

"Their canoes, twenty-two feet long, and about three wide, were curiously made of the branches of trees, covered with pieces of beech-tree bark, sewed together with intestines of seals. A fire was burning in the middle, upon some earth, and all their property, consisting of a few skins and bone-headed lances, was stowed at the ends.

"The young woman would not have been ill-looking, had she been well scrubbed, and all the yellow clay with which she was bedaubed, washed away. I think they use the clayey mixture for warmth rather than for show, as it stops the pores of the skin, preventing evaporation and keeping out the cold air. Their only clothing was a skin, thrown loosely about them; and their hair was much like a horse's mane, that has never been combed.

"April 14th. Anchored in Port Famine.

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"April 16th. Lieutenant Skyring went on board the Adelaide with Mr. Kirke, five seamen, and one of the Beagle's whale-boats. Mr. Bynoe, the assistant-surgeon, also went as a volunteer.

"April 17th. The Adelaide sailed to survey the Magdalen and Barbara Channels; after which she was to rejoin the Beagle at Port Gallant. She soon got into a strong southerly wind, and could make no progress, as the current was against her; she therefore again stood into the bay, and anchored.

"A sharply cold night made us remember we were far south, although the weather by day had been mild. I have said little about this anchorage, as it has already been described. The appearance of the surrounding country is striking and picturesque. Mount Tarn, with its patches of snow, rising from thick woods, and the high snow-covered mountains in the distance, with dark blue sea at their base, are very remarkable objects.

"We sailed on the 19th with the Adelaide, which had been prevented from going sooner by strong and unfavourable winds: and about noon we parted from our consort, whose course was southerly, into the Magdalen Channel, while we went towards Lyell Sound.

"I cannot help here remarking, that the scenery this day appeared to me magnificent. Many ranges of mountains, besides Mount Sarmiento, were distinctly visible, and the continual change occurring in the views of the land, as clouds passed over the sun, with such a variety of tints of every colour, from that of the dazzling snow to the deep darkness of the still water, made me wish earnestly to be enabled to give an idea of it upon paper; but a necessary look-out for the vessel, not having a commissioned officer with me who had been in the Strait before, kept my attention too much occupied to allow me to make more than a few hasty outlines. Under the high land the Beagle had but little wind, and night closed upon us before we could gain an anchorage in Lyell Sound, so we shortened sail after dark, and kept near mid channel until the morning.

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" The night was one of the most beautiful I have ever seen; nearly calm, the sky clear of clouds, excepting a few large white masses, which at times passed over the bright full moon: whose light striking upon the snow-covered summits of the mountains by which we were surrounded, contrasted strongly with their dark gloomy bases, and gave an effect to the scene which I shall never forget.

" At daylight, on the 20th, we were close to Lyell Sound, and stood along its west side, looking for an anchorage, until we found a very good harbour, about a mile inside Mazaredo Point.

" I then went away, with two boats, to examine the Sound, leaving the master to sound and plan the inner harbour.

" Kempe Harbour, within Lyell Sound, would hold six large ships in security; but, like most of the harbours hereabouts, access is difficult, on account of the squalls off the high land, which are so irregular, and often violent.

" During the night of the 21st, it blew strong in squalls, and the chain-cable kept us awake by rattling very much over rocks; yet when the anchor was hove to the bows next morning, it appeared to have been well bedded in stiff clay. To these sounds we afterwards became familiarised.

" Wednesday, 22d. Strong squalls from the south-eastward during the night, and in the morning; when, being anxious to reach Cascade Bay, I weighed, though the weather was thick, and the wind against us. The flaws were so variable, that we were two hours knocking the helm and sails about before we could clear the anchorage, and move half a mile in still water. I should recommend warping in and out of these harbours, in preference to making sail: as it is far easier, if a ship is provided with small hawsers and kedges: and the hawsers can often be made fast to the rocks, or roots of trees.

" The tide rises about four feet in Kempe Harbour; and there is a place where a vessel might be grounded or careened with perfect safety.

" Mazaredo Peak (Bougainville's Sugar Loaf) is an excellent guide to Kempe Harbour; the valley-like appearance of

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the land also shows its situation to a vessel in the Straits. What at first appears to be Lyell Sound is Kempe Harbour, the Sound lies more to the left.

" After passing Mazaredo Point, the land is rugged and less woody; it is not very high, and has a peculiar, rounded appearance, like the tops of loaves of bread.

" There was slate in Kempe Harbour, which seemed to me fit for roofing purposes.

" In Cascade Bay we found the abundance of limpets and muscles usual on these shores, and of particularly good quality. The Indians live almost entirely upon them and sea-eggs, though birds, and occasionally a seal, add to their subsistence. Vegetation, both on shore and in the water, is most abundant. At every step one sinks knee-deep in moss, grass, fern, or low bushes. Trees seem to arrive but seldom at perfection; the climate is so moist that they rot while growing, before they attain any size. Moss grows every where; each bough is covered with it: and the water appears to be as favourable to the growth of kelp as the land is to that of plants. The large kind (*Fucus giganteus*) shoots up, from many fathoms depth, to the surface, with strong stalks and large leaves.

" 23d. A bad day; blowing strong, and at times raining. Mr. Murray, Mr. Stokes, and I, went with three boats to continue our work of exploring and sounding.

" Saturday, 25th. We weighed and made sail; but the breeze failed, and flaws came against us. While laying out warps, and hanging by the stream-cable, a squall took the ship and drove her against the rocks, but without doing her any injury, for they were quite wall-sided. The main-yard and spanker-boom were among the trees. We again laid out warps, and had made some progress, when another strong squall obliged us to go back into our anchorage, to remain until the hail, snow, wind, and rain should cease.

" 26th. An unpromising and wet morning; but the heavy rain being over, we weighed, and in a few hours reached the western side of San Pedro Sound.

" About a mile from the point we anchored in Murray Cove,

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which affords good shelter from westerly winds, and is very easy of access, being a small roadstead rather than a harbour.

"27th. We set out early with the boats, but the weather was too bad to do much; however, something was done, and at dusk we went ashore on a small island in the Sound. It rained very hard all the afternoon and during part of the night. We sheltered ourselves as well as we could with the boat's sails and tarpaulins; but during the night the wind shifted, and blew so hard, that it threw down our slight shelter, and made me very anxious about the ship; for I was doubtful of the security of the anchorage where she lay.

"28th. This morning was very cold, it rained hard and blew strong; but when it cleared away for a short time, we set to work again, to explore what appeared to be a channel.

"After a three hours' pull against wind, snow, and hail, my channel proved to be only one of the numerous inlets which encroach upon the Fuegian territory; and the boats returned to the Beagle, with the help of strong squalls from the S.W. I was not a little glad to see the ship in the place where I had left her. During the night another anchor had been let go; but she had not moved from her position. This anchorage is so easy of access, that I hope it will be of use to vessels passing through the Strait. There is room for one large sized ship to lie conveniently, or for two or three small craft.

"The weather has not yet been so cold as I expected it would be: snow lies on the deck a short time, but the thermometer has not been lower than 31° (Fahrenheit).

"29th. A rainy, blowing morning: Mr. Stokes and I set out in the boats; but it rained so much, that we could only make a fire to dry our clothes, and remove the numbness, caused by sitting a long time in the wet.

"On the 3d of May, we anchored in Port Gallant: though perfectly secure, this is a dismal harbour in winter, being so surrounded by high mountains, that the sun is seldom visible. Until the 7th, in addition to our usual daily duties, we were occupied in preparing for an excursion, in boats, to the Jerome Channel. Salt provisions were entirely withheld from the crew

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for three days, and instead of them, preserved meat, shell-fish, and a large pig, brought from Monte Video, were substituted. We found in this, as in almost every Fuegian harbour, abundance of muscles, limpets, and wild celery; some fish and some wild-fowl. Many of our party thought shags good eating, but only one person could be found daring enough to try whether old Sir John Narborough was quite warranted in saying that a fox was 'savoury food,' and that one repented of his experiment during a week's serious illness.

"My reason for entirely stopping the use of salt-meat, for a few days, was the belief that, at least, two or three days' change of diet is necessary to cause any real alteration in the system; and that it is better to give fresh provisions for three days in succession, and salt-meat during the remainder of three weeks, than to give fresh-meat at three separate intervals in the same period.

"During the wet weather of these regions, we derived great benefit from awnings, painted for the purpose, while refitting at Rio de Janeiro and Maldonado: they kept the lower, and a great part of the upper deck quite dry, even in heavy rain.

"May 7th. Mr. Stokes and I set out with a cutter and whale-boat, to explore the Jerome Channel. We were well provided, with as much as the boats could stow, of what we thought likely to be useful during a month's cruise. Of water we took but little, trusting to the wetness of these regions for a supply. Each man had his clothes covered with canvas, or duck, well painted; and instead of a hat, every one had a 'south-wester' (like a coal-heaver's cap).

"Our provisions, being sufficient for twenty-eight days, made the boats rather deep; and I soon found the cutter pulled very heavily, and was obliged to take her in tow. All our party slept in the cutter the first night, the whale-boat being made fast astern. Towards midnight it blew fresh, and as the boats were anchored near the wash of the beach, they rolled a good deal; and soon afterwards, feeling the whale-boat hanging heavily on her rope, I hauled her up alongside, and found she was almost swamped; in a few minutes she

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must have sunk with all her heavy cargo, to us invaluable. The plug had worked out by her rolling:—I seldom left her afloat at night after this warning. Having saved the boat, made me think less of all our things being wetted, and of some of the instruments being almost spoiled.

"At daylight, on the 8th, we pulled along shore, with the wind against us, and reached Point York before the tide made strongly; but that place we could not pass; and sooner than give up an inch of ground, let go our grapnels, in the middle of a race of tide, that tumbled in over both gunwales, and ran past us at the rate of five knots. At one P.M. it slackened, and we pulled on into Bachelor River, very glad to get so good a place to dry our clothes, and put the boats to rights. Three deserted wigwams gave us shelter; and while some made fires, others went to collect shell-fish, or shoot birds. Though the season was so far advanced, some shrubs were in flower, particularly one, which is very like a jessamine, and has a sweet smell. Cranberries and berberis-berries were plentiful: I should have liked to pass some days at this place, it was so very pretty; the whole shore was like a shrubbery. I cannot account for the exaggerated accounts of the Fuegian coasts given by some voyagers: it is true that the peaks of the mountains are covered with snow, and those sides exposed to the prevailing west winds are barren, and rugged; but every sheltered spot is covered with vegetation, and large trees seem to grow almost upon the bare rock. I was strongly reminded of some of the Greek islands in winter, when they also have a share of snow on their mountains.

May 9th. The tide carried our boats rapidly up the Jerome Channel, which, though narrow, is quite free from danger. The west shore is very high, and steep, and well covered with wood; the eastern is lower, and less woody.

"Having passed this channel, we entered the mysterious Indian Sound, with all that anxiety one feels about a place, of which nothing is known, and much is imagined. I hoped to find a large river; and the strong tide setting up the channel convinced me that there was a body of water inland, but of what nature

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remained to be discovered. At dusk we put into a small creek, and secured the boats, hauling up the whale-boat on the sand. When too late to remove, we found the place of our bivouac so wet and swampy, that nearly two hours were occupied in trying to light a fire. Supper and merry songs were succeeded by heavy rain, which continued throughout that night and the next day without intermission.

"10th. Continual hard rain prevented our moving: the whale-boat's men were thoroughly drenched in their tent during the night; but made a better one in the morning. The cutter, having a tarpaulin cover, gave her crew a better lodging; and although a small and loaded boat, only twenty-four feet long, could not be expected to allow much room to a dozen sleepers, during such weather, with the help of our blanket bags,(*m*) we did very well.

"11th. During this night, also, it rained very hard. Early the next morning, however, it cleared a little, and we got under-weigh. When in the fair-way our hopes were much excited; for beyond a high island, like a sugar-loaf, appeared an opening without land. I tasted the water repeatedly, fancying it less salt, and that we were approaching a river.

"Less salt it might have been, from the number of water-falls dashing down the mountains on each side of the channel, which is here about two miles wide, with a current, or rather stream of tide, running at the rate of two knots an hour.

"At noon, we reached the Sugar Loaf: it cost a struggle to get to the top with the instruments; but the view repaid me. For three points of the compass towards the north-east, I could see no land, except two islands; and the farthest extreme to the eastward, appeared to me distant, at least, thirty miles. No mountains or high land could be seen to the north or east; the country seemed there to change its character, and become

(*m*) Each officer and man, when detached from the Beagle during a night, carried a blanket, or large poncho (sewed up, and with a drawing-string, like a large bag), in which they slept, and found much comfort and warmth.—R. F.

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lower and less wooded. This was, indeed, an animating view: I stood considering what might be the boundary of this water, till I recollected, that the longer I thought about it, the longer I should be finding it out; so we pushed on with the boats, of course taking the necessary bearings and angles, until we reached the 'Point of Islets' in 'Otway Water.'

"On the 12th, our oars were going early.

"The two islands, 'Englefield' and 'Vivian,' were the only land upon the horizon for six points of the compass. The southern coast trended away nearly east from Cape Charles, preserving the high mountainous character of the Fuegian shores, while that to the northward was low, though as yet well wooded.

"I was nearly tempted to try whether Fanny Bay led towards the Gulf of Xaultegua; but fortunately did not, as I should have regretted the time so employed.

"Point Hamond is thickly-wooded with evergreens, similar to those of the Strait; and with a species of pine, about thirty or forty feet in height.

"To the S.E. three remarkable promontories stand out in bold relief from the Fuegian shore; but beyond them the land sinks into the tame flatness of Patagonia.

"The water on the west shore is not deep; from ten to thirty fathoms at a quarter of a mile off shore, but getting more shallow advancing northward. There is anchorage for a vessel after passing Indian Channel, the whole way along; and as the prevailing winds are off shore, it would generally be safe. In Indian Channel I only know of two anchorages, Cutter Bay and Bending Cove.

"Such constant rain fell during this evening, that it was not until after much trouble that we at last made fires. Carrying dry fuel in the boats we found indispensable, and I would recommend any person who passes a night on shore in this wet climate, with a boat, to carry a sheet of copper, or a piece of flat iron, in preference to any boat-stove, as a fire can be lighted upon it much more easily, and it does not take much stowage: the great difficulty about fires here is getting fuel to burn when the ground is wet, or when snow lies on it.

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"13th. Raining so steadily all day, that it was useless to proceed: I could neither see my way, nor notice any thing but wind and rain.

"14th. So mild was the weather, that I bathed this morning, and did not find the water colder than I have felt it in autumn on the English coast; its temperature, at a foot below the surface, averaged 42°; that of the air was 39°. From this place, Point Hamond, I saw seven points of the compass clear of land, my eye being twenty feet above the level of the sea. The water was quite salt, therefore we were certain of being in an unexpected inland sea, or large lagoon. Four miles from Point Hamond lie Englefield and Vivian Islands, rather low, but well wooded with evergreens. They are the only islands of any note in the Otway Water. The farthest point I could discern I called Cape Marvel, for much I wondered at the hitherto unsuspected extent of this inlet.

"At noon we were off the north end of Englefield Island. Mr. Stokes and I observed the sun's meridian altitude satisfactorily from the boats, so smooth was the water. This quiet day was too fine, for it was hard work pulling from nine till five, without any help from sails. Towards evening a breeze sprung up in our favour, and with its assistance we ran along the land about ten miles. Taking advantage of the moonlight, I did not look out for a resting-place till past seven o'clock, when we had a great deal of trouble in landing; the coast having quite changed its character; and instead of deep water with a rocky shore, we found a flat shingly beach and shoal water, with very large stones scattered between high and low water marks, so numerously as to make it dangerous for a boat, especially at night. Upon landing, we found the ground quite changed into a fine light soil, with stunted bushes and trees; and so dry was the wood, that a fire was easily kindled, but not a drop of water could be got any where to cook our supper. A considerable rise and fall of tide was observed, much greater than near Indian Channel.

"15th. No breakfast this morning,' for want of water—a decided proof of the change of climate and country. North of

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us the sky was clear; but to the southward, over the Strait, hung thick clouds. The trees were not evergreen, and at this time their leaves were withered and falling.

"While pulling along shore, and passing a low projecting point, we saw the smoke of three fires, and approaching nearer, observed four canoes lying on the beach, near several wigwams. Their owners soon appeared, running along the shore, hallooing and jumping. The first who came near us reminded me of an old-fashioned sign of the 'Red Lion,' for he was painted red all over, and looked more like a wild beast than a human being; another was covered with a bluish mixture; a third was quite black. Several had the lower half of the face blacked, and the oldest men and women were painted entirely black. There were about eight men, six or eight boys, and perhaps a dozen women and girls. Some had a skin over their shoulders, but others had no covering at all, except paint; they seemed apprehensive, and hid several skins and other things in the wood, as soon as they saw us approaching.

"When they found we were peaceably disposed, and had tobacco and knives, they were eager to barter with us. How they have learned the use of tobacco is curious, but they are fond of it to excess. Guanaco, as well as seal and otter skins, are in their possession; therefore they probably barter with the Patagonians. They have also the skins and horns of a deer, which, as I understood them, inhabits their country.*(n)* They catch small animals with snares, made of whalebone, just like hare-snares. This tribe was very rich in Fuegian wealth, such as skins, arrows, lances, &c. They appeared to be of a race similar, but superior, to the Fuegians, being stronger, stouter, more lively, and more active. I persuaded one of their boys to have his face washed, and found his natural complexion was scarcely darker than that of a European. Their language sounds like that of the Fuegians, and the huts and weapons are precisely similar to their's. We asked them for water, and they pointed to a place about a mile further, mak-

(n) Like a roebuck; supposed to be the 'Huemul' mentioned by Molina.—R. F.

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ing signs to us that we must dig in the earth for it. We went there, and near a green-looking spot some good water was found. We then landed, and enjoyed our breakfast at one o'clock, being not a little thirsty.

"The natives were still with us; they seemed inquisitive and cunning; and shewed great surprise at a sextant and artificial horizon, by which they sat down, attentively watching what was done. I put my watch to their ears; they were much astonished, and each came in his turn to hear it tick. I pointed to the watch and then to the sky; they shook their heads and suddenly looked so grave, that from their manner in this instance, and from what I could understand by their signs, I felt certain they had an idea of a Superior Being, although they have nothing like an image, and did not appear to us to have any form of worship. We could learn scarcely any words of their language, because of their trick of repeating whatever we said.

"They saw how we lighted a fire, by means of a tinder-box, and took an opportunity to tread it out of sight. Our loss was not known until leaving the spot, when that material necessary was missed. It was evident they had stolen it; and while I was meditating a reprisal, one of our men by chance trod upon the missing box, which was artfully hid under the sand. After this discovery, they seemed rather inclined for a skirmish, all having clubs, while our men appeared to have no weapons. However, we parted without a quarrel.

"The features of these people differed from those of the Fuegians whom I had previously seen, in being better formed, and having a less artful expression.

"We pulled hence along a low shore until evening, when distant land began to show itself, stretching to the northward and eastward, and bounding this supposed inland sea. At dusk we discovered an opening, which appeared to be either a river or a channel, and I steered for its north bank, securing the boats for the night in a place we named Donkin Cove, as a mark of respect to the preserver of meat, to whom we had been so often thankful. A little of this meat, mixed with wild fowl, and some wild celery, makes a wholesome and

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agreeable mess. On boat service, meat preserved in tin is particularly useful, being already cooked, and therefore fit for dinner without the aid of fire.

" We were surprised at the mildness of the weather. Indeed, the change of climate was as pleasant as it was sudden and unexpected.

" 16th. At daylight, we found ourselves in the entrance of what was thought a river. Under this impression, I hoped to penetrate into the interior of the country, and meet some new tribes of Patagonians. As soon as we could get underweigh, we pulled and sailed along a winding channel, on one side of which was a pleasant-looking, woody country, extending towards Tierra del Fuego; and on the other, a low, barren district, like Eastern Patagonia. The banks on both shores were from five to forty feet high, sloping, and covered with grass.

" The current was in our favour, which with the saltness of the water, inclined me to think it a channel, and not the mouth of a river. In this opinion I was confirmed in a short time, by seeing surf breaking against some land beyond an opening, which showed that we were approaching a large body of water. Soon after, we reached the extreme west point of this small channel; and, to our surprise, saw an expanse, at least thirty miles across from east to west, and twenty from north to south. I thought it more at first, but probably was deceived. West and south of it I observed high snow-covered mountains; and the summit of one was remarkable, being like a castle with a high tower. Northward, the land was low; excepting a few ranges of down-like hills with large plains between them.

" It happened to be a very clear day, and all that could be seen at any time was visible. In two places there seemed to me to be openings to the westward; in the southernmost I could see no land at all; the other was backed by distant mountains, but still had the appearance of an opening. After this I went to the top of a hill near me, about three hundred feet high, to gain a better view, yet so small an elevation made but little difference, and I rather thought the opposite coast farther off than I had at first supposed.

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"Having sent the cutter back a short distance, to make a fire and land our things, I crossed the channel to a fine level plain, and measured a base line. In crossing, I found a most rapid tide, at least five or six knots at neap tides, and to pull against it was out of the question. It caused a considerable swell and race at the entrance, which is not a quarter of a mile wide, though it averages twelve fathoms in depth. On the plain was growing thick grass, like that in the vicinity of the river Plata. So rich and good was the grass and trefoil, that I saved a few seeds, hoping some day to see their produce in England. No tree was seen; the soil seemed dry, rich, and light. Skunks, and a small kind of cavy, had burrowed every where, which proves the climate to be of a different nature from that of the Strait. The bones and traces of guanacoes were numerous, and some horses' tracks were found; as also part of a dead guanaco, which appeared to have been a prey to wild beasts. Water was not so plentiful as to the southward; but quite sufficient for all useful purposes, many small brooks being noticed, besides springs in the sides of the low hills. We shot a swan (*o*) and some coots; the swans were so fat, or so tame, that they would not rise from the water.

"17th. While on Whitestone Plain, a very heavy squall of wind and hail passed over from the S.W., so cuttingly cold, that it showed me one reason why these plains, swept by every wind from S.S.W. to N., are destitute of trees.

"After dark, we returned to the cutter and partook of a large mess, made of the swan we had shot, the coots, some limpets, and preserved meat. The shortness of the days was becoming very inconvenient; from eight to four were the only hours of daylight; but some of the nights were so fine, that I got many sets of observations of the moon and stars.

(*o*) Black-necked swan, noticed elsewhere by Captain King.—R.F.

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CHAPTER XIV.

Place for a Settlement—Frost—Boats in danger—Narrow escape—Sudden change—Beagle Hills—Fuegian painting—Tides—Medicine—Water warmer than the air—Jerome Channel—Mr. Stokes returns to the Beagle—Cape Quod—Snowy Sound—Whale Sound—Choiseul Bay—Return to the Beagle—Adelaide returns—Plan of operations—Difficulties removed—Preparations—Wear and tear of clothing—Ascend the Mountain de la Cruz—Sail from Port Gallant—Tides—Borja Bay—Cape Quod—Gulf of Xaultegua—Frost and snow—Meet Adelaide—Part—Enter Pacific—Arrive at Chiloe.

"18th of May. VERY cold, raining heavily, and blowing strong from S.W. The tide turned this day (full moon), and set to the westward at 1.15. I only say 'turned,' because I could not distinguish the ebb from the flood, so little rise and fall was there. No sooner had the tide ceased to run in one direction, than it began to run as strongly in the other, for about six hours. For the last four nights I noticed, that soon after sunset the sky was suddenly overcast, a trifling shower fell, and afterwards the heavens became beautifully clear. The climate must be much like that of the east coast of Patagonia, as shrubs grow here like those I saw at Port Desire. While walking, the leaves and dry sticks crackled under foot, which is very different from what one observes about the Strait of Magalhaens, where everything is wet and spungy. I was inclined to think this place suitable for a settlement. There is water, wood, and good soil, fit for planting, besides pasture land; the climate is not bad; and probably the Patagonian Indians might be induced to trade in guanaco meat, as they now do at Gregory Bay; while any of their hostile incursions would be prevented by the channel.

"19th. Two natives, a man and a boy, came to our boats this morning; they seemed to have neither curiosity, nor fear, nor even a relish for tobacco. They took a piece of tinder, picked up a stone, and went away to some wigwams, at a little distance, where we soon afterwards saw a fire burning.

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"During this night and the preceding it froze sharply; but the sky was so clear, that I observed many sets of distances, on each side the moon.

"20th. We went eastward through the little channel. Every thing was frozen; and the boat's sails were useless until thawed. We left Donkin Cove directly after noon, and with a fresh and fair wind, steered towards Pecket Harbour. I may as well mention here my reasons for taking this course, instead of going farther westward.

"Considering our very limited time, and provisions, I wished to do first what was most useful; and to find a new passage, seemed to me the primary object. Having surveyed the narrow winding channel, and proved its navigability for vessels of any class; I thought it desirable to ascertain next the nature of the separation between Otway Water and the Strait of Magalhaens, between Laredo Bay and Pecket Harbour.

"A western passage might be sought by the Adelaide schooner, or by myself, at a future time. If we tried to cross the Skyring Water, our success would be very doubtful, for during the whole time we had been in the channel, the wind blew strong from S.W., raising so much sea, that it was with great difficulty I could sound outside the western entrance, even in a whale-boat.

"A fine breeze carried us rapidly eastward; but it freshened too fast, reef after reef was taken in, until at two o'clock we were obliged to lower the sail, and pull to windward; for as far as we could see, the shore continued unbroken, flat, and low, with a high surf breaking on it. To have attempted to land, would have been folly; and as the wind continued to increase, and a current setting to windward caused a very short awkward sea, I sent Mr. Stokes off in the cutter, under his small close-reefed sails, to hang to windward as long as he could carry sail, while I kept the whale-boat head to wind. At three o'clock, we were embayed, and about a mile from the shore. My boat was deeply laden, and as our clothes and bags got soaked, pulled more heavily. We threw a bag of fuel overboard, but kept everything else to the last. At sunset the sea

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was higher, and the wind as strong as ever. I saw the cutter a little before, about three miles from us, standing to the eastward on a wind; but whether she would clear the shore I could not make out.

"After dark, finding we could not well be worse off as to risk, I bore up, and pulled with the sea rather abaft the beam, twisting the boat 'end on' to each wave as it came, hoping to get into smoother water to the westward. Night, and having hung on our oars five hours, made me think of beaching the boat to save the men; for in a sea so short and breaking, it was not likely she would live much longer. At any time in the afternoon, momentary neglect, allowing a wave to take her improperly, would have swamped us; and after dark it was worse. Shortly after bearing up, a heavy sea broke over my back, and half filled the boat: we were baling away, expecting its successor, and had little thoughts of the boat living, when—quite suddenly—the sea fell, and soon after the wind became moderate. So extraordinary was the change, that the men, by one impulse, lay on their oars, and looked about to see what had happened. Probably we had passed the place where a tide was setting against the wind. I immediately put the boat's head towards the cove we left in the morning, and with thankful gladness the men pulled fast ahead. In ten minutes the sea was smooth, and the breeze so moderate, as not to impede our progress. Our only anxiety was then about the cutter; for we could not tell how she had weathered the gale. I was sure she would have prospered if kept by the wind; but some accident, or change of purpose, was to be feared.

"About an hour after midnight, we landed in safety at Donkin Cove; so tired, and numbed by the cold, for it was freezing sharply, that we could hardly get out of the boat. The embers of our morning fire were still burning; so we put on some wood, and lay down round them. No men could have behaved better than that boat's crew: not a word was uttered by one of them; nor did an oar flag at any time, although they acknowledged, after landing, that they never expected to see the shore again. We resolved to start early to look for

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the cutter, and fell asleep: but before daylight I was roused by some one, and to my joy, saw Mr. Stokes standing by me. He had just arrived with the cutter, having kept his wind till the sea fell; and since that time had been pulling towards this spot: with what thankful feelings all hands lay down to sleep may be easily supposed.

"21st. This morning I believe no one waked before ten o'clock. Drying our clothes, and putting the boats to rights, occupied most of the day. Our time was now so short, besides having almost expended our provisions, that I gave up the idea of crossing the Otway Water, and decided to return nearly the way we came, after taking a view from the higher ground.

"22d. A sharp frost, during the past night and this day, hardened the ground, and with four of my boat's crew, I walked to the Beagle Hills. Our way led through a scattered wood, the only one seen on the north side of the channel, and in which most of the trees appeared to have been burned. We gained the summit of the heights soon after noon, and were amply rewarded by an extensive view.

"Although not more than eight hundred feet above the sea, I could discern the Gregory Hills (so plainly as to make out their yellowish brown colour); Cape Bartholomew, Nassau Island; Cape Monmouth; the high peaks over Cape Froward; the range of mountains thence to the Jerome Channel, and from the Jerome, westward to all those about Cape Phillip, and Cape Parker; and the whole extent of the Otway and Skyring Waters; the latter heing bounded to the N.W. by down-like hills, about six or eight hundred feet high. North of the Beagle Hills, a range of similar downs extended; and to the east was a succession of lagoons, completely intersecting the flat country towards Pecket Harbour.

"We left a memorial, cut in lead, at the foot of a post sunk in the ground; but the air was so cold, that the men, who wished to add their names, were unable to mark them on the lead. It was eight o'clock before we regained our bivouac, much fatigued by the day's work.

"23d. I went into a wigwam, where there was a woman

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and two children. A rough likeness made of her did not please at all, because it was white: she took out her red paint, and put some on her own cheeks, as drawn on the paper, and then was quite satisfied, sitting as still as a mouse, while I made another sketch. In return for the compliment paid to her countenance, she daubed my face, as well as my coxswain's, with the same red mixture.

"24th. A sharp frost during the night. We left Donkin Cove, as soon as I had taken observations for the chronometers. A fine breeze in our favour carried us rapidly along, and at dusk we were near Englefield Island. The last few nights have been so clear, that two or three of the men, and myself, have slept in the open air without any other covering than our blanket-bags, and clothes. My cloak has been frozen hard over me every morning; yet I never slept more soundly, nor was in better health.

"We had a good view of Mount Misery this day. It is about 3,000 feet in height; twice as high as the surrounding mountains, and quite bare, even of snow, on the summit. The night tides here rise more than those of the day at this season: the times of high water do not differ much on the opposite shores. About an hour after dusk we reached Englefield Island, having made a capital run, with a fresh and fair wind. Creeping in the dark, along shore, we at last found shelter for the boats, and formed a snug place amongst the bushes for our tent and fires. One of my boat's crew was ill this day; the first man that had been seriously so, although several had been slightly affected by the muscles and limpets; and one had fits. A draught of hot port wine and Winter's-bark, certainly seemed to be an efficient medicine for the slighter complaints.

"25th. Blowing strong from the westward, with much rain. I forced a way, with much difficulty, among thick bushes, to the top of the island, and when I got there found, to my mortification, that by no possible contrivance could I see round, for I was encompassed by lofty trees of nearly equal height.

"26th. We crossed over to the east shore: the temperature of

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the water, between Englefield Island and the nearest land, one foot beneath the surface, was 42°; the air at the same time being 38°. While the sea water preserves this temperature, it must tend much to moderate the severity of cold, one would naturally expect in this latitude, near so many snow-covered mountains. We arrived at the Point of Islets, soon after sunset, on the 27th.

"28th. Almost every night I observed that the wind subsided soon after sunset, the clouds passed away, and the first part of the night was very fine; but that, towards morning, wind and clouds generally succeeded. From Point of Islets, we sailed southward; and were again close to the mountains: from whose appearance at this spot, no one would suppose that any passage lay between them; so intricate and winding are the channels.

"I was sorry to leave the open country, behind me; but time pressed; and there was yet much to do with our loaded boats, which could not make very great progress in the short daylight afforded by this season. After passing Bennett Island the land became rugged, and mountainous on each side, covered, however, with wood and vegetation wherever it could grow; and we were again in the Magalhaenic regions.

"This day I examined as much of the west side of the channel, as time would allow, and reached Corona Creek at about eight o'clock. What I called the Sugar Loaf must be the Corona Island of Cordova's officers; for at some distance it looks somewhat like a crown. It is singular that they inserted (in their chart) an island near their Corona, which cannot be distinguished from the main-land, until one is within two miles of it; and as at that distance the Otway Water is plainly visible, must they not have seen the opening? Tired of their job, did they return without prosecuting the discovery, or was the weather too thick to see far? Their description of the Jerome Channel, leads to the supposition of a continual current setting through in one direction, instead of a regular ebb and flood; and the surest sign of a passage between places in Tierra del Fuego, is a current or stream.

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Many large inlets and sounds look like channels; but on going a short distance into them, you find dead water.

"29th. We passed through Jerome Channel, and reached the bar, off Bachelor River, after dark; but the cutter got aground, and gave us some trouble to float her again. Afterwards one of the men was landed on the bar, and by his walking in the deepest water, and the whale-boat going next, we got into the little river at nine o'clock, not sorry to be in safety. There are tide races between the Jerome Channel, and Bachelor River, which are sometimes dangerous; but as the breeze was moderate, we passed them without difficulty.

"May 30th. Employed chiefly in stowing the cutter afresh, packing specimens, and preparing my boat to take what remained of our provisions. At two next morning, when the tide served, Mr. Stokes set out to return to the Beagle: and having both wind and tide in his favour arrived early at Port Gallant.

"The wind increased after daylight, and blew strong, with squalls. I waited a short time, but, having no hopes of its improving, left the river. My boat was much lumbered, having the chronometer-box, and more instruments than before; yet she pulled pretty well, even against the heavy squalls. After landing at the west side of the entrance to the Jerome Channel, to take bearings and angles, we pulled along shore to the westward, and at dark hauled the boat up in a small sheltered corner. After she was secured, we employed ourselves looking for limpets and muscles for supper, by the light of a lanthorn, as we had good appetites, and our provisions were scanty.

"June 1st. We pulled along shore against a strong and squally wind, and before evening nearly reached Cape Quod; but not being able to pass it, stopped in a cove on the east side.

"2d. At the oars again, early, having a fine clear morning, with the tide rather in our favour. By eleven, Cape Quod was astern of us; and a long view of the Strait presented itself. This part is very rugged and barren, and looks triste, indeed; still wherever a tree can take root it tries to grow. This night was passed on a small island at the west point of Snowy Sound.

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"3d. We began at daylight, and worked, from point to point, up the sound, thinking it a channel. Two good anchorages were found on the west side, but none on the east, except a trifling cove between the little island and the land, which would only shelter a small vessel. The night was passed on an island five miles within the sound. It rained hard for an hour before we landed, and all the night afterwards. Our rest was not the most satisfactory, as the ground was wet and swampy.

"Two of the boat's crew got into a hole under a tree thinking they should be warm; but in the middle of the night they complained of not being able to get up, and of being half frozen.

"4th. The rain ceased at times this morning, but the wind continued. After going to the top of an island, we pulled and sailed onwards, not having a doubt of soon getting into Whale Sound. At noon, the passage appeared suspiciously small; yet I could not doubt the fine large opening laid down in our old charts, and proceeded until the shore made a sudden turn, when, to my astonishment, I saw a high black cliff stopping farther progress. After a hearty growl, we turned back, and landed to look for a sleeping place. Not a spot could we find that was not wet like a sponge; but night was closing in, and obliged us to stay where we were. It was bitterly cold, all of us were wet through, the ground was a mere swamp, we could not get a fire to burn, and the frost was sharp.

"After daylight on the 5th, we succeeded in making a large fire, and spent two hours drying our clothes and warming ourselves. In order to lighten the boat, no one carried more clothes, since leaving the cutter, than those he wore, except one shirt. We hastened back towards Charles Island, passing some very remarkable glaciers, one of which looked like an enormous frozen river, covering the whole side of a mountain. Many portions were of a transparent blue colour, which, contrasted with the snowy whiteness of others, and with the dark shadows of bare rocky places, had a very striking effect. At noon, we passed out of the sound, and steered for Charles Island, with a

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light breeze in our favour. Seeing a canoe coming across, we made towards it, and found a wretched-looking family, consisting of a man, his wife, and three children, with some small dogs, seemingly more miserable than their owners. A few wooden-headed spears were all the property they possessed, excepting the worn-out skins thrown over their shoulders. The man sold me a little dog for a bit of tobacco, and afterwards wanted to have him again, because his wife would not consent to the bargain. However, I kept the dog, and they began to abuse us in right earnest, the woman alternately crying and scolding, and the man apparently calling on the wind and water to destroy us. His gestures were very expressive and animated. I was surprised to see so much feeling for a wretched little half-starved puppy, and made them happy by returning him, without asking for the tobacco.

"El Morrion *(p)* (the helmet) was certainly an excellent name for the promontory we passed this day. It reminded me of the 'Castle of Otranto.'

"We reached a small islet, at the west point of Charles Bay, and passed a good night on the top of a bare rock. So often had we slept in wet places, that a dry, though stony berth, was thought very comfortable. The boat's two sails, oars, and boat-hook, formed our tent.

"6th. We left the islet as soon after day-light as we could get breakfast, and take the required bearings and angles; went into Spot Cove, thence crossed to Charles Island, and to the narrow opening between it and the nearest land. Ulloa's memory can no longer be preserved here in an island, though it may in a peninsula. This small channel is narrow, and has a strong tide setting through it. There is anchorage all the way, though generally over a rocky bottom, and it is navigable for small vessels: its average width is a quarter of a mile, and its length about three miles. For a boat going westward through the Strait, it is far preferable to the regular channel. Two old Fuegians were living here, a man and a woman.

"When in Whale Sound, appearances were such that had I

(p) Noticed previously by Captain Stokes.—R. F.

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not been to the bottom of Snowy Sound, I should have thought they joined. After going far enough, to see quite to the end, we returned, hauled the boat on a shingle beach, and secured her for the time. When a bit of shingle beach could be found, it was a prize; for on it we could always make a good tent, and have a dry bed, besides hauling the boat up easily. There is a greater rise and fall of tide here, than at the other side of Charles Island, being not less than seven or eight feet, at springs. During the night, a dog stole a small piece of pork, which we had reserved for our last dinner; and, until his track was discovered, there was no little distrust among our party.

"Whale Sound is a large and deep inlet, ending in a valley between mountains. On the south side, a vessel may anchor in one place, at the west side of Last Harbour; but there, though the harbour appears large, the anchorage is small, and close to the shore. We pulled and sailed along the south shore, landing occasionally to take bearings, until we reached Choiseul Bay, and in a cove, at its west side, we passed the night. This is a place no ship need approach: it is a large, deceiving bay, full of islets and patches of kelp, under which, probably, there are rocks, and between the islets the water is deep and unfit for anchorage. The temperature of the sea this day, in the middle of the sound, one foot below the surface, was 45°.

"8th. As it rained heavily, we remained under such shelter as we could obtain; and prepared for our return to the Beagle, by making use of the only razor we had. When the rain ceased, we left the cove and sailed across to Port Gallant, with a fresh breeze. The smoke of natives' fires was seen near the entrance of the Barbara Channel; and on Prince Island, where we stopped a few minutes, the first man seen had on an old pair of sailor's trowsers, which he had obtained from the Beagle tied round his legs in six places. The wigwam these people were living in was not half covered: both wind and rain passed through it. How they bear the cold is surprising, being without clothes: one minute sitting close to the fire, and the next perhaps up to the waist in water, getting muscles or sea-eggs. The women dive for sea-eggs, even in the middle of winter;

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but the water is never very cold (42° to 44°).(q) In the afternoon we saw the Beagle's mast-heads, and soon afterwards arrived on board, and enjoyed the happiness of finding all hands well, and every thing ready for farther progress. Lieutenant Kempe had turned the few hours of light, each day afforded, to the best acccount. Those who have had the care of ships in remote places, will know my feelings at finding all as it should be, after a long absence, in a country little known. Not a man had been ill; and the weather had been very tolerable compared with what was expected. There was less snow on the mountains than when I left Port Gallant early in May. One thing only disappointed me,—the Adelaide had not arrived. It was past the time appointed for her, but she might have found much more to do than was expected, or might have been obliged to return by the Magdalen, instead of coming through the Barbara Channel.

"During my absence, two sealing vessels had been at Port Gallant, on their way through the Strait. From one (an American), which arrived on the 7th of May from Staten Land, information was received that the Adventure had not been there. The Chanticleer had remained some time, but had sailed for the Cape of Good Hope. The master of the American had a brother staying with a boat's crew in Staten Land, during the whole of April, who would probably have seen the Adventure, had she called. The other was Mr. Cutler's vessel, the Uxor, bound to the United States; he had been through a channel which leads from the Gulf of Trinidad to Cape Tamar, and spoke well of it; but could give no drawing, nor precise information; having passed through rapidly.

"Lieutenant Kempe had been at the summit of the Mountain de la Cruz, and left a memorial. No rare animals had been seen, nor any new birds. Small fish were still caught with hook and line, but very few with the seine.

"I never was fully aware of the comfort of a bed until this

(q) At the western entrance of the Strait the water is said to be generally a few degrees warmer than at the eastern.—R. F.

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night. Not even a frost-bitten foot could prevent me from sleeping soundly for the first time during many nights.

"9th. At one o'clock this day, I heard an exclamation of 'The schooner!' and soon saw her standing across from the Barbara Channel with a fair wind. Before she anchored in Port Gallant, I went on board, and, to my joy, found Lieutenants Skyring and Graves, and all their companions well, having thoroughly completed the work they had to perform, without loss, or even an accident. The difficulty of their task was increased by very bad weather; but they succeeded in tracing and surveying the Magdalen Channel to its junction with the sea, and thence returned by the Barbara Channel to Port Gallant; carrying on a regular chain of triangles, and connecting their work with points previously fixed in the Strait of Magalhaens. A multitude of small islands, and much bad weather, detained them longer than was expected.

"While Lieutenants Skyring and Graves, assisted by Mr. Kirke, were employed surveying, Mr. Bynoe collected geological and other specimens.*

"11th. We had nearly reached the shortest day; the sun did not rise above the hills until past eleven; it disappeared again before two (the land being less high towards the N.W.), and even in those three hours was seldom visible.

"12th. Finding that Lieutenant Skyring agreed with me in thinking that the channel from Cape Tamar to the Gulf of Trinidad might be surveyed by the Adelaide, in her way to San Carlos de Chiloe, I resolved to send him and Lieutenant Graves on that service, hoping that it would lead to the discovery of a passage into the Skyring Water, and give vessels another way of getting into or out of the Strait, should thick weather or adverse winds oppose them in the usual channel.

"In making this arrangement there was much to be considered. As I had received no orders from Captain King to employ the Adelaide in surveying, after her return from the Magdalen Channel; and as I had been desired to repair, with her, to San Carlos, in Chiloe, during which voyage Lieutenant

* Geol. Soc. Museum, Nos. 176 to 205, and Zool. Mus.

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Skyring was to be on board his own vessel, the Beagle, it would be incurring considerable responsibility, to order a new piece of service to be undertaken, which might not be successful; and would require officers, men, a boat, provisions, and stores from the Beagle.

"I did not doubt that the measure would be approved by Captain King, because he had discussed the feasibility of such a plan with me, and had expressed a wish that it should be tried; but as I had not received any orders, I could not decide without anxiety.

"Another, though a minor difficulty, arose from sending Lieutenant Skyring in command of the Adelaide, over Lieutenant Graves, her proper commander, who had expected to take her to Chiloé, and was quite competent to undertake this or any other service in which she might be employed. Both these officers excelled in their professional duties; but Skyring had been on the western coasts of Patagonia before, and was the senior.

"Much to the credit of Lieutenant Graves, he removed one weight, by volunteering to go any where I thought proper to direct, either alone or with Lieutenant Skyring, and the necessary orders were forthwith given. (See Appendix). Mr. Kirke was again to form one of their party, as well as Mr. Bynoe, who exchanged temporarily with Mr. Park. The Beagle's whale-boat was also lent, with five able seamen to man her; and good care was taken that nothing the ship could give should be wanting in their outfit for a service which, at that time of year, must be severe and tedious.

"Anchors and cables, hawsers and kedges, were abundantly supplied, because in warping into unknown places, or anchoring hastily, many an anchor is unavoidably broken or lost.

"The boat's crew, who had been away with the Adelaide, and were going in her again, were supplied with extra clothing at the expense of Government, the wear and tear of their clothes having been far beyond what they could be expected to make good out of their pay.

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"As an instance, I may mention, that a careful north countryman carried with him, when he left the Beagle, two new pair of shoes (besides those on his feet), and three pair of new stockings: but brought back only a ragged pair of stockings and the remains of one shoe. The others had been fairly worn out, or lost, in scrambling over rocks and ascending mountains.

"One height ascended by Lieutenant Skyring was so steep, that the men were obliged to pass the instruments from one to another, at a great risk of their own lives; and when they reached the summit, the wind was so strong, that a heavy theodolite and stand, firmly placed, was blown over; and even a Kater's compass could scarcely be used.

"With good clothing and provisions, weather may be almost defied, and work may be done at the less unfavourable times; but without them, ill-humour and ill-health must inevitably appear in such a climate as this.

"14th, Sunday. I had the satisfaction of keeping this day in a proper manner, for the first time since we entered the Strait. So much had depended upon employing every minute of our time while the weather would allow, that there had been little distinction of days.

"17th. The morning being fine, with not much wind, though a sharp frost, I left the ship with Mr. Murray and four men, and landed in Fortescue Bay, intending to ascend the mountain 'De la Cruz,' if the snow and ice did not prevent me.

"On the beach, close to the water, I suspended the mountain barometer, and let it remain half an hour before we began the ascent, which, from the snow lying so deep, was troublesome; for at one step a hard rock received one's foot, and at the next, perhaps, a deep hole amongst broken trees. Sometimes we tumbled head foremost into soft snow, slightly covering rotten mossy boughs and swampy ground; and at others, slipped between the concealed trunks of trees, which, though much decayed, were hard enough to cause many a bruise. Each movement of our arms or legs shook down a shower of snow from the trees, among which we were forcing our way.

"At noon we gained the part that is clear of wood, but

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so very steep and slippery was the summit, that we were obliged to go on our hands and knees, forcing them as deeply into the snow as possible, to avoid sliding down again. The highest point is not visible from Port Gallant.

"While I took angles with the theodolite, the seamen made a fire. It was well we carried some fuel and a tinder-box, with a sheet of copper, upon which to kindle it; for without a fire we should have been quite numbed. Standing in one place for two hours, after being much warmed by exertion, made us more sensible of the cold. The highest spot is but a few yards wide, and by barometrical measurement is 2,280 feet above the sea.* The height is, in truth, small; but as the mountain is so steep, and rises so abruptly from the sea, it appears considerable.

"When we had finished our observations with the barometer and theodolite, we deposited a Memorial, containing a list of the officers and crews of the Beagle and Adelaide—an account of the object of their voyage, how far it had succeeded, and where we were going—and a collection of coins, well-soldered up in a tin case—upon the bare rock; and made a great pile of stones over it.

"Having again examined the barometer, we began to descend; for the sun disappearing behind the distant mountains, warned us that it was time to return. We had enjoyed a magnificent view on all sides, and were reluctant to leave our station. In descending, we made rapid progress at first, sliding many yards together down the soft snow; but, by the time we reached the woody part, it was getting dark, and having foolishly tried to return by a straight line, instead of going round, we found steep cliffs, and ravines covered with rotten trees, which perplexed us exceedingly. Darkness, and the deep snow, much increased our dilemma; yet we could not resist laughing heartily at the ludicrous scrapes some of the party got into: one man was rather a-head, looking for a way to descend a steep place, when the snow slipped from under him, and down he went, about eighty feet, partly sliding,

* By angular measurement it was found to be 2,270 feet.

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partly falling, but quite against his consent. What he did by accident, we were obliged to do, because there was no alternative; so away we slid, one after another, like so many sledges upon Russian ice-hills, holding the instruments as we could, by one hand, while the other was employed to check or steady us. With a little more of this sort of work, and some struggling through the wood at the bottom, we reached the shore, where a boat was waiting for us, and at about eight arrived on board, in a half-wet, half-frozen condition.*

"19th. Every thing was brought on board, the ship unmoored, and all made ready for our departure next morning.

"20th. Sailed from Port Gallant, leaving the Adelaide to rate her chronometers, and rejoin us before leaving the Strait. In the evening we anchored in Elizabeth Bay, after a severe day's struggle against a strong and contrary wind, with much rain.

"21st. Blowing hard again this morning from the N.W., with a great deal of rain. Weighed and made sail under reefed courses and treble reefed topsails, but the wind and tide were more than a match for us, so we stood across into Whale Sound, and worked up under the lee of Carlos Island, finding the tide there rather in our favour. The 'williwaws' (I know no better name for the sudden gusts that come off the high land) gave us some trouble, occasionally laying us almost on our beam ends. At half past two I was induced to anchor under the lee of the south-east extremity of Carlos Island, and thought our day's work was repaid by a snug position close to a weather-shore, besides having made some little progress; but after dark the wind became more violent, and a williwaw drove us out into deep water. We set the storm sails, which, with the weather-tide, known to be then making strongly, I hoped would take her a-head sufficiently to clear Rupert Island (lying under our lee), and all hands then went to the capstan; but while heaving-in the cable, our bower anchor again caught the ground and brought us up. We veered away cable

* The wristbands of our shirts, and all our outer clothes, were coated with ice, while our inner clothing was wet through.

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directly, let go another anchor, and rode out the rest of the gale, which was extremely violent, without driving.

" The instant our anchor caught, I knew we must be on a ridge, of which Lieut. Skyring had spoken to me, lying between Rupert and Carlos Islands, across which the tide makes strongly, at the rate of about three knots. Rupert Island was still under our lee, distant less than half a mile.

" 22d. Blowing hard and raining. At 9 A.M. it cleared and moderated, but so strong a tide set past us, to the south, that we could not attempt to weigh. It differs here from that in mid-channel by two hours, which may much assist a vessel if she manages so as to take eight hours tide in her favour.

" At eleven we unmoored, and got ready for moving at the turn of tide.* At one we weighed and made sail with a moderate wind from N.W., and by keeping close to Carlos Island, and making short boards, we had a weather-tide, while in the fairway of the Strait the stream was running to the S.E. We anchored in Bachelor's Bay (or York Roads), choosing an outside berth in order to have more room to weigh again and work with the morning tide. It blew hard in the night, but we rode securely, although the tide ran at least three knots where we were.

" 23d. We started and worked to the westward, and at nine were abreast of Borja Bay; but by trying for too much, nearly lost all that we had gained, for in standing across from the bay, hoping to weather Cape Quod, the flood tide took us so strongly, that it cost three hours close working to get to an anchor even in Borja Bay. We had rain and sleet continually through the day, and it blew hard at night, but as plenty of chain was out, the topsails and courses were close reefed, and the top-gallant masts on deck, we were ready for anything.

" 24th. Heavy squalls, with almost constant rain, prevented our moving westward, and similar weather continued throughout the day, becoming worse at night. Had we had plenty of provisions I should not have minded this delay, because we might have remained at anchor till it was over; but so much

* On heaving up the best bower, we found it had lost one fluke.

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had been said about the difficulty sometimes found in working through the Strait, that it concerned us greatly not to lose a chance of making progress. During this night the squalls were very heavy. The holding ground must have been excellent, for williwaws drove the ship from one side to the other as if she had been a chip upon the water.

"26th. Weighed this morning, weathered Cape Quod, and worked to the westward, the weather having cleared and become very fine. The part where most tide is felt was then past. Cape Quod projects so far south that the Strait is there extremely narrow, and though very deep, has a strong tide.

"27th. At daylight we found ourselves to windward of Marian's Cove. Looking eastward upon the land about Cape Quod, it has a very bleak and rugged appearance. The almost perennial west winds prevent vegetation from growing on the heights exposed to their action. Hence the desolate look of the western shores of Tierra del Fuego. We saw a sail beyond Cape Notch, and, just before we moored, close to the shore in Half-port Cove, we made her out to be the Adelaide.

"28th. A bad morning, snowy and blowing, but the wind being moderate between the squalls, I went in a whale boat to examine the Gulf of Xaultegua, and pulled along the south shore towards Cape Monday. Having gained some distance to windward, while the snow was so thick it was impossible to see the shore, we made sail across the Strait, and hit the place within a cable's length. When the snow ceased falling, we saw a large space of water before us, the land opposite being at least five miles distant. We sailed towards a strange looking islet in the middle of the gulf, very similar to the old mouldering figures of the fabled Sphinx, but the snow becoming again almost incessant, only allowing us to see our way at intervals, while the wind was too strong for even a close reefed sail, we landed, and hauled the boat up on an island. I was in hopes of finding an opening which would lead me to the Skyring Water; and my boat's crew, being almost as eager as I was, cared little for the wind or snow. This night we made a larger tent than usual, with a top-gallant studding sail, and

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the consequence was, we were extremely cold, as there was a sharp frost, and the snow was lying every where very deep. Next night we were wiser, and reduced our tent to the smallest dimensions.

"29th. Early in the morning we resumed our search. I had a chronometer with me, but as we never saw the sun, nor even a star, I should have been as well without it. We pulled and sailed towards the northernmost corner first, but found no opening, and went thence to the eastward, with a strong and favourable breeze. Passing Still-hope Point I felt sure of finding a passage, for before me were the tops of mountains seen from the Otway Water. I was, however, deceived, the gulf ended in two bights, or inlets, unconnected with other waters: so we returned to Still-hope Point and hauled up the boat. The night passed very well, in a snug place among trees, although the snow was falling thickly. Early next morning we left the shore, having employed a quarter of an hour in clearing the snow out of our boat. When we started, it snowed fast but without wind, and we steered by compass for the Sphinx. I sketched what I could see of the south side of this gulf, but did not consider it worth delaying longer, in such weather, for so unimportant a place, while anxious that the Beagle should reach Chiloé before her provisions were expended, and that I should fall in with the Adelaide before leaving the Strait. If ever a minute survey is made of this gulf, it should be after all others have been examined, as it is utterly useless. The temperature of the water within it we found to be 40° Fahr. We landed on St. Anne's Island, having run near thirty miles since the morning, and thence we sailed across the Strait, reached His Majesty's little vessel, and found that the Adelaide had not yet passed by. All looked cold and wintry, every thing being covered with snow; and our sails were hard frozen, for the first time.

"July 1st. After beating loose the sails, we stood out in the ship to meet the Adelaide, which was seen coming towards us. I went on board, and found every one well. They too, in attempting to anchor off Carlos Island, had, like ourselves, been driven

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out: we compared chronometers, and supplied her with a few things not thought of before (keeping under all sail meanwhile to profit by an easterly wind); and the Beagle's officers lent the Adelaide their own stove.

"In the afternoon, we parted company; the Adelaide stood towards Upright Bay, and anchored at dusk, while we steered out of the Strait, with a freshening breeze from the east, which increased much as we made westing. At midnight, we were in the Pacific, and all our anxiety about weeks of beating to windward upon short allowance of provisions, vanished as quickly as the land astern. The glass falling, with the wind in the S.E. quarter, foretold unusually bad weather; we therefore shortened sail by degrees, making all secure.

"2d. At six o'clock in the morning, it was blowing a gale of wind, with so much sea, that it was necessary to steer right before it,—or heave-to,—which with a fair wind was not preferable; and we found the vessel scud extremely well, under close reefed fore and main topsails, and double reefed foresail. Our quarter boats caused anxiety, for the davits were low, and at every lurch the boats were risked. Frequently they dipped in the sea, and sometimes were half filled; but they hung fast till by a moment's neglect of the steerage, a sea broke over the whale-boat, and carried her away. The other, being much smaller and stronger, held on well, though frequently under water. Towards midnight the gale broke; by the next morning the weather was more moderate; and from that time it continued fine, until our arrival at Chilóe.

"On the 5th, at daylight, we saw land at a great distance, which afterwards proved to be the Island of Guafo, and in the afternoon the south end of Chilóe was seen.

"On the 8th, we were working towards the Port of San Carlos, being off Point Huapilacuy, and next day (9th) anchored in the port of San Carlos, which seemed to be well sheltered by a country, the appearance of which was very agreeable when contrasted with that of Tierra del Fuego.

"The town reminded me of a Cornish village. I thought, from their appearance and colour, that the houses were built

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of stone, and roofed with slate; but afterwards found they were of wood, from their foundations, to the tops of their roofs. Except a few cleared spaces, the island is entirely covered with trees, even on the highest hills. The Captain of the Port (an Englishman) boarded us as we neared the anchorage, and was very obliging in his offers. From him I learnt that the Adventure had not yet arrived, nor even been heard of on the coast. We anchored under the lee of Barcacura Heights, in a good berth, and moored ship. I went on shore immediately, and paid my respects to the Governor, Don José Santiago Aldunate, a brigadier-general in the Chilian Service, whose kind manner, and friendly offers of every assistance he could render us, were very gratifying. From the master of a merchant ship, lately arrived, I was surprised and concerned to learn, that the Adventure had not reached Valparaiso before the time of his sailing thence (20th of June).*

"Refitting the Beagle, repairing and building boats, occupied most of the officers, and all the crew, while Mr. Stokes and I were engaged in the work of the survey, during our stay in the Port of San Carlos. Our ship required caulking, which, in so rainy a climate, was difficult to accomplish. So continually wet was the weather, that had we not dried our sails, and unbent them, during three fine days which we had(r) on our arrival, they would not have been dry during our stay."

* The Adventure arrived on the 21st.—P. P. K.

(r) Por milagro (miraculously); as the inhabitants told me.—R. F.

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CHAPTER XV.

Extracts from the Journals of Lieutenants Skyring and Graves—Magdalen Channel — Keats Sound — Mount Sarmiento — Barrow Head — Cockburn Channel — Prevalence of south-west winds — Melville Sound — Ascent of Mount Skyring — Memorial — Cockburn and Barbara Channels — Mass of Islets and Rocks — Hewett Bay — Cypress trees useful—Adelaide rejoins Beagle in Port Gallant—Captain King's narrative resumed — Plan of future proceedings — Adelaide arrives at Chilóe — Abstract of Lieutenant Skyring's account of her proceedings—Smyth Channel—Mount Burney—'Ancon sin Salida'—Natives—Kirke Narrows—Guia Narrows—Peculiar tides—Indians in plank canoes—Passage to Chilóe.

THE extracts from Captain Fitz Roy's first journal being ended, I shall now give some passages from the journals of Lieutenants Skyring and Graves, while employed in the Adelaide, exploring and surveying the Magdalen and Barbara Channels.

The reader will remember, that the Adelaide parted company with the Beagle, at the entrance of the Magdalen Channel, on the 19th of April; and steered to the southward under the direction of Lieutenant Skyring.

Lieutenant Graves says:—

"The east and west shores of the Magdalen Channel run nearly parallel to each other: but the east side is broken by a large opening, named Keats Sound, which runs into the land for eight miles, and appears very like a channel.*(s)*

"At the S.W. angle of the Magdalen Channel stands Mount Sarmiento: the most conspicuous, and the most splendid object in these regions. Rising abruptly from the sea, to a height of about 7,000 feet, it terminates in two sharp peaks, which seem absolutely in the sky: so lofty does the mountain appear, when you are close to its base.

(s) I do not think that there is any opening at the bottom of Keats Sound; which lies at the base of a chain of snow-covered mountains, whose southern side I have closely traced.—R. F.

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"Two thirds of the height are covered with snow; and two enormous glaciers descend into the deep blue waters of the sea beneath. When the sun shines, it is a most brilliant and magnificent sight.

"Many days were almost lost to us, in consequence of heavy gales, accompanied by torrents of rain; but we profited by intervals of fine weather to move from cove to cove.

"On the 5th of May, while working out of Stormy Bay, we grounded, and remained fixed upon a rock several hours, but were lifted off again by the next tide, without having sustained material injury.

"To vessels navigating this channel, I should strongly recommend giving a preference to the south shore, where there are many openings, and I have no doubt good anchorages, which, as our time was limited, and the weather very tempestuous, we had not an opportunity of examining. If any such exist they would have a decided advantage over those on the north shore, from being generally to windward, and therefore easy to leave, as well as more secure. King and Fitz Roy Islands, lying in mid-channel, between Stormy and Park Bays, are of bold approach, as are also the Kirke Rocks, which lie further to the S.W.

"One morning, being anxious to obtain a more secure situation for the vessel, we started in search of a better berth, intending, if possible, to reach a bay on the other shore, near Barrow Head, apparently affording good anchorage; but after beating about, from nine until four o'clock, without being able to reach it, the breeze freshening, and sea increasing, we bore up, and again anchored under the lee of the same island. S.W. winds prevail in these parts throughout the year: in confirmation of which, besides the experience we ourselves have had, all the trees which stand exposed, are bent in an opposite direction; and on the S.W. side of all the land open to that point, not only does the vegetation commence much further from the water's edge, but it is scarcer, and more stunted. In sheltered places the trees grow to within a foot of high-water mark.

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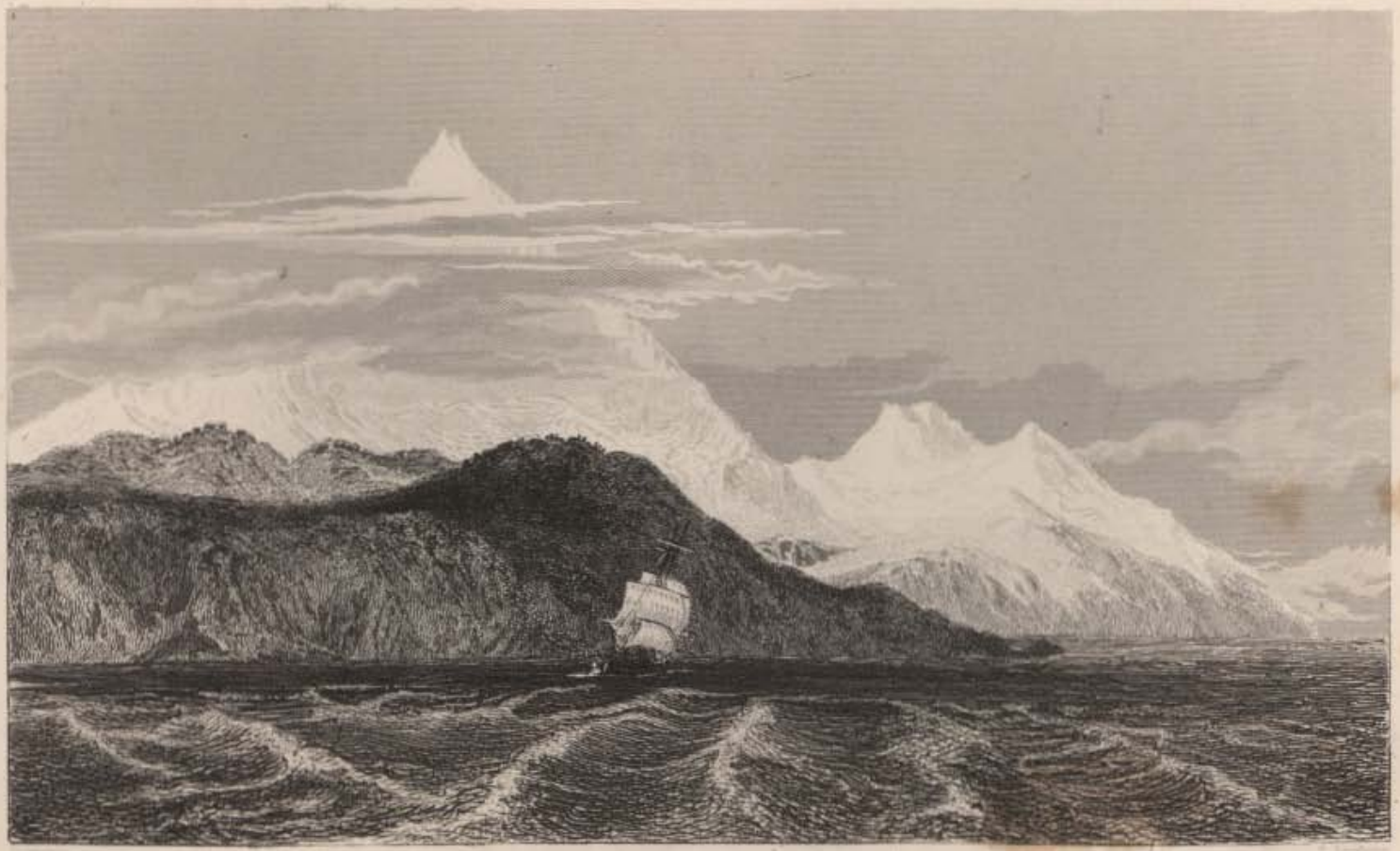

MOUNT SARMIENTO.

Published by Henry Colburn, Great Marlborough Street, 1839.

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"May 11th. We remained at the above-mentioned anchorage; and while Lieutenant Skyring was examining a cluster of islands in the vicinity, I obtained observations for the latitude and longitude; and as it was the first fine day, indeed the only one since entering this channel in which we had a fair proportion of sunshine, it was taken advantage of to dry and air all our clothes and bedding, and clean out the vessel thoroughly.

"The next anchorage we took, was in a cove just large enough to hold the schooner, at the entrance of Dyneley Sound, on the north shore. In crossing over, we had a fine view of Mount Sarmiento; and looking to seaward, from the hill over this cove, the Tussac, and the Fury Rocks, at the entrance of Melville Sound, which are much resorted to by sealers, were clearly distinguishable.

"During our stay here, until May 15th, the neighbouring coast was examined, whenever the weather permitted. We also communicated with several canoes full of Indians, but gained no additional information respecting the habits of the natives.

"The next start carried us through the islands of Melville Sound, to an anchorage in a small cove, at the N.E. end of the largest of the Magill Islands, upon which is Mount Skyring. Having resolved to ascend to the top, as it offered so commanding a view, and was so centrally situated, we remained for that purpose." The weather, for several days, was very unfavourable, and it was not until the 21st, that there was any reasonable prospect of obtaining a view from the summit; when Lieutenant Skyring and Mr. Kirke had a most laborious excursion, and the latter was nearly frost-bitten in ascending the mountain; but they were fully recompensed for the trouble and difficulty they had experienced.

Lieutenant Skyring says:—

"We gained the summit after three hour's hard travelling. During the last five hundred feet of ascent, the mountain was almost precipitous, and we had the utmost difficulty in passing the instruments from hand to hand. Its formation is remarkable, although, I believe, the same structure exists throughout the hills around. The base is a coarse granite, but this solid

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formation cannot be traced half the height; above is an immense heap of masses of rock, irregularly and wonderfully thrown together, many huge fragments overhanging, with apparently very little hold. This station was the most commanding we had chosen during the survey, and answered well for the object we desired; which being attained, we returned on board, and I rejoiced when all were safe, for it was neither an easy, nor a pleasant enterprise."

A document, of which the following is a copy, was enclosed in a bottle and a strong outer case, and left at the summit of the mountain.

(Copy.)

This Memorial was left by the officers of H.M. Schooner Adelaide, while employed on a survey of the Magdalen, Cockburn, and Barbara Channels; and any person finding it is requested to leave the original document, and build the pile, under which it is placed, at least six feet higher.

Signed this 16th day of May 1829, by

W. G. Skyring, Lieut. and assist. surveyor of H.M.S. Beagle.
Thomas Graves, Lieut. of H.M. Schooner Adelaide.
James Kirke, Midshipman H.M.S. Beagle.
Alex. Millar, Master assist. H.M.S. Adelaide.
Benj. Bynoe, Assist. surgeon H.M.S. Beagle.
Jno. Park, Assist. surgeon H.M.S. Adventure.

God save the King.

"In the Cockburn Channel,* the flood-tide sets to seaward;

* In the old Dutch charts, a passage was laid down near the place, and nearly in the direction of the Cockburn Channel, and named 'Jelouzelt:' but until some written authority can be produced to prove that this passage was explored, or, at the least, discovered by the person who gave the name of 'Jelouzelt' to one of the almost innumerable openings in Tierra del Fuego, it does not appear that the inlet so called has any claim to our consideration, greater than that of the non-existing San Sebastian Channel,—or a number of other imaginary passages which must have been laid down, upon supposition only, in many old charts.

The first person known to have passed through the Cockburn Channel was the mate of the Prince of Saxe Cobourg, who went in a boat (see page 66). It was afterwards passed by Mr. William Low, master of the Mercury, and has since been used by several vessels.

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but it was not found to be of consequence to a vessel in working through. The rise and fall is not more than six, or at most, eight feet, at spring-tides.

" May 22d. We quitted this anchorage; and having worked to the westward, through the Adelaide Passage, took up a berth in a small bay, two miles and a half to the northward, where we remained during the night, and next morning; then, after examining the neighbouring coast sufficiently to carry on our triangulation, proceeded to an anchorage on the north side of Bynoe Island. From the summit of this place an extensive view was obtained of the islands in Melville Sound, as well as of the entrance to the Cockburn and Barbara Channels. Such a complicated mass of islands and rocks, I never before saw; to lay them all down correctly would occupy a long time. Sufficient, however, has been done to take the navigator through this labyrinth; but I am well aware, that very much is still wanting to complete the survey.

" Fury and North Harbours, of which the former became more particularly known to us from the Prince of Saxe Cobourg having been wrecked there in December 1826, were laid down from an eye-sketch only; but the peaks of the island, and its extremes, were fixed by triangulation.*

" Melville Sound is formed by the islands which separate the Cockburn from the Barbara Channels. Generally speaking, they, as well as the coasts in the immediate neighbourhood which are exposed to seaward, present a most barren and desolate appearance.

" Until the 26th of May, we were much occupied among the surrounding islands; but time being short, we took advantage of a southerly wind to run up the Barbara Channel, and soon reached an anchorage in Hewett Bay. While securing the vessel, a canoe, containing only a man, woman, and child, and three dogs, was seen coming round the south point of the bay. As they seemed very unwilling to pay us a visit, remaining at a distance, and vociferating as usual, ' Ho-say,' ' Ho-say!' Mr. Bynoe and I communicated with them in the dinghy; but

* Since surveyed by Capt. Fitz Roy in the Beagle, 1829-30.

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finding they had not an article worth bartering for, we soon left them, and returned on board. It was suspected their companions were not far off, and indeed, the day after, Lieutenant Skyring saw several canoes; but the moment he was discovered, they were beached, and the men, taking to the woods, kept at a distance.

"On the 29th, we left Hewett Bay, and, after threading the needle through a multitude of islands, islets, and small rocks, for more than three miles, reached an anchorage in a small cove, at the north entrance of Brown Bay, where we were detained, and confined to the vessel, by heavy gales, and stormy weather, until June 2d; when, having a fine day, we reached a spot (marked in the chart as North anchorage) sufficiently secure for a small vessel; but not to be recommended to any other.

"Between Hewett Bay, and the above anchorage, there are several rocks, among patches of kelp, which, as they only show themselves at half ebb, or near low water, render the navigation rather intricate. A good maxim in these channels is, 'Avoid kelp, and you avoid danger.' Forty-three days had passed since we left Port Famine; and in this interval, I find we had nine favourable days, twelve partially favourable, some hours of which we could employ in the work about which we were engaged, and the remaining twenty-three were days of rain and wind, far too unfavourable to serve our purpose in the least.

"June 4th. While turning to windward, we, for the first time, felt the influence of the tide, which, from the channel's narrowing, begins to be sensible: here it was sufficiently strong to prevent our gaining ground in beating to windward, although with a good working breeze; we therefore ran into a bay on the west side, and anchored. The country around had rather a pleasing appearance, the shores being partially covered with the evergreen, and deciduous-leaved beech, and a few stunted cypress-trees. These last are serviceable for boat-hook spars, or boats' masts; and, when seasoned, work up very smoothly, and wear well: the beech-trees do not equal those found further northward in the Strait, except here and there in sheltered corners.

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"With a leading wind, the next morning, we reached the south narrows of the Barbara Channel, through which we were carried by a strong tide, and anchored in Bedford Bay.

"Here, as well as throughout the Barbara channel, the flood tide sets to the southward. We obtained at this place angles which connected our triangulation with points fixed by Captain King during the previous year, and finished our examination of these channels within a very few days of the time allotted.

"On the 8th of June we attempted to pass through the Shag Narrows, but not saving the tide, were obliged to anchor for the night in Field Bay, which is small and much exposed to southerly winds; the bank also is very abrupt, and the water is deep close to the shore.

"On the 9th we succeeded in clearing the Narrows, and reached Port Gallant early in the afternoon, where we rejoined the Beagle."

Having given these brief extracts from Journals kept on board the Beagle and Adelaide, during the time occupied by the Adventure about Cape Horn, or on her way to Chiloé, I will resume my own narrative.

As it was my intention to remain at this port * until the Beagle and Adelaide were equipped, the Adventure was made snug, and, by way of relaxation, such of the officers as could be spared from the duties of the ship, resided in turns at the town, where also the ship's company had frequently permission to amuse themselves.

The Hoxsley schooner arrived from Valparaiso and brought me letters from the Admiralty, acquiescing in my request to return to England direct, instead of proceeding by way of New South Wales and the Cape of Good Hope, as was originally intended. I therefore determined to return to Valparaiso as soon as our consorts had taken their departure, proceed thence to Port Famine, where we were to be joined by the Adelaide, and afterwards repair to Rio de Janeiro to await the Beagle's arrival, when we should sail for England.

* San Carlos, in Chiloé.

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On the 20th of September my anxiety for the Adelaide was relieved by her appearance, and by finding all on board her in good health. She had gone up the coast by the channels that communicate with the Strait of Magalhaens at Beaufort Bay, passing inside of Hanover Island and Madre de Dios; and Lieut. Skyring gave me a very interesting account of their discoveries, of which the following is an abstract.

It will be remembered that the Beagle left the Adelaide at anchor under Cape Upright. While there the wind freshened up from the eastward, and threw a swell into the bay, which rendered the anchorage very unsafe, as the schooner's stern was in the foam of the sea that broke on the rocky shore close to her. Much anxiety was felt for their safety, but the anchors held well. As soon as the weather permitted they sailed, entered Beaufort Bay, and steered towards a deep opening to the eastward of Cape Phillip, into which they ran with a steady S.E. wind, and found an anchorage on the west side in Deep Harbour.

On the 5th of July Lieut. Skyring and Mr. Kirke were absent in a whaleboat, exploring a deep opening eastward of Cape Tamar, which they found to terminate in two sounds, named by them Icy Sound and Glacier Bay; the first from its being covered with a sheet of ice, and the latter from its being full of large masses which had been detached from an extensive glacier occupying the bottom of the bay. The examination of this opening was made in search of a channel, through which, vessels had entered the Strait, and the schooner was to proceed to her rendezvous. The result proved that the Adelaide was already in the channel they were looking for, therefore they returned on board, and proceeded (7th) to the northward. In passing Mount Joy a strong tide was observed, the certain indication of a channel; for, as has been before remarked, within sounds the tide has no perceptible stream. To gain a better knowledge of their way they anchored early in Good's Bay; the course of the channel, from the intersection of points, and intervention of islands, being by no means distinct. Lieut. Graves made a plan of the bay, while

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Lieut. Skyring, and his assistant,* completed the survey of the entrance to the passage, which was named Smyth Channel, as a compliment to Capt. W. H. Smyth, R. N., under whom, while surveying the Mediterranean, both Lieuts. Skyring and Graves had served.

The best channel they found to the eastward of Renouard Island, and the Adelaide took that course, but stopped a night in a small cove on the eastern side of the island, and in passing Shoal Island next day struck on a rock; she was got off however without injury, and anchored afterwards, for a night, on the north side of the Island of the Narrows.

The two following days (10th and 11th) were spent in examining the coast, and exploring Clapperton Inlet, which had the appearance of being a channel. From the hills at the bottom Lieut. Skyring noticed a considerable tract of low land and open plain, extending to the northward. On the 12th, being Sunday, they remained quiet, and on the 13th the weather was so calm that they only reached Hose Harbour, on the east side; and the next day Oake Bay. Thence crossing the channel in a whaleboat they explored some distance along that shore; and on the 15th anchored in Otter Bay. This slow progress was unavoidable, owing to the calm state of the weather, and to the survey being principally, if not entirely, carried on in boats.

On the 16th the schooner was towed onwards, and passing over an extensive shoal flat of three fathoms, reached the Summer Islands, where she might have stopped, but, as the tide was still favourable, she proceeded to an anchorage under Long Island, the most northern in the Elson group.

The eastern shore of the channel was there very different in character from what they had so long been accustomed to, being nearly level; and, extending for some distance off every low point, there was shoal water.

For some days a lofty mountain, covered with snow, had been in sight; which, by angular measurement, proved to

* Mr. Kirke.

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be 5,800 feet in height. It was named Mount Burney, in compliment to the admiral.

On the 17th the Adelaide reached Fortune Bay, situated at the east extreme of a headland, on each side of which is a channel, leading, apparently, towards Cape Isabel. The northern seemed to be the principal one, and therefore was followed next day (18th) as far as Welcome Bay.

Continuing the survey onwards they reached Victory Passage, which they entered, thinking they were in the mouth of the 'Ancon sin Salida,' as laid down from Sarmiento's journal by Admiral Burney. The weather, however, became so bad, that they were obliged to take shelter in Island Bay, and the next day the wind setting in from the eastward, they gave up, for a time, their search for the 'Ancon sin salida,' and proceeded by Smyth Channel, as far as Hamper Bay, where they were again detained by bad weather. Here a few rock fish were caught, but at no other time during this cruise were the fishermen successful, although the channel was so filled by porpoises and seals, that it is probably well stocked with fish at the proper season: and there are many places where the seine might be shot. Proceeding slowly on the 25th, the Adelaide struck on a rock, and remained fast for a few hours, but as the tide rose she swung off without damage. Upon examining Rocky Bay they found it a complete bed of rocks; yet, bad as it was, the Adelaide was obliged to remain there five days, owing to the tempestuous state of the weather. On the 30th they reached the north end of Smyth Channel, and anchored in Narrow Creek.

On the 31st Lieut. Skyring went to a remarkable hill, which he called Mount Trafalgar, but thought it might have been the 'Monte Trigo'* of Sarmiento, so much did its appearance remind him of a corn stack. The day was most favourable: a round of angles, and an extensive view down Lord Nelson's Strait, were obtained from the summit. They remained on an island all night, sheltered by the boat, and next morning went to two points, called by Sarmiento 'Oueste,' and 'Mas

* A heap, or stack of corn.

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al Oueste,' (west and more west,) returning to the Adelaide in the evening.

The following morning was fine, and the Adelaide moved out of Smyth Channel, the survey of which was completed very satisfactorily, although their progress was slow, owing to constant northerly winds.

By towing the Adelaide during tedious calms, they reached Montague Bay in the evening, and next day anchored in Relief Harbour, on the S.W. side of Vancouver Island.

As it was evident that the 'Ancon sin salida' was within Piazzi and Ceres Islands, up the west coasts of which they had passed, Lieut. Skyring left the schooner moored in Relief Harbour, and proceeded, on the 4th August, to the southward, in a whale-boat with Mr. Kirke; but he took no more than a week's provisions, that time being all he could devote to this exploration.

The 4th, 5th, and 6th, Lieutenant Skyring employed in pulling or sailing to the southward and eastward, through winding and intricate passages; although strong winds and much heavy rain annoyed him, and impeded his progress.

On the 7th the weather was much more favourable than it had lately been. The boat pulled and sailed to the southward, and at noon Lieutenant Skyring ascended a height,* having on each side of it a deep opening, but he was disappointed in the view; and, after taking bearings, pulled round the adjacent bights, one of which was exactly opposite Artist Bay, in Smyth Channel, and so near it that the two waters were only separated by a few hundred yards;† the other,‡ eastward of the height, was large, and closed at the bottom by very low lands. It was directly supposed to be the 'Ancon sin Salida;'§ but Sarmiento's description, and the chart compiled by Burney,

* No doubt the Mount Oracion of Sarmiento, p. 144.—P.P.K.

† This place is described in Sarmiento's journal, p. 144.—P.P.K.

‡ Ensenada de la Oracion of Sarmiento.—P.P.K.

§ This bay is also described by Sarmiento as an 'Ancon sin salida,' p. 143; but it is evidently not the one that bears that name on the chart. —P.P.K.

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were insufficient to enable them to decide with any degree of certainty. After looking round this bay, they continued to the eastward, and passed a point beyond which there was apparently a wide channel; having run about six miles down it without discovering any termination, they hauled their boat up on the beach for the night.

On the 8th, two canoes were noticed on the west shore; but seeing strangers the natives, apparently much frightened, all landed, except an old man; and taking with them what they most valued, hid themselves among the brush-wood, leaving their canoes fastened to the sea-weed. By some Fuegian words of invitation, the men were, however, induced to approach and traffic, receiving for their otter skins whatever could be spared. In appearance and manner these Indians were exactly similar to the Fuegians; and by their canoes only, which were built of planks, could they be distinguished as belonging to another tribe.

After leaving the natives, the boat passed Cape Earnest, and Lieutenant Skyring observed a wide channel leading north and then N.N.W.;* also, another opening to the eastward. The wind being easterly, he ran some distance to the northward, to gain more knowledge of the first inlet; and having gone ten or twelve miles from Cape Earnest, and observing the opening for eight miles beyond to be as wide as where they then were, he concluded it to be a channel, or else a deep sound terminated by low land, for there was evidently a division in

* Here is certainly the Ancon sin salida of Sarmiento, whose journal describes the inlet as terminating in a cove to the north, p. 142. The mountain of Año Nuevo cannot be mistaken; indeed the whole of the coast is so well described by the ancient mariner, that we have little difficulty in determining the greater number of places he visited. In all cases we have, of course, preserved his names. The chart compiled by Admiral Burney is a remarkable instance of the care which that author took in arranging it, and how ingeniously and correctly he has displayed his judgment; it is also a proof that our favourite old voyager, Sarmiento, was at least correct in his descriptions, although he appears to have been quite ignorant of the variation of the compass. — See Burney Coll. Voyages, p. 31; and Sarmiento, p. 162.

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the mountains, such as to justify this belief. Returning, they entered the smaller opening to the eastward, and were almost assured of its being a channel; for when they were between the points, many porpoises and seals were observed, and a tide was found setting westward, at the rate of two knots. At dark, they hauled their boat on the beach of an excellent bay, at the north side of the narrow reach, and secured her for the night.

On the 9th, shortly after daylight, they set out in a N.E. direction to ascertain the truth of their supposition; and before noon knew, beyond a doubt, that they were correct in their belief, being in the narrows of a channel before unknown, that had eluded Sarmiento's notice. These narrows, which Lieutenant Skyring felt assured would lead to a large opening, were upwards of three miles in length, and generally about one-third of a mile in breadth. A strong tide took the boat through; and at the N.E. extremity, where the narrows were reduced to four hundred yards in width, the water, although a neap-tide, rushed at the rate of four knots, forming whirling eddies, which were carefully avoided by Lieutenant Skyring. At spring-tide, the strength of these rapids would probably not be less than seven knots.

Having passed through them, a clear channel was seen, upwards of two miles wide, running to the N.b.E. for, at least, eight miles, and then turning directly eastward, between moderately high land. Another channel, nearly a mile and a half wide, trended to the S.E. for two or three miles, and then also turned to the eastward. Here they stopped. Lieutenant Skyring regretted extremely not being able to prosecute the discovery, and have one more view from the eastern point of the N.E. channel; but as only one day's provisions remained, it would have been imprudent to delay his return. It was evident, that they had passed through the range of the Cordilleras,* for to the eastward the country appeared totally different, the highest hill not being above seven hundred feet. The opening to the N.E. was thought to communicate with the waters' lately discovered by Captain Fitz Roy. The latitude

* 'Cordillera Nevada' of Sarmiento.

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was obtained on Point Return; and in the afternoon, reluctantly but anxiously, they retraced their way, and passed that night at their former quarters, in Whale-boat Bay.

On the 10th, at daylight, they proceeded on their return. The wind was fair until they reached Cape Earnest, when it drew right against them; and they had the unpleasant prospect of a tedious pull to the schooner, with very little provision.

The 11th was a thoroughly wet day, and the wind was so strong from the northward, with a very heavy sea running, that it was impossible to proceed.

On the 12th, they left the bay soon after daylight, and having pulled along shore a few miles, crossed Union Sound, and gained the Narrows of San Benito, the wind being still fresh from the northward; thence they continued pulling until they hauled up, after dark, in a bay, opposite Point Benito, and waited till the morning of the 13th, when with a fresh S.W. wind they made good progress, which was of the more consequence, as their provisions were expended, although they had eked them out with corvorants and muscles. At last, the sight of the Adelaide rejoiced them, and they soon afterwards reached her. Their appearance was a relief to all who were on board, as they were becoming very anxious, and Lieut. Graves was preparing to send the other whale-boat in search of them. During their absence he had made the necessary astronomical observations, and finished the examination of those shores adjacent to the harbours.

From the 13th to the 17th, the schooner was detained by bad weather, and the following day only succeeded in reaching Escape Bay, in San Estevan Channel, which was found to be a good and well-sheltered anchorage, although small.

On the 19th, after angles had been taken on each side of the Channel, the Adelaide got under weigh, and steered up the Channel. At noon she passed the mount which they supposed to be Sarmiento's Monte Trigo, and soon after, nearing Esperanza Island, they sought for some mark by which to recognise the Mountain of the Fox ('Monte de la Zorra'). In the white part of a cliff, they fancied some resemblance to an

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animal, and noticed a harbour opposite, in which they anchored. They had such trouble in getting to the northward, that this day's run, though only eighteen miles, was a cause of much satisfaction.

On the 20th, at daylight, the boats were employed around the anchorage, and at nine o'clock the vessel was underweigh, and working to the northward, although it rained hard then, as well as throughout the whole day, after beating until the evening, she anchored on the west shore.

Constant rain fell through the whole night, and during the 21st; it was therefore impossible to make any progress to the northward.

On the 22d the Adelaide weighed, and the weather being calm, was towed during the whole forenoon. At noon a southerly wind sprung up, and by the evening she was in the Guia Narrows (of Sarmiento). They tried for anchorage in Unfit Bay, conceiving it to be Sarmiento's Port Ochavario; but none being found, the vessel was towed into a cove, and securely moored.

Next day the boats surveyed the Guia Narrows. Although long, they did not appear hazardous to pass, for the tides are not very rapid. The ebb tide runs to the northward, but at the south entrance of the San Estevan Channel, the ebb sets to the southward; which difference in direction, within so short a distance, is extraordinary, and difficult to account for without knowing more of the coast. Certainly there is a meeting of tides between the two entrances; probably, all the land westward of San Estevan is a collection of large islands, and water flows into this channel, from the Pacific, through many openings, which may be the cause of this peculiarity.

24th. With light breezes from the eastward, the schooner weighed and stood through the Narrows; passed Point San Juan, and continued along the eastern shore of Concepcion Strait to Guard Bay, where she was moored.

25th. Rainy weather until near noon, when the boats were employed.

On the 26th the schooner was towed out, and, as it was calm,

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kept a boat a-head the whole day. She anchored in a small bight, formed by Chance Islands, about seven miles from Guard Bay.

The 27th was rainy, but the boats went to different points, and angles were taken before the schooner weighed and worked northward. At noon she came to an anchor in a small bay, northward of the Hocico de Caiman. Constant rain during the remainder of the day.

On the 28th it rained too incessantly the whole morning, to allow the party to work, even in boats; and the day was passed in laying down former observations.

29th. After angles had been taken near the anchorage, the schooner was moved, and worked along the coast. A strong wind from the N.W., with a heavy sea, brought the vessel under close-reefed sails, and obliged her to anchor in Walker Bay.

On the 30th, the Adelaide anchored in Molyneux Sound. To give a clearer idea of the delays experienced in making progress to the northward through these intricate channels, I shall now extract part of Lieutenant Skyring's Journal, in his own words:

"31st. Wind N.N.W. with a heavy swell in the Strait; the boats at daylight went north and south of the anchorage, and angles were obtained. At nine, ready for starting; but the weather was too unfavourable, and continued so until the 4th of September, when, at seven o'clock in the morning, we weighed. At nine, squally—obliged to double-reef; but the tide serving, we gained a few miles to windward, and at one, P.M., stood among a mass of islands on the west side, and moored in Tom's Bay, steadying the vessel with the stream anchor. In the afternoon the survey was continued, and from the heights a view was obtained of the Gulf of Trinidad, and of several points observed last year. Another detention of two days, owing to bad weather.

"7th. Cloudy; weighed at daylight, and stood for the narrows. At eight, squally, with thick snowy weather; but, being once under weigh, we refrained from returning, until compelled. It certainly was not a favourable day for working

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through; but the wind moderated, and our attempt succeeded. No anchorage being found by the boats on the north side of the narrows, we made for the weather-shore of the gulf, and anchored early in Windward Bay. In the afternoon, angles were taken on Middle Island, and east and west of the anchorage. The time of our departure drawing near, it became doubly necessary to work constantly, that we might join this survey with that of last year, in the Beagle.

"8th. Weighed at daylight; wind light from N.W.; but, falling calm, boats were detached for continuing the angles, and the latitude was observed on Red Beak Rocks. At five o'clock, we gained an anchorage, close to the eastward of the Ancon del Morro, on the S.E. side of Division Isle, in a bay which answered our purpose, although it was rather a confined place. Some angles were taken on Point Candelaria, preparatory to continuing our course next morning.

"9th. At daylight weighed and stood over to the northern shore, and at eleven, anchored in Neesham Bay, in eleven fathoms. Boats employed in the afternoon, on the survey. While at anchor, two canoes, containing together thirty-two Indians, came alongside; they were chiefly men, a finer race of people, better formed, and better featured than the Fuegians, and much less noisy. Their canoes were made of planks, the longest upwards of twenty-three feet in length: they appeared exceedingly buoyant, and pulled quickly.

"10th. At daylight, we sailed out of the bay, with a light breeze from the eastward; at seven, the wind increased, and a heavy sea rose in the gulf. It was my intention to get an anchorage under Mount Corso; but, as that was now a leeward coast, with a heavy sea setting upon the shore, it would have been improper to attempt seeking for one. If it had answered our purpose, we might have gone to Port Henry, and, indeed, this was the only safe course we could have pursued, if our object had been to remain in the gulf; but no time was left to wait for favourable weather; therefore I chose in preference to leave the gulf, and take advantage of the fair wind to gain an offing, the time of our return being so near.

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"We left the gulf two days before I had expected to have done so; but we all rejoiced at our departure. No crew could have performed their duty more willingly than the Adelaide's; but such lengthened fatigue as they had undergone, was sufficient to make any men feel happy at the prospect of a respite.

"It was a pleasing reflection to Lieutenant Graves and myself, that the orders had been fully executed; that the coast we had passed was throughout well connected; and that this service was concluded without any illness or accident among the crew, without any damage to the vessel, without any loss of boats, or even the slightest misfortune."

During the Adelaide's passage to Chilóe, Lieutenant Skyring and his companion were assiduously employed in transferring their observations to paper, notwithstanding the violent motion of their little vessel, during ten days of rough weather.

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CHAPTER XVI.

Chilóe—Its probable importance—Valdivia founds seven cities; afterwards destroyed by the Indians—Migration of Spanish settlers—Province and Islands of Chilóe—Districts and population—Government—Defence—Winds—Town—Durability of wooden buildings—Cultivation—Want of industry—Improvement—Dress—Habits of lower classes—Morality—Schools—Language—Produce—Manufactures—Exports and imports—Varieties of wood—Alerse—Roads—Piraguas Ploughs—Corn—Potatoes—Contributions—Birds—Shell-fish—Medical practitioners—Remedies—Climate.

As the Island of Chilóe was formerly shrouded from notice, by the policy of its master, the King of Spain, and therefore little known to the world; I have considered it not irrelevant to the narration of the voyage, to introduce a short account of its present state, particularly as since the trade of the whole coast has been opened, a new era has dawned upon this interesting island; and although it has been, as yet, the least frequented of the South American States, I think the time is not far distant, when it will become an important part of the Chilian territory.

After the foundation of the city of Penco, or Concepcion, by Don Pedro de Valdivia, in the year 1550, he passed on towards the south in search of convenient situations for other cities; and crossing the river Bio Bio, which separates Concepcion from the territory of the Araucanian Indians, successively founded Imperial, Valdivia, Villa Rica, Angol, Cañete, and Osorno; the last being effected in the year 1558. The necessary distribution of the Spanish forces, to protect so many points, made them comparatively defenceless, in a country inhabited by a large population of Indians, who contemplated the hostile occupation of their native land, by the invading army, with a deep dissatisfaction. They had for some time endured, with sullen patience, the yoke of the Spaniards; but at last, incensed by the servility and bondage to which they were reduced, and, probably, by no small portion of ill-treatment; the whole population rose simultaneously, and waged a most destructive and

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harassing war against the Spaniards, in which the above-mentioned cities were all destroyed, and the greater number of their inhabitants put to death.

The destruction of the city of Osorno caused the province of Chilóe, or, at least, the adjacent districts of Calbuco and Carelmapu, to be occupied. This town, being more distant from the seat of war, where the main body of the Indian army was actively employed, was enabled to hold out for some time; but, at last, cut off from assistance, prevented from communicating with friends, and utterly destitute of supplies, the inhabitants retired to the fort, or citadel; which they maintained, until compelled, by absolute want of provisions, to abandon their position, and proceed to the south, with a view of establishing themselves in Carelmapu and Calbuco; where they hoped to be safe from attack.

Their retreat was attended by much suffering; many died from fatigue, and many were cut off by the Indians, who hovered about them and murdered all who fell into their hands.* At last they reached their destination, and established themselves first at Carelmapu, which is on the main-land, on the north side of the Boca de Chilóe, opposite to San Carlos; and afterwards at Calbuco, on an island at the entrance to the Gulf of Reloncavi. The latter position by its insularity, was effectually protected against any attack from Indian tribes, who, for many years, continually harassed the inhabitants of Carelmapu.

At what date this journey was made does not appear; nor is it certain that these places were occupied before the foundation of the city of Castro, in 1566, by the Licentiate Lope Garcia de Castro, in pursuance of an order from the Viceroy of Peru, Marshal Don Martin Ruiz de Gamboa.†

The island of Chilóe, from its situation, is a place of considerable importance, and may be termed the key of the Pacific.

* A very full and detailed account of this journey is given by Agüeros, in his 'History of the Province of Chilóe,' pp. 50 to 56, as well as in the 'Chronicles of the Province of Lima, by Padre Fr. Diego de Cordova,' Salinas, chap. xvii. p. 485.

† Agüeros, l. c. p. 57.

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It is the northernmost of that vast archipelago, which borders the coast from latitude 42° south to Cape Horn.

The province of Chilóe, one of the eight divisions of the Chilian Republic, includes several islands, and extends on the main-land, as far as the south bank of the River Maullin;* which takes in the districts of Carelmapu and Calbuco. Its southern extent is not defined; but as the existence of Chilian authority is not known, to the southward of the Chonos Archipelago, certainly not farther south than the land of Tres Montes, the parallel of 47° may be considered its southern limit. The country thence, to the Strait of Magalhaens, is known by the appellation of Western Patagonia.

Besides the Isla Grande, as Chilóe is called, the following islands are inhabited:—Achao, or Quinchao, Lemuy, Quehuy, Chelin, Linlin, Llignua, Quenac, Meulin, Caguach or Cahuache, Alao, Apiao, Chaulinec, all in front of Castro; the Chaugues Islands, opposite to Tenoun; Calbuco, Llaichua, Quenu, Tabor, Abtao, Chiduapi (on which is the fort); Huar in the neighbourhood, and district of Calbuco; and, to the South, Tanqui, to which may be added Caylin, which is also called El fin de la Cristiandad.†

Of the above, next to the Isla Grande, the principal are Quinchao and Lemuy, both of which are very populous, and

* Agüeros describes its boundary thus:—It is situated between the latitudes 41° 30′ and 44°; from Point Capitanes to Quilan. On the north it is bounded by the territories of the Indian tribes Juncos and Rancos, which extend to Valdivia; on the N.E. by those of the ancient but destroyed city Osorno; on the south by the archipelago of Guaitecas and Guaianeco, and others which extend to the Strait of Magalhaens; on the east by the Cordillera; and on the west by the sea. (Agüeros, p. 61.)

† When the Yntendente, or governor of the province, visited Castro for the purpose of taking a census of the population, a family of Indians waited upon him to render an account of their property; who, upon being asked whence they came, replied, "Del fin de la Cristiandad." The name being new to the Yntendente, it was explained to him that they belonged to Caylin, which was more generally known by the above name, because there existed no Christian population beyond, or to the southward of, that island.

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almost entirely cultivated. The other islands are small, and very close to each other; but separated by navigable channels, which offer many dangers to the frail vessels in which the islanders move about.

The province is divided into ten districts, or Partidos, as follows:—

1. San Carlos, containing the northern coast of the island, as far as Chacao.
2. Chacao. The N.E. part of the island.
3. Carelmapu and Maullin.
4. Calbuco.
5. Dalcahue, extending from Chacao to Tenoun.
6. Quenac.
7. Quinchao.
8. Castro.
9. Lemuy.
10. Chonchi, which extends from Castro to the south extremity of the island.

By the census of 1828, the population of the large island, and those in its neighbourhood would appear to be, comparatively, very considerable; the number of souls being 43,131:* particularly as the greater portion of the interior, and much of the sea-coast, are quite uninhabited. The population of the district of San Carlos is confined principally to the town; for between it and Chacao, there are very few inhabitants. At Chacao there are only about two hundred houses, and Dalcahue is but thinly occupied: but Castro, Quinchao, and Lemuy, are very populous. These three districts are the most fertile and productive part of the island, particularly for seven or eight miles round Castro. The peninsula opposite to that town, which is entirely cleared, would abundantly repay its cultivators, were industry more common among them.

Chilóe is governed by an 'Yntendente,' or civil governor, who exacts obedience to the constitutional laws, as well as to the orders of the executive powers, and the resolutions of the provincial assembly, which is composed of members, elected

* In the year 1783 there were 23,447 (Agüeros): and in 1832, 43,830.

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by the people, at the rate of one deputy for 7,500 souls; but whatever the number may be, short of 90,000, twelve deputies are to be elected. The duration of the assembly is biennial, and its business is to superintend the civil regulations of the province.

Under the Yntendente each province has a local governor, whose principal duties are to maintain order, preside in the municipal meetings, see their regulations carried into execution, and obey the orders of the Yntendente of the province. Whilst we were at Chiloé, the duties of Yntendente, and military commandant, were performed by one person, Brigadier-general Don José Santiago Aldunate; but, upon his resignation, the offices were separated: the military commandant retaining the charge of the treasury. The duties of the military chief, are to dispose of the troops under his command, as he sees occasion, so as to ensure the quietness, and subordination of the province, for which he is responsible; and to render the Yntendente such assistance as he may require; but, for all ordinary purposes, the Militia, who are under the immediate control of the Yntendente, are employed. For the administration of the law there is a Judge (Juez de letras), who tries all civil as well criminal actions. The province sends two deputies to the Chilian congress, one from San Carlos, and the other from Castro. At the beginning of the year 1829, the Militia amounted to more than seven thousand men, and the regular troops to three hundred and thirty, which was quite sufficient for the province.

The port of San Carlos is capable of being well defended, and, during the time of the Spaniards, was in a good state of defence. The entrance was protected by a battery on the highland of the Corona, and by the castle of Aguy, which effectually commands it. Farther in, on the same side of the port, was the small, but well-placed, two-gun battery of Barcacura; close under which is the anchorage. On the town side there are several batteries; but, towards the Pudeto it is weak, although capable of being made very strong. Fort San Carlos, which, for some years past, has been used as a cemetery, was well-selected as to position, and constructed in a manner very

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creditable to the engineer. It was surrounded by a deep and wide ditch; and under it lay two small batteries: one, San Antonio, commanding the passage between the small island of Cochinos, and the Main; and the other flanking the anchorage off the town. At the Mole were two guns, and opposite to it, under the governor's house, was the battery, Del Carmen, mounting twelve or fourteen guns. In the town, in a convenient situation, there were excellent barracks, capable of containing more than one thousand men.

The original establishment was at the Sandy Point, on the western side of the port, where the situation is better sheltered, and, perhaps, equally capable of being well defended. It is, also, on the windward side of the harbour, and close to the safest anchorage which the port affords; but the inconvenience of water-carriage was found to be so great, that the establishment was removed to its present site. A still better situation might have been selected opposite to Sandy Point, at Leche Agua; where the anchorage is perfectly safe, and the communication with Castro could be more advantageously made.

Northerly and westerly winds prevail, and the town is exposed to all their fury, which, at times, is extreme. The anchorage nearest to it, for the sake of convenience, and expedition in loading and unloading cargoes, is often taken up, but is very unsafe, many vessels having been lost there, from the bottom being shoal, and rocky; and the swell, during a northerly gale, is so short and deep, that anchors will not hold.

The town is built on two rising grounds, and in the valley that separates them; through which a rivulet runs into the bay, at a mole which affords sufficient protection to the boats and piraguas frequenting the port. The houses, which are all of wood, are generally small, and have but little comfort. The plaza, or square, without which no town in Chile of the least importance is to be found, is situated on a flat piece of ground at the summit of the southern hill, and commands an extensive view. It is about one hundred and eighty yards square, with a flag-staff in the centre.

On the north side there is a strong, well-built stone store-

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house, and opposite to it is the church, also built of stone. On the side next the sea is the Yntendente's residence, a low range of wooden buildings, erected without regard to taste, convenience, or comfort; and opposite to this are two or three dwellings, very little superior to common huts, or ranchos.

Within the last few years, however, some substantial buildings have been erected by the more wealthy people in the town, an example which is likely to be followed. During our visit, several were built equally creditable for strength and convenience; and not a little remarkable for the rapidity, with which they were completed.

Wood, being abundant, and cheap, as well as easily worked, is the only material used in the construction of houses, which, with the exception of the provision-store, and the church, are all built of it; and notwithstanding the perishable nature of the material, which is not protected by paint, or any external coating, from the humidity of the climate, they are of extraordinary durability. The treasury, one of the oldest houses in the place, has been built upwards of seventy years; and is even now tight, and dry, and by no means unserviceable: but its removal has been ordered, and, probably ere this, it has been replaced by another. In Chacao, where, in former days, the Yntendente resided, the greater number of the government-buildings, not less than sixty or seventy years old, are still standing. This durability can only be accounted for by the nature of the wood, and the practice of charring the ends of the timbers before they are inserted in the ground. The lower frame is of 'Roble;' (*t*) the beams are of laurel, and the floors and partitions, as well as the weather-boarding and shingles, of 'Alerse:' the latter forms an excellent substitute for tiles, or slate, being much lighter, and almost as durable. Some of the houses are thatched with reeds; but this shift is only used by those who cannot afford the expense of shingling.

The inclosures, round the houses, are fenced with stakes of

(*t*) A kind of beech, found every where on these shores. The literal meaning of Roble, is oak.—R. F.

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Luma, three or four yards in length, fastened above and below to cross-rails, by ligatures of creeping plants, of which there is an abundance in the woods close to the town: the general name for them is Buque.

The land in the vicinity of San Carlos, which is a peninsula, is cleared of timber, and partially cultivated. In the valley, through which the rivulet runs into the sea near the mole, there are a few attempts at gardens; but the extent to which the inhabitants cultivate, seems to be confined to a rood of potatoes and wheat, which, with a litter of pigs, and an inexhaustible store of shell-fish on the coast, are the principal support of their families. It is not surprising, when so little personal trouble is necessary to provide subsistence, that the Chilotes(*u*) should not be an industrious race. Byron, in his narrative of the loss of the Wager, has given a most excellent and correct account of the inhabitants of this island; which, excepting for those about San Carlos and Castro, may well serve at the present time. In the town, trade, a free communication with other parts of South America, and the residence of several Europeans, have introduced approaches towards refinement; and besides the articles of luxury that occasionally make their appearance, such as chairs and tables, crockery-ware, and similar domestic comforts; shoes and stockings are now, on feast days, in common use among the females; although in many instances one can easily observe, that the wearer is actuated by vanity, rather than by any comfort or pleasure she derives, from a confinement to which her feet have not been accustomed.* This is one of the steps towards civilization, which the Chilote peasantry are making, and among the higher classes 'el ultimo modo' (the latest fashion), is not less the theme of conversation than it is in other parts of the Republic.

In style of dress, among the upper ranks, the men are more advanced than the women, many having been in other countries.

(*u*) Native of Chilóe.—R. F.

* Agüeros says, "both men and women go generally with the foot and leg uncovered; with the exception of the principal families; but even those do not all wear shoes."—(Agüeros, p. 108.)

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They have given up the use of the poncho, and in this particular, they say they are before the gentry at Concepcion, who wear it on all occasions: and probably are quite right, for, with respect to comfort, there is much to admire in the poncho, as, of all cloaks, it is the most generally convenient, and the best adapted for protecting the person, especially on horseback, where it is indispensable: its use, however, offers the wearer such an opportunity to neglect the other part of his dress, which it effectually conceals, that sometimes, beneath the poncho, the body is very ill-clothed.

The dress of men in the lower orders, consists of a pair of trowsers, and a shirt, over which is thrown the all-concealing poncho. The women are as slightly clad; but instead of a poncho, they wear a rebozo, or shawl, which, however, is very often dispensed with, and their persons are left too much exposed.

These lower classes, or Indians, as they, with much reason, are termed, are scarcely superior to the uncivilized savages of the southern coasts; and live principally upon shell-fish, with what little they are enabled to procure besides by the sale of a few pigs, or poultry, which they rear on the scanty store of potatoes and wheat, that remains after their new crop comes to maturity. One roof shelters a whole family. Father and mother, sons and daughters, dogs and pigs, all live and sleep in their only room, in the middle of which, a fire is made; whence the smoke escapes by numerous apertures in the roof and sides of the dwelling.

As to their morals, within the precincts of their habitations, I have reason to believe they have not much to boast of, although they are described, by Agüeros and other writers, as most innocent, and well-conducted. Agüeros speaks highly of their character; and cites Padre Ovalle, who, writing upon Chilóe, between the years 1629 and 1636, says: "The natives of these islands are the most docile and noble (dociles y nobles) of all Chile, and are the least given to drunkenness, and other vices; therefore they are best disposed to be edified by the light of the Gospel."

Since the province became subject to the Chilian Republic,

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the government has made several attempts to improve the condition of the inhabitants; among which, the instruction of public schools, was not the least important. From an official report there appear to be ninety schools, in which 3,840 children receive an education, according to the abilities of the masters, who are employed; but these, from the small salary attached to the situation, cannot be expected to be superior.

The language in common use, is Spanish; the original Indian tongue being almost forgotten: but it is supposed to be the same as that spoken by the Indians of Madre de Dios; for, on a late occasion, a whaler which had been upon the coast of those islands, and had taken on board an Indian, as a pilot, called at Castro; and during her visit, the Indian communicated with those who understood the language of the Chonos, and by them was tolerably well understood. This Indian has been frequently embarked on board American or English sealers, which frequent those coasts, to serve as a pilot to the seal-rookeries.* He is known by the name of Dan.

The products of the island, for the year 1828, according to the census, and returns, officially made, were—

Wheat.. 64,935 fanegas (175 lbs. in a fanega) about 200,000 bushels.
Barley.. 21,645.
Potatoes 194,805.

and the muster of stock, and apple-trees, as follows:—

Horned cattle	5,411 head.
Sheep	86,580
Swine	21,645
Apple trees	75,754

The manufactures of the province are Carro, a coarse woollen cloth, two and a half, or three yards long, and three quarters of a yard wide, used for men's garments, and of very durable quality.

Ponchos—both these and the carro are manufactured by women, in a rude sort of loom, of wool dyed of various colours from plants that are found in the island, or imported for the

* Places where seal congregate—so called always by the sealers.

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purpose. Of the latter indigo is much used, and it is the general colour for the ground-work of the ponchos.

Frezadas, bordillas, sabanillas, mantillas de lana, blankets or rather counterpanes of different textures, are also among the manufactures: none of the above are exported, being made merely for their own use.

Cables, hawsers, and rope, they make of a plant, called Quilineja, which is supposed to be the root of a species of *Callixene*.

No wine or spirit is made in the province, but Chicha (a very good cyder) is manufactured from apples. The only other fruit produced is the 'Frutilla,' a kind of strawberry.

The exports must very nearly amount to the value of foreign imports, which consist principally of sugar, wine, brandy, salt, wearing apparel, and household furniture. The import duty on European and North American produce is twenty-seven per cent.; from which, however, some articles, such as arms and munitions of war, instruments of music, and other things of less importance, are exempt. Spirits of all kinds, foreign wines, tobacco, tea, and cards, are monopolized by the government, and sold at an immense profit. The unauthorized sale of these goods is declared illegal, and is punishable by a heavy fine, and sequestration of goods.

The exports, during the year 1828, consisted of wood in beams, planks, and boards; hams, wheat, a small quantity of dried fish, fire-wood, and brooms,* to the amount of 52,320 dollars, of which 35,683 dollars were for wood, and 10,887 for wheat. These articles were exported in sixteen vessels under national, and eight under foreign flags. The exports are said to be increasing very much. In the year 1791, Agüeros describes the exports of alerse planks (tablones) to Lima, to be between fifty and sixty thousand in number; and some years previous to have been in a much greater quantity. The number of alerse boards exported, during the last year, was 328,928, but of planks only 2,623.

The island, and neighbouring part of the main land, produce

* Potatoes are not mentioned in the report, yet they must have been exported in considerable quantities.

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a great abundance, as well as variety, of wood fit for exportation, as well as home consumption. The following is a list of the principal trees, with their qualities, and the use to which they are most adapted.

Avellana (*Quadra heterophylla*), a handsome tree, in appearance like the ash of Europe, of a light wood, which shrinks very much when dry, and may be used with advantage for oars, being light, strong, and springy, as well as for planking small vessels below the water, and for the ceiling within; it is bad for firewood, being too light. The seed is a nut, about the size of a cherry, the kernel of which is roasted and eaten. The tree abounds at Concepcion, and in the country to the south, and grows on the Peninsula of Lacuy.

Roble (*Fagus obliqua*, Mirb.), a large tree; and, from the durable quality of its timber, considered the best in the island, for ground-frames of houses, planks for vessels, and beams. The piraguas are built chiefly of this wood. There are two sorts, one an evergreen, and the other a deciduous-leaved tree. It is evidently a beech, and the same that grows in all parts of the Strait of Magalhaens; the smooth-leafed sort is *F. obliqua* of Mirb.—see Bertero, in Mercurio Chileno, No. 14, p. 640.

Tiqui, heavy wood; but esteemed strong and durable. Piraguas are sometimes built of it.

Laurel, used for house building in-doors, for beams and rafters, and posts; durable when not exposed to damp, in which it soon perishes.

Mañu, a tree of great dimensions, tall and straight, the leaf is like that of a yew; it is a very useful wood in ship-building, for planks, and, next to alerse, is the best for spars which the island produces; but the large trees have a great tendency to become rotten at the heart, owing possibly to the humidity of the climate, and to the very wet soil.

As the Adelaide wanted a mast, I sent her round to Castro for a mañu spar, for which I agreed to pay eighty dollars; but of twenty trees that were cut down, not one was sound at the heart. The wood is heavy, with large knots, which penetrate into the trunk to a great depth. A great deal of this timber grows in the Gulf of Peñas.

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Muermo. There is no wood produced on the island more useful than the muermo. It is used for timbers, and knees, and all other purposes of ship-building: and is excellent for the planks of boats, as it bears wet and dry without suffering from either. It is abundant, and much used as firewood, for which it is well suited.

Luma (*Myrtus Luma*), a very tough and useful wood, used for tree-nails, for stakes in fencing, for rafters in the roofs of houses; and is exported in large quantities to Lima, for shafts and poles of carriages. The fruit is sweet, and might yield a strong spirit; it is called cauchao.

Ciruelillo, a small tree, used only for washing-bowls and boxes; it is of little value.

Quiaka. Of no value.

Tapu, a very crooked tree, growing along the ground in swampy places. It might serve for floors, and timbers for small vessels; but it is not used, from its being so very hard.

Tenu, something like muermo, and considered a good wood.

Peta, a species of *Myrtus*, of which hoops for barrels are made.

Ralral, considered to be like the wood of the walnut-tree, and of general use, on account of its toughness and durability; it is made into blocks for ships.

Meli, more tough than luma: of this the country people make pick-axes, for cultivating the ground (Agüeros, p. 127).

Pelu, also tough; useful for axle-trees and gun-carriages (Agüeros, p. 127).

Mayten, useful for turning; and lasts long under water.

The above mentioned are produced on the island; but the two following, alerse and cypress, are from the main-land, in the neighbourhood of the Cordilleras. They are not only in general use in Chiloé, but are exported in large quantities to all the ports to the northward. The alerse, near Chiloé, is of better quality than that which comes from Concepcion.

The Cypress is brought to the island in 'tablones' (or planks), seven or eight feet long, two inches thick, and nine or ten inches wide, as is also the alerse; but the latter, from the facility with

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which it splits, is brought in boards also, four feet long, half an inch thick, and six inches broad, which, as I have before remarked, are the principal articles of barter.

The Alerse is found in great quantities near Calbuco; but at so great a distance from the beach that it cannot easily be conveyed thither for embarkation, except in the above form. The tree is cut down and squared, then hewn by the axe into as many logs of seven or eight feet long as it will afford; and these, with the assistance of iron wedges, are split into planks and boards, in which state, without being further trimmed, they are tied together in bundles, and carried on men's backs, or dragged over the ground to the beach.

The extraordinary straightness of the grain of this tree enables the natives to split it, so as to make it appear as if it had been dressed with an adze, or even with a plane; but, as I have said, the axe is the only instrument used. So great is the difficulty of obtaining a spar of this wood, that when I wished to procure a new mast for the Adelaide, I offered four times the value of an alerse spar to the natives, besides the assistance of twenty men, and tackles, &c. to assist in conveying it to the beach. The temptation was almost too great to be withstood; but the man to whom I applied, who had before been employed to get masts for a schooner in the Chilian service, and a flag-staff for the town, said that it would take his own party two months to bring one to the beach: with the assistance of our people, however, it might be done in a month. The trees were distant, and there were two or three ridges of heights to cross, that would cause much delay. The facility with which these people usually handle timber was a sufficient proof to me that such a task, if refused by them, must be very difficult indeed, and I gave it up, as the Yntendente was so obliging as to give me the flag-staff, which had taken the same party two months to procure.

The Hoxsley, a national schooner, built at Chiloé, for the government, was masted with alerse spars, which proved to be very strong.

Alerse is used principally for the floors, partitions, and

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weather-boards of houses, also for shingling the roof; for which purpose it is very superior and durable: after exposure to the weather it turns blue, and has the appearance of slate. It does not shrink or warp; and though brittle, is of a very close grain, and well adapted for furniture. Of this wood the country people make staves for casks; and the bark of the tree is used for caulking the seams of vessels, for which it answers remarkably well, being extremely durable when constantly wet, though it soon decays when exposed to the sun and air.

Spars of alerse, eighty or ninety feet in length, may be procured; and from eight hundred to a thousand boards are frequently obtained from a single tree. I was told that as many as one thousand five hundred have sometimes been cut out of one trunk. Alerse is found on the island, but not of any size. It is also common in the Strait of Magalhaens, in all those parts west of Cape Froward; but there, from the poverty of the soil, it is of very stunted growth.

The cypress is thought to be a different tree, but I rather imagine it to be only a variety; the wood being white, whilst that of the alerse is of a deep red colour. As the trade of the island is principally carried on by water, roads are seldom used for that purpose, for which, indeed, the few that exist are far from being convenient. Between San Carlos and Castro there is a road cut through the forest, forty or fifty feet in width, in the middle of which is a causeway, four or five feet wide, formed of logs of wood, laid transversely. This is the only way of communication, unless, which rarely occurs, the weather has been dry during some days; for, off the causeway, there is a mere bog, in which a horse frequently sinks up to the girths in mud. In many parts of the causeway, indeed, where the logs have decayed, and have not been repaired, the passage is equally bad, so that in wet weather, only persons without a load are able to pass. For the greater part of the way, the trees on each side prevent an extensive view; but on approaching within five or six miles of Castro, the country becomes more open, having been cleared by cultivation, and there, of course, the road improves.

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There is a track branching off from the main road to the district of Dalcahue; but on it, I believe, there is no causeway.

As the only mode of supplying the town of San Carlos with provisions is by water-carriage, it is frequently ill supplied during winter, when N.W. winds prevent the arrival of the piraguas. A southerly wind for two days, at that season, brings from fifty to a hundred piraguas from Dalcahue and Castro, laden with hams, potatoes, pigs, grain, fowls, calves, dried fish, and charcoal, which are sold at a cheap rate, paying one-tenth to the government.

The arrival of so many piraguas at San Carlos creates no slight bustle in the neighbourhood of the mole; and a stranger happening to arrive at the time would think it a place of considerable trade; the return, however, of the N.W. wind, with all its attendant "vapours, clouds, and storms," very soon dispels the illusion: the piraguas depart, one after another, and in two days all is dull and monotonous.

These piraguas, the boats used by the natives of the archipelago of Chiloé, are all similar in form and material; but vary much in size, according to the voyage they have to perform. The largest are from thirty-five to forty feet long. The head and stern are alike, and resemble those of a whale-boat, being sharp at both ends. The transverse section is that of a thick wedge, so that they have no bearings, and must be extremely unsafe,(*v*) particularly with so lofty a sail as they hoist; and yet these vessels have made long, and even dangerous passages, as is fully attested in Agüeros's account of the missionaries' visit to the archipelago southward of Tres Montes. These boats are literally sewn together, there is not a nail used in their construction; every portion of the hull is of a vegetable nature. The lower, or garboard strake, is sewn to the keel by strips of the stem of a creeping plant, called Pepoi,* and the seam is caulked with bark of the alerse, which, while under

(v) When moderately laden they are stiff under sail; and are not such very bad sea-boats, if properly managed.—R. F.

* Molina, i. 167. A species of 'Dolichos.'

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water, is admirably adapted for the purpose. The upper planking consists of three or four broad boards on each side, sewn together, and their seams caulked. The wood of which they are made is the roble, or sometimes tiqui.

Agüeros's description of the construction of a piragua cannot be improved. "They are constructed of five or seven planks, each of which is from two to four fathoms long, half or three-fourths of a yard wide, and two or three inches thick. These are fashioned, or worked, narrow at each end, so as to form the bow and stern, and afterwards are exposed to the fire, in order to burn the outer surface on both sides. To unite these planks, they bore or burn holes, two inches from each other, along the edges of the planks, through which they sew them together with a rope of solid reeds (soquillas), or twisted cane (coligues), forming a junction as close as a seam of cloth. To prevent water from passing through the seams, they apply along the plank, within and without, pounded leaves of trees, over which they pass the stitches, and with the same preparation of leaves the holes are filled up. Thus constructed, it is in appearance a perfect boat, or vessel, but without keel or deck. That they may resist the pressure of the water, and retain their shape, curved pieces (curbas) of wood, called 'barrotes' are fitted inside, and fastened by wedges of wood, instead of nails. For all this, they are dangerous; and, since their sails, oars, and other furniture are very inferior to what boats require, they are much exposed to be easily sunk, and the risk is greatly increased by want of care and management in those who navigate them."

In the above description Agüeros has given a very good account of the rude manner in which they are built, and has not in the least magnified the danger attendant on their use. It is, indeed, a miserable and unsafe vessel; and for the rudeness of its construction, and the poverty of its equipment, is a perfect prototype of the crew which it conveys.

The largest have from eight to ten people, each of whom furnishes one poncho, and the 'patron,' who steers, and directs

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the course and all their movements, provides two ponchos, all which are sewn together to form their sail, which is hoisted by 'lazos,' or thongs of bullock's hide.

These sails are generally in a wretched state, the name Santisima is applied to them all by the crews, with the hope of securing the protection of their patron saint. The anchor is of wood, formed of four crooked pieces, in the shape of a grapnel with four flukes, at the bottom, or crown of which a large stone is fastened, to increase its weight. The crews are exceedingly timid, and instead of making exertions to extricate their vessel from any impending danger, they throw themselves on their knees, beating their breasts and calling loudly upon their saint, for 'misericordia.'

I was given to understand that very few of them can swim, which seems extraordinary, since they are born and bred in the immediate vicinity of the sea, and depend chiefly upon its productions for subsistence. The fact speaks strongly for the indolence of their character, even although the rigour of the climate forms a bar to bathing as a mere amusement. Several piraguas were lost while we were at Chiloé, and, as may be inferred, their crews were all drowned.

With regard to the cultivation of land, they are very far behind, and, comparing the present state with the description of Byron (1740), and of Agüeros (1791), very little improvement seems to have been made. The ground is prepared by make-shift ploughs, of a very rude construction. Two poles of hard wood (luma), about three yards long and proportionably large, trimmed to a sharp point at one end and rounded at the other, are held by the middle, one in each hand, and pointed very obliquely into the ground; in this direction they are forced forward, by pressing against the blunt end with the abdomen, which is defended by a sheepskin, suspended in the form of an apron. After these have penetrated twelve or fourteen inches into the soil, a second person, generally a woman or a boy, places a stout stick under the poles, or 'lumas,' as they are called, close to the earth, to form a solid support for them.

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The large ends are then forced down, the ground turned up, and the lumas pushed forward again, while the woman uses her stick to turn the clods over, to the right and left, alternately. These clods are afterwards broken up by a wooden tool, in the shape of a pick-axe, called 'hualate,' made of the wood named meli. Rude as this process is, the operation is rapidly performed, and I have seen a field, ploughed in this way, that would not do much discredit to an expert ploughman with a European plough.

The soil is a rich, sandy loam, of a dark red colour; and although rarely, if ever manured, produces fair average crops. According to the usual allowance of 175lbs for a fanega of wheat,* the weight of a bushel would not be more than 51$\frac{1}{2}$lbs., which shews that the grain is but poor. Wheat is sown in the month of April, and cut in the same month of the following year; but from the humidity of the climate, and constant rain, particularly at that season (the commencement of winter), it is frequently reaped before it is ripe, and almost always gathered in wet. Every subsequent sunny day is taken advantage of, to dry the grain, but a part must be spoiled by mildew. The evaporation, however, is so great, that merely moving it about, and keeping it thinly strewed in granaries, will effect much. It is trodden out by oxen, and to clean it, the grain is thrown up in the wind by means of broad wooden shovels, and effectually separated from the chaff. This rude winnowing takes place frequently in the principal streets of San Carlos, and even at the mole, where one would suppose that a great deal must be lost; but from the adroitness of the operation, it is not only well cleaned, but suffers no diminution.

Potatoes are planted in September, October, and November, and are fit to dig up in May.

Of the proceeds of harvest, one-tenth is paid as a tribute, or

* The fanega weighs 175 lbs. and contains twelve almudes, which being cubic measures of eight inches and a half, contain each 614·125 cubic inches; therefore a fanega contains 7369·5 cubic inches, and as an English bushel contains 2150·4 cubic inches $\frac{2150{\cdot}4 \times 175}{7369{\cdot}5} = 51\frac{6}{10}$ lbs. the weight of a bushel.

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tax, to the government; but forced contributions may be required, when the necessities of the state demand them. These contributions are sometimes unfairly levied in Chile; for the subsidy is only taken from those who possess grain, or some equally tangible article which can easily be turned into money; so that persons who are rich enough to live without cultivating land, or trading for their support, contribute nothing towards the emergency of the State. How does this accord with republican principles? or how can a republican government, so conducted, expect to become respectable among nations?

I am not aware that such contributions have yet been levied in Chiloé. From the character of General Aldunate, I do not for a moment think he would commit such an act of injustice; but it is in the power of any Yntendente to call for them, and I afterwards witnessed an example of this, during my visit to Concepcion. A considerable quantity of wheat, purchased by a Russian vessel, for the use of their settlements on the coast of California, was brought down to the port, at a time when the government was much in want of money, and knew no just way of obtaining it. They therefore very unceremoniously seized the wheat, and applied its value in dollars to their own use, giving only an uncertain, almost a nominal security to the owner for the recovery of his money. The only way of accounting for such an arbitrary proceeding is, that the country was distracted by civil war, and that the person who owned the property was opposed to that party, which at the time happened to have the upper hand, and which held, by main strength alone, the reins of government.

Among the birds of Chiloé, the most remarkable are the 'Cagge,' the 'Cancania,' or 'Canqueña,' and the 'Barking bird.'*

* Molina notices the 'Cagge,' or 'Chiloé duck,' (*Anas antarctica*) vol. i. p. 268, and calls it *Anas hybrida*. M. Lesson, in his 'Manuel d'Ornithologie,' ii. 409, has taken great pains to describe it, and remarks, with reason, that much obscurity exists in the specific descriptions of the goose kind in the Malouine (Falkland) Islands, and the extreme southern land of America. The male, Lesson says, is white, the feet and beak of a bright

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The shell-fish,* for which this island is justly famed, are principally brought from Calbuco, and consist of the finest

a bright yellow colour. All the specimens that we saw, and numbers were killed by us, had a black beak with a red cere—otherwise M. Lesson's description is correct. In many specimens, however, we found the tip of the primary wing feathers black, which is not to be wondered at when the colour of the female is considered, but which it is not an easy task to describe. M. Lesson, I think, has done it justice in a note to his vol. ii. p. 409:—"Anas antarctica. A capite griseo, genis gulo colloque albo et nigro acuti-striatis; oculorum circuitu nudo: pectore abdomineque omninò atris, atque vittis niveis notatis: tectricibus alarum nigris; dorso uropygio caudâ et ano albis; alis niveis cum speculo lato virescente, brunneo marginato; pennis longis aterrimis; rostro et pedibus, aurantiacis."

These birds are very common in the Straits of Magalhaens, and every where on the west coast between the Strait and Chiloé; also at the Falkland Islands.

The *Cancania* (or *Canqueña*) is the *Anas Magellanica*, *Anser Magellanicus* (Ency. Méth. p. 117). From Buffon's description, and a well-drawn but badly-coloured figure, in the Planches Enluminées, No. 1006, I have no hesitation in assigning it to that kind. The colour of the head, however, instead of being 'reddish purple,' is cinereous with a reddish hue; the feathers of the sides and thigh covers are white, with five black bars, the extremity being white; the central portion of the abdomen is white; the speculum of a splendid shining green. This bird is common to the Strait as well as to Chiloé, and is probably Byron's 'Painted Duck,' and the *Anser pictus* of the Ency. Méth., p. 117. M. Lesson considers *Anas leucoptera*, Gmel. as the male of *Anas Magellanica*, which may be doubted. The 'Barking Bird,' as our sailors called it, was first brought to me by Capt. Stokes, having been shot during the Beagle's visit to Port Otway, in the Gulf of Peñas. It was an imperfect specimen; but Mr. Tarn afterwards obtained for me several others. It seems to have a great affinity to the genus *Megapodius;* but no specimens of that genus being in England when I was last there, and the Barking Bird differing in essential points from M. Tenminck's description of the genus, and from the figured specimen of *Megapodius Freycinettii;*—particularly in the length and form of its wings, which are rounded, and so short as not to reach beyond the base of the tail;—also in the emargination of the upper mandible;—I have been induced, by Mr. Vigors' advice, to form it, provisionally, into a new genus, termed *Hylactes*. (See Proc. Zool. Soc., vol. i. p. 15.) There is another specimen in our collection (now in the Zoological Society's Museum), which will probably be placed in this genus, but there existed some uncertainty in essential points, which prevented my describing it before I left England.

* Among the numerous testaceous productions is a small shell, which

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muscles, of which there are two sorts: the Choro (*Mytilus Choras*, Molina), and Cholgua (*Mytilus Magellanicus*, Lamarck), Picos (*Balanus psittacus nob. Lepas psittacus* Molina, 1, p. 223), a large barnacle,* and the oyster (*O. Edulis*), which is exceedingly well-flavoured. Besides which there are several kinds of shell-fish of less value, but equally abundant, such as Navajuelas (*Solen sp.*); Caracoles (*Turbo*); Cornes (*Pholas Chiloensis*, Molina); Campaña (*Calyptræa*); Lapas (*Crepidula*); Tacas (*Chama Thaca*, Molina); Locos (*Concholepas Peruviana*, *Murex Loco* of Molina); Quilmagues; Piures (*Pyura sp.* Molina); and others.

The apparently inexhaustible abundance of shell-fish with which nature has provided the inhabitants of these islands, the facility with which they are obtained, and their consequent cheapness, is the principal cause of that want of industry which is so remarkable in the Chilotes.

Of the above-mentioned shell-fish, those deserving more particular notice are the large muscle, the oyster, and the pico.

Molina has described the choro of Concepcion, which is not at all different from that of Chiloé. It is often found seven or eight inches long. The fish is as large as a goose's egg, and of a very rich flavour: there are two kinds, one of a dark brown, and the other of a yellow colour; but the last is most esteemed. There is also another sort, much larger than the choro, yet equally delicate and good, the fish of which is as large as a swan's egg: it is called cholgua; but as the shells seem to be of the same species, I think the distinction can only be owing to size. In Febres's Dictionary of the Chileno language, the word

constitutes a new genus. *Marinula*, nob. in Zool. Journal, vol. v. p. 343. It was found on the wooden piles which support the mole in the bay of San Carlos, below the wash of the high water. The mole stands out into the sea, and there is no fresh water near it, save a very little rill, which discharges its tiny stream more than fifty yards off. This shell was named *Marinula Pepita*, Zool. Journal, l. c. No. 43. The following is its generic character:—'Testa ovato-producta, sub-solida; apertura ovata, integra; columella bidentata et basin versus uniplicata; dentibus magnis subremotis conniventibus, superiori maximo; operculum nullum.'

* Zool. Journal, vol. v. p. 333.

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cholchua is rendered into Spanish by "cascara de choros blancos," or shell of the white muscle. Cholhua, or cholgua (the letters g and h are indiscriminately used), must be a corruption; for it is now used in Chiloé to distinguish the large from the small choros.

The manner in which the natives of these islands, both Indians and descendants of foreigners, cook shell-fish, is very similar to that used for baking in the South Sea Islands, and on some parts of the coast of New Holland. A hole is dug in the ground, in which large smooth stones are laid, and upon them a fire is kindled. When they are sufficiently heated, the ashes are cleared away, and shell-fish are heaped upon the stones, and covered, first with leaves or straw, and then with earth. The fish, thus baked, are exceedingly tender and good; and this mode of cooking them is very superior to any other, as they retain, within the shell, all their own juiciness.

The oyster, which is a true *Ostrea edulis*, is found in beds, at low water, or taken with the dredge. It is about the size of the native oyster of England, and not at all inferior to it in flavour. In Agüeros's account of Chiloé, he notices this excellent shell-fish; but remarks, that the islanders are ignorant of the value at which it is appreciated. It is rather curious, that, excepting in the neighbourhood of Chiloé, the oyster is very rarely to be met with on the South American coast, while there it is in the greatest abundance. We have never observed any shells of this fish anywhere between the river Plata and Chiloé; nor is it known elsewhere upon the western coast, I believe, to the southward of Guayaquil, which is very near the equinoctial line.* The oyster-shells at Port San Julian are fossils. Of the Linnæan genus, Ostrea, there are many sorts, on all parts of the coast, both east and west, but they are what we call the pecten or scollop. At Coquimbo, a species of scollop is much used as an article of food, and called oyster; but it has no further right to the name than because Linnæus classed them all as *Ostrea*, and Molina describes this to be *Ostrea edulis*.

* Some have since been found on the north-east side of the Guaytecas Islands.

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The pico, which is a barnacle, grows to a very large size; at Concepcion, however, it is still larger, being six or seven inches in length. It has, when properly cooked, very much the flavour of a crab, and by the inhabitants of this Archipelago is considered preferable to any other shell-fish.

Before concluding this imperfect description of the shell-fish of Chiloe, the piure claims some consideration, if it be only for its peculiar and disagreeable appearance. It was considered by Molina as a genus allied to *Ascidia* (Mol. i. 214), none of the varieties of which are inviting in their look, as an edible substance, but the piure is still less so. It is thus described by Molina: "The piure, scarcely deserving the name of a living animal, is as remarkable for its figure, as for the manner in which it is lodged. The body is about the size and shape of a small pear, an inch in diameter; or it may be described as a small, conical, fleshy bag, of a red colour, filled with saline liquor, and provided with two trunks or processes in the upper part, one of which is the mouth, similar to that of the Tetias; and between these processes are seen two small, black, and shining points, which are supposed to be the eyes. I could distinguish no other organs, nor any viscera in the fleshy substance of which it is composed, which is smooth without and spongy within. They are extremely sensitive, and when touched, spout water out of both apertures. These small animals are shut up in a firm, but glutinous case, of various shapes; one case often contains eight or ten distinct bodies, separated from each other by cells, formed of a strong membraneous substance. They are attached to rocks or stones, under water, excepting when left uncovered by a low tide. The natives eat them boiled, or roasted in their shells. They also dry them for exportation to the province of Cusco, where their flavour is much esteemed, and considered equal to that of the lobster."

At Chiloe, the piure is said to be a remedy for barrenness; and to such an extent has this idea prevailed, that a Chilote woman, eating this fish, literally says, if asked what she is doing, that "she is making children." One would not, however, suppose, from the number of children which are seen

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crowding round the doors, that the Chilotes had any necessity for such food.

If one may judge from the few applications made to our medical men for advice, the climate is either very healthy, or the natives prefer their own mode of cure. They have very few medical advisers, and those few are not held in much estimation, being people of little or no education. A prejudice against medical men has been, even in late years, extended to foreign practitioners, and carried to great lengths. This illiberal feeling is, however, fast wearing away; but, among the lower orders, the application of herbs and other simples is yet wholly resorted to for the removal of their complaints. One day, when I was employed in making some astronomical observations, at Sandy Point, a woman passed me, and forcing her way through a thicket of thorny plants, began to gather branches of a species of arbutus (*A. rigida.*), a small shrubby plant, which is every where abundant, especially to the south, and in the Strait of Magalhaens. My curiosity prompted me to inquire her reason for collecting it with such apparent anxiety. She replied, with a desponding air, "It is chaura* for a poor, sick child. These branches," she said, "are to be put into the fire, and, being green, will produce a thick smoke, and yield a very strong aromatic smell. The child, who is only five months old, is to be held over it, which, as they say, is a good remedy; but," she added, with an air of doubt, "I know not (dicen que es bueno, pero yo no sé)." "Who says so?" I asked. "Los que saben (those who know)," replied the half-credulous mother, with a deep sigh, partly doubting the efficacy of the remedy, but unwilling to lose the advantages of whatever virtue it might possess, for the benefit of her sick infant.

The climate of Chiloé is considered, by those who live in other parts of Chile, to be "rigorous, cold, and damp." Certainly there is much reason for such an opinion, particularly in the winter months, when it almost always rains, and the wind, with little cessation, blows hard, from N. to N.W., and,

* Chaura. Una murta que no se come. Febres, Dict. of the Chileno language. It is, however, edible, and has rather a pleasant flavour.

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by the W. to S.W.; but notwithstanding the great quantity of rain that falls, the evaporation is great, and it cannot therefore be called unhealthy; indeed, from experience, it is considered quite otherwise. Agüeros, to whose excellent account of Chiloé I have so often referred, dilates much upon this subject, and from having resided there a considerable time, may be taken as the best authority. Those who now reside upon the island speak very much against it, and all whom I met, previous to my visit, condemned it, as being "the worst in the world." Perhaps we, who had lately been experiencing a much more disagreeable climate, went to Chiloé with the expectation of finding it exceed in severity that to which we had been accustomed in the Strait of Magalhaens, but we found ourselves agreeably mistaken. Our visit certainly was in the better season, and we had, perhaps, no right to form a decided opinion upon the other part of the year. I shall, therefore, first quote Agüeros, and then describe what we found the weather from September to December; yet as these months were considered by the inhabitants to be finer than is usual at that season, we can only form a vague idea of the spring and summer. For the autumn and winter I must depend upon the accounts of others.

After explaining the contra-position of the seasons, to what is experienced north of the equator, with regard to the months of the year; Agüeros says, "Chiloé has also its four seasons, but does not enjoy the benefit of those changes, as do other parts of Chile; for there is neither that abundance of fruit, nor are its fields adorned with so many and such beautiful flowers, and useful medicinal plants. The summer is the best time; for in the month of January, from ten o'clock in the morning till three in the afternoon, the heat is excessive. Between these hours, however, a sea-breeze, which is called 'Vira-zon,' refreshes the air. In the winter the temperature is very cold; but the frosts are by no means so severe as in Europe. I have never seen ice, even in the small streams, nor does snow lie any length of time on the ground.

"In the winter months, as well as in other parts of the year, there are falls of rain, and heavy gales from N.N.W., and west,

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which last frequently for the whole moon, with scarcely a cessation, and the wind, at times, is so furious, that the houses are not secure, and the largest trees are torn up by the roots. The weather, when it is fine, cannot be depended upon for any length of time; not even in summer; for in the month of January I have frequently experienced gales, and rain, as severe and copious as in the winter. During the summer months southerly winds are more prevalent, and, while they last, the weather is fine, and clear, and the air particularly dry.

"Although the winter months, and a considerable part of the other seasons, are very disagreeable, owing to the severity of the winds, and exceeding quantity of rain, it cannot be denied that the climate is healthy. In Chiloé no epidemic diseases are experienced. The small-pox and measles are not known;* nor have tertian fevers, so common in the north, ever been experienced on the island. Spotted fever (tabardillo), and acute pains in the stomach, are the only disorders to which the inhabitants of this archipelago are subject. Thunder and lightning are rarely experienced; but earthquakes have occurred at intervals. In the year 1633 the church and houses were destroyed, and in the year 1737 much damage to the village of Isla grande was caused by earthquakes."

So far Agüeros. On the whole, the climate is not so unfavourable as we had been led to expect from all that we had heard.

Captain Fitz Roy arrived there in July, during the latter part of which, and the month of August, the weather was very wet, with some heavy gales from the N.W.; but in his Meteorological Journal for those months there is no record of the thermometer falling below 38°, and it is recorded to have fallen to that degree only on one occasion, the general height being from 45° to 50°. The first part and the middle of September were boisterous and wet; but towards the end of the month the wind was chiefly from the southward, and the weather dry and

* The small-pox was introduced into the island, in the year 1776, by a ship from Lima; but it was confined to San Carlos, and was soon eradicated. The measles also were introduced by similar means, in the year 1769; but did not re-appear after once ceasing.

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extremely fine. In October it was rather changeable; but for the last ten days, with the exception of one, on which there was a fresh gale with a heavy fall of rain, it was fine and dry, and the winds were moderate.

The month of November was generally fine, but the first half of December continued tempestuous and wet. The mean temperature of the months, and other meteorological remarks, are as follows:

1829.	Months.	Temperature. Mean at 9 A.M. Air.	Temperature. Mean at 9 A.M. 3 P.M. water at anch.	Temperature. Ex. of Temp. Max.	Temperature. Ex. of Temp. Min.	Pressure reduced to 32°.	Hygrometer (Daniells'). Dew Point.	Hygrometer (Daniells'). Dew Point less than Air.	Hygrometer (Daniells'). Expansion.	Hygrometer (Daniells'). Dryness by Thermo. Scales.	Hygrometer (Daniells'). Weight of a cubic foot of air.	No of Days. Fine.	No of Days. Rain.	Rain. Quantity fallen.	Rain. Quantity evaporated.	Rain. Remaining in the gage at end of month.
July	22 days	46·9	47·9	...	...	29·927										
Aug.	31 ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sept.	30 ...	47	...	64·5	55·2	30·061	40·9	6·18	296·9	906·2	3·3854	7	7	1·68	0·48	1·2
Oct.	31 ...	50·9	...	73	37	29·979	45·8	5·14	349·8	845·0	3·9575	21	10	4·22	2·25	1·97
Nov.	30 ..	53·5	..	68·5	42	29·892	48·4	4·79	416·2	844·5	4·3361	14	16	4·89	2·28	2·61

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This table partly shows the state of the weather during three spring months. The greatest quantity of rain in the gage at the end of the month of November did not exceeed 2·6 inches. At St. Martin's Cove, near Cape Horn, after thirty days' observation, the rain-gage contained eight inches; so that although Chiloé bears the character of being a very wet place, it is not one-third so bad as Cape Horn. The time of our visit to San Carlos was certainly the finest part of the year; and I believe that the weather we experienced was unusually dry even for the season; therefore, the above table does not present a fair criterion of the climate: I do not, however, think it is by any means so bad as has been represented.

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CHAPTER XVII.

Chilóe the last Spanish possession in South America—Freyre's Expedition—Failure—Second Expedition under Freyre and Blanco—Quintanilla's capitulation—Chilóe taken—Aldunate placed in command—Chilóe a dependency of Chile—Beagle sails to sea coast of Tierra del Fuego—Adelaide repaired—Adelaide sails—Adventure goes to Valparaiso—Juan Fernandez—Fishery—Goats—Dogs—Geology—Botany—Shells—Spanish accounts—Anson's voyage—Talcahuano—Concepcion—Pinoleo—Araucanian Indians—Re-enter the Strait of Maghalhaens—Fuegians.

The island of Chilóe was the last place the King of Spain possessed in South America; and even to this day he is not without friends there, who would gladly restore his absolute monarchy, notwithstanding the advantages that are acknowledged to have been derived from the change of masters, and the consequent opening of trade, which has added very much to the comfort, as well as civilization of the inhabitants.

During the struggle for independence, this island was too distant from the seat of war to render it important; but when all other parts of Chile were freed from the king's troops, the new government despatched an expedition, consisting of between three and four thousand men, commanded by the Director-General Freyre, to attack it. Upon the appearance of this expedition off the harbour of San Carlos, the Spanish governor, Quintanilla, was inclined to capitulate; but, instead of anchoring in the roads, the squadron proceeded to Chacao, landed troops there, and despatched some of their forces to Castro, where they were repulsed by the Spanish and native troops, and obliged to re-embark. In this interval, one of the ships left the squadron, and returned to Valparaiso, whence she was immediately ordered back; but meanwhile the Director had embarked his troops, and returned to Concepcion. Not long afterwards, in January 1826, a second expedition, under the same general, sailed from Valdivia, convoyed by a strong squadron, under the command of Admiral Blanco.

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"Upon this occasion the troops landed, on the 8th, at the little inlet of the Bay of Huechucucuy; and Fort Corona was immediately taken. On the 10th, the disembarkation of the troops was completed. A battalion was left to mask Fort Aguy, while a force, under Colonel Aldunate, passed on, and took the battery of Barcacura. On the 10th, Admiral Blanco shifted his flag; and, leaving the O'Higgins outside, stood into the bay with the rest of the squadron, which anchored off Barcacura.

"The governor, Quintanilla, with upwards of three thousand Royalists, took up a strong position on a hill, at the S.E. side of the bay, flanked on the left by an impenetrable wood, on the right by the shore, and supported by three gun-boats in shallow water. These were taken by the boats of the squadron, under Captain Bell, and turned against the Royalists. Their position was thus enfiladed, and they retired. Freyre then advanced: some skirmishing took place: Quintanilla capitulated; and the territory of Chile was no longer sullied by the Spanish flag.

"Colonel Aldunate, Majors Maruri, Asagra, and Tupper (a native of Jersey); and Captain Bell, of the navy, greatly distinguished themselves."—Miller's Memoirs.

Colonel Aldunate was afterwards invested with the government of the island; but, owing to the disaffection of the troops, who were urged on by the King of Spain's agents, a revolution took place, Aldunate was imprisoned, and afterwards sent to Valparaiso, and the Spanish flag once more waved in Chilóe. It was, however, for a short time only; Aldunate was despatched once more, and with a small force of three hundred veteran troops, headed by Colonel Tupper, and accompanied by the Aquiles, brig of war, again obtained possession of the island, which he has since kept, though not quietly, for the Royalists were constantly on the alert, and made several futile attempts to recover the place for their king. Time has now reconciled the greater number to the change; and, I believe, Chilóe may be considered a contented dependency of the republic of Chile.

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The Beagle being ready to resume her voyage, sailed on the 19th of November to survey the southern coasts of Tierra del Fuego; after which, she was to rejoin the Adventure at Rio de Janeiro.*

As the Adelaide had received some damage in getting aground, it was requisite to lay her on the beach for examination and repair. Her mainmast, also, was found to be sprung so badly, as to render a new one necessary; which we should have found much difficulty in obtaining, but for the kindness of General Aldunate, who, finding that we were at a loss, proposed to give us the flag-staff of the town, a beautiful spar of alerse, that was in every way suitable. Previously, however, to accepting his offer, being aware that such an act might expose him to much reproach from the people of the town, who were all very proud of it, I caused inquiry to be made whether a spar of the necessary dimensions could be brought from Calbuco; and in the meantime we proceeded with the repairs.

A creek behind Sandy Point offering every convenience for heaving her down, the Adelaide was moved into it, and laid on the beach. On stripping her copper off, the injury proved to be considerable; but not beyond our means to repair. Upon examination, the foremast was found to be in a bad state, but could be rendered effective by fishing it with the sound portion of the other mast, therefore our only real difficulty was to get a mainmast. From the account I received from Calbuco, I found that, without a great delay, not less than two months, and sending a portion of our people with ropes and tackles, there was no chance of procuring a spar: it could only be obtained at a considerable distance from the shore, and when felled must be dragged over several high ranges of hills, which might be called mountains, before it could be got to the water-side. General Aldunate, through whom this inquiry was made, then renewed his offer of the flag-staff, which I accepted most thankfully; and by his order it was taken down, and conveyed to the ship, soon after which it was converted into an excellent mainmast for the schooner. Before it was moved, a new, but

* See orders to Captain Fitz Roy, in the Appendix.

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OLD CHURCH AT CASTRO.

NEAR PT ARENA.

PT ARENA - SAN CARLOS CHILOE.

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shorter staff, with a topmast, was fitted for the flag; notwithstanding which, many unpleasant observations were made, and absurd reports circulated, which spread to Chile, and even to Peru, that the English were about to take possession of Chiloé, and had already removed the flag-staff of San Carlos.

By Lieutenant Mitchell's activity in superintending the Adelaide's repairs, she was got ready for sea at the beginning of December, and sailed on the 8th, under the command of Lieutenant Skyring, with orders* to survey those parts of the Gulf of Peñas which had not been examined by the Beagle; particularly the River San Tadeo, in San Quintin's Sound; the openings behind Xavier Island; the Channel's Mouths; and the Guaianeco Islands, where the Wager was wrecked: and then to proceed down the Mesier Channel, behind the Island Campana, which was supposed to communicate with Concepcion Strait, by the Brazo Ancho (or Wide Channel) of Sarmiento. He was then to go to the Ancon sin Salida, examining all the openings into the main land, on his way, and search for a communication with the large waters, discovered by Captain Fitz Roy, through which he was to try to enter the Strait, and join the Adventure, at Port Famine, during the month of April.

Lieutenants Skyring and Graves again took with them, by Captain Fitz Roy's permission, Mr. Kirke and Mr. Bynoe, of the Beagle; Mr. Alexander Millar and Mr. Parke also accompanied them.

Having thus despatched our companions, we prepared, on board the Adventure, to return to Valparaiso; intending to proceed to Rio de Janeiro; by way of Concepcion, Port Famine, and Monte Video; for the sake of adding some links to our chronometric chain: with a view to which, I had taken the opportunity of having the chronometers cleaned at Valparaiso by Mr. Roskell, agent for Messrs. Roskell chronometer-makers at Liverpool. General Aldunate being on the point of returning to Valparaiso, I had an opportunity of obliging him, and showing my sense of the assistance, and essential kindness we had

* See orders to Lieut. Skyring, in the Appendix.

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received, by offering him and all his family a passage in the Adventure, which he accepted; and on the 17th we left Chiloé. In our way we touched at Concepcion, and anchored at Valparaiso on the 2d of January.

We remained there until the 11th of February, and then sailed on our return to Rio de Janeiro, with the intention of passing though the Strait of Magalhaens, and taking that opportunity of completing some few parts, which our former surveys had left unfinished. As the breeze, which, on this coast, blows with the constancy of a trade wind, would carry us close to the island of Juan Fernandez, I determined upon visiting it, for a few days; and then proceeding again to Concepcion.

We reached Cumberland Bay, on the north side of Juan Fernandez, on the 16th, and anchored, within two cables lengths of the beach, in ten fathoms.

I have seldom seen a more remarkable and picturesque view, than is presented by the approach to Juan Fernandez. When seen from a distance, the mountain of the 'Yungue' (Anvil), so called from its resemblance to a blacksmith's anvil, appears conspicuously placed in the midst of a range of precipitous mountains, and is alone an object of interest. It rises three thousand feet above a shore, which is formed by an abrupt wall of dark-coloured bare rock, eight or nine hundred feet in height, through whose wild ravines, broken by the mountain torrents, views are caught of verdant glades, surrounded by luxuriant woodland.

The higher parts of the island are in general thickly-wooded; but in some places there are grassy plains of considerable extent, whose lively colour contrasts agreeably with the dark foliage of myrtle-trees, which abound on the island.

The Yungue is wooded, nearly from the summit to its base; whence an extensive and fertile valley extends to the shore, and is watered by two streams, which take their rise in the heights, and fall into the sea.

This valley appears to have been formerly cleared and cultivated by the Spaniards, who had a colony here; for the stone

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walls, which served to divide their enclosures, still remain. From Walter's account of Anson's voyage, and the view given with it of the commodore's tent, there is no difficulty in determining this valley to be the spot on which his encampment was placed.

The island is now (1830) occupied, or rather rented from the governor of Chile for a term of years, by Don Joachim Larrain. The establishment consists of a superintendent (mayor-domo), there called, 'the governor;' and forty persons, who are employed in the seal and cod fishery, and in drying fish for the Chilian market. Their dwellings are erected on the flat land, at the north side of the bay, where the soil is richer than in other parts; and where it is more sheltered from the squalls, which, during strong southerly gales, rush down the valley of the Yungue, the situation of the former establishment, with great violence.

The remains of a fort, called San Juan Baptiste, are yet in a tolerable state; and from an inscription on the wall, it appears to have been repaired, or completed, in the year 1809. It is situated on a rising ground, about one hundred and thirty feet above the sea, at the S.W. part of the bay, and overlooks the village; there are now no guns mounted, but, with a few, it might be made very effective in a short time; and, from its situation, would command the bay.

In the middle of the beach are some ruins of a four-gun battery, and there are also traces of a fort at the N.W. end of the bay.

At present, except wild-goats, wild peaches, figs, abundance of fish, and excellent fresh water, no refreshments can be procured. An establishment of forty persons, with very little to do, might naturally be expected to cultivate the land, raise vegetables and fruit, and rear poultry and pigs, to supply the vessels, which frequently touch here for wood and water; but it is not the character of the Chileno to take any trouble, unless obliged, although his own comfort and advantage may be materially concerned.

The mayor-domo, however, told me that their attempts to

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cultivate the soil, and raise potatoes, had been defeated by the destructive ravages of a worm.

By sending a boat to the east point of the bay, to fish in forty fathoms water, a most delicious kind of cod-fish may be taken, in such numbers, that two men, in half an hour, could fill the boat. Craw-fish, of large size, are almost equally abundant; they are taken with a hooked stick: one of our boats caught forty-five in a very short time. The inhabitants catch them, and cure their tails, by exposure to the sun, for exportation to Chile, where they are much esteemed, and fetch a high price.

Wild-goats are very numerous among the inaccessible parts of the island, but are not easily obtained; they are sometimes shot, or taken with a lazo. These animals, according to Woodes Rogers, and other writers, were originally left on the island by Juan Fernandez, who, for a short time, lived there. According to the 'Noticias Secretas,' p. 50 to 56, they are supposed to have been landed by the Buccaneers, who frequented this island. Certain it is, that, without such refreshments, the Buccaneers would not have been able to carry on their harassing war of plunder against the Spanish possessions on the American coast to such an extent; nor should we, perhaps, have heard anything more about Commodore Anson, and the crews of the Centurion and Gloucester, who were, on their arrival at this island, in the last stage of scurvy.

To prevent Juan Fernandez from being so tempting a resort to Buccaneers, the Viceroy of Peru caused a great many dogs to be landed, which hunted down and destroyed the goats in great numbers: this in some measure has prevented their subsequent increase. The dogs however drove the goats to places where they could not follow them, and were then obliged to destroy seals for food. Large troops of these dogs still range about the lower grounds; but the heights are in the undisturbed possession of wild-goats; which may be seen in numbers browsing on elevated and almost inaccessible places, where they live in safety.

The geological character of this island, according to Mr. Caldcleugh, who accompanied me in this trip, is of basaltic

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green-stone, and trap, which appears, at first sight, to be volcanic; but, on a more particular examination, the lava-like appearance of the rock does not seem to arise from an igneous origin.

The green-stone is full of crystals of olivine, which, as they decompose, leave hollows, resembling those of scoriæ. Mr. Caldcleugh communicated an account of the structure to the Geological Society.* In Captain Hall's interesting journal, there is a list of Geological and Mineralogical specimens, of which one from Mas-a-fuéra† is named 'Vesicular Lava.' May it not be this same rock in a decomposed state?

The late Signor Bertero, whose botanical collections from Chile have enriched many of the principal herbaria in Europe, accompanied me to make a collection of the Flora of the island; and he considered that the character of the vegetation was very little allied to the Chilian, but partook more of that of California. The sandal-wood, which has been described as indigenous to this island, was not found by us, growing, but a large quantity was collected about the hills and vallies, in a dry state, and apparently very old. It is of the red kind, and still preserves a strong scent. The mayor-domo told me there were no sandal-wood trees in the island; but we had reason to think his information was incorrect, for one of the inhabitants would have taken us to a place where he said they were growing in large quantities, had not our arrangements for sailing interfered.

The island produces several kinds of grass; but the most abundant herbaceous plant is a species of oat, which grows very luxuriantly, and towards the westward covers the ground for many miles. The neighbourhood of Cumberland Bay is over-run with strawberry plants, wild radishes, mint, and balm, besides peach, apple, cherry, and fig trees, which are

* Phil. Journal, and Annals of Philosophy, for March 1831 (new series x.), 220.

† Juan Fernandez is called 'de Tierra,' because it is nearer the mainland than another adjacent island, which is called 'Mas-a-fuéra' (farther off, or more in the distance).

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found wild every where, and remind one of Lord Anson's visit.*

Not only in its botanical productions does this island differ from the Chilian coast, but also in its shells: the shell fish being extremely scarce, and dissimilar in character. On the rocks we found a patella and a small chama, but we saw no mytilus. From the deep water I fished up some coral, and attached to one fragment was a new species of arca.† The fishing-lines brought up, from the depth of eighty fathoms, a branch of coralline, to which an infinite number of a species of caryophyllia were attached. The existence of coral is mentioned in Mr. Barry's translation of the 'Noticias Secretas de America; por Don J. Juan, y Don A. de Ulloa,' a work which contains a long and, generally speaking, good account of the island; but their description of the anchorage does not agree with ours. They say, "The distance between the two points, which form the bay, is two miles, and its depth about half a league; and, although the depth is nearly the same in all parts, the best berth to moor ships is in the front of the 'Playa del Este;' but it is necessary to be close to the stones of the beach, for at one or two cables' length there are fifty fathoms water, and the outer anchor is in the depth of seventy or eighty fathoms; but if the vessel is three or four cables off, it will be necessary to drop the outer anchor in one hundred fathoms, which, even with two cables an end, will scarcely secure the ship." Now, at three cables' length from the beach, we had only ten fathoms, our outer anchor was dropped in seventeen fathoms, and in a line between the two points of the bay there is not more than fifty fathoms.

If the accounts of those Spanish officers were correct, the earthquakes, which certainly affect these islands, must have caused a considerable uprising of the base of the island; but, on referring to the plan in Anson's voyage, the soundings in 1741 do not appear to have been different from ours. The innermost ship, whose berth we occupied, is, in that plan, at anchor in

* Anson's Voyage, p. 118.

† Arca angulata. See Zool. Journal, vol. v. p. 336.

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nineteen fathoms, and the depth between the points of the bay is shown to be about fifty fathoms.

There are few persons who have not read, with much interest, Mr. Walter's account of the Centurion's voyage, and who are not well acquainted with his description of this island, which we found exceedingly correct. The views of the land, although old-fashioned in execution, are most correctly delineated, and the plan of the bay is quite sufficient for every common purpose of navigation; but as we had an opportunity of fixing its latitude and longitude more correctly, it became desirable to make a more detailed plan than Commodore Anson's.

The seals and sea-lions, which were so abundant formerly, are now reduced to such a small number, as to make the seal-fishery scarcely worth notice. They have been destroyed by taking them indiscriminately, without regard to age or sex, leaving none to propagate the race but those who by chance escaped. At present the island is let to a tenant, who is not permitted to kill them until the young have taken to the water, by which means an opportunity is given for them to increase.

I am not aware that there are any indigenous animals. Dogs, goats, and rats, have been imported. Land birds are not numerous; some pigeons, said to have been imported, and a few hawks, are occasionally seen, besides three species of humming-birds, two of which are new to science.* Of sea-birds we saw very few; but were informed that the 'Goat Islands,' at the south-west end of Juan Fernandez, are completely covered by them at the breeding season.

During our stay, several excursions were made, in various directions, from the village, and much facilitated by beaten paths, one of which leads up a valley, westward of that of the

*Trochilus Fernandensis, nob. *Troch: ferugineo-rufus; capitis vertice splendento-coccineo; remigibus fuscis.* Long. 5 uncias.

Trochilus Stokesii, nob. *Troch: corpore supra viridi-splendente, subtus albo, viridi-guttato; capite supra, guttisque confertis gulæ lazulino-splendentibus: remigibus fusco-atris; remigum omnium, mediis exceptis, pogoniis internis albis.* Long. 4½ uncias. Proceed. Zool. Society, vol. i.; also Phil. Magazine, for March 1831, p. 227.

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Yungue, and thence to a pass over the principal range, communicating with the other side of the island. This pass, called the Puertozuela, is 1,800 feet high, and was visited several times by the officers. On one occasion, they went to the western part of the island, to hunt wild goats. The party set out in boats with the mayor-domo, or governor, as their guide; but before they reached the proper landing-place, became so impatient that they landed, intending to walk back. The governor, however, persevered, and returned, in the evening, with five fine she-goats, which he had taken with 'lazos.' Our pedestrians found their return by no means so easy as they had contemplated, being obliged to pass the night in a cave, which they fortunately found at sunset, and they did not reach the ship until the following afternoon, fatigued, but much pleased by their ramble.

The thermometer on board ranged, during the day, between 63° and 82°, and the barometer between 29·98, and 30·16. On shore the thermometer stood higher, in fine, unclouded weather, and lower when the summits of the hills were covered with clouds.

We put to sea on the 22d, anchored at Talcahuano on the 3d of March, and sailed again on the 17th, to proceed through the Strait of Magalhaens.

While at Concepcion I had an opportunity of seeing Pinoleo,* the Indian chief, from whom Captain Basil Hall endeavoured to obtain the release of a captured Araucanian female, whose husband had been murdered in cold blood before her eyes.†

Mr. Rouse, our consul, procured for me the necessary introduction, and, with one of the governor's aides-de-camp, accompanied us to the Indian quarters, situated on the out-

* Pinoleo (from 'Pino,' pisando; and 'leo,' rio; or, pisando sobre el rio, living close to the banks of a river), is the Chief of a small tribe, whose territory is near the River Imperial; but he generally lives in the confines of Concepcion. He has four wives in the interior (la tierra) and three in the town.

† Hall's Extracts from a Journal, vol. i. pp. 316. 322.

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skirts of the town, towards the river Bio-Bio. We found the chief's residence (little better than a rancho, or hut of the country), surrounded by Indians, some of whom were armed; and at the door were his two daughters, young, and rather good-looking, whose persons and dress we had leisure to examine, whilst waiting the chief's pleasure to receive us. They were clothed with a mantle, or wrapper, of green baize, enveloping the body from the neck to the feet, and fastened at the breast by a toup, or tupu* (a silver pin, or skewer, headed with a round silver plate, three inches in diameter), over which hung a string of beads. Their hair, which was remarkably fine and clean, as well as neatly dressed, was divided into two plaited tails ('trensas'), and their foreheads were ornamented with a broad fillet, worked over with beads.† They also wore necklaces, bracelets, ear-rings, and anklets of similar manufacture.

Our names having been announced to Pinoleo, he came to the door to receive us, and invited us to enter. Some of our party he recognized, and seemed pleased at their visiting him. We were early, and found him sober; but from his bloated and haggard appearance, it seemed that he had not been long so. On entering the hut, we observed a number of Indians, scarcely sober, seated round, near the walls. Some turbid wine was presented to us, in a silver cup, which we sipped as it passed round; but the last of our party knowing that to return the cup without emptying it, would be an offence, was obliged to drink the contents, and a bitter potion they were. Pinoleo was then stout and rather corpulent, five feet ten inches in height, of a fairer complexion than the generality of his countrymen, and had lost much of his hair. He had laid aside the Indian

* In Febres 'Arte de la lengua de Chile' they are thus described "Ahujas grandes con una plancha redonda de plata como una hostia, ò mayor, con que prenden las mujeres sus mantas—Certain large bodkins, with a round silver plate, as large as, or larger than, an oyster, with which the women fasten their mantles."

† The ornament on the forehead, which is worn only by unmarried women, is called Trare-lonco, from the old Chilian words trarin, to fasten, and lonco, the head. The bracelet is called Anello cure; the anklets, Anelleo.

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dress, and wore the deshabille of a Spaniard, a shirt and pair of trowsers, in a very slovenly manner. He spoke Spanish with great facility, and appeared to be quite at his ease in conversation. He has the rank of lieutenant-colonel in the Chilian army, and receives pay, as a retainer for his friendship.

A very short visit was sufficient to satisfy us, and we took the first opportunity of retiring, for fear of a second cup of wine. While leaving the hut, we were beset by some of his followers, asking for money. The Indian quarter is a scene of drunkenness the whole day; the women, however, are prevented from thus injuring themselves; they are industrious and cleanly, and are principally occupied in the manufacture of ponchos. These Indians are frequently at war with other tribes, who live on the south side of the Bio-Bio river, and who have never yet been conquered by white men, of which they are not a little proud. (*w*)

These Araucanians are by no means to be despised. The Cacique Mariloan,* who resides near San Carlos, on the Bio-Bio, has three hundred fighting men under his own command; and from the influence he holds over neighbouring Caciques, could bring upwards of one thousand men into the field. Upon the occasion of a late revolution in Chile, a deputation of chiefs was sent by the Araucanian Caciques to inquire into the cause of those disturbances, of which they had received intelligence. They first asked for an interpreter, whom they cautioned to give a true and literal translation of their speech; and then they made a long harangue, in which they explained the cause of their visit, and declared their willingness to assist their friends, if their aid should be required, to expel a foreign foe; but if the troubles were caused only by the quarrels and dissensions of parties, they would not take an active part. They were then given to understand that an attempt had been made by one party to put down another, upon which they declined assisting either. The conference being ended, some horses were

(*w*) Not since the first Spanish conquest, perhaps.—R. F.

* From 'Mari,' diez, and 'loan,' huapo: whence Mariloan means 'huapo como diez,' or, 'equal to ten men.'

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slaughtered and skinned. Large holes were dug, and the skins put into them, to form substitutes for vessels, into which barrels of wine were poured, and the Indians commenced their feast of horses' flesh and turbid wine, which threw them rapidly into a state of excitement and intoxication, that lasted some hours after the wine was all drunk.

In this neighbourhood, the Araucanian pine (*Araucaria imbricata*) is found, but very few of the trees grow near the sea. One beautiful specimen which I saw in a garden was, at least, forty feet in height, with branches sweeping the ground. The cones of these trees, called piñones, are brought to the town from the mountains where they grow, and are roasted, to be sold in the streets.

On the 31st of March, the land about Cape Lucia was seen, and at noon it bore E. b. N., distant twelve miles, when the wind ceased, and a heavy swell setting us towards the land, made our situation an anxious one. A breeze, however, sprung up, and by carrying a press of sail, we succeeded in gaining an offing before dark. The night was very squally, but next morning (1st April) the weather was better, so we stood in, and made the Evangelists, which were seen from the mast-head, at a distance of twenty-two miles. Between these islands and Cape Pillar we found a most turbulent sea; yet no sooner had we entered the Strait, than the water became perfectly smooth. I intended anchoring in the Harbour of Mercy; but the night proved fine, and the wind was so favourable, that we proceeded by the chart, using a patent log, and passing within two miles of the headlands. Sail was reduced as much as possible, to give us space sufficient to run on during the night, steering E. $\frac{3}{4}$ S. by compass. Towards midnight the weather became cloudy, and occasionally the land was concealed from our view.

Abreast of Cape Tamar, and as far as Cape Providence, some sharp squalls raised a sea, rather heavy, considering we were in the Strait; but afterwards the water became smooth again. Off the latter cape, the patent log indicated a distance run equal to that shown by the chart, which proved that we had

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experienced no current. At daylight we were in the entrance of the 'Long Reach,' abreast of Cape Monday.

While passing the opening opposite to Playa Parda, a schooner was observed at anchor, and a boat was seen coming out to us. It contained the mate of the schooner Industry, of New Bedford, who informed us that she had been lying there, weather-bound, for nearly a month. He came to make inquiries about good anchorages to the westward (having already lost two anchors), and to learn in what part of the Strait he was; his own idea being, that the vessel was under Cape Monday. Having given him the required information, we proceeded; but the wind fell light, and we were glad to anchor in the cove of Playa Parda. With our chains we found it safe; but the bottom, being rocky, would probably do much injury to hempen cables.

The opening opposite to us, where the schooner was lying, was evidently Sarmiento's 'Abra.' It appeared to us to be a mile and a half wide, with an island in the entrance. Within, it seemed to take a south, then a south-west direction, and afterwards to trend round a low hummocky point of the eastern shore, under a high, precipitous ridge, on the opposite or western shore, towards the S.E.; beyond this its course could not be observed. When passing through this part of the Strait, Captain Stokes found the weather so bad, that although the distance across was only two or three miles, the shores were often concealed by clouds and rain, so as to render it impossible for him to make any survey of them.

We were detained the two following days by bad weather. On the 5th we proceeded, but before we got abreast of Snowy Sound, heavy rain set in, which lasted all day.

As we passed Borja Bay, a schooner was observed at anchor in it, so like the Adelaide, that we altered our course to communicate with her. From a boat which came off to us, we learned that it was a sealing-vessel, called the Hope, of New York, going through the Strait, from Staten Land. She had seen nothing of the Adelaide.

When abreast of Bachelor River, a canoe, containing two

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men and two women, came out to us; but we did not delay long, and at five the anchor was dropped in Fortescue Bay.

As it did not appear that the Adelaide had preceded us, I determined upon remaining, to make a chronometric measurement from Port Gallant to Port Famine; and the next morning Lieutenant Graves landed, and obtained a set of sights for time.

In the early part of the day, two canoes, containing eight or ten Fuegians, entered the bay. They came from the westward; but we did not recognize among them any of those who visited the ship as we passed Bachelor's River. Several had red baize shirts, and some had 'Union caps,' such as are supplied to our men-of-war; which they must have procured from the Beagle or Adelaide, or from the Chanticleer, at Cape Horn. (*x*) After hanging about us all day, they landed at sunset, and took up their quarters in some old wigwams in the inner harbour.

The canoes of these natives were very different in their construction from any we had seen to the eastward. Instead of being paddled, they were pulled with oars; one of which was an ash oar, probably obtained from some sealing-vessel. The canoes were large; at the bottom was a plank, twenty inches wide, to which were sewn the sides, in the manner of the piraguas, and they were caulked with bark, in a similar way.

We did not remark any thing peculiar among these people which we had not perceived in other natives of Tierra del Fuego, except that they frequently used the word 'pecheray,' a word particularly noticed by Bougainville, who thought that it meant the name of the tribe; and, in consequence, the Fuegians have been often called Pecherays.

On one of the officers cutting a lock of hair from a woman's head, the men became angry, and one of them taking it away, threw half of it into the fire, and, rolling up the other portion between the palms of his hands, swallowed it. Immediately

(*x*) I believe that the natives who have canoes of the kind described above, do not go near the Hermite Islands, on which Cape Horn is situated.—R. F.

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afterwards, placing his hands to the fire, as if to warm them, and looking upwards, he uttered a few words, apparently of invocation: then, looking at us, pointed upwards, and exclaimed, with a tone and gesture of explanation, 'Pecheray, Pecheray.' After which, they cut off some hair from several of the officers who were present, and repeated a similar ceremony.

From this fact, one might suppose the word to be connected with their ideas of divine worship; but we had heard it used for so many opposite things, that I could not consider it of so much importance as some of the officers were inclined to think it.

The next day a party ascended the Mountain de la Cruz, to deposit a pewter plate, on which were cut the names of the ship and officers. At the summit they found the pile of stones made by Captain Fitz Roy, which they left undisturbed; but made another, in which a bottle was placed, containing the little Spanish coin, and copies, on vellum, of the memorials we had formerly taken from it, also several English coins, and some medals. The bottle was corked, covered with resin, and enveloped in sheet lead. Our party returned in the evening, having been seven hours in going up and descending.

The next day I obtained an angular measurement of the Mountain de la Cruz, with a theodolite, having measured a base of 2,608 feet, which gave for its elevation 2,364 feet, 74 feet more than Captain Fitz Roy's barometrical determination.

During the day several Fuegian families had arrived, and, by the evening, ten canoes, containing altogether about sixty natives, were collected. I landed to visit them, for I had never before seen so many assembled. We entered all the wigwams but one, which was said to be occupied by a woman in labour. In the opening stood her husband, painted all over with a red ochrous earth, and his head and breast ornamented with the white down of birds. The other Fuegians called him 'Pecheray;' and appeared to consider him, while in the character he had assumed, as a being superior to themselves.

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Hence, there evidently is something of a superstitious nature connected with the word; but our frequent attempts to find out its precise meaning, were unsuccessful. On repeating this expression to a group of natives, one of them immediately coughed up a piece of blubber, which he had been eating, and gave it to another, who swallowed it with much ceremony, and with a peculiar guttural noise; then, looking up, and pointing with his finger to the skies, solemnly pronounced the talismanic 'Pecheray.' This word is also used in pointing to the sun.

On the 10th April, I went to Charles Islands, and surveyed them. There is very good anchorage for a small vessel, in eighteen fathoms, at the north end of the passage which separates them; and at the bottom, or elbow, under the eastern island, in thirteen or fourteen fathoms. The next day, a fresh arrival in two canoes increased the number of Indians to eighty; rather a formidable body for a small vessel to encounter. They conducted themselves, on the whole, very peaceably, but seemed determined that our curiosity should not be gratified by finding out the contents of the 'tabooed' wigwam. It was always guarded by the 'Pecheray,' who seemed ready and determined to dispute all access to it, by means of a heavy club. One of the midshipmen, however, with a little coaxing, persuaded the man to let him put his head in; but those who were inside, having received their lesson, threw ashes in his face, and nearly blinded him. After this, seeing they were determined on the point, I desired that no further attempt should be made to ascertain what was really going on inside the wigwam.

We sailed the next day (11th), not without some apprehension that the Adelaide might meet this large concourse of Indians before they separated; as Port Gallant was a place rarely passed by vessels without stopping, and the natives being all housed behind a point of land, could not be seen until too late.

We were abreast of Cape Froward at noon; in the evening we anchored in French Bay, and next day (13th) reached Port Famine. As I purposed remaining until the Adelaide should arrive, the tents were set up, the boats landed for repair, and the transit instrument was set up, in the hope that a comet

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might be visible, which we had seen in our passage from Concepcion to the Strait; but the weather was at first too cloudy, and afterwards the comet itself was too faint to be discerned.*

On the 21st, nine canoes arrived in the bay, containing a large party of Fuegians, principally those who frequent the Magdalen Channel, and probably the sea-coast. They had generally shown themselves disposed to be mischievous, and I determined upon preventing their encamping near us; for their presence would greatly impede our watering and wooding parties, by distracting the attention of the people. I, therefore, went to meet them at the watering-place, under Point St. Anna, where they had landed, near one of our boats which was on the beach. Among them we only recognised three who had visited us before, and those three were brought to our remembrance by their former misconduct. I had always made it a rule to treat them kindly, with the view of obtaining their good-will; but I found it was the wrong way to gain their respect, for it only made them expect more from me, the consequence of which was, that when we separated, neither party was pleased with the other. I used on this occasion a more dictatorial tone than I had hitherto done; for, seeing several with slings in their hands, and a collection of large, round pebbles wrapped up in the corner of their mantles, I desired them to throw the stones away, which they did not hesitate to do. The Indians were now all landed, and evidently presuming upon their numerical strength, upwards of eighty being assembled, began to make themselves very familiar.

I thought it best to check their advances, by desiring them not to visit the side of the bay where our tents stood, but to go round Point St. Anna, to an adjoining cove. They seemed to understand me perfectly, and soon afterwards embarked, while I returned on board. The natives, however, landed again, in the middle of the bay, at the north side, and there encamped.

Next morning, the men of the tribe visited our tents, but found them surrounded by a rope I had caused to be fixed,

* The same comet was seen at the Mauritius; and its orbit calculated. See Ast. Soc. Proceedings, and Phil. Journal.

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and which they were not permitted to pass. At noon, after observing the sun's transit, I went to the barrier, and while the people were at dinner, endeavoured to amuse our visitors, who were from fifteen to twenty in number, by showing them several trifles; among the rest, a pocket set of coloured glasses, belonging to the transit. They looked through them at the sun, but handled them rather roughly, and broke the frame; upon which I expressed my anger, and turned them away. Soon afterwards, however, I walked towards them, and selecting the Indian who had offended me, gave him a bunch of beads, and thus restored peace; but desired them, at the same time, to go to their wigwams, which they did. In their way, they mischievously broke down a part of my meridian mark; seeing which, I sent a carpenter, attended by a marine, to repair it, and went myself to inspect its being again set up. The natives were collected round it, evidently in expectation of my being angry, and awaited my approach. Upon my coming near, I showed them that I was much displeased, and ordered them into their canoes; when one of the party, muttering a few words, picked up a stone from the ground, and was fixing it in his sling, when I took the marine's musket, and presented it at him, upon which the whole took to their heels; the principal offender and another ran along the beach, and the rest to their canoes. I could not resist the opportunity of letting them know we were prepared for them, by firing over the heads of the two who were running near the water.

The report of the musket attracted the attention of Lieutenant Mitchell, who was on board on the look-out, expecting some fracas would, sooner or later, take place; and seeing four or five canoes paddling across, and the two Indians running along the beach, he manned a boat, and pulled towards the canoes, which tried to evade him, and stones were thrown at him as he approached. A musket fired over their heads, soon quieted them, when he pulled round their canoes, to show them they were in his power, but did not molest them, and then allowed the party to proceed.

This affair alarmed the women at the wigwams, and hastily

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gathering up their effects, they hurried into their canoes, and joined the others, who all paddled round Point St. Anna. The men, however, landed there, and remained on shore, armed with slings, spears, and bows, ready to defend themselves, and, by their gestures, defying us to land. No attention was paid to them, and, after a short time, they went over the hills to the coves on the north side of the point. As we had now openly quarrelled, I thought it better that they should keep at a distance; and therefore, taking two boats, pulled round the point, to tell them to go five miles farther, to Rocky Bay; but the canoes were already beached, and the women had taken up their quarters. As we approached, the hills echoed with the screams of the women and the shouts of the men; all of whom, stark naked, armed, and daubed with white paint, their heads being stuck full of white feathers, hastened down to the point of the bay. The place, from its nature, offered a good defence, as the beach was lined by large rocks, behind which they could conceal themselves from our view, and yet assail us with stones. When within a few yards of the beach, we held a parley—the object of which was, that they should go farther to the northward; to this they vociferously replied, by desiring us to leave them. Seeing there was no chance of enforcing our demand, without shedding blood, I ordered the boats away; and on getting about a musket-shot from the beach, one of the Fuegians threw a stone, which fell close to us. In an instant, every one of them was concealed behind the rocks; but we returned their fire, and another large stone fell within two feet of the boat. A second musket was fired, and another stone was returned, with equal precision. After the interchange of a few more stones for bullets, they ceased throwing them, and we returned on board. It was very unlikely that any of our shot took effect; for we were at a long distance, and could only see their heads above the rocks. Fortunately, none of the stones struck us, for they were large enough to have caused a severe bruise. It is astonishing how very correctly they throw them, and to what a distance. When the first stone fell close to us, we all thought ourselves out of musket-shot.

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The next morning, five or six natives were seen crouching down among high grass, on the hill over our watering-well, waiting for the people to go for water; probably with the intention of assailing them, for it appeared afterwards that their slings and bows were in readiness. To show them they were not out of our reach, I caused a six-pound shot to be fired over their heads, which, as it went high above them, made no impression. The gun was then pointed lower, and another ineffectual shot fired. A third, however, fell close to them, when they jumped up, shook their mantles in the air, with the most violent gestures, and, apparently in a furious rage, scampered off; but the last man, before he disappeared, threw an immense stone, which did not reach one quarter of the distance.

We saw nothing more of the natives until the evening, when Lieutenant Mitchell, who went to look for them, found they had moved away to Rocky Bay, where they had encamped on the open beach. The next day, I sent him to endeavour to make peace, which he very easily effected, by the interchange of a few trifles.

After this we had much bad weather, during which most of the Indians kept close to their wigwams; but a few occasionally communicated with our watering party, quite peaceably, as if nothing had happened. A day or two after, the weather improved, and the Fuegians dispersed, probably for want of food, some going to the northward, but the greater part along shore to the southward. These people pointed upwards to the sky, when they were going away, repeating the word 'Pecheray.'

This was our last interview with the wretched Fuegians. Naturally petulant and quarrelsome, they are also ever intent upon mischief; the fear of punishment alone restraining them. Weakly-manned vessels passing through this Strait should always avoid them, if they are numerous; for unless they are given what they want, they try to steal it, and any consequent punishment probably brings on a quarrel. Their conduct, and servile bearing, at our first seeing them, gave them an appearance of being timid and inactive; while, in reality, they

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are the very reverse. Had we attempted to land on the last occasion, I do not think we should have effected our object, without receiving some severe contusions from their stones, which they sling with such extraordinary precision and force: so much so, that I consider the sling, in their dexterous hands, to be equal to a musket in ours. Indeed, with many of us, a native would have had the advantage. It has been too much the practice, when obliged to fire upon them, to fire over their heads; by which proceeding the savages are led to consider our weapons as so uncertain in their effect, that they become much depreciated in their estimation. It would be almost preferable to inflict a slight wound, in order to show the nature of our arms, and as a warning against further hostilities.

When the Uxbridge, sealer, was at anchor in a harbour in the Magdalen Channel, some Indians, who were on board, angry at being ordered out of the vessel at sunset, threw stones at the person who was walking the deck, as they returned to the shore. Several muskets were fired over their heads, at which they expressed neither fear nor concern; but paddled leisurely away, and the next morning came off again to the vessel, as if nothing had happened. At Port Famine, Duclos Guyot had a skirmish with natives, the particulars of which are described in Dom Pernetty's History (ii. 653). Three of the Indians were killed, and three of the French were severely wounded. It may be here remarked, that the chief's name, according to M. Duclos Guyot, was 'Pach-a-chui,' which is not unlike 'Pecheray;' the women were called 'Cap, cap,' probably a mistake for 'Cab, cab;' which evidently means 'no, no!' for it was an expression we frequently used, and was never misunderstood. Their cunning is sufficiently proved by the theft of the Adelaide's boat, in St. Simon's Sound (page 142).

The absence of the Fuegians permitted us to move about a little; and among other places, we visited their late encampment at Rocky Bay, our approach to which was offensively indicated by a most sickening smell. On our way, I found two fossils; one was very interesting, bearing the appearance of a

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large orthoceratite:* the other was a Venus. From Rocky Point we descried a strange sail, which, by her movements, we thought must be the Beagle: I returned, therefore, and sent Lieutenant Mitchell out to her. She arrived in the evening, but proved to be a ship belonging to the Hudson Bay Company, called the Dryad, bound to the Columbia River, and last from the Falkland Islands. She came to wait for Mr. Low, of the Adeona, who had promised to pilot her through the Magdalen Channel. The Adeona arrived on the 3d of May; and the following day, to our great joy, the Adelaide hove in sight: and being becalmed, was towed to an anchorage.

The result of her cruise proved to be very interesting, although no communication had been discovered between the 'Ancon sin Salida,' and the Skyring Water. The only loss they had sustained was, however, a severe one; Mr. Alexander Millar having died of inflammation in the bowels. The death of this promising young man threw a damp over the happiness we felt at meeting again, after having so nearly completed this long and tedious voyage.

We had, for some days, been getting ready for sea, and now hastened to complete our preparations. The Dryad, after receiving some assistance from us, sailed in company with the Adeona, and passed out to the Pacific, by going through the Magdalen Channel. The day afterwards we took our final departure—crossed the shoal that extends off Magdalena Island, in five fathoms, sailed on rapidly, and passed Gregory Bay at noon. Seeing us approach, a large party of Patagonians, at least a hundred in number, assembled at the usual place of communication; but as both wind and tide were in our favour, and we could derive no novel information from them, we continued on our course. The Indians were probably much mortified and disappointed; but all on board were delighted by avoiding the anticipated delay. We showed our colours to them, but I dare say our friend, Maria, was not very well pleased with my want of courtesy, in passing by so old an acquaintance

* They are deposited in the Museum of the Geological Society.

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without a salutation; or, what she coveted much more, such presents as she had always received when we anchored.

Just before entering the First Narrow, we passed through a furious 'tide-race,' which broke over the Adelaide, and not a little impeded her progress. No accident, however, was the consequence; and a rapid tide, running at the least nine knots an hour, swept us through the Narrow, and round the reef off Cape Orange: after which we proceeded rapidly, and rounded Cape Virgins at ten P.M., not a little elated by leaving behind us, with no expectation of ever seeing it again, the famous Strait of Magalhaens.

Our voyage to Monte Video was rather long; but we delayed there only to water the ship, in the usual place, off Cape Jesu Maria, and then proceeded to Rio de Janeiro, where we awaited the arrival of the Beagle. Our anxiety for her safety, during so hazardous a survey as that of the sea-coasts of Tierra del Fuego, was soon removed, by hearing that she had touched at Monte Video; and, on the 2d of August, our consort was seen entering the harbour; when we were delighted by finding all well on board, and the little vessel quite ready for sea, having refitted on her passage.

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CHAPTER XVIII.

Adelaide's last cruise—Port Otway—San Quintin—Marine Islands—Unknown river or passage—San Tadeo—Isthmus of Ofqui—San Rafael—Sufferings and route of the Wager's party—Channel's Mouth—Byron—Cheap—Elliott—Hamilton—Campbell—Indian Cacique—Passage of the Desecho—Osorio—Xavier Island—Jesuit Sound—Kirke's report—Night tides—Guaianeco Islands—Site of the Wager's wreck—Bulkeley and Cummings—Speedwell Bay—Indigenous wild potato—Mesier Channel—Fatal Bay—Death of Mr. Millar—Fallos Channel—Lieutenant Skyring's illness—English Narrow—Fish—Wigwams—Indians—Level Bay——Brazo Ancho—Eyre Sound—Seal—Icebergs—Walker Bay—Nature of the country—Habits of the natives—Scarcity of population.

I WILL now relate the principal incidents of the Adelaide's last cruise. The following pages contain extracts from Lieutenant Skyring's journal, and also notices obtained from other sources.

The Adelaide sailed from Chiloe on the 8th of December 1829, made Cape Tres Montes on the 14th, and anchored in Port Otway the same evening. Of this place Lieutenant Skyring writes: "Good anchorage, wood, water, and shell-fish (such as muscles and clams), Port Otway affords: but no more. Excepting in one or two sandy bights, a landing is hardly to be effected; walking along shore is impossible, and it is scarcely practicable to enter the country, the land being so thickly wooded, from the summits of the hills down to the water-side. No soil is to be discovered; the shrubs, and even the trees, which are of large growth, rise out of moss, or decomposed vegetable substances. The climate is very wet; none but amphibious animals were seen, among which hair-seals were numerous. There were very few birds, excepting turkey buzzards; and not a trace of human beings; indeed, I do not believe Indians ever go there—(*y*) they rarely leave the direct channels; as a proof

(*y*) For evidence that Indians have been thereabouts, see Byron's account of the cave entered by the surgeon of the Wager. I believe that curious place was either in, or close to, Port Otway.—R. F.

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of which, some articles left by the Beagle, in a conspicuous place, were found by us untouched." During the Adelaide's stay at Port Otway, the openings on the east side of Hoppner Sound were explored, yet they proved to be only small inlets. Mr. Kirke examined some, which appeared to communicate with San Quintin Sound; but found them to be merely channels dividing the group of the Marine Islands,* excepting the most southern, which is the entrance of Newman Inlet, a deep bight, without anchorage, but abounding with hair-seal.

From Byron's Narrative it would appear, that there is a channel somewhere hereabouts communicating with the Gulf of San Rafael, to the east of the Peninsula of Tres Montes; for the Indian guide wanted to conduct the Wager's barge through it, but was prevented by the strength of the current.

The Adelaide sailed from Port Otway on the 18th, and the same evening reached San Quintin Sound, anchoring opposite an opening northward of Dead-tree Island, that proved to be the mouth of the River San Tadeo, by which Byron and his unfortunate companions effected their escape to Chilóe.

The sufferings of this party, which are so affectingly described in Byron's narrative of the loss of the Wager, made so deep an impression on our minds, that I thought it not irrelevant to the object of this voyage to endeavour to trace their steps. Among the numerous incidents that occurred to them, the passage of the 'Desecho,' or carrying-place over the Isthmus of Ofqui, is, from all the circumstances connected with it, one of the most interesting. It may be remembered, that, upon the departure of Captain Cheap, and his shipwrecked crew, from the place of the wreck (Byron's Narrative, p. 69), they proceeded round the shores of the Gulf of Peñas, with an intention of tracing the Coast of Chilóe. They first attempted to steer for Cape Tres Montes, which headland they had seen, in one of the intervals of fair weather, from the summit of Mount Misery, and which appeared to be twenty or thirty leagues distant. The wind,

* The Marine Islands were so called, in remembrance of the four marines who were put on shore from the Wager's boats, and left behind. See Byron's Nar., p. 85.

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however, freshened to a gale, and they were obliged to run before it, and throw all their provisions overboard to lighten the boat.

At night they took refuge in a small opening, which led to a secure harbour, and next day advanced a little farther, till they reached some small islands, where they were detained three or four days by bad weather.

After leaving that place, they found an opening, into which they rowed, flattering themselves it would prove to be a passage; but, being disappointed, they were obliged to return. This was probably the inlet, called 'Channel's Mouth.' Xavier Island was the next place they went to, named by them Montrose Island. Byron describes this island so exactly, that there cannot be the least doubt of its identity. "The next morning," he says, "being calm, we rowed out; but as soon as clear of the island, we found a great swell from the westward: we rowed to the bottom of a very large bay, which was to northward of us, the land very low, and we were in hopes of finding some inlet through, but did not; so kept along shore to the westward. This part, which I take to be fifty leagues from Wager Island, is the very bottom of the large bay it lies in. Here was the only passage to be found, which (if we could by any means have got information of it) would have saved us much fruitless labour. Of this passage I shall have occasion to say more hereafter."—Byron's Nar. p. 74. This is evidently San Quintin Sound. They proceeded to the westward and northward, entered a larger bay (Holloway Sound), and discovered another headland at a great distance to the westward (Cape Tres Montes), which they reached with much difficulty; but being unable to get round it, and losing the boat that accompanied them, besides being obliged to leave four of the marines behind, they became quite disheartened, and returned to Wager Island, to linger out their miserable lives, without the least prospect of again seeing home. This expedition occupied two months, during which they lived principally upon sea-weed, called 'tangle;' but sometimes passed whole days without eating anything at all. While they

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were absent, some Indians had visited the wreck; and, about a fortnight after their return, they arrived a second time, in two canoes. Among them was an Indian Cacique of the Chonos tribe, who live in the neighbourhood of Chilóe. It was supposed that a report of the wreck had reached that place; and that this Cacique, and another Indian, had come to derive some advantage from it. As the Cacique spoke Spanish, the surgeon, Mr. Elliot, made himself so far understood, as to let him know that they wished to reach some of the Spanish settlements; and eventually bargained to give him the barge, and every thing in it, if he would conduct them to Chilóe. The party consisted of Captain Cheap; Mr. Elliot, the surgeon; Mr. Campbell, Mr. Hamilton, and Mr. Byron, midshipmen; and eight men, besides the two Indians; in all fifteen. The first night they slept on an island, and the next laid upon their oars, to the westward of Montrose Island, not being able to land.

They then pulled, "to the bottom of a great bay, where the Indian guide had left his family, a wife and two children." There they staid two or three days; after which, taking on board the family, they proceeded to a river, "the stream of which," Byron says, "was so rapid, that after our utmost efforts, from morning to evening, we gained little upon the current; and, at last, were obliged to desist from our attempts, and return."

This was probably a river, or channel, to the westward of San Quintin Sound, which eluded our search; and, if so, it must communicate with channels north-eastward of the Peninsula of Tres Montes. The Indians, anxious to get the barge to the Chonos, had no other way to effect their purpose; for the usual route was over the 'Desecho;' to pass which, it was necessary to take a boat or canoe to pieces, and carry her, piecemeal, over a high mountain.

After losing the barge, they crossed the Peninsula of Forelius, by hauling canoes over a narrow neck of land, and reached the water of San Quintin Sound; where they met another native family, with whom they proceeded to the River San Tadeo, "up which they rowed four or five leagues; and then

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took to a branch of it that ran first to the eastward, and then to the northward." There they landed, took the canoes to pieces, and carried them over the isthmus; then putting them together again, re-embarked, and proceeded through the Chonos Archipelago to Chilóe.

When at Chilóe, I saw an old man, Pedro Osorio, who had been in two of the last missionary voyages (in 1769 and 1778), to the Guaineco Islands; where the Wager was wrecked. He related to me the particulars of these voyages, and gave me an account of the 'Desecho,' over which the missionaries transported their piraguas. He also remembered Byron and his companions; and described them by the following names:—Don David (Captain David Cheap); Don Juan (John Byron); Hamerton (Hamilton); and Plasta. The name Plasta is not once mentioned in Byron's Narrative; but on referring to Bulkeley's and Cumming's account, one Plastow is described as the captain's servant; and perhaps he was one of the number who remained with Captain Cheap.(*z*) Pedro Osorio must have been upwards of ninety years of age, in 1829.(*a*) A detailed account of these voyages is given in Agüeros's Historical Description of the province of Chilóe, p. 205.

Captain Stokes's 'Dead-tree Island,' in the entrance of San Estevan Gulf, is near the 'Cirujano Island' (Surgeon Island) of those voyages. Pedro Osorio told me that it was so called, because the surgeon of the Wager died there. From Byron's Narrative it would appear, that the surgeon died, and was buried, just before they embarked to cross the sound.—See Byron, p. 147.

As the examination of the River San Tadeo, and the discovery of the 'Desecho,' formed a part of Lieutenant Skyring's instructions, he proceeded up it, in a whale-boat, accompanied by Mr. Kirke. The entrance of the river is blocked up by a bar of sand and stones, which, at low spring-tide, must be nearly dry; and a heavy swell breaks upon its whole length, joining the surf of the beach, on each side; so that there is

(*z*) Could 'Plasta' refer to Alexander Campbell?—R. F.

(*a*) Pedro Osorio died at San Carlos in 1832.—R. F.

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no deep channel; and, except in very fine weather, an attempt to cross is hazardous.

At its mouth, the breadth is about a quarter of a mile, but within the entrance it increases for a short distance: at three miles up, it is three hundred yards, and thence gradually diminishes. The shores are a mixture of clay and sand; and the country, on both sides, is low and marshy, abounding with brant-geese, ducks, teal, and snipe.

The land, near the mouth of the river, is studded with dead trees (a species of pine, about twenty feet high), which appear to have been killed by the sea overflowing the banks;(*b*) as it does at high-water for several miles.

Three miles from the entrance this river divides into two branches, one leading N.W., and the other eastward. Considering the latter, from Byron's description, to be the proper course, Lieutenant Skyring followed it. At nine miles from the mouth, a stream was found falling into the river from the north, in every respect differing from the principal stream; the water being fresh, dark, and clear, and the current constantly running down, uninfluenced by the tide; while the water of the river was brackish and turbid, and affected by the ebbing and flowing of the tide, although, at that distance, its effect was much diminished.

The shores of the Black River, as this new stream was called, are thickly wooded, which is not the case with the principal stream. They had entered it about a hundred yards before they discovered that they had left the main river; but being desirous of proceeding, they followed its windings, the next day, for three leagues; during the greater part of which distance, they found a strong current against them, and were also much impeded by fallen trees lying in the bed of the river. In many parts they dragged their boat along by the help of overhanging branches, or projecting roots; and the width, generally, was not more than fifty yards. As no piragua could pass there, Lieutenant Skyring felt assured that he was not in the right stream; therefore, returning to the main river, he proceeded

(*b*) Or by an earthquake wave.—R. F

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up it during the next two days. At two miles above the junction, the tide ceased to be felt; and a rapid current met them, which increased in strength until they were unable to stem it; and as they were prevented from tracking the boats, by trees growing on the banks, they could ascend no farther.

This place was not more than eleven miles from the sea; although, from the tortuous course of the stream, they had gone double that distance, and were about two miles from the foot of a mountain, whence the river descends. The mountain was very high, and the vallies, or ravines, were filled with glaciers. From Byron's description, it seems probable that Lieutenant Skyring was near the carrying place; but as further delay could answer no good end, he very prudently returned, looking carefully about, as he proceeded, for some signs of a landing-place, but without success. He re-crossed the bar, reached the Adelaide without accident, and the next day went on in her to Xavier Island. On the way they passed Dead-tree Island; where, observing seal on the rocks, a boat was sent ashore, and her crew succeeded in killing a few sea-elephants, twenty feet long.

Favoured with fine weather, they were enabled to land on the north side of Xavier Island, to improve the former survey; and in the evening anchored in Xavier Bay, where they remained four days; during which, Jesuit Sound was explored, and found to terminate in two narrow inlets. Being a leewardly opening, it is unfit for any vessel to enter.

The name Jesuit Sound, and those of the two inlets at the bottom, Benito and Julian, are memorials of the missionaries, who, in the expedition of 1778, entered and explored it.* (Agüeros, p. 232.)

The Adelaide anchored the next night in Ygnacio Bay, at the south end of Xavier Island, which Lieutenant Skyring

* Mr. Kirke, who examined them, says, "There are two openings opposite Xavier Island, on the main land: the northernmost runs through high land, and is terminated by a low sandy beach, with a river in the middle, running from a large glacier; the southern inlet is ended by high mountainous land."

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recommends for small vessels; the depth of water being six or eight fathoms, and the anchorage well sheltered from the wind.

On the 31st they anchored under the Hazard Islands, in the Channel's Mouth: "preparatory," writes Lieutenant Skyring, "to commencing new work with the new year; for since entering the gulf, except while examining the San Tadeo, we had followed the Beagle's track, and only completed what she left unfinished; but from this place all would be new. This was the last wild anchorage she had taken; and although now fixed in the best situation, and in the height of summer, we found our position almost as dangerous as hers.

"Early on the 1st of January 1830, Mr. Kirke went in a whale-boat to examine the openings, at the mouth of which we had anchored: he returned on the 9th, having traced to the end, all which had the least appearance of being channels. The two largest, the south and the east, penetrated into the Cordillera for thirty miles. All these inlets are narrow but deep arms of the sea, running between ranges of very steep hills; their sides affording not the least shelter, even for a boat, and apparently deserted; for neither seal, nor birds of any kind were seen, nor were there even muscles on the rocks."

Mr. Kirke, in his report, says: "The three northernmost of the inlets of the Channel's Mouth end with high land on each side, and low sandy beaches at the head, beyond which there rises a ridge of high mountains, about two miles from the beach. The S.E. inlets end in rivers rushing down from the mountains, and a rocky shore: not the smallest shelter could I find, even for the boat. Two days and nights I was forced to keep her hauled up on a rock, just above high-water mark, in a strong gale, while the williwaws were so violent, that we were all obliged to add our weight to that of the boat, to prevent her from being blown off: and twice we were washed out of our resting-places, on the beach, by the night tide rising about fifteen or sixteen inches above that of the day."

This opening in the coast is noticed by the pilot Machado (Agüeros, p. 210); but by whom the name of Channel's Mouth was given, does not appear. It is by no means descriptive of

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what it has been proved to be; but as Lieutenant Skyring thought that a change in the name would not answer any good purpose, he very properly left it unaltered.

The day after Mr. Kirke returned, very bad weather set in, and detained the Adelaide nine days, during which nothing could be done, out of the vessel.

"January 19th," Lieutenant Skyring writes, "with moderate weather, and an easterly wind, we left the Channel's Mouth, and, standing for the Guaianeco Islands, passed those of Ayautau (between which and the mainland are several rocky reefs, though the passage seems to be sufficiently clear for any vessel); and skirting Tarn Bay, we distinguished the Mesier Channel, and could see many leagues down it. The entrance of the Mesier Channel is very remarkable, from having two high and singular peaks on the islands at its mouth: the northernmost very much resembling (although higher than) Nelson's monument, near the Strait; and the other, more to the southward, and much higher, resembling a church with a cupola, instead of a spire. Both are easily made out from the westward, at a distance of twenty or thirty miles.

"We reached the Guaianeco Islands in the afternoon. The two largest are divided by a narrow passage, on the west side of which we anchored, in ten fathoms, in a spacious and secure haven, which proved to be Speedwell Bay of Bulkeley and Cummings; the boats were employed next day, and, while the examination of the coast was pursued, I sought to ascertain the exact spot of the wreck of the Wager, but never could discover it: not a fragment of that ill-fated vessel was seen in any of our excursions. A few pieces of the boat lost by the Beagle last year were picked up; but nothing more that could tend to denote the misfortunes which have occurred near these islands.

"From the description of the Wager's wreck, in Bulkeley and Cummings, there seems to be little doubt of the place being at the N.W. end of the eastern Guaianeco Island, near my Rundle's Passage, which is the place so often mentioned in their account as the 'Lagoon.'

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"Being well supplied with powder and small shot, the people provided themselves plentifully, during our stay at Speedwell Bay, with a variety of wild-fowl, namely, geese, ducks, red-beaks, shags, and the ibis; curlew, snipe, plover, and moorhens, were also met with, and fish were observed in shoals near the vessel, but, as we had no seine, they escaped. With hooks and lines our fishermen had no luck; the baits were no sooner at the bottom, than they were taken away, and for a day or two the cause of their loss was unknown; but being accidentally ascertained, small trap-nets were made, and great numbers of crabs were taken, about a pound each in weight.

"In almost every bay we noticed the potato, growing among wild celery, close above high-water mark: but in so unfavourable a situation, choked by other vegetables, its produce was very small.

"The trees are not of large growth in these islands, neither is the land thickly wooded; but above the beach, and almost round the coast, there is a breast-work of jungle and underwood, from fifty to one hundred yards broad, and nearly impenetrable; beyond which is a great extent of clear, but low and swampy ground.

"On the 25th, we left this port, and ran to the S.E., through what I have named Rundle's Passage. This small channel, where the islands approach each other, is about a quarter of a mile wide, perfectly clear in the whole extent, and also at its southern entrance; but at the northern there are many detached rocks, which are obstacles to entering Speedwell Bay, except in daylight. Rounding the islets, at the S.E. extreme of Byron Islands, we anchored in Muscle Bay, which lies on the northern side: by no means a secure place,—but the only one that could be found, by the boats, after many hours' search. I selected this situation in order that the entrance to the Fallos Channel, and the whole outline of these islands, might be laid down, and properly connected with the land of Port Barbara; which was thoroughly executed by Mr. Kirke and Mr. Millar, although delayed in the completion of their

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work until the 1st of February. (c) On that day we sailed, and entered the Mesier Channel, anchoring in a small open bay, the only stopping-place we could perceive; which, from the loss we sustained shortly after our arrival, was called Fatal Bay. It is insecure, and the anchorage ground confined: the only convenience was, that wood and fresh-water were near. During our stay we had much rain, which retarded us. Mr. Kirke went away in a boat, whenever the weather permitted, and, on the 8th, we sailed for an anchorage, about ten miles to the southward, where he had previously been; but a sad event happened before our departure.

"On the afternoon of the 3d, we had the misfortune to lose Mr. Alexander Millar, who died in consequence of a severe attack of inflammation of the bowels, which carried him off, after an illness of only three days.

"On Thursday afternoon he was buried, close to the shore, near the anchorage, and just within the edge of the wood.

"That our progress had been so slow during the last month, was a great disappointment; but we had had many causes of detention. All the early part of January the weather was stormy: eighteen days we were anchored within the Channel's Mouth; yet during two only could our boats leave the vessel.

"Among the Guaianeco islands we had moderate weather, but also much wet: still the chief cause of our delay, I fear, was my own illness. From the beginning of January, I had been confined to my bed, with a tedious and obstinate disease; and from that time most of the angles were taken, and all the observations were made, by Mr. Kirke, who was ever exceedingly willing and indefatigable. After the loss of Mr. Millar, not only almost the whole duty of surveying fell upon him, but much of the duty of the vessel.

"At noon this day (8th), we moored in Island Harbour, a small but excellent landlocked anchorage, with good holding

(c) During much of this cruise, Lieutenant Skyring was so ill that he was unable to leave the Adelaide; and for a month he was confined to bed. His illness was caused by fatigue, and by sitting too long while constructing charts.—R. F.

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ground, and abundance of wood and water. The two following days, Mr. Kirke was away examining the coast; the third we were confined by bad weather; and, indeed, during our whole continuance at this place, we had very much rain.

"We sailed early on the 12th from Island Harbour, and by night reached Waterfall Bay, an anchorage about fifteen miles to the southward: the wind all day was light, and the tide, the greater part of the time, against us; so that, with every exertion, we scarcely gained anchoring ground before it was quite dark: the strength of the tide was upwards of a mile an hour, at neap-tides: the ebb and flood were of equal duration, the former running to the S. b. E., the latter N. b. W. Thirty miles within the Mesier Channel it is as wide as at the entrance, and for several miles to the southward appears clear: so that no one is liable thus far to mistake its course.

"The land on the west side appears to be a number of large islands, with here and there wide passages leading to the S.W., rendering it probable that there are many (although not direct) communications between the Mesier and the Fallos Channels. Our anchorages were chiefly on the eastern shore, that the openings on that side might be more readily examined; but all which appeared to run far inland were found to be merely narrow inlets, or sounds ending abruptly. On each side the land is hilly, but not high; and this distinguishes the Mesier Channel from many others, whose shores for miles are formed by ranges of steep-sided mountains. Here, in many places, there is much low land, which is generally thickly wooded, yet with no greater variety of trees than is to met with in the Strait of Magalhaens. The beech, birch, pine, or cypress, Winter's-bark, and a kind of red-wood, form the forests; but none were observed that could be at all serviceable for the larger spars of a vessel.

"(16th). Left Waterfall Bay, and with a N.W. breeze passed Middle Island, entered Lion Bay, and moored in White Kelp Cove. The coast survey was soon finished, but we were confined at our anchors here four days; not by bad, but by extraordinarily fine weather. During such intervals, so very rare

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in these regions, the wind, if there is any, is almost always southerly, and light.

"At every anchorage we had found Indian wigwams, but as yet had not met with any natives. Here we took a great number of fish; and, among them, one like the ling, found on the east coast of Patagonia, off Cape Fairweather, but of smaller size, for the largest did not weigh more than two pounds. Very few water-fowl were seen; steamers and shags were the only ones shot; but in the woods we noticed king-fishers, wood-peckers, barking-birds, parroquets, and humming-birds.

"(21st.) With a light northerly wind we left this cove, and about ten miles to the southward the appearance of the channel changed greatly. Instead of sailing through unconnected land, of moderate height, we were confined between two mountainous ridges.* At noon we were obliged to anchor in Halt Bay, no opening appearing to the right or left, and being apparently embayed. On the west side, the high land was skirted by several low islands, among which our only way of proceeding seemed to lie. This day and the next Mr. Kirke was away, seeking a passage; and having found one, and noticed the tides, we sailed through on the 23d, and gave it the name of the English Narrow. It is long and intricate, chiefly formed by islands; and in three places, where the shores approach each other, the distance across is less than four hundred yards, yet with a fair wind and slack tide, there is no hazard in passing. In the afternoon, we moored in ten or twelve fathoms in Level Bay, a spacious anchorage near the southern entrance of the Narrow; the bottom mud and sand, and the depth of water equal throughout. Mr. Kirke, who was among the islands opposite this bay, saw numerous shoals

* On the west shore Mr. Kirke noticed what appeared to be a channel, about twelve miles N.W. of Halt Bay, in the mouth of which was a considerable tide-ripple; an almost certain indication of such an opening. "I thought the inlet about twelve miles north-west of Halt Bay much like a channel. I also noticed a distinct tide ripple, which I did not remark near any other opening. To me this appeared the southernmost inlet, of any depth; or at all likely to be a channel."—Kirke MS.

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of fish in many of the bights; with a seine, therefore, an abundant supply might be obtained.

"The woodland eastward of our anchorage had very recently been on fire, and the conflagration must have been extensive, and very destructive; for throughout a space of ten or twelve miles along shore, all the trees had been consumed, the dead trunks of the larger ones alone remaining. We left Level Bay on the morning of the 25th, and passed a canoe full of Indians; but they pulled to the shore, and ran into the woods; therefore, since they avoided us, and we had a fair wind, I did not seek their acquaintance. We had noticed traces of them in the neighbourhood of the Narrow, on each side of which many wigwams, that had been recently occupied, were seen.

"For the next ten or twelve miles we went through a fine reach, whose shores were low, and whose channel was interspersed with several islands, affording probably excellent anchorages; but to the southward the hills became more steep, and, except in the ravines, were destitute of vegetation. At four or five leagues to the E.S.E., beyond the English Narrow, an opening, apparently a channel, presented itself, and the reach in which we were sailing seemed to end. Doubtful which course to follow, we anchored the vessel in Rocky Bight, and despatched the boats to examine both passages. That to the E.S.E. was found to run direct nearly ten miles, and to communicate with a fine clear channel, trending to the S.S.W., which proved afterwards to be the Wide Channel (Brazo Ancho) of Sarmiento. At the junction, a considerable arm extended to the N.N.E., apparently a continuation of the Wide Channel.

"On Mr. Kirke's return from examining the passage in which we were sailing, I learnt that the same width continued about five miles southward of our present anchorage, and that there the shores approached closely, forming the intricate passage called Rowlett Narrow; which, after a S.E. course of many miles, also joins Wide Channel. The island formed by the two channels was named Saumarez Island, in honour of the gallant admiral.

"It rained hard and blew strongly the whole day, which

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prevented our moving; but on the 27th we shifted our anchorage to Fury Cove, in Wide Channel.

"Mr. Kirke, on the 28th, examined an opening to the northward, called Sir George Eyre Sound, which terminates in a wide fresh-water river, running through low land from a large glacier. The low grounds extend two or three miles from it, and then the land becomes high. Behind the glacier there is a ridge of high mountains, covered with snow, which we had seen twice before; first, from near White Kelp Cove, and again from Halt Bay. In the sound, we saw three whales, and being the first we had observed, since leaving the Gulf of Peñas, they inclined us to think we were near the Gulf of Trinidad. A great number of fur seal, besides two of their rookeries, or breeding-places, were also seen. Several icebergs were floating out of the sound, some of which were dark-coloured; and upon one I found a quantity of rock that had come down with it from the mountains. There was serpentine and granite, specimens of which were collected, and given to Captain King. One of the bergs, which was large, was aground. It was nearly seven fathoms above the water, and bottom could not be found by sounding round it with twenty-one fathoms of line.

"Fury Cove is diminutive; there is not more than sufficient space for two small vessels; but the ground is good, and in every other respect it is a secure haven. We sailed on the 3d of March with the expectation of soon recognizing some known points in the Gulf of Trinidad; but as the wind failed, we were obliged to anchor for the night in Sandy Bay, in eight fathoms.

"As we proceeded to the southward, the appearance of the country gradually changed: the mountains seemed more barren, the trees and shrubs more stunted, the land rose more suddenly, and the shores of the channel became bolder, and presented an uniform rocky line of coast.

"(4th.) We again steered southward, and at noon an opening appearing on the east side, which ran several miles inland, I sought an adjacent anchorage, in order that it might be explored. Our boats were examining the shore all day, and

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sounding in the coves, but no fit spot was found; therefore we were forced to stop in an ill-sheltered nook, termed Small Craft Bight, which just served us (having fair weather) as a resting-place until morning (5th), when we set out again to find a better anchorage; for I still desired to ascertain whether the opening to the eastward was a sound or a channel. In our course to the southward we traced both shores in search of a stopping-place; but there was neither bight nor cove where it was possible to anchor, until we arrived at Open Bay, which lies near the entrance of Wide Channel. Even this was such a very insecure place, that although I remained the next day, to examine the neighbouring coast, it was far too exposed an anchorage for the vessel to continue in while the boats were away at a distance.

"Disappointed by not finding a place for the schooner near the opening I wished to explore, I was yet averse to leaving it unexamined, having traced every inlet to its extremity for upwards of two hundred miles along the continent. I wished to continue so sure a mode of proceeding; and although I felt certain that this opening terminated like the rest, and Mr. Kirke held the same opinion, I would gladly have prevented any doubt by following its course in the boats, could we have gained a safe anchorage for the vessel. The nearest harbour that could be found was thirty miles from the opening, and it would have detained us too long to send the boats such a distance; so considering that we had yet a great extent of coast to examine; that my state of health did not permit me to undertake any very exposed or arduous service; and that Mr. Kirke was the only person to whom such duty could be entrusted, I was induced to relinquish our former practice of exploring every opening to its end.

"We left Open Bay on the 7th, and soon entered Concepcion Strait, keeping along the east shore, and sending a boat, at every opening, to seek a situation for the vessel. In the afternoon, a tolerably sheltered bay was found, at the south end of the North Canning Island, open only from S.E. to S.W.; but those winds being frequent and violent, and the

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bay exposed to a long reach of sea from that quarter, it cannot be accounted a safe harbour; yet it was very far preferable to many places in which we had been obliged to anchor.

"This bay (Portland Bay) is on the north side of an opening called by Sarmiento 'Canal de Tres Cerros,' and from the broken state of the interior high land, one is led to imagine a channel might be found there. His conclusion, I have no doubt, was drawn from this appearance, since the view down the opening is very limited, and, at the distance of three or four miles within the entrance, is interrupted by several small islands. Mr. Kirke passed between those islets, and followed an opening to the S.E., for upwards of eight leagues. On his return, he reported that he had found a fine channel, of which the principal entrance was the opening of Sarmiento's 'Canal San Andres.'

"On the 12th, in full anticipation of making some interesting discovery, we sailed into the 'Canal San Andres,' anchoring in the afternoon in Expectation Bay, where we remained until the 15th. During that time, Mr. Kirke was employed examining the different openings, and tracing this supposed channel farther. At his return, he said that he had found a termination to every opening, even to that in which we then were, which he had previously thought to be a channel. Like the rest, it extended only to the base of the snowy Cordillera, and then was suddenly closed by immense glaciers.

"This information caused great disappointment, as all hope of passing through the Cordillera, thus far northward, was now given up; and I was fearful we should be delayed many more days before we could extricate ourselves from this (as we then supposed) false channel. We were many miles within the entrance; in that distance there were no anchorages, and the wind being generally from the westward, I anticipated much labour before we could effect our return; but the very next day we were so fortunate as to have a slant of fair wind, by which we cleared this opening, and a second time entered Concepcion Strait. Knowing, by our former survey, that there was no anchorage along the coast to the southward of Cape San Andres before reaching Guard Bay, I ran over to Madre

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de Dios, and brought up in Walker Bay. Fortunate we were, too; for before midnight the weather became so stormy as to oblige us to strike the topmasts and yard, let go a second anchor, and veer a long scope of cable. At few places in these channels where we had anchored, could we have veered even half a cable. We remained the following day, and on the 21st, the weather being moderate, ran for the Guia Narrow, and having a favourable tide, passed through easily.

"It was my wish to have anchored among the islands to the southward of Cape Charles, since that would have been the most convenient place for the Adelaide, while examining the opening beyond Cape San Antonio; but hauling round the headland into a bay formed by those islands, no soundings could be gained; and not perceiving any bight at all likely to afford shelter, I continued my course for Puerto Bueno, where Sarmiento thought there was good anchorage. In the evening, with the assistance of the boats, we moored in Schooner Cove, Puerto Bueno, and the next day, Mr. Kirke went to examine the opening north of San Antonio.

"While we remained, a plan was made of this port, which lies five miles S.E. from Cape Charles and three and a-half from Bonduca Island. The shore is steep, and without any indenture. To the southward is Lear Bay, a mile in extent, affording anchorage, but not to be chosen when such an excellent haven as Puerto Bueno is near. The south extreme of this bay forms the north point of Puerto Bueno, and a few hundred yards south of that point is Rosamond Island, which is low and pointed; four hundred yards S.S.E. of this, is a small round islet, bold to on every side; and between this islet and a low point, a quarter of a mile to the S.E., is the widest channel to the anchorage. Sarmiento, indeed, most appropriately named it Puerto Bueno. It has both an inner and an outer port, the depth of water throughout is from nine to six fathoms, and any position in either I consider safe; but excepting that it affords better shelter, it differs in no respect from other anchorages in these regions. Wood and water are generally found in abundance near them all: fish may be caught; geese, ducks, shags, and

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steamers may be shot; and shell-fish gathered. The country, also, has the same appearance, and is of a similar nature; for if you force a passage through the woods, it is over fallen trees and moss; if you walk over clear flat ground, the place is found to be a swamp; and if you ascend the hills, it is by climbing over rocks, partially covered with spongy moss.

"Mr. Kirke returned on the 24th, having found that the opening beyond San Antonio led to the N.E., and at ten miles from the cape communicated with that called the Canal San Andres.

"At daylight we left Schooner Cove, and in passing down Sarmiento Channel I tried, though unsuccessfully, to reconcile some of his remarks with our own observations. South of San Marco and San Lucas there are two extensive bays, which we afterwards found communicated with an opening between San Mateo and San Vicente, separating the greater part of the eastern shore of this channel from the main land.

"I wished to anchor near Cape San Lucas, but around that opening no place could be distinguished likely to afford shelter, the shore in every part being bold, steep, and rocky. A like uniformity of coast presented itself as far as Cape San Mateo; but on the west side, along both Esperanza and Vancouver Island, lie many bays that are well adapted for vessels. Sailing, however, under Cape San Lucas, we stood for San Mateo, and succeeded in anchoring in a small port, formed by Weasel Island, scarcely large enough, but perfectly safe, when once we were secured. From this place the boats were despatched. An opening east of our present station was to be traced, and this part of Sarmiento Channel, with the entrance between San Mateo and San Vicente, was to be laid down. These operations, which in moderately fair weather would not have occupied three days, were not completed before the 31st, from our being delayed by violent winds, and almost continual rain. We had also had exceedingly bad weather during our stay in Puerto Bueno, and those employed in the boats had undergone very severe fatigue, and had suffered much from wet and cold. A short distance within the entrance of the

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opening, between Cape San Mateo and San Vincent, it turns suddenly to the south and S.b.E., continues in that direction for nearly thirty miles, washing the base of the Cordillera which rises from it precipitously, and is closed by a low isthmus, two miles across, dividing this inlet from Stewart Bay, and over which Mr. Kirke passed to take the bearings of several points that he recognised in Collingwood Strait.

"In the prosecution of the survey northward of our anchorage, those passages were discovered which separate so much of the east coast of Sarmiento Channel from the main land; and the islands thus made known I named after Commodore Sir Edward Owen,* the channel of separation being called Blanche Passage.

"One of the boats met with a canoe containing eight Indians; this was only the second that had yet been seen during our cruise.

"An interview, which two of the schooner's men had with these people, is so characteristic of the habits of the natives who wander in canoes, that I add the account, as given by one of those men: 'When we arrived at the wigwam, there were two women and five children inside, and a dozen dogs near it. At our entrance, the children crept close to one side of the wigwam, behind their mothers, who made signs for us to sit down on the opposite side, which we did. The women, seeing that we were wet, and meant to do them no harm, sent the two eldest children out to gather sticks, and made up a large fire; so we cut some pieces of bread from a loaf which we had, and distributed them. They all appeared to like the bread, particularly the youngest, which was sucking at the breast; for it eat its own slice, besides one we gave its mother. After we had been there about half an hour, and had given them some beads and buttons, a man came in from behind the wigwam, where he had concealed himself when we entered, and sat down beside us. By signs, he asked where our boat was, and how many men there were with us. We told him the men and boat were a little way off, and made signs that we wanted to

* At the request of Lieutenant Mitchell, of the Adventure.

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stay all night with him. We then gave him some bread, which he smelt, and afterwards eat. He offered us some sea-elephant blubber, about two inches and a-half thick ; we took it, and making signs it was not good, flung it on the fire. As soon as it began to melt, he took it from the fire, put one part in his mouth, and holding the other drew it back again, squeezing out the oil with his teeth, which were nearly shut. He put the same piece on the fire again, and, after an addition to it, too offensive to mention, again sucked it. Several more pieces were served the same way, and the women and children partook of them. They drank large draughts of water as soon as they had done eating. As it grew dark at about eight o'clock, the man began to talk to the women about our 'sherroo' or boat, and our men, who he thought were near. They seemed to be alarmed, for the women shortly after left the wigwam, and did not return. They were quite naked. The man took the youngest child in his arms, squatted down with the rest, and making signs that he was going to sleep, stretched himself by the fire, the children lying between him and the side of the wigwam. Soon afterwards another man came in, who seemed to be about twenty-two years of age, younger by ten years than the first we saw. He had a piece of platted grass round his head, in the form of a band. After talking some time with his companion, he talked and laughed with us, ate some bread, and would have eaten all we had, if we had not kept it from him. He ate about two pounds of blubber, broiling and squeezing it, as the other had done, and drank three or four pints of water. We had only one case knife, which he was very fond of borrowing now and then, to cut the blubber, pretending that the muscle shells, which he broke for the purpose, were not sharp enough. He examined all our clothes, felt our limbs and breasts, and would have taken our clothes off, if we had let him. He wanted a knife, and was continually feeling about us for one, as we did not let him know that we had only one. He opened a rush basket, and took out several trifles, such as fire-stone,* feathers, spear-heads, a sailor's old mitten, part of

* Iron pyrites.

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a Guernsey-frock, and other things, some of which he offered for the knife.

" 'About midnight it rained very hard, and the inside of the wigwam became soaked with wet; so they all roused up, and made a large fire; then ate some blubber, and drank some more water. They always carried a firebrand with them when they went out in the dark to get water, or for any thing else they might want. When they had well warmed themselves they lay down again. The young man lay close to us, and, when he supposed we were asleep, began to search the man who had the knife, but we kept watch and he could not get it. About two hours afterwards he made up the fire, and went out, as we thought, for firewood: but for no other purpose than to take away bushes from the side of the wigwam, that he might have a clear passage for what he intended to do. Returning, he took up a piece of blubber, and asked for the knife to cut it. As soon as he had cut a slice, and put it on the fire, he darted through the part of the wigwam, which he had weakened, like an arrow. The other man seemed to be very much vexed, and thinking, perhaps, that we should do some mischief in consequence of the loss of the knife, watched an opportunity, when he thought we were asleep, to take out all the children, and leave us quite by ourselves. About two hours after, he returned, and pulling down dry branches, from the inside of the wigwam, made up a large fire. We had no doubt that the younger man was at hand watching us, and just at daybreak, as we were preparing to start, he jumped into the wigwam with his face streaked almost all over with black, and pretended to be quite a stranger. When we asked for the knife, he would not know what we meant, but took up one of our shoes that lay on the ground, and gave it to us. The band of grass was taken off his head, and his hair was quite loose. There were neither skins, spears, nor arrows in the wigwam, but no doubt they were in the bushes; for when we threatened to take the canoe he jumped into the wood, resting on one knee, with his right hand on the ground, and eyed us sharply till we were out of sight.'

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"The other family seen in the Mesier Channel we did not communicate with, and it may be remarked that in this passage, although between four and five hundred miles in extent, we did not meet twenty human beings; a strong evidence that these regions are very thinly inhabited, particularly when it is considered that we made no rapid progress, and that our boats traversed, through different channels, at least twice the distance run by the vessel."

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CHAPTER XIX.

Sarmiento Channel—Ancon sin Salida—Cape Earnest—Canal of the Mountains—Termination of the Andes—Kirke Narrow—Easter Bay—Disappointment Bay—Obstruction Sound—Last Hope Inlet—Swans—Coots—Deer—River—Lagoon—Singular eddies—Passage of the Narrow—Arrival at Port Famine—Zoological remarks.

"(April 1st). THIS morning the weather was very unsettled, squally, and thick: but as no delay could be admitted, when there was a possibility of moving, we left at eight o'clock, and followed the course of Sarmiento Channel. I have no doubt that a passage exists eastward of Point San Gaspar, leading to Collingwood Strait, and forming an island between that point and Cape San Bartolomé: but with the N.W. wind and bad weather we then had, that bight was too leewardly for us to venture into.

"The knowledge of an opening there could be of no great importance, yet had I been able to find an anchorage near Cape San Bartolomé I would gladly have profited by it, in order to assure myself of the existence of a passage. In hauling round, the appearance of the land favoured my impression; but our chief object being to seek a channel through the high mountains, I stood toward Stewart Bay, the most southern part examined by the boats. Finding I could not anchor there without entering the bight and risking delay, which I was unwilling to do, as I wished to reach Whale-boat Bay as soon as possible, we proceeded and anchored in the evening in Shingle Roads, ready for moving the next morning. Having, last year, passed along the whole line of coast, from Cape Earnest to this place, there seemed to me no necessity for a closer examination, for I knew there was no opening within that distance, and I could very little improve what was then laid down on the

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chart. The weather was very unpromising, and at daylight the next morning it blew hard from the N.W., but we weighed and ran to the southward. When in the 'Ancon sin Salida' of Sarmiento the wind suddenly shifted to the S.E., and was so strong that we were quite unable to beat between Cape Earnest and the northern island of the 'Ancon,' but passing round, found anchorage near the east end in a small bay: however, as the wind had moderated, and the Canal of the Mountains was open to us, on the east side of which there appeared to be several secure bays, we kept under sail, and in the evening anchored in Leeward Bay, which we at first thought would afford excellent shelter, but on reaching it found we had erred exceedingly. There was no time to look for another, so we moored, and prepared for bad weather, which, as usual, was soon experienced; and we were kept two days without a possibility of moving, or doing any thing to make our situation more secure. We had heavy squalls during the whole time; the wind being generally west or W.N.W., but at times nearly S.W., when more swell was thrown into the bay.

"On the 5th we got clear of this bad and leewardly anchorage, the wind being more to the N.W.; but we had still such very squally weather, with rain, that it was a work of several hours to beat to Whale-boat Bay, where we moored in the evening, and prepared for examining the coast with our boats, both to the east and west. Before leaving Leeward Bay, a round of angles was taken from high ground north of the anchorage, and it was satisfactory to reflect that the 'Ancon sin Salida' was traced far more correctly than could be done in our former visit. There was constant rain and squally weather all the morning, and only in the latter part of the day could any work be performed in the boats. On the following morning Mr. Kirke went to trace the Canal of the Mountains, and I rejoice to say that I was again able to assist in the boat service, and went to examine some openings. After leaving Kirke Narrow on the right hand a wide sound appeared, about nine miles in length; and having traversed it, we turned to the east, through a narrow intricate channel (White Narrow),

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obstructed by several small islets, and passed suddenly out into a clear, open bay. Our prospect here became wholly different to that which for months before we had daily witnessed. North and south of us were deep bays, while to the east, between two points seven or eight miles apart, our view was unobstructed by land, and we were sanguine in hoping that we had discovered an extensive body of water. There was also a considerable change in the appearance of the country, which no less delighted than astonished us; for so gratifying a prospect had not been seen since leaving Chiloé. Eastward, as I said before, we could perceive no land; to the north-east and south-eastward lay a low flat country, and the hills in the interior were long, level ranges, similar to that near Cape Gregory, while behind us, in every direction westward, rose high rugged mountains. I fully believed that our course hereafter would be in open water, along the shores of a low country, and that we had taken leave of narrow straits, enclosed by snow-capped mountains: the only difficulty to be now overcome was, I imagined, that of getting the vessel safely through the Kirke Narrow; which, hazardous as I thought the pass, was preferable to the intricate White Narrow, through which we had just passed. Such were my expectations; and with so noble a prospect in view, I hastened to look for anchorage for the schooner, which I succeeded in finding at a place named by me Easter Bay, and returned on board the next day through Kirke Narrow. Mr. Kirke employed three days about his work, having traced the inlet, which trended northward from Cape Grey for nearly eleven leagues. He found that it was bordered on each side by a steep range of mountains, broken here and there by deep ravines, which were filled with frozen snow, and surmounted by extensive glaciers, whence huge avalanches were continually falling. The western side of this canal is formed by the southern termination of the Andes. At the northern end are two bays, with sandy beaches, backed by low land, which, however, rises gradually to high peaked mountains, distant about two miles.

"Early on Easter Tuesday we left Whale-boat Bay, and

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proceeded towards the Kirke Narrow. We had been unvarying in watching and trying the strength of the tides during our stay; but the observations never accorded with those in the narrow, and our calculations this morning, after all the trouble we had taken, were found to be erroneous. On approaching the place we met a stream of tide setting to the S.W. between two and three knots; the wind was light; we sometimes gained ground—at others were forced back by the strength of the tide—and thus kept hovering near the entrance until eleven o'clock; when the tide slackened, and we neared the eastern end, which is by far the narrowest part, and where, I apprehended, every exertion would be required to clear the rocks; but fortunately it was at the moment of slack water—we passed through easily, and our anticipated difficulty vanished. This eastern entrance is narrowed by two islands, which contract the width, at one part, to a hundred and fifty yards. When clear of this passage, Point Return, Point Desire, and Easter Bay were in sight, and we found ourselves in a channel much wider than those to which we had been lately accustomed. To the south was a deep sound, apparently branching in different directions between high land, but our principal object was the low country to the N.E., and through this we were so sanguine as to make sure of finding a passage. In the evening we anchored in Easter Bay, and moored the schooner in four and six fathoms, over a muddy bottom.

"Next morning (12th) the boats were prepared for going away to gain a better knowledge of the country around, to find out the best anchorage, and to become acquainted with some of the many advantages that, from the prospect before us, we considered ourselves sure of experiencing. Mr. Kirke went to examine Worsley Sound, and he was desired to examine every opening as he proceeded eastward. As soon as he was gone, I set about measuring a base between Easter Bay and Focus Island; which, being of moderate height, appeared to be a favourable position for extending the triangulation. This work was soon finished; but I was greatly disappointed, when on the summit of the island, with the view that presented itself

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to the eastward. The low points, before mentioned, beyond which, from Easter Bay, we could distinguish no land, and between which we expected to make good our course to the S.E., appeared to be connected by a low flat country. An extensive sheet of water was indeed observed to the eastward, yet I could only, from its appearance, conclude that it was a spacious bay.

"My attention was next drawn to the southward, in which direction, to the east of Woolley Peninsula, appeared a wide and deep opening, and this I determined to explore on the morrow; for it was now the only course likely to lead us to Fitz Roy Passage, where it became every day more indispensable that we should arrive, since our provisions were getting short. At my return on board, I learnt from Mr. Kirke that he had examined the greater part of Worsley Sound, whose eastern shore formed a line of coast almost connected with that of the bight before us, to which the name of Disappointment Bay was given.

"It was arranged that he should proceed from his last point, and carefully trace the shore of Disappointment Bay to the eastern headland of the southern opening, down which it was my intention to proceed. With these objects in view, we left the schooner next morning. A fair wind soon brought me to the entrance, where I landed to take bearings on the west side, and arrived at the promontory of 'Hope' by noon. There I ascended to the summit of the hills, but found them so thickly wooded, that my anticipated view of the land was almost intercepted, and the angles taken were in consequence very limited.

"At this promontory the course of the channel trends slightly to the eastward; and its direction is afterwards to the S.S.E., being open and clear for eight or ten miles, when low land stretching across from the west side intercepts the view. In passing to the southward, I landed frequently to continue the angles, and hauled up, at the close of day, in Rara Avis Bay, still doubtful of the nature of the opening.

"Next morning, passing Point Intervene, we pulled into an extensive reach; and having landed, to take bearings, on the

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east side, near Cape Thomas, I proceeded, in hopes that beyond the next point some better prospect would be gained: on arriving there, however, my expectations were instantly checked by a bold rising shore, continuing uninterruptedly as far as the Oliver Islands, which we passed soon afterwards.

"The width of the channel between the Oliver Islands and the northern shore is not more than a mile, but it afterwards increases, and turns sharply first to the west, and then S.S.W. In the west reach there are many small islands, and the high ranges on both sides being detached from each other, gave me yet some hopes of finding a passage between them. Proceeding in the afternoon, a bight appeared to the S.S.E., about two miles to the westward of Cape Up-an'down, which was examined, although there was no prospect of meeting with success by tracing it, and in it were found two small passages leading to the S.E., suitable only for boats. We ran down the largest, and a mile within the entrance were embayed. At the bottom of this bight the land was low, and I tried to get on some eminence, that I might command a view to the S.E., but was always impeded by an impervious wood. I observed, however, distant high land in that direction, and could see a sheet of water, about six miles from me: but whether it was a lagoon, or a part of the Skyring Water, was doubtful. I could not, at this prospect, rejoice as Magalhaens did, when he first saw the Pacific, for my situation, I began to think, resembled that of Sterne's starling.

"Keeping along the south shore, until late in the evening, we gained the west end of this reach, and finding no shelter for the boat, crossed to the broken land on the west side, and passed that night in Hewitt Harbour.

"On the following morning, we pursued our course to the S.S.W., and at eleven o'clock reached the extremity of this extensive sound. All our suspense was then removed, and all our hopes destroyed; for the closing shores formed but a small bay in the S.W., and high land encircled every part without leaving an opening.

"Throughout the examination of this sound, we did not

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distinguish any decided stream of tide, and the rise and fall did not appear to have ever exceeded a foot: that there was a slight tidal movement of the water seemed evident, from the streams of foam coming from the cascades; and also from the fallen leaves which were borne on the water, from the shores of the bays, in long lines; but signs like these are indicative of there being no strength of tide: I have frequently noticed such appearances in large sounds, or inlets, but never in any channel where there was a current.

"The bays between Hope Promontory and Point Intervene are frequented by immense numbers of black-necked swans (*Anser nigricollis*): hundreds were seen together; they appeared not at all wild when we first passed; but, on our return, there was no approaching them within musket shot. Many ducks and coots were also observed. On a rock, near the Oliver Islands, was a small 'rookery' of hair-seal; and, in our progress down the sound, we passed some few shags and divers. This is the enumeration of all we saw, and these few species seem to possess, undisturbed, this Obstruction Sound; for we neither observed any wigwams, nor saw any traces of inhabitants.

"Having no interest in remaining, after some necessary angles were taken on Meta Islet, we commenced our return; and, with a fair wind, made good progress, landing only where it was necessary for angles, and reached the vessel on the evening of the next day (16th). I have fully stated the examination of this sound, and have been, perhaps, unnecessarily particular and diffuse; but I think that when its near approach to the Skyring Water is known by others, it will be considered very singular that no communication exists between them. To every one on board the Adelaide it was a great disappointment. The only inlet now remaining to be explored was through the S.S.E. opening, east of Point Return; which, on the 18th, I went to examine. Mr. Kirke returned on the same day as myself, having traced the coast as far as he had been directed, and found the large expanse of Disappointment Bay nearly bounded by a flat stony beach; and the water so shallow, that even his whale-boat could seldom approach the shore within a quarter of a

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mile; but he had left a small opening in the N.E. unexplored, which, as our last hope, I thought it necessary to examine; and he went for that purpose the next morning. Situated as we were, we had great reason to be very earnest in the search for a passage; and, I think, that no channel into the Skyring Water, however small and intricate, would have been left unattempted at this crisis. During the vessel's continuance in Easter Bay, the men, who remained on board, were employed in clearing the hold, and completing wood and water to the utmost, in order that we might not be delayed at any anchorage after our departure thence.

"On the 18th, I went, in a boat, down the opening east of Point Return; and by noon reached Virginia Island. Two miles to the southward the channel branches to the S.E., and to the S.W.; I followed the latter branch, landing where necessary to continue the angles, and arrived in the evening at the extremity, which was closed by low land; in the middle was a wide and rapid stream. The slot of a deer was seen along the margin of the shore. Next day we proceeded down the S.E. branch to the Centre Island, thence steered towards an opening that appeared in the S.W., and passing through a narrow winding passage, entered a large bay, which was closed at the bottom by low land, similarly to the branch examined yesterday. Only an opening to the N.E. now remained to be explored; but night coming on, we hauled up in Tranquil Bay, near the northern extremity. The N.E. opening was found to trend eastward for three miles, and then turn to the S.E., forming an extensive bay, whose shores were encircled by low land, and only separated from Obstruction Sound, by an isthmus two miles broad. Our search being concluded, I hastened back, and arrived on board the schooner late in the evening. Finding Mr. Kirke had not returned, I still entertained some little hope, and the vessel was prepared to move either one way or the other as soon as he came back.

"Late on the 21st, Mr. Kirke arrived. The opening in the N.E. had been traced for nearly thirty miles from the entrance, first to the N.E., and then to the W.N.W., till it was closed

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by high land far to the northward of Worsley Bay. Many deer were seen on the plains eastward of the inlet, and some were shot at, but escaped. Swans, ducks, and coots had been killed in such numbers, that on their return all the schooner's crew were plentifully supplied. Of this place Mr. Kirke says: 'At the commencement of the N.E. sound there is low land, which extends about thirteen miles up its shores. The entrance is three or four miles wide; but five miles up, the inlet is contracted to about half a mile in width, by a shoal connecting three islets with the western shore. These islets were literally surrounded by black-necked swans, mixed with a few which had black-tipped wings: the male of the latter has a peculiar note, which sounds like 'ken kank,' but the female only sounds 'kank.'

"'A few coots were shot in this neighbourhood, out of an immense quantity seen. In each of two flocks, I think, there must have been upwards of a thousand.

"'From these islets the sound trends nearly north for seven or eight miles, when it is again narrowed by an island, on each side of which there is a narrow passage for a vessel; but the eastern one is the best. The few bays near here are fit for small vessels only.

"'Beyond this island the face of the country begins to alter from low to mountainous land, with long flats in the valleys, and the sound also changes its course more to the N.W. Near a high bluff on the eastern shore, eight miles further up the sound, the land becomes higher and covered with snow; yet there are still a few level patches between the mountains. From this bluff the sound trends about a point more westerly for five or six miles, to a place where there is a small inlet, on the left, between two snow-covered, mountainous ridges. The water there was changed to a clayey-colour, and had a brackish taste. Continuing our course for two miles, I found a large expanse of water, the north end of which was limited by low land, backed by high snowy mountains in the distance; its southern extreme terminated at the foot of high mountains, also covered with snow; and had a large run of water from a

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glacier on the western side. In returning we saw some deer on the eastern shore of the low land, between the islands of the second reach, but could not get within gun-shot: they appeared to be of a dark colour, and fully as large as a guanaco. Some of our men thought they could distinguish small straight horns, but I could not myself see them.(*d*) I endeavoured to cross the isthmus, where Lieutenant Skyring had seen water from Focus Island, near Easter Bay, and first attempted it by the course of a fresh water river, at the head of the bay; but I found the country so thickly covered with stunted wood, about eight feet high, and exceedingly prickly, that I lost my way twice, and returned to the shore; I tried again however, about half a mile more to the eastward, and at last got to a high part of the land. When there, and mounted on another man's shoulders, I could scarcely see above the trees (which, at the roots, were not thicker than a man's wrist): there was evidently a large expanse of water, but I could not distinguish much of it. I think it probable that it is fresh, as the river, fifty yards wide, is rapid, and appears to run out of it. There is not any high land in the neighbourhood, whence such a run of fresh water could be supplied.

"'I saw numbers of deer tracks about this place, and the boat's crew observed three deer similar to those above-mentioned.'—(Kirke MS.)

"We weighed on the 22d, and towed out of Easter Bay, with the hope of repassing Kirke Narrow; but shortly afterwards so dense a fog arose, that we could distinguish no land, and were unable to profit by the advantage of a light fair wind, with otherwise favourable weather. In the afternoon, when it cleared up a little, we anchored in Fog Bay, on the west side of the channel, about three miles from Kirke Narrow.

(d) Mr. Kirke was rather short-sighted, and therefore unable to discern distant objects clearly. From the natives of Ponsonby land, between the Otway and Skyring Waters, I procured, and gave to Captain King, some short straight horns, and parts of the skins of animals, which were probably deer of the kind seen by Mr. Kirke, and, since that time, by Mr. Low, when he followed my track into the Skyring Water with his sealing vessel, the Unicorn schooner.—R. F.

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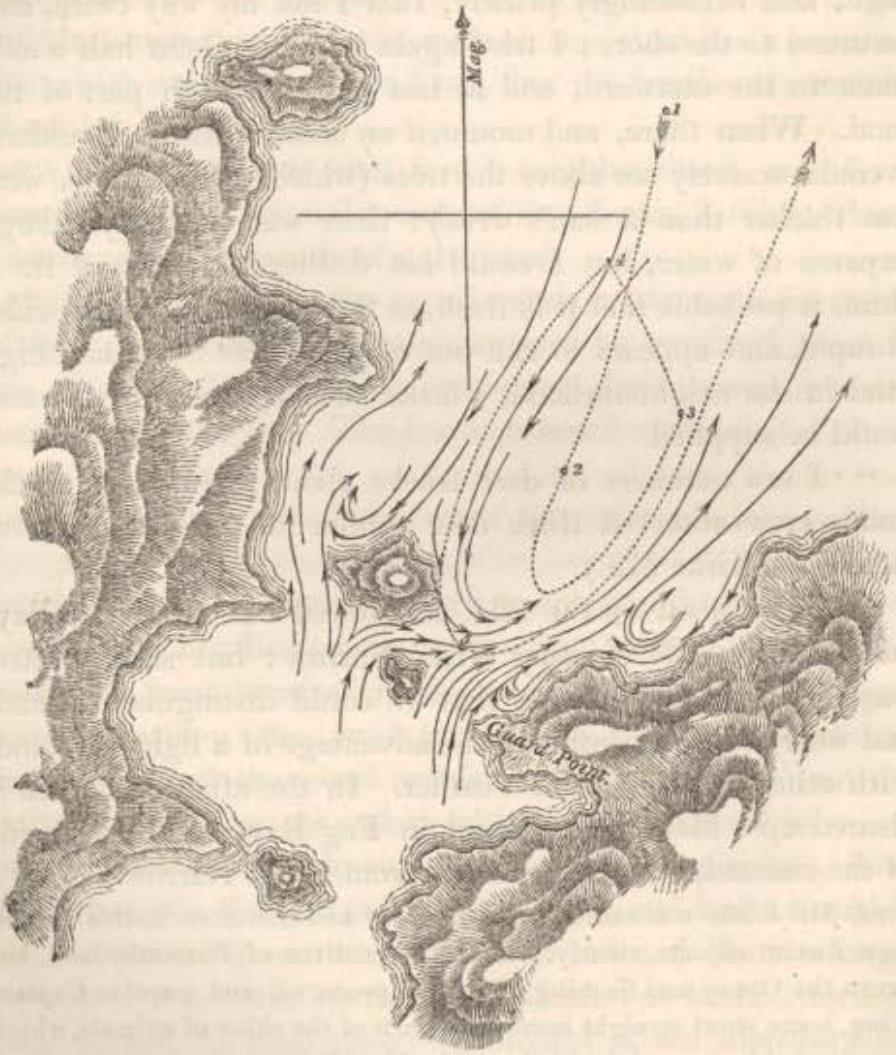
" (23d.) A thick fog confined us at our anchorage till eight, when, having some hopes of the weather clearing, we weighed, and stood for the Narrow, but a continued haze prevented us from entering until after noon. As we approached, no tide could be perceived, and again we were doubtful of our calculations, having expected to find it favourable, however, we steered for the islands. To give a better idea how we were driven about as we tried to approach this Narrow, I have attempted, in the subjoined plan, to show the direction of the currents, and the courses we were carried by the eddies.



" The wind was light from the north-eastward. Upon our reaching the station marked 1, without having previously

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noticed any current, we observed a strong rippling in the Narrow, and immediately sent the boats a-head to tow us towards mid-channel. We proceeded rather quickly until we arrived at 2, when our progress was checked, and we were carried rapidly back, as far as 3. In the Narrow the tide was evidently against us; but in crossing to the N.W. at 4, we were forced by the counter-current against all the efforts of the boats—were carried close to the large island—and for the space of thirty yards, were brushing the overhanging trees with our main-boom. This part was, most fortunately, quite steep; for had the vessel touched in her swift course, she must have been swung with violence against the rocks, and much damaged, perhaps irreparably.

"No sooner had we passed the end of this island, than we were shot into mid-channel to 5, and then as suddenly and swiftly carried back by the stream of the tide. The boats could never keep hold of the vessel while in these whirlpools; and it was several times fortunate that they had cast off the tow-rope in time, for thrice we were twisted round, as if on a pivot, by those violent eddies.

"A favourable moment was seized, the boats were again sent a-head; and, by great exertions, we were towed out of the influence of the tide, and then waited for the time of slack water.

"At three o'clock Mr. Kirke was sent to Guard Point, to ascertain the time of high water; and at half-past four, in consequence of his signal, we towed in with both boats, and passed the islands with a favouring tide; but one quarter of a mile farther, we met ripplings, which we had no sooner entered than a reverse of tide was found, as if the waters from the sounds were gradually forcing back the tide of the channel. We still, however, made progress to the S.W.; but it was not before eight o'clock that we anchored in the west entrance of this Narrow, pleased, indeed, to be again secure, and to have escaped unharmed.

"24th. Thick, hazy weather in the morning; but at eight o'clock it cleared a little, so we weighed, and soon reached the

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Ancon of Sarmiento. A strong S.E. wind, during the forenoon, carried us past Cape Año Nuevo, and at noon we were near the opening into Smyth Channel, which I have called Victory Passage. We moored in Sandy Bay, in eight fathoms, purposing to remain during the next day (Sunday); and on the 26th, with a moderate wind from the northward, we left Sandy Bay, and stood to the south, passed the Elson Islands by noon, and at three moored in Hose Harbour. Next day we cleared Smyth Channel, and anchored in Deep Harbour.

"(28th.) Wind light and northerly. We towed out of Deep Harbour at daylight, stood across Beaufort Bay, and anchored in Tamar Bay; where, the weather being unfavourable, we remained during all the next day, filling water and cutting wood,—preparatory to our run to Monte Video,—in case of not finding the Adventure at the appointed rendezvous, Port Famine.

"On the 30th, with a moderate breeze from the N.W., we left Tamar Bay; but the wind soon after becoming contrary, we made but little progress, and anchored that evening in a small cove, near the east point of Upright Bay, where we passed the following day, in consequence of the wind continuing easterly, and causing much sea in the Strait.

"2d. Weighed, stood out, and made all sail, steering through the Strait. We passed Playa Parda early that afternoon, and Cape Quod soon afterwards, and as there was every appearance of a moderately fine night, continued our course. We hauled in near Port Gallant, when it grew dark, and burned a blue light, to call the attention of any vessel lying there; but no return was made, so we passed on. At midnight we were between Cape Holland and Cape Froward, the wind being light and the weather moderate.

"3d. On rounding Cape Froward, we beat up in-shore against a N.N.E. breeze, and in the evening were three or four miles to the northward of Point St. Isidro. After a tempestuous night, we reached Port Famine, where, to our great joy, we found the Adventure."

With the exception of such fish and birds as had been pre-

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viously observed near the Strait, Lieutenant Skyring and his party saw few living creatures. One novelty which Mr. Bynoe gave me was a splendid corvorant, which, being quite new, and the most beautiful of the genus, I named *Phalacrocorax Imperialis.**

I also received a species of swan, quite distinct from the common one of the Strait, which has been long known as the black-necked swan (*Anser nigricollis* of Ind. Orn., ii. 834; and Latham, x. 223). Considering it an undescribed species, it was named *Cygnus anatodoides.*†

Several deer were seen, but none obtained. There is reason, however, to suppose them to be of a novel species. The horns are short and straight.

* *Phal: capite cristato, collo posteriori, corporeque supra intensè purpureis; alis scapularibusque viridi-atris; remigibus rectricibusque duodecim fusco-atris; corpore subtus, fasciâ alarum maculâque dorsi medii sericeo-albis; rostro nigro; pedibus flavescentibus. Staluria Phal. Carbonis.* It was found in the Inner Sounds, within the 'Ancon sin Salida.'—Proceed. of the Zool. Society, vol. i.; also Phil. Magazine, for March 1831, p. 227.

† *C. albus remigibus primariis ad apicem nigris, rostro pedibusque rubris, illo lato subdepresso.* Molina describes a Chilian duck thus. Anas Coscoroba—*A. rostro extremo dilatato rotundato, corpore albo,* but I do not think it is the same as my specimen; certainly it is not *Anser Candidus* of Veillos, the ganso blanco of D'Azara, which the author of the Dict. D'Hist. Nat. (xxiii. 331.) supposes to be the same as A. Coscoroba (id. p. 332). Molina's description is very short, and does not mention the tips of the primary wing feathers being black.

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CHAPTER XX.

Beagle sails from San Carlos—Enter Strait—Harbour of Mercy—Cape Pillar—Apostles—Judges—Landfall Island—Cape Gloucester—Dislocation Harbour—Week Islands—Fuegians—Latitude Bay—Boat's crew in distress—Petrel—Passages—Otway Bay—Cape Tate—Fincham Islands—Deepwater Sound—Breaker Bay—Grafton Islands—Geological remarks—Barbara Channel—Mount Skyring—Compasses affected—Drawings—Provisions—Opportunities lost.

Captain Fitz Roy having received his orders on the 18th of November (see Appendix), sailed the following morning from San Carlos, and proceeding to the southward, approached the entrance of the Strait of Magalhaens on the night of the 24th. The following are extracts from his Journal :—

" At daylight on the 25th, with the wind at S.W., we made Cape Pillar right a-head (E.N.E. by compass), distant seven or eight leagues. The wind became lighter, and we were set by a current to the S.W , which obliged us, in nearing the Cape, to alter our course from E.N.E. to N.N.E., to avoid being carried too near the Apostle Rocks. A dangerous rock, under water, on which the sea breaks, lies half a mile more towards the north than either of the Apostles. Cape Pillar is a detached headland, and so very remarkable that no person can fail to know it easily.

" A very good latitude was obtained at noon, from which, and the astronomical bearing of the Cape, we made its latitude within half a mile of that given in the chart by Captain Stokes and Lieutenant Skyring ; and the weather being clear and fine, sketches were taken of all the surrounding land. At one, we passed the Cape, and at three, anchored in the Harbour of Mercy. By the distance we had run, as shown by the patent log and compared with the chart, there had been a current against us of more than a knot an hour.

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" In working into the harbour we passed over several patches of kelp, under which the bottom was plainly visible; but the lead never showed less than five fathoms, until we were about to anchor, when the vessel shot a-head into a weedy place, where we had three fathoms. This was about a cable's length in-shore (towards the highest mountain) of the spot marked by Lieutenant Skyring as good holding ground, to which we warped and anchored. It proved to be very good ground, being extremely tough clay.

" 27th. A promising morning tempted me to try to obtain observations and a round of angles on or near Cape Pillar. I therefore left the ship with the master, and went in a boat to the Cape. To land near it in much swell was not easy upon such steep and slippery rocks: at last we got ashore in a cove, and hauled the instruments up the rocks by lines, but could get no further, on account of precipices. I, therefore, gave up that attempt, and went outside the Cape, to look for a better place; but every part seemed similar, and, as the weather was getting foggy, it was useless to persevere. In going to the Cape, and in returning, I measured the distance by a patent log, and found the mean of the two measurements agree with the chart. What current there was, ran to the westward.

" A small ox, which we had carried from Chilóe, was doomed to end his voyage at this place, and probably we were the first people who ever eat fresh beef in the Strait of Magalhaens.

" 28th and 29th. Gloomy days, with much wind and rain; and the gusts coming so violently over the mountains, that we were unable to do any work, out of the ship.

" 30th. Still blowing and raining.

" Dec. 1st and 2d. Cloudy days, with strong wind; but one short interval of sunshine was gladly made use of for rating our chronometers.

" 3d. This morning we weighed, and worked out; and at one P.M. we were three miles westward of Cape Pillar, with every appearance of a N.W. gale. Shortly after, the weather became so thick, that I could not see any part of the coast; and therefore stood off shore, under low sail, expecting a bad

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night. Contrary to my expectation, the wind did not much increase; but the thick weather, and a heavy swell, induced me to stand farther out than I had at first intended. At eleven, P.M., we wore and stood in until daylight on the 4th, when we found ourselves so much to the southward, that the land about Cape Pillar bore N. b. W., the Cape itself being shut in. We steered for the land, hoping to turn the day to some account; but those hopes soon ceased, for before we had run sufficient distance to make a serviceable base line, the weather became so thick as to oblige us to haul our wind. We saw just enough to make out a number of rocks and breakers, lying at a considerable distance off shore. After noon it was clearer, and we again stood in-shore; but found that the current was setting us so fast to the southward, that it was necessary to carry all sail and keep on a wind, to avoid losing ground; yet, with a fresh, double-reefed topsail breeze and a deeply laden weatherly vessel, we could not hold our own, and at seven in the evening were close to an islet which lies off Cape Sunday. We had seen very little of the coast thus far: the current had rendered the patent log useless for measuring bases, and the weather was very unfavourable for astronomical observations. The land appeared to be high and mountainous, as far as Cape Deseado, whence it seemed lower and more broken, forming a large bay between that cape and Cape Sunday. Many rocks on which the sea breaks violently lie at a distance from the shore, besides those two clusters called the 'Apostles' and the 'Judges:' the latter off Cape Deseado, and the former off Apostle Point, a little south of Cape Pillar.

"5th. To our mortification, we found ourselves a great way off shore; and Landfall Island, which was eight miles to leeward the last evening, was now in the wind's eye, at a distance of about six leagues. A strong wind, with much swell, prevented our regaining lost ground in a northerly direction, I therefore preferred standing to the S.E. by the wind, intending to seek for a harbour, as it seemed hopeless to try to survey this coast while under sail, with such obstacles to contend against as a current setting about a mile an hour, and a sky

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generally clouded over. Our only chance appeared to be, going from harbour to harbour and keeping close in-shore.

"Behind Landfall Island the coast forms a deep bay, apparently full of islands, and it is said there is in that part a communication with the Strait of Magalhaens. Looking from seaward there seems to be an opening.

"From the southern point of this bay the coast presents a high and regular line for a few miles, and then there is a succession of islets, rocks, and broken land. We stood in close to the breakers, but too late in the evening to find an anchorage. I observed kelp on the surface of the water, growing up from the bottom, while the lead gave a depth of forty-five fathoms. This was in a wild-looking, open bight, full of rocks and breakers, and much exposed.

"We stood off, close to the wind, hoping to make northing and westing during the night; but at midnight it fell calm, and at day-break on the 6th, to our astonishment, we found ourselves to the southward of Cape Gloucester, a high, remarkable promontory, standing out from the land as if it were an island, with a peaked top, which, from the southward, appears notched. The day proved very fine, and as a breeze sprung up from the S.E. and gradually increased, I had hopes of seeing more of the coast, along which we had been hustled so fast, and so much against our inclination.

"In running along shore, I noticed several inlets that seemed likely to afford good harbours. This coast has not, by any means, such a rugged and harsh appearance as I expected; but the number of islets and breakers is quite enough to give it a most dangerous character. The land is not very high near the sea, and seems to be wooded wherever the prevailing winds will allow trees to grow. Soundings were taken at various distances within four miles of the shore, and the depth generally was between twenty and one hundred fathoms. A good idea may be formed of the current which had taken us to the S.E., when I say that, even with a fresh and fair wind, it occupied us the whole of the 6th to regain the place we had left the previous evening.

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"7th. At daylight it blew half a gale of wind; but we stood in, a little south of the cluster of rocks, called the Judges, towards a part of the shore which promised to afford a harbour. On closing it we saw an inlet, apparently large; but so fortified at the entrance by rocks and breakers, that I did not like to run in, without first sending a boat; yet it blew too strong, and there was too much sea, to lower one; therefore I stood off to wait for more moderate weather, for the place suited my purpose exactly, being near enough to the Judges, and Apostles, to fix their situation. This morning, Mr. Murray slipped across the forecastle and dislocated his shoulder: an accident which deprived us of his services for some time, and on account of it, we called the place where we anchored soon afterwards, Dislocation Harbour. So many rocks lie off this coast, that a vessel ought not to approach it unless she has daylight and clear weather. The lead will give warning, should the weather be thick, as soundings extend at least to four miles off shore, at which distance there are from thirty to one hundred fathoms, and generally speaking, there is less water as you approach the land.

"On the 8th, 9th, and 10th, we were busily occupied in surveying the harbour and adjacent coast. In this place water may be obtained very easily, as boats can lie in a fresh water stream which runs from the mountains. Wood is also plentiful. The harbour is large enough for four small vessels, and the bottom is very even, from fifteen to twenty-five fathoms, fine white sand. The entrance is narrow, but all dangers are visible, and now are laid down in the chart. It is much exposed to west winds, and the westerly swell, which might for weeks together prevent a vessel from getting out to sea.

"11th. A strong wind and much haziness prevented my weighing until near noon, when it became more moderate, though the weather was still thick. We then worked out with a light and variable breeze, which baffled us near the entrance, but at last we gained a good offing. I rejoiced to be outside, for our business in the harbour was over, and I had feared that west winds would detain us. The promontory, just to the southward of Dislocation Harbour, appeared to me to be 'Cape

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Deseado,' and that to the northward I called Chancery Point. Mr. Wilson ascended some heights at the back of the harbour, from which he saw many lakes, among barren and rugged hills; but a farther view was obstructed by other mountains.

"An oar was picked up near the watering place, and recognised by one of the men as the same which was left on a rock near Cape Pillar (in Observation Cove) by Captain Stokes, in January 1827. There could be no doubt of the fact, as the man's initials were on the oar, and it is curious as a proof of an outset along the south side of the Strait (near Cape Pillar), and of its continuation along shore. Traces of a fire were found, which showed that the natives visit even this most exposed part of the coast. The land about here is high, and craggy; and very barren, except in the valleys, where much wood grows. Some wild fowl were seen and shot.

"From Cape Deseado, the coast is high and unbroken for three miles; (a rocky islet lies about a mile from the shore) then there is an opening which probably leads into a good harbour behind a number of islands. Several islands succeed, for a space of two miles, after which is Barrister Bay; an exposed place, full of islets, rocks, and breakers, extending nearly to Murray Passage. In sailing along this coast we passed inside of several breakers; and, I hope, noted all that lie in the offing: but, we cannot be sure, for breakers on rocks which are under the surface of the sea do not always show themselves. As it was getting dark, we hauled to the wind, near Cape Sunday, and, in doing so, were startled by a huge breaker which suddenly foamed up at a small ship's length from us. Although looking out on all sides we had not previously seen any break near that spot. During the night we carried a heavy press of sail to avoid being drifted to the S.E., and at daylight I rejoiced to find that we had not lost ground, so we steered for the land, and rounded Graves' Island. Observing several openings, I hauled close round a point, and tried to enter one of them; the wind, however, baffled us, and our anchor was let go in an exposed berth, but on good holding ground. We found a cluster of islands with so many anchorages between

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them, that thinking they ought to be surveyed, I returned on board, weighed, and worked towards the nearest opening. We shot into it, and warped to a berth four cables' lengths up a narrow passage, and anchored in twenty-four fathoms, upon sand and clayey mud.

"13th. Many wigwams were found in this neighbourhood, which showed that our Fuegian acquaintances were occasional visitors. The inner harbour seemed to be a fine basin; but the bottom was found inferior to that of the anchorage at which the Beagle lay moored.

"15th. Strong wind and frequent rain prevented much being done out of the ship this day. I went to the top of a mountain near the ship, but could not take many angles because of the violent squalls and the rain. At night it blew a hard gale: the squalls came furiously over the heights, and obliged us to let go a third anchor and strike topmasts. We were quite sheltered from the true wind; but were reached most effectually by the williwaws, which came down with great force. However vexed we might have been at not being able to go far from the ship, we were certainly very fortunate in escaping this gale at a secure anchorage. It appeared to be blowing very heavily at sea.

"16th. A strong gale all day, with much rain, prevented our leaving the ship. In coming down a height on the 15th, I found some red porphyry rock, like that about Port Desire; and the first I had seen in these parts. Another novelty was a tract of about two acres of pure white sand thinly covered with grass.

"Though the middle of summer, the weather was not much warmer than in winter. The average height of the thermometer was about ten degrees greater; being nearly the same, as during the months of August and September, in Chiloé.

"17th. A continuance of bad weather: no work was done in the boats this day. In the afternoon I tried to go up the mountain I had ascended on Tuesday, to bring down a theodolite which I had left at the top; but the wind obliged me to return unsuccessful.

"18th. Similar weather continued until noon: frequent strong

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squalls, and rain: the sky being so constantly overcast that we saw neither sun nor stars. Although no progress was made in this weather, it was some satisfaction to think that we lost nothing but time; and that we saved much wear of the vessel by lying at anchor instead of being at sea. Being more moderate in the afternoon, our boats went away, and the ship was prepared for sailing. We tried to get some fur-seal, which were seen on a rock near the harbour, but they were too wary.

"My boat was almost capsized by a 'blind breaker,' which rose suddenly underneath her, and in an instant she was surrounded by and floated upon a white wave of foam, which broke all round and over, but without upsetting or swamping her.

"19th. Weighed and ran across to an anchorage in Landfall Island which I had seen from the heights. We anchored in a sheltered bay lying on the north side of the larger island, at the east opening of a passage which separates it from the smaller. These islands are high and, towards the sea, barren; but the sides of the hills, towards the east, are thickly wooded.

"A large smoke made near the bay showed us, that the Fuegians were in possession of our intended quarters; and soon after we anchored, a canoe came off to us full of men, women, and children, sixteen in all. They were in every respect similar to those we had so frequently met before; and from their unwillingness to part with furs or skins, unless for serviceable articles, such as knives, &c. appeared to have had dealings with Europeans: beads and trinkets they did not value. They had, in the canoe, many eggs, and dead birds, which they eat raw: the birds were a light blue, or dove-coloured, petrel, about eight inches long, which goes on land for a part of the year to lay eggs in holes in the ground. During this and the following day, we were fortunate enough to obtain observations, and nearly all the necessary bearings and angles.

"As yet I was pleased with the anchorage; the bottom shoaled gradually from twenty to five fathoms (fine sand), and it was sheltered from west winds, besides others, except north. Having obtained particularly good observations for latitude at

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this spot; I called it Latitude Bay. It is remarkably easy of access, and is also easy to leave: rather rare qualities in a Fuegian Harbour. Cape Inman being prominently situated, is a good guide to the anchorage.

"Sunday 20th. A fine day; and, knowing its value, we turned it to account. From a height I saw Cape Gloucester and the point of land on this (the northern) side of it; and to the northward I could distinguish the land about the entrance to the Strait. The Landfall Islands appeared to be the top of a ridge of mountains lying (partly below the sea) in the same direction as most of the neighbouring ranges. Many dangerous rocks lie off the S.W. side; and there is no passage for a ship between the islands, for the opening is narrow, and has only two fathoms in some places.

"21st. This morning I sent the master and Mr. Wilson* in a whale-boat to the east end of the island, to make a plan of that part, and get some angles and bearings necessary for continuing the survey.

"22d. A bad day, blowing hard and raining. The wind being from north and N.N.W. threw in a swell; and as we were not yet sure of the quality of the bottom, though apparently good, we struck topmasts and veered away a long scope of cable.

"24th. The wind shifted to the S.W. and became rather more moderate, though still squally, with much rain. It freshened again in the night, and backed to the northward.

"Christmas-day. Blowing strong from N.N.W. with a thickly clouded sky and heavy rain. I was very anxious to see the master return, but he could not in such weather. I feared that his provisions would be exhausted, having taken only enough for four days; yet they had a good tent, guns, and ammunition.

"26th. A strong wind with thick weather and much rain throughout the whole day. There was no possibility of sending a boat to the master, or of his returning by water. The island being very narrow he, or some of his party, could walk across,

* Mate, lent to the Beagle, from the Adventure.

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if they were in want of provisions, so as we did not hear from them I trusted that they had found wild fowl enough, and were not in distress.

"27th. Rather a more moderate morning with clearer weather. We looked out anxiously for the whale-boat, as, in such weather, she might get back to the ship without much difficulty. Before noon Mr. Wilson and the coxswain were seen on shore making signals to the ship; and a boat was sent immediately to bring them on board. They were very weak and tired, having walked across the island during the preceding afternoon and night, and having had no food for the last two days. The master and the other four men were said to be in a cove at the back of the island, and to have been without provisions since the 24th, not having been able to find either shellfish or wild fowl.

"At the time Mr. Wilson arrived on board, I was absent taking angles and bearings, but was soon informed of his return, and at noon left the ship with a week's provisions for the master's party and my own boat's crew. I had not lost sight of the Beagle when I met the former returning. Having given them some food, and two fresh hands to help them in pulling to the ship (it being then quite moderate and fine) I continued my course to the place they had left, in order to do what the bad weather had prevented the master from doing. Being favoured with a fine afternoon I succeeded in obtaining the necessary angles and bearings, and returned to our vessel the following morning.

"28th. At my return I found the master and his party nearly recovered. They had tried every day to return to the ship, but had been repeatedly forced back, at the risk of being driven out to sea. The gusts of wind from off the high land were so powerful as almost to upset the boat, although she had not even a mast up. Continual rain had wetted their ammunition and tinder, and they were then without fire or victuals: upon which Mr. Wilson and the coxswain set out, on Saturday afternoon, to acquaint us with their situation.

"When they came down to the sea-side the Fuegians took

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advantage of their weak state to beat the coxswain and take away some of his clothes; therefore after my return I went in search of them. They had however taken the alarm, and were all gone away. This party consisted of about twenty persons, eight of whom were men, and the rest women and children. When some of our officers went to their wigwams they appeared armed with clubs, spears, and swords, which seemed to have been made out of iron hoops, or else were old cutlasses worn very thin by frequent cleaning. They must have obtained these, and many trifles we noticed, from sealing vessels. By the visits of those vessels, I suppose, they have been taught to hide their furs and other skins, and have learned the effects of fire-arms. The chief part of their subsistence on this island appeared to be penguins, seal, young birds, and petrel which they take in a curious way. Having caught a small bird they tie a string to its leg and put it into a hole where blue petrels lay eggs. Several old birds instantly fasten upon the intruder, and are drawn out with him by the string.

"We weighed and worked out of the bay, increasing our depth of water very gradually as we left the shore, but having always the same bottom, fine speckled sand. I can safely recommend this bay as a good anchorage for shipping, and two cable's lengths N.N.W. of the Beagle's berth as the best place. Wood and water are not to be found so close to the anchorage as in other Fuegian harbours, but they may be obtained with very little trouble, and in any quantity, by going up the passage (between the islands) to one of many streams which run from the high land. There is plenty of water also very near the best berth, on the south side, but frequently a surf breaks on that beach. Two particular advantages which this roadstead* possesses, consist in the ease with which a vessel can enter or leave it, during any wind; and in its situation being well pointed out by a remarkable headland, named Cape Inman (in compliment to the Professor), which is high, with perpendicular cliffs, and almost detached from other land; so that a vessel,

* A small vessel may moor between the islands, instead of lying in the outer road.

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knowing her latitude within five miles of the truth, cannot fail to make it out, if the weather is tolerably clear. Wild fowl and shell-fish were very scarce there, probably because the Fuegians had scared or consumed them. From the top of a mountain, at the east end of the large island, I saw a great way down two channels or openings, which appeared to run far to the eastward, among many islands and very broken land. Such a succession of islets, rocks, and breakers, as the coast presented, was astonishing: many hundreds were counted while looking eastward from one station only.

"I wished much to know where these openings led, and whether there was a direct communication through them to the Strait, as seemed almost certain; but considering the time already spent, the extent of coast to be surveyed, and the small advantage of such information, except to satisfy curiosity, I determined to proceed to the next prominent headland, a mountain at the S.E. extremity of Otway Bay, whose position I had already fixed with respect to stations on Landfall Island.

"If there is a passage through those openings into Otway Bay, it must be unfit for vessels, being hampered with outlying rocks and breakers among which she could find no shelter in the event of rainy weather coming on before she cleared them; and clouds and rain are prevalent. As yet we had been extremely fortunate, in being under sail at intervals of fine weather, and anchored during the gales; but this was partly owing to a very careful attention to the barometer and sympiesometer.

"Having left Latitude Bay, we stood off until midnight, and then in shore again, carrying a press of sail all the time, in order to 'hold our own' against our old enemy, the current.

"At daylight (29th), not having been swept to leeward by the current, we were in a good position for continuing the survey from the place left the previous night. We bore up as soon as the land could be distinctly seen,—rounded Landfall Island very near the outer rocks, and then steered for Cape Tate (the extremity of the mountain I mentioned yesterday). Those outlying rocks are not very dangerous, as the sea

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always breaks violently upon them. In crossing Otway Bay, the morning being clear, I was enabled to add considerably to what had been already learned respecting the shores and dangers around it.(*e*)

"Off Cape Tate, to the north and west, lie the College Rocks. Those nearest the Cape are also nearest the track of a ship running along the land, and half a mile west of them lies a detached and dangerous rock, under water. The sea generally breaks on it.

"We had very thick weather when close to those rocks, which obliged us to 'haul our wind' for half an hour; when, as it cleared, we steered round Cape Tate, about a mile off shore. I was in hopes of gaining an anchorage between it and the Fincham Islands, and therefore kept as near the land as I could; but seeing numerous breakers a-head and outside of me, I altered our course, and steered to go outside of all the rocks. After we had passed some of them, a large bight opened out to the north-eastward, and tempted me to haul up for it. We entered the sound at noon, and stood on for nearly four miles without finding an anchorage, or even gaining bottom with fifty fathoms of line, although at the entrance we had from twenty to ten fathoms. Thick weather coming on, made me very anxious to anchor somewhere, and we were now too much hampered to stand out again. We appeared to be among a multitude of islands, very near each other, yet without any anchorage between them; therefore, having no other resource, we let go both anchors upon the end of a steep-sided islet, where one fell into seven, the other into ten fathoms water, and hooked the rocks. Veering half a cable on each, we found forty fathoms under the stern, with a similar rocky bottom; so that we had the pleasant prospect of shouldering both our anchors, and drifting into deep water, with the first strong squall. During the remainder of that day, our boats were looking for better anchorage, but without success; they found patches of rocky

(*e*) In Otway Bay, not far from Landfall Island, is a rock on which Mr. Low found Fuegians living among a number of (apparently) tame seals. See second volume.—R. F.

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ground with from ten to twenty fathoms here and there, but not one that could be preferred to our islet.

"30th. One Fuegian family was found here, consisting of a man and woman, with their children. During this day it rained too hard for anything to be done out of the ship; the wind was moderate; yet much as I disliked our rocky berth, it could not be changed.

"31st. Moderate wind, with clearer weather. Mr. Murray and Mr. Stokes went away to different parts of the sound, while I was employed near the ship. Observations for latitude, longitude, and variation were made.

"1st January. During part of the last night and this morning, the wind blew strongly in squalls, and made me very anxious; but the weather rendered it impossible to move voluntarily, for it was raining hard as well as blowing. At about eight it cleared, and the wind shifted to the southward, when we weighed, and worked down the sound; but it was after noon before we had cleared its entrance, and seven in the evening before we were outside of all the breakers, the wind having been light and contrary the whole time.

"(2d.) At five this morning, being close to the Fincham Islands, with clear weather, and a fresh breeze from the N.W., we steered into Breaker Bay, towards a ragged-looking projecting point. Having approached as near as we could, and sounded, and taken angles, we steered so as to pass outside of some very outlying rocks, near the middle of the bay; for in-shore of them, I saw from the mast-head numerous breakers, rocks, and islets, in every direction. A worse place for a ship could scarcely be found; for, supposing thick weather to come on when in the depth of the bay, she would have lurking rocks and islets just awash with the water, on all sides of her, and no guide to take her clear of them, for soundings would be useless; and in such weather, the best chart that could be constructed would not help her. With this idea of the place, and for reasons similar to those which induced me to pass hastily across Otway Bay, I steered for Cape Gloucester, after passing the Midbay Rocks, at the distance of a quarter of a

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mile. The land at the bottom of the bay appeared to be distant, and much broken. Indeed, from the Week Islands to Cape Gloucester,(*f*) there is an almost innumerable succession of islands and rocks, without any continued tract of land, so that channels might be found in all directions; valuable, no doubt, to Fuegians in their canoes, but not often to seamen in ships, nor even to sealers; for where the natives go with their canoes, seals are never found in any numbers.

"In crossing Breaker Bay, even with a moderate wind, there was a very cross and awkward sea, owing, doubtless, to the ocean swell rolling into this deep bight. Such a swell would add much to the difficulty which vessels might find in getting out of this bay: I should therefore recommend them to avoid it particularly. Cape Gloucester is a most remarkable promontory, which can never be mistaken, after seeing even an indifferent sketch of it. At a distance it makes like a mountain rising out of the sea, but, on approaching nearer to it, a narrow neck of land appears.

"We found from twenty to thirty fathoms water, at the distance of a mile from the cape; and saw several outlying breakers about half a mile off shore. From the steep and rocky nature of these coasts one would not expect to find soundings until close to the land: but on every outer part of this coast, that we have visited, the bottom may be reached with the sounding line. Some natives were seen under the cape, who made a large fire. We stood into two bights, looking for anchorage, but, finding only rocks and breakers, steered along shore, rounded Ipswich Island, and hauled into a spacious bay, at the northern side of which there appeared to be several openings like harbours. In working across, we were agreeably surprised to find it a continued roadstead, open only towards the S.E., and having regular soundings, from twenty to fourteen fathoms. We anchored about a mile from the entrance of what seemed to be a harbour, at the N.W. corner, having worked up against a fresh N.W. wind. Our anchor was dropped in sixteen fathoms, and held well. I went directly to

(*f*) And thence to the Strait of Le Maire.—R. F.

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look at the opening, and found a passage, in which were good soundings, leading into a very snug basin, perfectly sheltered from wind and sea, in which the bottom was composed of sand and clay, and the depth of water from five to fifteen fathoms. As soon as I returned we weighed and worked up to the entrance of the basin; then anchored, warped into it, and moored with half a cable each way.

"This was the most secure and sheltered cove I had yet seen. It was called Laura Basin; and the bay we had crossed was named Euston Bay. I was very glad to discover so safe a place, because it enabled me to ascertain the position of Cape Gloucester and the neighbouring land, with the correctness which so prominent a place required, and because I hoped that it would prove useful as a harbour for vessels. From the top of a high ridge surrounding the basin, I thought Cape Gloucester seemed to be about seven miles off, and seeing a valley lead some distance in the desired direction, determined to go to it overland. I was so much pleased with the bay and the basin, that I did not hesitate to spend some time in the examination of their vicinity. The mountains hitherto examined between Cape Pillar and these (the Grafton) islands, consist of greenstone, slate, or sandstone (excepting those near Deep-water Sound, which are of very coarse-grained whitish granite); and from the continual action of such heavy seas as break on those shores, the sandstone and slate rocks wear away, and by their detritus not only the bottoms of harbours are covered, but a bank is formed which extends into the offing. A moderate depth of water and good anchorages were found near slaty or sandstone hills, but exactly the reverse in the vicinity of granite.(*g*)

"4th. Early this morning I sent Mr. Murray in a whaleboat to examine and plan some openings I had noticed on the north side of Euston Bay; and Mr. Stokes to make a plan of the harbour, and the basin in which we were lying. The master carried six days' provisions with him, in case he should be detained, as on a former occasion, by bad weather. No place

(*g*) See second volume for further remarks on this subject.—R. F.

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could be more convenient than this for such purposes as wooding and watering; and we took advantage of it to the utmost by filling the ship's hold. The water casks were filled in our boat, in perfectly smooth water, and the wood was cut close to the water side.

"6th. A party of twelve, consisting of the Purser, Mr. W. Wilson, Mr. Megget, eight seamen and myself, set out from the ship, intending to walk to Cape Gloucester. We landed in a valley at the N.W. corner of the harbour and began our march, two men carrying the tent, and the others our instruments and provisions: we had arms also, in case of meeting Indians. Difficult travelling, with such a cargo, very soon obliged us to stop and rest, but by continual changes with the heaviest loads, and great exertion on the part of those who carried them, we got over two-thirds of our journey in the course of the day, and at night pitched our tent, and defied the rain which poured incessantly until seven the following morning: when every height was covered with snow, as if it had been the middle of winter.

"7th. As soon as we had breakfasted we moved on again, and at noon reached the foot of a mountain which forms the Cape. Leaving the others to pitch our tent and cook some victuals, Mr. Wilson, Mr. Megget, and two seamen, ascended the mountain with me. A very severe task we had, but at last gained the highest pinnacle, where there was just room to place the theodolite and kneel by it, at the risk of a puff of wind canting us over either side. A stone moved from its place, would have reached the water as soon from one side as from the other. It was not a very clear day, but sufficiently so to enable me to gain the desired angles and bearings. From this summit I had a clear view of that dangerous place Breaker Bay, and was more confirmed in the idea I had formed of it, and rejoiced that I did not stand farther in with the Beagle. Having thus succeeded, and buried two memorials, one cased in tin and the other in a bottle, we filled our pockets with pieces of the rock and returned; rather too quickly, for the steepness of the hill assisted us more than we wished. During our absence some Fuegians had appeared, who were quiet and

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inoffensive; but they seemed very distrustful of us, and, before sun-rise next morning, were all gone except one man. These natives seemed to be very active and went up the mountain in about half the time that our party required. They had two canoes with them, but how they had reached this place by water was puzzling, when the exposed bay they must have crossed and the prevailing weather were considered. Perhaps they had carried their canoes overland, being rather like the Chilote piraguas, made of boards sewed together.

"8th. We heard the voices of the Fuegians at day-break this morning; but at four o'clock only one old man remained, who was probably left to watch us. We began our return, rather stiff from previous days' exertions, and looking dismally at the high rugged hills between the Beagle and ourselves. The first ascent on our way back was the worst of all: how the men carried their cargo so well astonished me, for with a very light load I was glad to rest frequently. Breakfast revived us, and by taking afterwards a better line we avoided the steepest hills and found much easier walking. While resting at our meal the weather was so clear that I got bearings of Cape Inman and other points more than fifty miles distant. There was very little variety or novelty in this walk through a Fuegian island. The same kind of scenery and the same species of plants and shrubs were found which we had seen every where else in Tierra del Fuego. Being more or less rocky made the only change. Of quadrupeds, excepting otters and dogs, I saw no traces, nor do I think any were to be found. A large kind of snipe, by some called a woodcock, and quails, of a large and, I think, peculiar species, were often seen and shot. The latter are not by any means so well tasted as the European quail, and their flesh is darker and coarser. At seven this evening we were again on board the Beagle, not a little tired.

"Should any future voyager feel inclined to make a similar excursion towards Cape Gloucester, he had better not think too lightly of his task.

"9th. Mr. Murray returned, having been into many openings between the islands to the eastward, and having collected

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much information. This afternoon it blew a heavy gale, but in such a sheltered place we only felt a few williwaws. From Mr. Murray's account it appeared that this island and those adjoining it to the eastward are a cluster lying together, but quite separated from the mainland, or rather the main body of islands, by a channel opening northward into Breaker Bay, and to the southward into Stokes Bay. They were called the Grafton Islands.

"10th. We had a heavy gale throughout this day with much rain. Bad weather, while at a good anchorage, I did not at that time regret, as the materials for our charts accumulated fast, and afforded no leisure time while we were detained on board.

"11th. A favourable day allowed us to examine and sound the outer roads, and obtain a round of angles from the western extreme of Ipswich Island, which completed my triangulation. Landing there was dangerous, and ascending the hill extremely difficult, on account of thick tangled brushwood which grows about three or four feet high on every part of the east side, and is so matted together as to be almost impenetrable. We generally scrambled over this jungle, but sometimes crept under it.

"12th. A tolerably fine day. The sun was visible both in the morning and afternoon; and from different summits Mr. Stokes and I took angles. The sky being clear near the horizon gave us a wide range. Meanwhile the ship was prepared to sail in search of a new place at which to employ our instruments. I hoped that this basin, harbour, and roadstead, might be of service, and therefore spared no pains about them. Eight latitudes were obtained by sets of circum-meridional altitudes; with four different sextants: two by Mr. Stokes, the rest by me: and as they all agreed, within fifteen seconds, I supposed their mean to be nearly correct. The sights for time were good, and the chronometers were going so steadily that dependence may be placed upon the accuracy of their results. To a vessel bound round Cape Horn and meeting with an accident, or in want of wood or water, this place might be useful. It is very easy to find, and easy to enter or depart from with the prevailing westerly winds.

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"13th. We weighed and left the harbour, but the morning proved too hazy to allow of our running down the coast, therefore until eight o'clock we kept under easy sail in the roads. Being clear and moderate after that time, we passed Leading Island, and hove-to, to watch for a breaker near it. It broke but twice during the hour that we waited, therefore probably there is water enough to allow any vessel to pass in safety. At ten we bore up, and ran towards Isabella Island; my first object being to look for a place called by sealers 'Hope Harbour,' which, from what I could learn, ought to lie thereabouts. Its situation was not recognised by our boatswain,(*h*) who had been in it when sealing on this coast; so passing close to Isabella Island, we hauled our wind under the lee of the land, and came to an anchor in fifteen fathoms, sheltered from north to S.W. b. S. A high peaked hill, over the cove where I took observations, made this a suitable place for the business of the survey. Mr. Murray went up the height, while Mr. Stokes and I were employed near the water, till rain set in and drove us on board. This is the easternmost of the Grafton Islands. Beyond the channel, which separates them from the main body of islands, appeared a succession of broken land, not very high, but reaching apparently to a distant range of snowy mountains. The part nearest to us was a labyrinth of islets and rocks. Towards night the wind increased much, and drew to the S.W. and S.W. b. S. I was doubtful of our anchorage, and had the wind drawn one point more to the southward, we should have had a heavy sea to deal with, and must have slipped our cable.

"14th. It moderated again, and the sun showed himself enough to enable us to get sights, and be on board in time to weigh at nine. We had reason to think a sealing vessel had been along this coast not long before us, by the traces our boats found in several places. Indians also had frequented these islands, for their wigwams were found everywhere. Observations on shore made our anchoring here of some consequence, although as a

(*h*) Mr. Sorrell, formerly with Mr. Weddell, and since that time with Mr. Brisbane.—R. F.

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safe anchorage for other vessels, it is out of the question, being an exposed roadstead, with many rocks, both to seaward and in-shore. A sealer might use it, but not willingly I should think. As we ran towards the Agnes Islands, before a strong W.N.W. wind, many rocks and breakers showed themselves, and when we neared the islands, became numerous on each side of us. It would have been more prudent to have kept outside all of them; but I was anxious to find Hope Harbour, or run into the entrance of the Barbara Channel, and anchor in the north cove of Fury Island. Having passed the three Agnes Islands, and being nearly abreast of Cape Kempe,* our view became far from agreeable, for the sea, on all sides, seemed strewed with breakers; and how to steer so as to pass between them was perplexing. We were at this time running free, under treble reefed topsails, with top-gallant yards and masts on deck; the wind being strong from W.N.W., but the weather tolerably clear. Suddenly the boatswain hailed, 'Hard-a-port, a rock under the bows!' Round the little vessel turned, almost as fast as the order was given; but the thrill that shot through us was happily not the precursor of our destruction; for the supposed rock proved to be a huge whale which had risen close to the bows, and was mistaken for the top of a rock by the boatswain, who was looking out on the forecastle, while I was at the mast-head, and the 'hands' were upon deck. This part of the coast, from the Agnes Islands to Cape Schomberg, is the worst I have seen, it is so very broken, and has so many rocks and dangerous breakers lying at a long distance from the shore.

"At noon we were close to Fury Island; but the wind fell and prevented our making much progress. Fury Harbour, where the Saxe Cobourg was lost, is a wild exposed place, and, as the bottom is bad, it ought to be avoided by all vessels: there is but one patch of good ground, and that is very small.

"Passing round Fury Island, we entered the Barbara Channel, at the entrance to which stands Mount Skyring, a high, peaked, and most barren mountain, visible at a great distance.

* The three peaks, in-shore of Cape Kempe, are very remarkable.

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We all felt much additional interest in what was then seen, on account of the late survey in the Adelaide. Cape Schomberg and the Astrea Rock were easily known by Lieutenant Graves's sketch. To a high mountain, which in some views very much resembled the dome of St. Paul's, I gave that name (finding it out of the limits of Lieutenant Skyring's survey): it lies a short distance east of Cape Schomberg. A passage appeared to go to the eastward, passing from the Barbara channel, northward of Cape Schomberg and St. Paul's. Light baffling winds and an ebb-tide, of about a knot an hour, setting out of the Barbara, detained us until six P.M., between the Magill and Fury Islands; but soon after that hour we anchored in North Cove, a small but perfectly secure place. By reaching this anchorage, I had the satisfaction of being enabled to connect my work with Lieutenant Skyring's, and to take a fresh start for the next piece of coast. Hitherto we had been extremely fortunate, both with the ship and the boats; but such success could not be expected always.

"15th. Early this morning, Mr. Murray went in a whale-boat to the islands, near Cape Kempe, to ascertain the situations of some reefs and islets thereabouts, and sketch the outer coast. Mr. Stokes went in another boat to look for Hope Harbour, and examine part of the coast. The boatswain accompanied him, as he thought he knew his way by passages among the islands, although he had failed to recognise the place from the offing.

"16th. Bad weather, blowing a gale of wind and raining nearly all the day.

"17th. A squally and disagreeable day; but our boats made some progress.

"18th. Some Natives came alongside for a short time. As usual, we would not allow them to come on board, because of their being such dexterous thieves. A man to whom the canoe appeared to belong was far better featured, and more stoutly made, than any we had seen among the Fuegians. After bartering some of their very valuable property they left us.

"19th. Early this morning Mr. Stokes returned: he had

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been near enough to Hope Harbour, to see that it was in the Grafton Islands, and was one of the coves examined by Mr. Murray. He then returned as he had been desired; but made very good use of his time while away, by collecting materials for the charts. He fell in with a canoe under sail (the sail being a seal-skin); the first instance I had then known of a Fuegian canoe sailing. As far as Mr. Stokes could see to the northward, the land was very broken, or rather it was a mass of islands reaching to the base of a range of snowy mountains.

"North Cove is large enough to hold any vessel when moored; but the passage, in and out, is too narrow and difficult for a ship of more than three or four hundred tons, unless she uses warps. Being on the weather side of high land, but sheltered by low islands, williwaws do not annoy during westerly winds; but in a southerly gale I think they would be furious.

"My next task was to ascend Mount Skyring. As there was but little snow on it, and the ground quite clear of wood, the ascent was easy; but when at the summit I could not see far, because of low misty clouds. I had taken only a compass with me, intending to look round, and ascend a second time with my usual companion, a theodolite. After taking a few bearings, I moved the compass off its stand, and placed it on a stone; when, to my surprise, I found the bearing of a point, I had just been looking at, altered twenty degrees. Suspecting the cause, I put it on another stone, a few feet distant, and found the bearing again altered many degrees. I then examined the stones, and found there was much pyrites in them;* and that when broken, or struck against one another, they smelt strongly of sulphur. The compass was then replaced on its stand, and bearings of the same point taken from various spots, only a few feet apart, the point being many miles distant, and at each spot the compass gave a different bearing, and was very dull and sluggish, although it was a good Kater's compass, with a light card. Having thus satisfied myself of the very strong local attraction existing, I returned to the ship, intend-

* Specimens of the rock at the summit are in the collection at the Geological Society, numbered 184 and 188.

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ing to make no further use of a compass in this place; and as Lieutenant Skyring might have been deceived in his bearings from a similar cause, I hoped to procure a round of angles, with a theodolite set to a true bearing, which might be serviceable for his work, as well as my own. Many pieces of the stone, from different heights, were brought down; and in most of them were traces of metal.

"The peaked top of this mountain is a mere heap of loose stones of all sizes. Whether the rock has been shattered in this manner by frost, by volcanic fire, or by lightning, I cannot tell; but I should think, from its appearance, by all three. Many of the stones are vitrified, and many are porous, like pumice-stones, although not so light.

"20th. I again went up Mount Skyring, taking a theodolite with me; and as the day was perfectly clear, and free from clouds, every point of land was visible, which can at any time be seen from that summit. Mount Sarmiento appeared in all its grandeur, towering above the other mountains to at least twice their height, and entirely covered with snow. Having set the theodolite to a painted post, fixed on shore near the Beagle (five miles distant), from which I had previously obtained the exact astronomical bearing of the spot on which the theodolite was placed; I obtained a most satisfactory round of angles, including most of the remarkable peaks, islands, and capes, within a range of forty miles from the mountain. The day was so fine, that it was not cold on the height, nor was there any wind to disturb the adjustment of the instrument.

This business being completed, I returned on board with Mr. Wilson, who, during the time I was on the height, made some very good sketches. Even at this early period his drawings were becoming a valuable addition to the gleanings of our cruise, and their number increased fast; for he took much pains with them, and produced not only good drawings, but most accurate delineations of the coast.

"21st. Fine weather for this climate. Mr. Murray returned in the whale-boat, having had a successful trip.

"By shooting and fishing we obtained frequent change of

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diet, for we shot much wild fowl (geese, shags, and ducks), and caught fish in the kelp, which were excellent eating. All that could be procured was regularly and equally distributed to the different messes in turn, and an account kept in a 'game book.' (Appendix.)

"22d. Mr. Stokes went to examine Fury Harbour, and returned late at night. In consequence of his account of the remains of the Saxe Cobourg sealing schooner, lost in that harbour, I sent a boat with the carpenter to collect from it some wood and bolts which might be useful to our ship, and remained at anchor for a day longer than I had intended.

"This day all hands were put upon two-thirds' allowance, but as it was a measure which affected the crew much and myself not at all, I was reluctant to give the necessary order, without first proposing the measure openly, and giving the following reasons:—

"Having succeeded beyond expectation in the examination of the coast thus far, and hoping to be able to continue the survey in the same manner, while our provisions lasted, I thought it better to shorten the allowance while all hands were well and hearty, and could obtain supplies of fish and wild fowl, rather than at a later period, when we might be otherwise situated. An extent of coast lay before us, and the parts particularly pointed out by Captain King, were yet unexamined.

"24th. A tolerably fine day; I tried all the compasses on shore, in three different places, placing them in a line to a distant mark; because in taking bearings, for the variation of the compass, during previous days, I had found very wide differences between the results of the same, as well as different compasses; and they were also very sluggish; the light cards being more so than the heavy ones. I found it impossible to reconcile their results by change of place or position, therefore it is probable that all the rock affected the needle; and I suspect that not only this island and the one on which Mount Skyring is situated, but most of the islands near are magnetic: particularly a cluster lying about a mile to seaward of the Magill Islands, on which, I believe, Lieutenant Skyring, or some of his party, took bearings. A boat was sent to

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watch the tide, on the day of new moon, at the entrance of the channel, and brought back a piece of the rock of which the last-mentioned cluster of islets consists. It is similar to that of Fury Island and Mount Skyring, apparently metallic, with a sulphureous smell, when struck or broken.* Small pieces put near the compass did not seem to affect it sensibly; but I did not spend time in trying the experiment with nicety, being satisfied of the general result. There may be metal in many of the Fuegian mountains, and I much regret that no person in the vessel was skilled in mineralogy, or at all acquainted with geology. It is a pity that so good an opportunity of ascertaining the nature of the rocks and earths of these regions should have been almost lost.

"I could not avoid often thinking of the talent and experience required for such scientific researches, of which we were wholly destitute; and inwardly resolving, that if ever I left England again on a similar expedition, I would endeavour to carry out a person qualified to examine the land; while the officers, and myself, would attend to hydrography."

* Geological Society, Coll. No. 197.

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CHAPTER XXI.

Skyring's chart — Noir Island — Penguins — Fuegians — Sarmiento — Townshend Harbour—Horace Peaks—Cape Desolation—Boat lost—Basket—Search in Desolate Bay—Natives—Heavy gale—Surprise—Seizure—Consequences—Return to Beagle—Sail to Stewart Harbour—Set out again—Escape of Natives—Unavailing search—Discomforts—Tides—Nature of Coast—Doris Cove—Christmas Sound—Cook—York-Minster—March Harbour—Build a boat—Treacherous rocks—Skirmish with the Natives—Captives—Boat-memory—Petrel.

"25th. We weighed, and went round to Fury Harbour, for the carpenter and his cargo, and met him with a spar and a raft of plank, taken from the wreck. Having hoisted the boat up, and got the plank on board, we stood out towards the West Furies, by the wind; my intention being either to sail round Noir Island, or anchor under it, before running to the eastward, in order that no part of the sea-coast might be left unexamined. We passed very near some of the rocks, but as the day was fine and the weather clear, a good look-out at the mast-head could be trusted.

"Before leaving the vicinity of Mount Skyring, I should remark that the true bearing of Mount Sarmiento's summit, which I obtained from the top of Mount Skyring, laid off on Lieutenant Skyring's chart, passed as truly through his position of the summit as if the line had been merely drawn between them. This is highly creditable to his work, for I know he did not himself see Mount Sarmiento, when upon Mount Skyring.

"The breeze freshened, and drew more to the westward towards evening, I had therefore no hopes of nearing Noir Island. We saw the Tower Rocks distinctly before dark, and stood on towards them until ten o'clock, closing Scylla to avoid Charybdis, for in-shore of us lay all those scattered rocks,

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among which we had steered when passing the Agnes Islands and Cape Kempe.

"The night was spent in making short boards, under reefed topsails, over the same two miles of ground, as nearly as possible, with the lead going, and a thoroughly good look-out. At daylight next morning the wind became strong and the weather thick, with rain, but we made as much sail as we could carry, and worked to windward all the day. In the afternoon it moderated, and before dark we anchored in a very good roadstead, at the east end of Noir Island, sheltered from all winds from N. to S. b. E. (by the west); over a clear, sandy bottom; and with a sheltered cove near us where boats may land easily, and get plenty of wood and water. In working up to the Island, we passed very near a dangerous rock, under water, lying four miles off shore; and another, near the anchorage. The sea does not break on either of them when there is not much swell.

"27th. A fine day favoured us; the master went to one part of the island, and Mr. Stokes to another, while I went to a third. Having taken angles at the extreme west point (which ends in a cluster of rocks like needles), I passed quite round the island, and returned to the anchorage after dusk, landing here and there for bearings, in my way.

"There is a cove at the south part of the island, where boats would be perfectly safe in any weather, but the entrance is too narrow for decked vessels. The island itself is narrow and long, apparently the top of a ridge of mountains, and formed of sandstone,* which accounts for the bottom near it being so good, and for the needle-like appearance of the rocks at the west end; as the sand-stone, being very soft, is continually wearing away by the action of the water.

"Multitudes of penguins were swarming together in some parts of the island, among the bushes and 'tussac'† near the shore, having gone there for the purposes of moulting and rear-

* Geological Society, No. 238 to 240, (perhaps clay-slate. P.P.K.)

† Name given by sealers to a thick rushy kind of grass, which grows near the sea, in these latitudes.

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ing their young. They were very valiant in self-defence, and ran open-mouthed, by dozens, at any one who invaded their territory, little knowing how soon a stick could scatter them on the ground. The young were good eating, but the others proved to be black and tough, when cooked. The manner in which they feed their young is curious, and rather amusing. The old bird gets on a little eminence, and makes a great noise (between quacking and braying), holding its head up in the air, as if it were haranguing the penguinnery, while the young one stands close to it, but a little lower. The old bird having continued its clatter for about a minute, puts its head down, and opens its mouth widely, into which the young one thrusts its head, and then appears to suck from the throat of its mother for a minute or two, after which the clatter is repeated, and the young one is again fed; this continues for about ten minutes. I observed some which were moulting make the same noise, and then apparently swallow what they thus supplied themselves with; so in this way I suppose they are furnished with subsistence during the time they cannot seek it in the water. Many hair seal were seen about the island, and three were killed. Wild fowl were very numerous. Strange to say, traces of the Fuegians (a wigwam, &c.) were found, which shows how far they will at times venture in their canoes.

"No danger lies outside of Noir Island, except in the Tower Rocks, which are above water, and 'steep-to,' but many perils lie to the south-eastward. Indeed, a worse place than the neighbourhood of Cape Kempe and the Agnes Islands could not often be found, I think: the chart of it, with all its stars to mark the rocks, looks like a map of part of the heavens, rather than part of the earth.

"28th. At daylight we sailed from these roads, and passed close to the Tower Rocks (within half a cable's length): they are two only in number, a mile and a half apart, and steep-sided. Thence we steered towards St. Paul's, my intention being to seek an anchorage in that direction. This day proved very fine and so clear that when we were becalmed, off St. Paul's, we saw Mount Sarmiento distinctly from the deck. A breeze

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carried us through Pratt Passage, which separates London Island from Sydney Island, to an anchorage in a good harbour, under a high peaked hill (Horace Peaks), which is a good mark for it. Finding no soundings in the Passage as we approached, gave us reason to be anxious; but in the harbour, the bottom proved to be excellent, and the water only of a moderate depth. As soon as we anchored, I tried to ascend Horace Peaks, but returned without having reached their summits before dark; however, I saw enough to give me a general idea of the distribution of the land and water near us. I thought that this anchorage would be favourable for ascertaining the latitude of Cape Schomberg* with exactness: having found a considerable difference between our chart and that of Lieutenant Skyring, respecting the latitude of that promontory.

"Meanwhile I contemplated sending the master to a headland called by Cook, Cape Desolation, and which well deserves the name, being a high, craggy, barren range of land. I was not sorry to find myself in a safe anchorage, for the weather seemed lowering; and after being favoured with some moderate days, we could not but expect a share of wind and rain.

"29th. This morning the weather looked as if we should be repaid for the few fine days which we had enjoyed; but as we felt it necessary to work in bad weather as well as in good, it did not prevent the master from setting out on his way to Cape Desolation; near which, as a conspicuous headland, whose position would be of great consequence, he was to search for a harbour, and obtain observations for connecting the survey. He could not have been in a finer boat (a whale-boat built by Mr. May, at San Carlos); and as he well knew what to do with her, I did not feel uneasy for his safety, although after his departure the wind increased rapidly, and towards evening blew a hard gale. The barometer had not given so much warning as usual; but it had been falling gradually since our arrival in this harbour, and continued to fall. The sympiesometer had been more on the alert, and had fallen more rapidly.

"(30th.) A continued gale, with rain and thick weather

* A high mountain at the N.W. end of London Island.

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throughout the day. During the night the weather became rather more moderate; but on the morning of the 31st, the wind again increased to a gale, and towards noon, the williwaws were so violent, that our small cutter, lying astern of the ship, was fairly capsized, though she had not even a mast standing. The ship herself careened, as if under a press of sail, sending all loose things to leeward with a general crash (not being secured for sea, while moored in so small a cove), but so rapidly did these blasts from the mountains pass by, that with a good scope of chain out, it was hardly strained to its utmost before the squall was over. While the gale was increasing, in the afternoon, the topmasts were struck; yet still, in the squalls, the vessel heeled many strakes when they caught her a-beam. At night they followed in such rapid succession, that if the holding-ground had not been excellent, and our ground-tackle very strong, we must have been driven on the rocks.

"Under the lee of high land is not the best anchorage in these regions. When good holding-ground can be found to windward of a height, and low land lies to windward of the anchorage, sufficient to break the sea, the place is much to be preferred; because the wind is steady and does not blow home against the height. The lee side of these heights is a great deal worse than the west side of Gibraltar Rock while the strongest Levanter is blowing.

"Considering that this month corresponds to August in our climate, it is natural to compare them, and to think how hay and corn would prosper in a Fuegian summer. As yet I have found no difference in Tierra del Fuego between summer and winter, excepting that in the former the days are longer, and the average temperature is perhaps ten degrees higher, but there is also then more wind and rain.

"The gale still continued, and prevented any thing being done out of the ship. However safe a cove Mr. Murray might have found, his time, I knew, must be passing most irksomely, as he could not have moved about since the day he left us. He had a week's provisions, but with moderate weather would have returned in three days.

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" Feb. 2d. Still very squally and unsettled. This gale began at N.N.W., and drew round to S.S.W. Much rain comes usually from the N.W. quarter; and as the wind draws southward, the weather becomes clearer. The squalls from the southern quarter bring a great deal of hail with them.

" 3d. I was enabled to take a round of angles from Horace Peaks, over the ship, the sky being clear near the horizon. The theodolite had been left near the top since the 28th, each day having been too bad to use it. These peaked hills required time and exertion in the ascent; but the wide range of view obtained from their summits on a clear day, amply repaid us for both. If the height was sufficient, it gave a bird's-eye view of many leagues, and showed at a glance where channels lay, which were islands, and what was the nature of the surrounding land and water. The shattered state of all these peaks is remarkable: frost, I think, must be the chief cause.

" After being deceived by the magnetism of Mount Skyring and other places, I never trusted the compass on a height, but always set up a mark near the water, at some distance, and from it obtained the astronomical bearing of my station at the summit. This afternoon we prepared the ship to proceed as soon as the master should arrive.

" 4th. Moderate weather. I was surprised that the master did not make his appearance; yet, having full confidence in his prudent management, and knowing that he had been all the time among islands, upon any one of which he could haul up his boat and remain in safety during the gales, I did not feel much anxiety, but supposed he was staying to take the necessary angles and observations, in which he had been delayed by the very bad weather we had lately experienced.

" At three this morning (5th), I was called up to hear that the whale-boat was lost—stolen by the natives; and that her coxswain and two men had just reached the ship in a clumsy canoe, made like a large basket, of wicker-work covered with pieces of canvas, and lined with clay, very leaky, and difficult to paddle. They had been sent by the master, who, with the other people, was at the cove under Cape Desolation, where

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they stopped on the first day. Their provisions were all consumed, two-thirds having been stolen with the boat, and the return of the natives, to plunder, and perhaps kill them, was expected daily.

"The basket, I cannot call it a canoe, left the Cape (now doubly deserving of its name) early on the morning of the 4th, and worked its way slowly and heavily amongst the islands, the men having only one biscuit each with them. They paddled all day, and the following night, until two o'clock this morning (5th), when in passing the cove where the ship lay, they heard one of our dogs bark, and found their way to us quite worn out by fatigue and hunger. Not a moment was lost, my boat was immediately prepared, and I hastened away with a fortnight's provisions for eleven men, intending to relieve the master, and then go in search of the stolen boat. The weather was rainy, and the wind fresh and squally; but at eleven o'clock I reached the cove, having passed to seaward of the cape, and there found Mr. Murray anxiously, but doubtfully, awaiting my arrival. My first object, after inquiring into the business, was to scrutinize minutely the place where the boat had been moored, (for I could not believe that she had been stolen;) but I was soon convinced that she had been well secured in a perfectly safe place, and that she must, indeed, have been taken away, just before daylight, by the natives. Her mast and sails, and part of the provisions were in her; but the men's clothes and the instruments had fortunately been landed. It was the usual custom with our boats, when away from the ship, to keep a watch at night; but this place appeared so isolated and desolate, that such a precaution did not seem necessary. Had I been with the boat, I should probably have lost her in the same manner; for I only kept a watch when I thought there was occasion, as I would not harass the boat's crew unnecessarily; and on this exposed and sea-beaten island, I should not have suspected that Indians would be found. It appeared that a party of them were living in two wigwams, in a little cove about a mile from that in which our boat lay, and must have seen her arrive;

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while their wigwams were so hidden as to escape the observation of the whale-boat's crew. At two o'clock on the first morning, Mr. Murray sent one of the men out of the tent to see if the boat rode well at her moorings in the cove, and he found her secure. At four another man went to look out, but she was then gone. The crew, doubtful what had been her fate, immediately spread about the shore of the island to seek for traces of her, and in their search they found the wigwams, evidently just deserted: the fire not being extinguished. This at once explained the mystery, and some proceeding along the shore, others went up on the hills to look for her in the offing; but all in vain. The next morning Mr. Murray began the basket, which was made chiefly by two of his men out of small boughs, and some parts of the tent, with a lining of clayey earth at the bottom. Being on an island, about fifteen miles from the Beagle, their plan was as necessary as it was ingenious: though certainly something more like a canoe than a coracle could have been paddled faster.

"The chronometer, theodolite, and other instruments having been saved, Mr. Murray had made observations for fixing the position of the place, and had done all that was required before I arrived, when they embarked, with their things, in my boat, which then contained altogether eleven men, a fortnight's provisions, two tents,* and clothing; yet with this load she travelled many a long mile, during the following week, a proof of the qualities of this five-oared whale-boat, which was also built by Mr. Jonathan May, our carpenter, while we were at San Carlos.

"The very first place we went to, a small island about two miles distant, convinced us still more decidedly of the fate of our lost boat, and gave us hopes of retrieving her; for near a lately used wigwam, we found her mast, part of which had been cut off with an axe that was in the boat. Our next point was then to be considered, for to chase the thieves I was determined. North and east of us, as far as the eye could reach, lay an extensive

* I carried two tents from the Beagle, theirs having been cut up for the basket.

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bay in which were many islands, large and small; and westward was a more connected mass of large islands reaching, apparently, to the foot of that grand chain of snowy mountains, which runs eastward from the Barbara Channel, and over the midst of which Sarmiento proudly towers. I resolved to trace the confines of the bay, from the west, towards the north and east, thinking it probable that the thieves would hasten to some secure cove, at a distance, rather than remain upon an outlying island, whence their retreat might be cut off. In the evening we met a canoe containing two Fuegians, a man and a woman, who made us understand, by signs, that several canoes were gone to the northward. This raised our hopes, and we pushed on. The woman, just mentioned, was the best looking I have seen among the Fuegians, and really well-featured: her voice was pleasing, and her manner neither so suspicious nor timid as that of the rest. Though young she was uncommonly fat, and did justice to a diet of limpets and muscles. Both she and her husband were perfectly naked. Having searched the coves for some distance farther, night came on, and we landed in a sheltered spot.

"The next day (6th), we found some rather doubtful traces of the thieves. Towards night it blew a strong gale, with hail-squalls and rain.

"On the 7th, at a place more than thirty miles E.N.E. of Cape Desolation, we fell in with a native family, and on searching their two canoes found our boat's lead line. This was a prize indeed; and we immediately took the man who had it into our boat, making him comprehend that he must show us where the people were, from whom he got it. He understood our meaning well enough, and following his guidance we reached a cove that afternoon, in which were two canoes full of women and children; but only one old man, and a lad of seventeen or eighteen. As usual with the Fuegians, upon perceiving us they all ran away into the bushes, carrying off as much of their property as possible—returning again naked, and huddling together in a corner. After a minute search, some of the boat's gear was found, part of her sail, and

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an oar, the loom of which had been made into a seal-club, and the blade into a paddle. The axe, and the boat's tool-bag were also found, which convinced us that this was the resort of those who had stolen our boat; and that the women, six in number, were their wives. The men were probably absent, in our boat, on a sealing expedition; as a fine large canoe, made of fir-plank, perhaps from the wreck of the Saxe Cobourg, was lying on the beach without paddles or spears. She did not come there without paddles: and where were the spears of which every Fuegian family has plenty? It was evident that the men of the party had taken them in our boat, and had cut up our oars like the one they had accidentally left. The women understood what we wanted, and made eager signs to explain to us where our boat was gone. I did not like to injure them, and only took away our own gear, and the young man, who came very readily, to show us where our boat was, and, with the man who had brought us to the place, squatted down in the boat apparently much pleased with some clothes and red caps, which were given to them. We had always behaved kindly to the Fuegians wherever we met them, and did not yet know how to treat them as they deserved, although they had robbed us of so great a treasure, upon the recovery or loss of which much of the success of our voyage depended. Following the guidance of these two natives, we pulled against wind and rain until dark, when it became absolutely necessary to secure our boat for the night, deeply laden as she was with thirteen people. As we were then at a great distance from the place, whence we brought the natives, having pulled for four hours alongshore, and as they seemed to be quite at their ease, and contented, I would not secure our guides as prisoners, but allowed them to lie by the fire in charge of the man on watch. About an hour before daylight, although the look-out man was only a few yards distant from the fire, they slipped into the bushes, and as it was almost dark were immediately out of sight. Their escape was discovered directly, but to search for them during darkness, in a thick wood, would have been useless; besides, our men were tired with their day's work, and wanted rest, so

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I would not disturb them until daylight (8th), when we continued our search in the direction the natives had indicated; but after examining several coves without finding any traces of Fuegians, we hastened back towards the wigwams we had visited on the previous day. Sailing close along-shore, a large smoke suddenly rose up, out of a small cove close by us, where we immediately landed, and looked all round; but found only the foot-prints of two Fuegians, probably the runaways, who had just succeeded in lighting a fire at the moment we passed by. This shows how quickly they find materials for the purpose, for when they left us, they had neither iron nor fire-stone (pyrites), nor any kind of tinder. They had carried off two tarpaulin coats, which Mr. Murray had kindly put on to keep them warm; although, treated as he had so lately been, one might have thought he would not have been the first to care for their comfort. I mention these incidents to show what was our behaviour to these savages, and that no wanton cruelty was exercised towards them.

"After looking for these two natives, and for Mr. Murray's coats, which at that time he could ill spare, we returned to our boat, and pushed on towards the wigwams. The moment the inmates saw us, they ran away, and we gave chase, trying, in vain, to make them stop. Disappointed in the hope of obtaining a guide, we determined to prevent these people from escaping far, and spreading any intelligence likely to impede the return of our boat, which we daily expected: we therefore destroyed two canoes, and part of a third, that the natives were building, and burned every material which could be useful to them in making another canoe.

"(9th). Next day, we went straight across the bay to Cape Desolation, against a fresh breeze: by pulling in turns, the boat was kept going fast through the water, and late in the evening we reached the cove from which the thieves had first started, when they stole the boat; but no traces of their having been there again, were found. I thought it probable that they would return to see what had become of our party, and whether our people were weak enough to be plundered again, or perhaps attacked.

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"This idea proving wrong, we retraced (10th) much of our former course, because the direction pointed out by the Fuegians who ran away from us seemed to lead towards the place we now steered for, Courtenay Sound, and was a probable line for the thieves to take. During the night it blew a gale from the southward, which increased next day (11th), and became more and more violent until the morning of the 12th, when it abated.

"We continued our search, however, sometimes under a close-reefed sail; sometimes on our oars, and sometimes scudding with only the mast up. Although the wind was very violent, too strong for a close reefed sail (with four reefs), the water was too much confined by islands to rise into a sea, but it was blown, as 'spoon drift,' in all directions. This day the Beagle had her topmasts and lower yards struck, for the gale was extremely heavy where she lay. The barometer foretold it very well, falling more than I had previously seen, although the wind was southerly. In an exposed anchorage, I do not think any vessel could have rode it out, however good the holding ground.

"12th. This morning the weather was better, and improving fast. We went over much ground without the smallest success, and in the afternoon steered to the eastward again, for a third visit to the boat stealers' family. As it was late when we approached the place, I landed half our party, and with the rest went to reconnoitre. After a long search we discovered the Indians in a cove, at some distance from that in which they were on the previous day; and having ascertained this point, taken a good view of the ground, and formed our plans, we returned to our companions, and prepared for surprising the natives and making them prisoners. My wish was to surround them unawares, and take as many as possible, to be kept as hostages for the return of our boat, or else to make them show us where she was; and, meanwhile, it was an object to prevent any from escaping to give the alarm.

"13th. Whether the men belonging to the tribe had returned during our absence, was uncertain, as we could not,

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without risk of discovery, get near enough to ascertain: but, in case we should find them, we went armed, each with a pistol or gun, a cutlass, and a piece of rope to secure a prisoner. We landed at some distance from the cove, and, leaving two men with our boat, crept quietly through the bushes for a long distance round, until we were quite at the back of the new wigwams; then closing gradually in a circle, we reached almost to the spot undiscovered; but their dogs winded us, and all at once ran towards us barking loudly. Further concealment was impossible, so we rushed on as fast as we could through the bushes. At first the Indians began to run away; but hearing us shout on both sides, some tried to hide themselves, by squatting under the banks of a stream of water. The foremost of our party, Elsmore by name, in jumping across this stream, slipped, and fell in just where two men and a woman were concealed: they instantly attacked him, trying to hold him down and beat out his brains with stones; and before any one could assist him, he had received several severe blows, and one eye was almost destroyed, by a dangerous stroke near the temple. Mr. Murray, seeing the man's danger, fired at one of the Fuegians, who staggered back and let Elsmore escape; but immediately recovering himself, picked up stones from the bed of the stream, or was supplied with them by those who stood close to him, and threw them from each hand with astonishing force and precision. His first stone struck the master with much force, broke a powder-horn hung round his neck, and nearly knocked him backwards: and two others were thrown so truly at the heads of those nearest him, that they barely saved themselves by dropping down. All this passed in a few seconds, so quick was he with each hand: but, poor fellow, it was his last struggle; unfortunately he was mortally wounded, and, throwing one more stone, he fell against the bank and expired. After some struggling, and a few hard blows, those who tried to secrete themselves were taken, but several who ran away along the beach escaped: so strong and stout were the females, that I, for one, had no idea that it was a woman, whose arms I and my coxswain endeavoured to pinion, until I heard some

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one say so. The oldest woman of the tribe was so powerful, that two of the strongest men of our party could scarcely pull her out from under the bank of the stream. The man who was shot was one of those whom we had taken in the boat as a guide, and the other was among our prisoners. Mr. Murray's coats were found in the wigwams divided into wrappers to throw over the shoulders. We embarked the Indians (two men, three women, and six children), and returned to the spot where we had passed the preceding night. One man who escaped was a one-eyed man we had seen before; he was more active than any, and soon out of our reach. Two or three others escaped with him, whom I did not see distinctly.

"That a life should have been lost in the struggle, I lament deeply; but if the Fuegian had not been shot at that moment, his next blow might have killed Elsmore, who was almost under water, and more than half stunned, for he had scarcely sense to struggle away, upon feeling the man's grasp relax. When fairly embarked, and before we asked any questions, the natives seemed very anxious to tell us where our boat was; but pointed in a direction quite opposite to that which they had previously shown us. We guarded them carefully through the night, and next morning (14th) set out upon our return to the Beagle, with twenty-two souls in the boat. My object was, to put them in security on board, run down the coast with the ship to some harbour more to the eastward, and then set out again upon another search; carrying some of my prisoners as guides, and leaving the rest on board to ensure the former remaining, and not deceiving us. We made tolerable progress, though the boat was so over-loaded, and on the 15th reached the Beagle with our living cargo. In our way we fell in with a family of natives, whose wigwams and canoes we searched; but finding none of our property, we left them not only unmolested, but gave them a few things, which in their eyes were valuable.

"This conduct appeared to surprise our prisoners, who, as far as we could make out, received a wholesome lecture, instead

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of assistance, from the strangers. At all events, when they parted, our passengers were as discontented as the others were cheerful. When we got on board, we fed our prisoners with fat pork and shell-fish, which they liked better than any thing else, and clothed them with old blankets.*

"Next morning (16th) we weighed, and sailed along the coast towards Cape Castlereagh, at the east side of Desolate Bay. Many straggling rocks and rocky islets were observed lying off Cape Desolation and in the Bay. That afternoon, we stood into a narrow opening, which appeared to be the outlet of a harbour close to Cape Castlereagh, and found a very good anchorage, well suited for the purposes both of continuing the survey and looking for the lost boat.

"(17th.) The master and I, with the cutter and a whale-boat, set out upon a second chase, taking a week's provisions. In the first cove I searched, not two miles from the Beagle, I found a piece of the boat's lead-line, which had been left in a lately deserted wigwam. This raised our hopes; and, in addition to the signs made by our prisoners, convinced us we were on the right track.

"I took with me a young man as a guide, and in the cutter the master carried the two stoutest of the women, having left all the rest of our prisoners on board. As far as we could make out, they appeared to understand perfectly that their safety and future freedom depended upon their showing us where to find the boat.

"We intended to go round the Stewart Islands; and after examining many coves, and finding signs that a party of natives had passed along the same route within the last two days, we stopped in a sheltered place for the night. Having given our prisoners as much food as they could eat, muscles, limpets, and pork, we let them lie down close to the fire, all three together. I would not tie them, neither did I think it necessary to keep an unusual watch, supposing that their children being

* It afterwards appeared that we had taken the families of the very men who stole the boat from Mr. Murray.

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left in our vessel was a security for the mothers far stronger than rope or iron. I kept watch myself during the first part of the night, as the men were tired by pulling all day, and incautiously allowed the Fuegians to lie between the fire and the bushes, having covered them up so snugly, with old blankets and my own poncho, that their bodies were entirely hidden. About midnight, while standing on the opposite side of the fire, looking at the boats, with my back to the Fuegians, I heard a rustling noise, and turned round; but seeing the heap of blankets unmoved, satisfied me, and I stooped down to the fire to look at my watch. At this moment, another rustle, and my dog jumping up and barking, told me that the natives had escaped. Still the blankets looked the same, for they were artfully propped up by bushes. All our party began immediately to search for them; but as the night was quite dark, and there was a thick wood close to us, our exertions were unavailing.

"Believing that we could not be far from the place where the natives supposed our boat to be, I thought that they would go directly and warn their people of our approach; and as the island was narrow, though long, a very little travelling would take them across to the part they had pointed out to us, while it might take a boat a considerable time to go round; I therefore started immediately to continue the search in that direction, and left the master to examine every place near our tents.

"In the afternoon of the same day I returned to him, having traversed a long extent of coast without finding an outlet to sea-ward, or any traces of the lost boat. Meanwhile Mr. Murray had searched every place near our bivouac without success; but he found the spot where the Fuegians had concealed themselves during the night, under the roots of a large tree, only a dozen yards from our fire.

"As it was possible that the thieves might have returned to the place whence we had taken the natives, I desired the master to cross the sound and go there, and afterwards return to meet me, while I continued the search eastward. With a fair and fresh wind I made a good run that evening, found a pas-

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sage opening to the sea,* and a wigwam just deserted. Here was cause for hope; and seeing, beyond the passage, some large islands lying to seaward of that which we had been coasting, it appeared probable that our boat had been taken there for seal-fishing. Our prisoners had given us to understand plainly enough that such was the object of those who had stolen her, and outlying islands were the most likely to be visited, as on them most seal are found.

"Next day (19th) I passed over to Gilbert Island, and in a cove found such recent marks of natives, that I felt sure of coming up with the chase in the course of the day. When the Fuegians stop anywhere, they generally bark a few trees, to repair their canoes or cover their wigwams; but those whose traces we were following, had made long journeys without stopping; and, where they did stay, barked no trees, which was one reason for supposing them to be the party in our boat. In the course of the day we pulled nearly round the islands,† looking into every cove.

"On the 20th, we discovered three small canoes with their owners in a cove.‡ All the men ran away, except two. As we saw that there were no more persons than the canoes required, we did not try to catch them, knowing that this could not be the party we were in search of. We had now examined every nook and corner about these islands, and I began to give up all hope of finding our boat in this direction. Having no clue to guide me farther, and much time having been lost, I reluctantly decided to return to the Beagle. Our only remaining hope, that the master might have met with the boat, was but very feeble.

"(21st.) All this day we were pulling to the westward, to regain the Beagle. At night-fall I met Mr. Murray, with the cutter, in the cove where I had appointed a rendezvous. He had not found any signs of the boat upon the opposite shore, and therefore returned; but he saw the people who had escaped from us when we surprised the whole family. They fled as soon as his boat was seen. Leaving, therefore, three men to

* Adventure Passage. † Gilbert Islands. ‡ Doris Cove.

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watch in the bushes, he stood out to sea in the boat; and the stratagem succeeded sufficiently to enable our men to get very near to the natives, but not to catch any of them. One old man squinted very much, and in other respects exactly answered the description of a Fuegian who ill-treated some of the Saxe-Cobourg's crew, when they were cast away in Fury Harbour. I wish we could have secured him; but he was always on the alert, and too nimble for our people. In their canoe, which was taken, was found the sleeve of Mr. Murray's tarpaulin coat, a proof that these people belonged to the tribe which had stolen our boat. The canoe was a wretchedly patched affair, evidently put together in a great hurry.

"Next morning (22d) the master and I set out on our return to the Beagle; but seeing a great smoke on the opposite shore, in Thieves' Sound, I thought it must be made by the offenders, who, having returned and found their home desolate, were making signals to discover where their family was gone: sending the cutter therefore on board, I pulled across the sound towards the smoke. As the distance was long, and the wind fresh against us, it was late before I arrived; yet the smoke rose as thickly as ever, exciting our expectations to the utmost: —but, to our disappointment, not a living creature could be seen near the fire, nor could any traces of natives be found. The fire must have been kindled in the morning, and as the weather was dry, had continued to burn all day.

"We were then just as much at a loss as ever, for probably (if that was the party), they had seen us, and would, for the future, be doubly watchful. At first we had a chance of coming upon them unawares, but the time for that had passed: every canoe in the sound had been examined, and all its inhabitants knew well what we were seeking.

"It blew too strong, and it was too late, to recross Whaleboat Sound that night, so I ascended a height to look round. Next morning (23d) we again searched many miles of the shores of Thieves' Sound without any success; and afterwards sailed across to Stewart Harbour. We reached the Beagle in the evening, but found that all the other prisoners, excepting

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three children, had escaped by swimming ashore during the preceding night. Thus, after much trouble and anxiety, much valuable time lost, and as fine a boat of her kind as ever was seen being stolen from us by these savages, I found myself with three young children to take care of, and no prospect whatever of recovering the boat. It was very hard work for the boats' crews, for during the first ten days we had incessant rainy weather, with gales of wind; and though the last few days had been uncommonly fine, the men's exertions in pulling about among the coves, and in ascending hills, had been extremely fatiguing.

"While the bad weather lasted, the men's clothes were seldom dry, either by day or night. Frequently they were soaked by rain during the greater part of the day, and at night they were in no better condition; for although a large fire (when made) might dry one side, the other as quickly became wet. Obliged, as we were, to pitch our small tent close to the water in order to be near our boat;—and because every other place was either rocky or covered with wood;—we were more than once awakened out of a sound sleep by finding that we were lying partly in the water, the night-tide having risen very much above that of the preceding day: although the tides should have been at that time 'taking off' (diminishing).

"Sometimes extreme difficulty was found in lighting a fire, because every thing was saturated with moisture; and hours have been passed in vain attempts, while every one was shivering with cold,—having no shelter from the pouring rain,—and after having been cramped in a small boat during the whole day.

"In Courtenay Sound I saw many nests of shags (corvorants) among the branches of trees near the water: until then, I had understood that those birds usually, if not invariably, built their nests on the ground or in cliffs.

"Much time had certainly been spent in this search, yet it ought not to be considered as altogether lost. Mr. Stokes had been hard at work during my absence, making plans of the harbours, and taking observations, and I am happy to say, that

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I had reason to place great confidence in his work, for he had always taken the utmost pains, and had been most careful. My wanderings had shown me that from the apparent sea coast to the base of that snowy chain of mountains which runs eastward from the Barbara Channel, there is much more water than land, and that a number of islands, lying near together, form the apparently connected coast; within which a wide sound-like passage extends, opening in places into bays and gulfs, where islands, islets, rocks and breakers, are very numerous. These waters wash the foot of the snowy chain which forms a continued barrier from the Barbara Channel to the Strait of Le Maire. This cruise had also given me more insight into the real character of the Fuegians, than I had then acquired by other means, and gave us all a severe warning which might prove very useful at a future day, when among more numerous tribes who would not be contented with a boat alone. Considering the extent of coast we had already examined, we ought to be thankful for having experienced no other disaster of any kind, and for having had the means of replacing this loss.

"I became convinced that so long as we were ignorant of the Fuegian language, and the natives were equally ignorant of ours, we should never know much about them, or the interior of their country; nor would there be the slightest chance of their being raised one step above the low place which they then held in our estimation. Their words seemed to be short, but to have many meanings, and their pronunciation was harsh and guttural.

"Stewart Harbour, in which the Beagle remained during the last boat cruise, proved to be a good one, and, having three outlets, may be entered or quitted with any wind, and without warping. Wood and water are as abundant as in other Fuegian harbours; and it may be easily known by the remarkable appearance of Cape Castlereagh, which is on the island that shelters the anchorage from the S.W. wind and sea. The outlets are narrow, and can only be passed with a leading wind; but if one does not serve, another will answer. It should be

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noticed, that there are two rocks nearly in the middle of the harbour, which are just awash at high water. A heavy swell is generally found outside, owing to the comparatively shallow water, in which there are soundings to about three miles from the Cape. In the entrances are from ten to twenty fathoms, therefore if the wind should baffle, or fail, an anchor may be dropped at any moment.

"In my last search among the Gilbert Islands, I found a good harbour for shipping, conveniently situated for carrying on the survey, in a place which otherwise I should certainly have overlooked: and to that harbour I decided on proceeding.

"For two miles to the eastward of Stewart Harbour, the shore projects, and is rocky and broken, then it retreats, forming a large bay, in which are the Gilbert Islands, and many rocky islets. We passed between Gilbert and Stewart Islands, anchored at noon under a point at the west entrance of the passage, and in the afternoon moved the Beagle to Doris Cove, and there moored her.

"I had decided to build another boat as quickly as possible, for I found it so much the best way to anchor the vessel in a safe place and then work with the boats on each side, that another good one was most necessary. Our cutter required too many men, and was neither so handy, nor could she pull to windward so well as a whale-boat; and our small boat was only fit for harbour duty. The weather on this coast was generally so thick and blowing, as not to admit of any thing like exact surveying while the vessel was under sail: the swell alone being usually too high to allow of a bearing being taken within six or eight degrees: and the sun we seldom saw. If caught by one of the very frequent gales, we might have been blown so far to the eastward that I know not how much time would have been lost in trying to regain our position. These coasts, which are composed of islands, allow boats to go a long distance in safety, and, from the heights near the sea, rocks and breakers may be seen, and their places ascertained, much better than can possibly be done at sea. For building a new boat we had all the materials on board, except prepared plank;

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CAPE HORN.

CAPE HORN.

CAPE SPENCER AND CAPE HORN.

(Water Peak) ST FRANCIS BAY AND ENTRANCE OF ST MARTIN COVE.

YORK MINSTER.

FALSE CAPE HORN.

CAPE NOIR.

CAPE NOIR.

W.H. Wilson. S.Bull

SOUTH WEST OPENING OF COCKBURN CHANNEL.

(Mount Skyring)

Published by Henry Colburn, 13, Great Marlborough Street, 1839.

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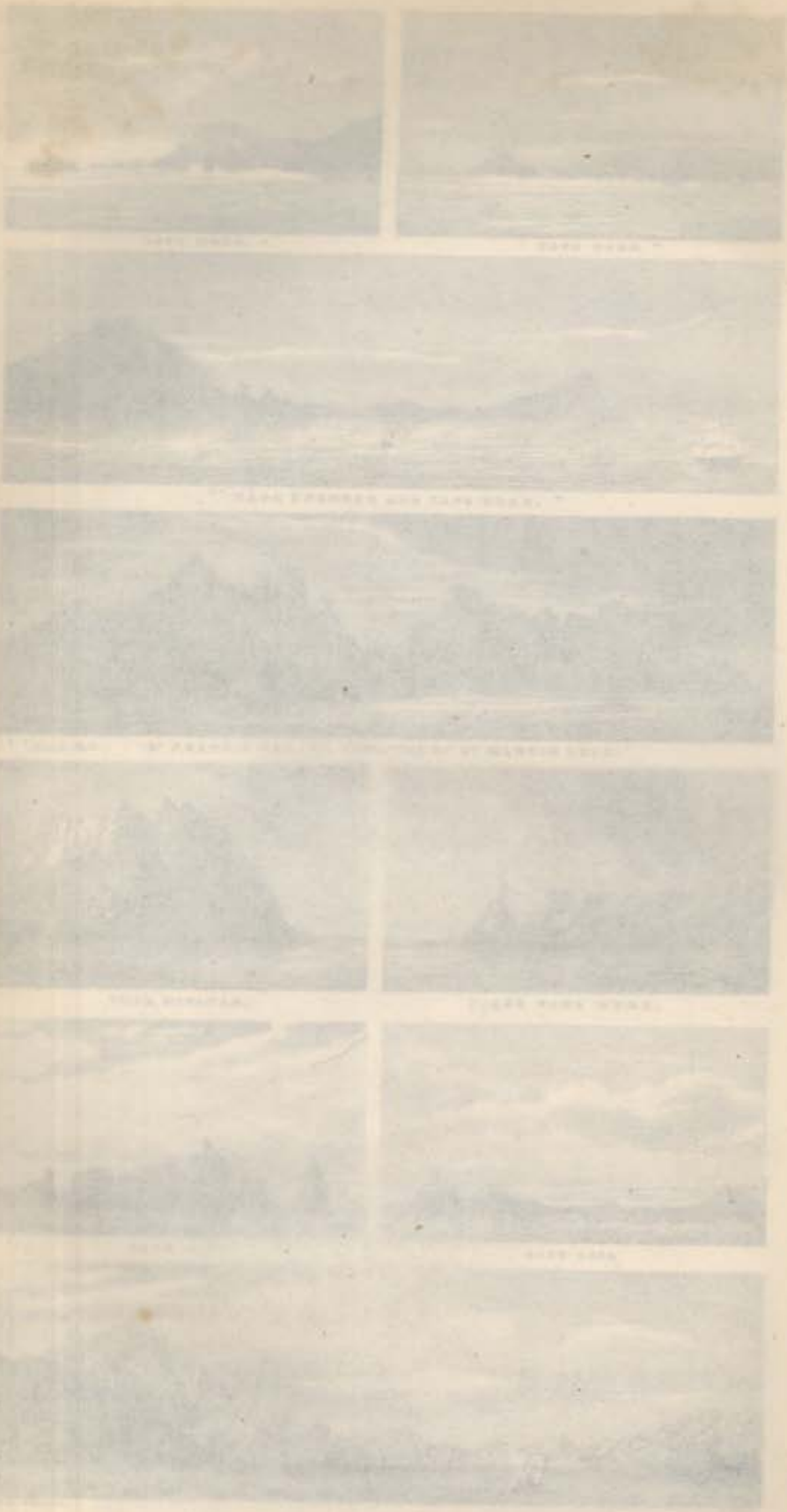

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and for this we cut up a spare spar, which was intended to supply the place of a defective or injured lower mast or bowsprit. With reluctance this fine spar, which had been the Doris's main-topmast, was condemned to the teeth of the saw; but I felt certain that the boat Mr. May would produce from it, would be valuable in any part of the world, and that for our voyage it was indispensable.

"Profiting by a clear day, I went to a height in the neighbourhood, whence I could see to a great distance in-shore, as well as along the coast, and got a view of Mount Sarmiento. While away from the Beagle, in search of the lost boat, we had enjoyed four succeeding days of fine weather, during which that noble mountain had been often seen by our party. The astronomical bearing of its summit was very useful in connecting this coast survey with that of the Strait of Magalhaens.

"25th and 26th. Mr. Murray went to the S.W. part of the island, taking three days' provisions. Mr. Stokes and I were employed near the ship, while every man who could use carpenter's tools was occupied in preparing materials for our new boat. The rock near here is greenstone, in which are many veins of pyrites. Specimens are deposited in the museum of the Geological Society.

"28th. Weighed, warped to windward, and made sail out of Adventure Passage. I was very anxious to reach Christmas Sound, because it seemed to me a good situation for the Beagle, while the boats could go east and west of her, and the new boat might be built. Running along the land, before a fresh breeze, we soon saw York Minster, and in the evening entered Christmas Sound, and anchored in the very spot where the Adventure lay when Cook was here. His sketch of the sound, and description of York Minster, are very good, and quite enough to guide a ship to the anchoring place. I fancied that the high part of the Minster must have crumbled away since he saw it, as it no longer resembled 'two towers,' but had a ragged, notched summit, when seen from the westward. It was some satisfaction to find ourselves at anchor at this spot in

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February, notwithstanding the vexatious delays we had so often experienced.

"As we had not sufficiently examined the coast between this sound and Gilbert Islands, I proposed sending Mr. Murray there with the cutter, while I should go to the eastward, during which time our new boat would be finished.

"1st March. This morning I went to look for a better anchorage for our vessel, that in which we lay being rather exposed, and very small. Neither Pickersgill Cove nor Port Clerke suited; so I looked further, and found another harbour, nearer to York Minster, easier of access for a ship arriving from sea, and with a cove in one corner where a vessel could lie in security, close to a woody point. Having sounded this harbour, I returned to move our ship. Cook says, speaking of Port Clerke, 'South of this inlet is another, which I did not examine:'—and into that inlet, named March Harbour, the Beagle prepared to go, but before we could weigh and work to windward, the weather became bad, which made our passage round the N.W. end of Shag Island rather difficult, as we had to contend with squalls, rain, and a narrow passage between rocks. The passage between Waterman Island and the south end of Shag Island is more roomy; but there is a rock near the middle which had not then been examined. We worked up to the innermost part of the harbour, and moored close to a woody point, in the most sheltered cove. Finding this to be a very convenient spot for building our boat, and in every point of view a good place for passing part of the month of March, I decided to keep the Beagle here for that purpose. This harbour might be useful to other vessels, its situation being well pointed out by York Minster (one of the most remarkable promontories on the coast), and affording wood and water with as little trouble as any place in which the Beagle had anchored.

"March 2d. The master set out in the large cutter, with a fortnight's provisions, to examine the coast between the north part of Christmas Sound and Point Alikhoolip, near which we passed on the 28th, without seeing much of it. With

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moderate weather and a little sunshine, he might have been expected to return in a week or ten days. He carried a chronometer and other necessary instruments. Two of the three children, left by their mother at Stewart Harbour, I sent with Mr. Murray, to be left with any Fuegians he might find most to the westward, whence they would soon find their friends. The third, who was about eight years old, was still with us: she seemed to be so happy and healthy, that I determined to detain her as a hostage for the stolen boat, and try to teach her English. Lieutenant Kempe built a temporary house for the carpenters, and other workmen, near the ship and the spot chosen for observations, so that all our little establishment was close together. The greater part of the boat's materials being already prepared, she was not expected to be long in building, under the able direction and assistance of Mr. May.

"3d. Some Fuegians in a canoe approached us this morning, seeming anxious to come on board. I had no wish for their company, and was sorry to see that they had found us out; for it was to be expected that they would soon pay us nightly as well as daily visits, and steal every thing left within their reach. Having made signs for them to leave us, without effect, I sent Mr. Wilson to drive them away, and fire a pistol over their heads, to frighten them. They then went back, but only round a point of land near the ship; so I sent the boat again to drive them out of the harbour, and deter them from paying us another visit. Reflecting, while Mr. Wilson was following them, that by getting one of these natives on board, there would be a chance of his learning enough English to be an interpreter, and that by his means we might recover our lost boat, I resolved to take the youngest man on board, as he, in all probability, had less strong ties to bind him to his people than others who were older, and might have families. With these ideas I went after them, and hauling their canoe alongside of my boat, told a young man to come into it; he did so, quite unconcernedly, and sat down, apparently contented and at his ease. The others said nothing, either to me or to him, but paddled out of the harbour as fast as they could.

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They seemed to belong to the same tribe as those we had last seen.

"4th. This afternoon our boat's keel was laid down, and her moulds were set up. Fuegia Basket* told 'York Minster'† all her story; at some parts of which he laughed heartily. Fuegia, cleaned and dressed, was much improved in appearance: she was already a pet on the lower deck, and appeared to be quite contented. York Minster was sullen at first, yet his appetite did not fail; and whatever he received more than he could eat, he stowed away in a corner; but as soon as he was well cleaned and clothed, and allowed to go about where he liked in the vessel, he became much more cheerful.

"At Cape Castlereagh and the heights over Doris Cove in Gilbert Island, the rock seemed to contain so much metal, that I spent the greater part of one day in trying experiments on pieces of it, with a blowpipe and mercury. By pounding and washing I separated about a tea-spoonful of metal from a piece of rock (taken at random) the size of a small cup. I put the powder by carefully, with some specimens of the rock—thinking that some of these otherwise barren mountains might be rich in metals. It would not be in conformity with most other parts of the world were the tract of mountainous islands composing the Archipelago of Tierra del Fuego condemned to internal as well as external unprofitableness. From the nature of the climate agriculture could seldom succeed; and perhaps no quadrupeds fit for man's use, except goats and dogs, could thrive in it: externally too, the land is unfit for the use of civilized man. In a few years its shores will be destitute of seal: and then, what benefit will be derived from it?—unless it prove internally rich, not in gold or silver, but perhaps in copper, iron, or other metals.

"5th. This day all hands were put on full allowance, our savings since we left San Carlos having secured a sufficient

* So called in remembrance of the basket-like canoe by which we received intelligence of the loss of our boat.

† The man I took out of the canoe.

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stock of provisions to last more than the time allotted for the the remainder of our solitary cruise.

" By using substitutes for the mens' shoes, made of sealskin, we secured enough to last as long as we should want them. I have never mentioned the state of our sick list, because it was always so trifling. There had been very little doing in the surgeon's department; nothing indeed of consequence, since Mr. Murray dislocated his shoulder.

" The promontory of York Minster is a black irregularly-shaped rocky cliff, eight hundred feet in height, rising almost perpendicularly from the sea. It is nearly the loftiest as well as the most projecting part of the land about Christmas Sound, which, generally speaking, is not near so high as that further west, but it is very barren. Granite is prevalent, and I could find no sandstone. Coming from the westward, we thought the heights about here inconsiderable; but Cook, coming from the South Sea, called them 'high and savage.' Had he made the land nearer the Barbara Channel, where the mountains are much higher, he would have spoken still more strongly of the wild and disagreeable appearance of the coast.

" 6th. During the past night it blew very hard, making our vessel jerk her cables with unusual violence, though we had a good scope out, and the water was perfectly smooth. We saw that the best bower-anchor had been dragged some distance, it was therefore hove to the bows when its stock was found to be broken, by a rock, in the midst of good ground, having caught the anchor. It had been obtained at San Carlos from a merchant brig, but being much too light for our vessel, had been woulded round with chains to give it weight: its place was taken by a frigate's stream-anchor, well made and well tried, which I had procured from Valparaiso.* In shifting our berth, the small bower chain was found to be so firmly fixed round another rock that for several hours we could not clear it. Such rocks as these are very treacherous and not easily detected, except by sweeping the bottom with a line and weights. A very

* It had formerly belonged to H.M.S. Doris, which was condemned at Valparaiso; being unserviceable.

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heavy squall, with lightning and thunder, passed over the ship this afternoon, depressing the sympiesometer more than I had ever witnessed. Very heavy rain followed.

"8th. In the forenoon I was on a height taking angles, when a large smoke was made by natives on a point at the entrance of the harbour; and at my return on board the ship, I found that two canoes had been seen, which appeared to be full of people. Supposing that they were strangers, I went in a small boat with two men to see them, and find out if they possessed any thing obtained from our lost whale-boat, for I thought it probable she might have been taken along the coast eastward, to elude our pursuit. I found them in a cove very near where our carpenters were at work. They had just landed, and were breaking boughs from the trees. I was surprised to see rather a large party, about fourteen in number, all of whom seemed to be men, except two women who were keeping the canoes. They wanted me to go to them, but I remained at a little distance, holding up bits of iron and knives, to induce them to come to me, for on the water we were less unequal to them. They were getting very bold and threatening in their manner, and I think would have tried to seize me and my boat, had not Lieutenant Kempe come into the cove with six men in the cutter, when their manner altered directly, and they began to consult together. They were at this time on a rock rising abruptly from the water, and the canoes, which I wanted to search, were at the foot of the rock. Under such local disadvantages I could not persevere without arms, for they had stones, slings, and spears, ready in their hands. Lieutenant Kempe and myself then returned on board for arms and more men, for I resolved to drive them out of the harbour, as it was absolutely necessary. Already they, or their countrymen, had robbed us of a boat, and endangered the lives of several persons; and had they been allowed to remain near us, the loss of that part of another boat which was already built would have followed, besides many things belonging to the carpenters and armourer, which they were using daily on shore.

"Another motive for searching the canoes, arose from see-

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ing so many men without women, for I concluded that some of the whale-boat thieves were among them, who, having seen our cutter go to the westward full of people, might suppose we had not many left on board: one boat's crew, as they perhaps imagined, being left on an island, and another away in search of them. They had hitherto seen only merchant-vessels on this coast, and judging of the number of a crew by them, might think there could not be many persons on board, and that the vessel would be easy to take. At all events they came prepared for war, being much painted, wearing white bands on their heads, carrying their slings and spears, and having left all their children and dogs, with most of their women, in some other place.

"Two boats being manned and armed, I went with Lieut. Kempe and Mr. Wilson to chase the Fuegians, who were paddling towards another part of the harbour. Seeing the boats approaching, they landed and got on the top of a rock, leaving the canoes underneath with the two women. From their manner I saw they were disposed to be hostile, and we therefore approached leisurely. Their canoes being within our reach, I told the bowman to haul one alongside that we might search it; but no sooner did his boathook touch it, than a shower of stones of all sizes came upon us, and one man was knocked down, apparently killed, by the blow of a large stone on the temple. We returned their volley with our fire-arms, but I believe without hitting one of them. Stones and balls continued to be exchanged till the cutter came to our assistance. The Fuegians then got behind a rock, where we could not see them, and kept close. Their canoes we took, and finding in them some bottles* and part of our lost boat's gear, we destroyed them. The man of my crew who was knocked down by a stone was only stunned, and soon recovered, but the blow was very severe and dangerous. Not choosing to risk any further injury to our people, and seeing no object to be gained, I would not land, though our numbers were much superior, and we had fire-

* Mr. Murray had some bottles of beer in his boat—besides those in which the men's allowance of spirits was kept.

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arms. It appeared that the savages knew of no alternative but escape or death, and that in trying to take them they would certainly do material injury to some of our party with their spears, stones, or large knives made of pieces of iron hoops. Remaining therefore with Lieut. Kempe, in the cutter, to watch their motions, I sent my boat on board with the man who was hurt. The Fuegians made their escape separately through the bushes, and were quickly out of sight and reach: we fired a few shots to frighten them, watched their retreat over the barren upper part of the hills, and then went to look for their wigwams, which could not be far distant, as I thought; but after unsuccessfully searching all the coves near us, a smoke was seen at the opposite side of the sound, on one of the Whittlebury islands; so concluding it was made by the rest of their tribe, and being late, I returned on board.

"9th. At daylight, next morning, I went to look for the wigwams, on the Whittlebury Islands, at the north side of the sound: we saw their smoke when we were half-way across, but no longer. The natives had probably seen us, and put out their fire directly, well knowing the difference between our boat and their own canoes, and noticing her coming from a part of the sound distant from the point whence they would expect their own people, and crossing over against a fresh breeze, which a canoe could not attempt to do. The wigwams were entirely deserted, and almost every thing was taken away; but near their huts a piece of 'King's white line,' quite new, was picked up; therefore our boat* had been there, or these were some of the people who stole her. For the late inmates of the wigwams we searched in vain—only their dogs remained, they themselves being hidden. Looking round on the other side of that islet, we saw two canoes paddling right away from the islands, though it was blowing a fresh breeze, and a considerable sea was running. Knowing, from the place they were in, and their course, that they were the fugitives from the wigwams, we gave chase, and came up with them before

* In the lost boat were several pieces of spare line, 'King's white line,' quite new.

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they could land, but so close to the shore that while securing one canoe, the other escaped. From that which we seized a young man and a girl jumped overboard, deserting an old woman and a child, whom we left in order to chase the young man; but he was so active in the water that it was fully a quarter of an hour before we could get him into our boat. Having at last secured him, we followed the others, but they had all landed and hidden, so we returned across the sound with our captive. In our way a smoke was seen in a cove of Waterman Island, and knowing that it must be made by those who escaped us yesterday, as there were no other natives there, we made sail for it; but the rogues saw us, and put out their fire. When we reached the spot, however, we found two wigwams just built, and covered with bark; so that there they had passed the night after their skirmish. I would not let any one land, as the Fuegians might be lurking in the bushes, and might be too much for two or three of us on shore,—but left the place. They would think us gone for more boats, as at the former meeting, and would shift their quarters immediately; so by thus harassing them, I hoped to be freed from any more of their visits while we remained in the neighbourhood.

"The bodily strength of these savages is very great ('York Minster' is as strong as any two of our stoutest men), which, with their agility, both on shore and in the water, and their quickness in attack and defence with stones and sticks, makes them difficult to deal with when out of their canoes. They are a brave, hardy race, and fight to the last struggle; though in the manner of a wild beast, it must be owned, else they would not, when excited, defy a whole boat's crew, and, single-handed, try to kill the men; as I have witnessed. That kindness towards these beings, and good treatment of them, is as yet useless, I almost think, both from my own experience and from much that I have heard of their conduct to sealing vessels. Until a mutual understanding can be established, moral fear is the only means by which they can be kept peaceable. As they see only vessels which when their boats are away have

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but a few people on board, their idea of the power of Europeans is very poor, and their dread of fire-arms not nearly so great as might be imagined.

"From this cove we returned to the Beagle. My Fuegian captive, whom I named 'Boat Memory,' seemed frightened, but not low-spirited; he eat enormously, and soon fell fast asleep. The meeting between him and York Minster was very tame, for, at first, they would not appear to recognise or speak to each other. 'Boat' was the best-featured Fuegian I had seen, and being young and well made, was a very favourable specimen of the race: 'York' was one of the stoutest men I had observed among them; but little Fuegia was almost as broad as she was high: she seemed to be so merry and happy, that I do not think she would willingly have quitted us. Three natives of Tierra del Fuego, better suited for the purpose of instruction, and for giving, as well as receiving information, could not, I think, have been found.

"10th. This morning, having been well cleaned and dressed, 'Boat' appeared contented and easy; and being together, kept York and him in better spirits than they would probably otherwise have been, for they laughed, and tried to talk, by imitating whatever was said. Fuegia soon began to learn English, and to say several things very well. She laughed and talked with her countrymen incessantly.

"12th. Some evenings, at dusk, I observed large flights of birds, of the petrel kind, skimming over the sea (like swallows), as if in chase of insects. These birds were black, about the size of a 'Cape Pigeon.' We tried to shoot one, but did not succeed."

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CHAPTER XXII.

Mr. Murray returns—Go to New Year Sound—See Diego Ramirez Islands from Henderson Island—Weddell's Indian Cove—Sympiesometer—Return to Christmas Sound—Beagle sails—Passes the Ildefonso and Diego Ramirez Islands—Anchors in Nassau Bay—Orange Bay—Yapoos—Mr. Murray discovers the Beagle Channel—Numerous Natives—Guanacoes—Compasses affected—Cape Horn—Specimens—Chanticleer—Mistake about St. Francis Bay—Diego Ramirez Islands Climate—San Joachim Cove—Barnevelt Isles—Evouts Isle—Lennox Harbour.

"14th. This morning the master returned, having succeeded in tracing the coast far enough to join our former work, although the weather had been very unfavourable. He met with many Fuegians, most of whom were armed with slings, spears, and cutting weapons made with pieces of iron hoop fastened on a stick. They were very troublesome, especially at night, and obliged him to keep them at a distance. Their respect for a musket was not so great as might have been expected, and unless they saw it tolerably close, and pointed directly at them, they cared not. The boat's crew bought some fish from them, for buttons and other trifles. From forty to fifty men, besides women and children, were seen in one place alone; and many were met elsewhere.

"Mr. Murray penetrated nearly to the base of the snow-covered mountains, which extend to the eastward in an unbroken chain, and ascertained that there are passages leading from Christmas Sound to the large bay where the whale-boat was stolen; and that they run near the foot of the mountains. He also saw a channel leading farther to the eastward than eye-sight could reach, whose average width seemed to be about a mile. He left the two children in charge of an old woman whom they met near the westernmost part which his party reached, who appeared to know them well, and to be very much pleased at having them placed in her care.

"15th. Raining and blowing:—as usual, I might say. When

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it moderated I left the Beagle, and set out in a boat with Mr. Wilson (mate), taking a fortnight's provisions; though I hoped to be again on board in less than ten days, by which time our new boat would be finished, and Mr. Stokes, as well as Mr. Murray, would have laid down his last work. My object was to go eastward towards Indian Sound and Nassau Bay, but the weather soon stopped our progress, and obliged us to put into a small cove on the west side of Point Nativity, where we hoped to get shelter from the increasing wind, though not from the rain, which poured down in torrents. The cove proved to be much exposed, but we staid there till daylight on the following morning, when we pulled out, and round the point to the eastward, gladly enough, for we had been in a bad berth during the night, exposed to wind and rain, besides swell. We ran along the land, with a moderate westerly wind, stopped for a time near Cape Rolle, the point of land next to Weddell's 'Hope Island;' and in the evening went into some openings among the adjacent islands.

"17th. At daylight we set out again, and ran along-shore with a fresh west wind, crossed the mouth of a bay which seemed likely to afford shelter, but did not then delay to look at it closely. Soon after noon we passed Weddell's 'Leading Hill,' which is a very singular double-peaked height, conspicuous from a long distance, and remarkable in every point of view. Between it and Black Point (a projecting craggy rock) lies a bay or sound, which appears to extend some distance northward. This part of the coast is bad for vessels to close with, being much broken, and having several rocky islets scattered near it; but two miles off shore there is no danger. Having found a secure cove near Leading Hill, we landed, and the men set up our tent, while Mr. Wilson and I ascended the heights to look round. The wind soon freshened to a gale, and made us rejoice at having reached a sheltered place.

"18th. The whole of this day was lost by us, for it blew a strong gale with continual rain. Collecting limpets and muscles—cutting wood—and drying our clothes on one side by the fire, while the other got wet, were our only occupations.

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19th. Still a strong wind, but less rain. Between the squalls I obtained a few sights of the sun, for time, and at noon a tolerably good set for latitude. Being then better weather, and likely to improve, we crossed in the boat to Leading Hill, and from its summit took the necessary angles. It was very cold and windy, but we effected all that was then required.

"20th. Decamped very early and ran across Duff Bay, towards Henderson Island, with a moderately fresh breeze off the land; and as my object was to obtain a good view and a round of angles from the summit of a height on that island, I passed Weddell's Morton Isle, Blunder Cove, &c. without stopping, and reached the north end of Henderson Island soon enough to get sights for time. From that spot we went a short distance to a cove, where the boat might remain during my absence on the hill, observed the latitude, and then ascended. Before we were half-way up, a squall came on from S.W. and increased rapidly, but having ascended so far, I was not disposed to turn back, so we pushed on and reached the summit; yet, when there, I could not use a theodolite, on account of the wind. Towards the east I could see a long distance, to the farthest of the Hermite Islands; but towards the west the view was obscured by haze; so leaving the instruments, I hastened down to the boat and found her safe, though she had been in great danger. By this time the wind had moderated, and before dark we measured the distance between the morning and noon stations: that from the latter to the summit of the hill I had measured, when at the top, by a micrometer. We then passed round the north end of the island, and in the dark searched the east side for a resting-place, which after some time was found.

"21st. A fine clear day enabled me to make the necessary observations, and I then went up the height and succeeded in obtaining a distinct view of the Diego Ramirez Islands. As this hill is distant from them between fifty and sixty miles, I felt sure of getting a good cross bearing from the south end of the Hermite Islands, distant from them, as I then thought, only about forty, and thus fixing their position.

"New Year Sound appears to be a large body of water ex-

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tending towards the N.W., with a multitude of islands scattered about it. From its east side the land trends away towards a point which is curiously peaked, like a horn, and which I supposed to be the western point of Nassau Bay.*

"22d. We had hardly left our cove, when steady rain set in; however, we went across towards New Year Sound, sometimes favoured by the wind, but could do little. As far as I saw the day before, the snowy chain of mountains continued to the eastward, therefore I had little hope of finding a body of water in the interior of Tierra del Fuego, about the head of Nassau Bay. About noon we were near Weddell's 'Indian Cove,' but the weather being thick I did not recognise it, so we stood up the sound with a fresh breeze from the W.S.W. I soon found that it led only to the north and west, and probably communicated with some of the passages which Mr. Murray saw leading to the eastward from the neighbourhood of Christmas Sound. Towards the north and east I had already noticed a long range of mountains. Concluding therefore from what I then observed, and from views obtained from the heights, that no passage leads from this sound direct to Christmas Sound, and that to return to the Beagle I must go part of the way by the sea-coast, or else go round, by a series of intricate passages, to the places which Mr. Murray had seen in the cutter; I preferred the coast, as a second view of it would be of use, while a traverse among the islands could not be very beneficial.

"Putting about, we returned down the sound, the breeze still allowing us to sail fast. We closed the western shore to look for Indian Cove, and, as the weather had cleared up, found it without difficulty. It is not so good a place as I expected; for except at the inner corner close to a run of water, I found only rocky soundings. The few casts of good ground were so close to the shore that the place can only be considered fit for a cutter, or small craft, which could lie quite close to the land. This cove is, in my opinion, too far inland to be of general use; and an anchorage under Morton Island would be far preferable

* False Cape Horn, or Cape False.

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for a vessel arriving from sea. We found an empty North-American cask, apparently left that season: on a height near the cove there was a pile of stones we had not time to examine: and much wood appeared to have been cut down lately by the crew of some vessel. We saw several wigwams, but no Indians. That night we stopped near the S.W. point of the sound, close to Gold-dust Island.

"23d. After examining the cove, in which we passed the night, and taking observations, we crossed Duff Bay, towards Leading Hill. I wished to have seen more of a promising bay on the east side of Morton Island, where I thought there was good anchorage, but could not afford time, as it was probable that we should be delayed in our return along this exposed part of the coast against the prevailing winds. There is a considerable tide between Morton Isle and the point next to Gold-dust Isle. The flood comes from the westward, about one knot, or at times two knots, an hour. With the ebb it is nearly slack water, or perhaps there is a slight tendency towards the west; and such appears to be the case all along this coast, from Christmas Sound. We reached Leading Hill late in the afternoon, although the wind had increased much and was directly against us: at night it blew a gale from the westward.

"24th. A strong gale prevented our moving, or making any beneficial use of our time.

"25th. Still blowing very fresh; but I thought we could pull round into the next bay, and there do some good by planning the harbour, &c., although we might get no farther for some days. From the season, the state of the sympiesometer, and the appearance of the weather, I did not expect any favourable change until about the end of the month. The sympiesometer was my constant companion: I preferred it to a barometer, as being much more portable and quicker in its motions. By great exertion on the part of the men, for it required five hours' hard pulling, we got round a headland into the next bay, a distance of only four miles. It rained great part of the time, and in the afternoon poured steadily, but we succeeded in finding a sheltered spot for our lodging, and soon put ourselves into

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somewhat better plight than we had been in during the greater part of the day, the men having been constantly soaked through, and their hands quite numbed with cold and wet. I was disappointed by this place; the various coves were sounded, without getting bottom with twenty-five fathoms of line; and I could find no anchorage without going further up the inlet than would suit any vessel running in from sea for a temporary shelter.

"26th. A strong gale prevented our going outside, but in hopes that there might be an inland passage I set out to look for one. Having pulled and sailed about six miles up the inlet, we reached its termination, and thence returned to our bivouac. There seemed to be an opening into Duff Bay not previously seen, which would have saved us some time and trouble had we known of its existence.

"27th. The gale continued with more or less violence, and during the greater part of the day we were occupied in gathering limpets and muscles, as a stock of food in case of being detained longer than our provisions would last. Shooting did not succeed, because the sea-birds were very wild and scarce. I regretted that there was no harbour in the inlet which could be planned during our stay. Every cove we could find had deep water, and so rocky a bottom that we found difficulty in securing even our small boat; for this continued gale raised so much swell that we were kept on the alert at night to shift her berth as often as the wind changed.

"28th. This day, and the preceding night, the wind was exceedingly violent, from N.W. to S.W., but generally southward of west. In pulling across the cove to get limpets, the squalls at times forced the oars out of the men's hands, and blew them across or away from the boat. Much rain fell during most nights, but after sunrise it generally ceased; sometimes however the rain poured down by day as much as by night.

"I here saw many seals teaching their young ones to swim. It was curious to see the old seal supporting the pup by its flipper, as if to let it breathe and rest, and then pushing it away into deep water to shift for itself.

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"29th. This morning, with better weather, we sailed very early in hopes to get round Black Point; the wind being moderate promised well, but, with the sun, it rose again. However, we tried hard for about six hours, during four of which I hardly hoped to succeed, for it blew strong, and the tide race was dangerous: but before evening we gained the sheltered part of Trefusis Bay. The men were on their oars from five in the morning till four in the afternoon, and, excepting two rests of a quarter of an hour each, pulling hard all the time. We landed in a sheltered spot, about half a mile within the entrance of a passage which leads from Trefusis Bay to Christmas Sound. Our fatigue and thorough drenching, by sea and rain, was then little cared for, having gained our point, and being only a day's pull from the Beagle.

"I had seen along this passage from Christmas Sound, as well as from Leading Hill, and rejoiced to get into it, for the outer coast is a wild one for a boat at any period of the year —and this was the month of March; about the worst time.

"30th. A fine clear morning. We started with the sun, and pulled so fast along in the smooth water, that by the evening we reached our little vessel, and found that all was well on board; that there had been no more visits from the Fuegians, nor any troubles. The new boat was finished on the 23d, only twenty days having been occupied by Mr. May and three men in building her. Appearance was very much in her favour, notwithstanding the disadvantages under which she was built. Lieutenant Kempe had finished all the ship's work with his usual promptness: new topmast rigging had been fitted, and every thing prepared for sea. I was two days over the time for which we carried provisions, but by my coxswain's care of them, and by using limpets and other shell-fish, we still had a sufficiency.

"Having seen as much as seemed necessary of the coast between Christmas Sound and Nassau Bay (I mean necessary in proportion to our limited time and provisions), the Ildefonsos and Diego Ramirez Isles were to be our next objects.

"31st. A strong wind, with much rain, prevented our mov-

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ing early—but as the sun rose higher the weather improved, and we tried to weigh,—yet were provokingly delayed, for the chain was so fast round a rock, that for nearly an hour we could not move it. At last we succeeded, without injury to anything—left the harbour, and stood away for the Ildefonsos with a strong W.S.W. wind and a confused high swell.

"March Harbour (so called from our having passed the month of March in it) is not so good as I at first thought. The bottom is certainly excellent in some parts; it is well sheltered, and easy of access, but there are many rocky places which would injure a hemp cable. Besides, there is a dangerous rock under water in the wide part of the harbour, hidden by a large patch of kelp.

"We passed along the S.W. side of the Ildefonsos, at the distance of half a mile. They appeared like the higher parts of a mountain almost under water, lying N.W. and S.E., nearly broken through by the sea in several places, so as to form several islets, of which the highest and largest is about two hundred feet above the sea, and one-third of a mile in length; another is about one-quarter of a mile long; the rest are mere rocks. The two larger are covered with tussac,* among which we saw numerous seal which had scrambled up to the very summits. Having seen enough of these islets, we hauled our wind, and shortened sail, to prepare for the night: for it blew a fresh gale, with every appearance of its increasing and drawing to the southward. I wished to make the Diego Ramirez Islands the next morning, and thence run to the north-eastward; and, had the wind been moderate, could have done so without difficulty; but after carrying a press of sail during the night, and making southing, with as little easting as possible, I found myself, at daylight next morning, five miles to leeward of the above-mentioned islands, with the wind strong from the N.W., and too much sea to allow me to hope to see more of them without remaining under sail until the weather moderated. This would not have

* A rushy kind of coarse grass.

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suited the chronometers, or our limited time; therefore we wore round and steered (by Weddell's chart) for the western part of the Hermite Islands, intending to run along the land from West Cape. The wind became more moderate towards noon, but the weather got so thick that no part of the land could be made out distinctly; and supposing that a point of land which I saw was Cape Spencer, we steered directly for it, as the day was drawing to a close and obliged me to give up my intention of coasting. Nearing the land, I found it resembled the point I had seen from Henderson Island, and supposed to be the S.W. extreme of Nassau Bay, but did not correspond to any part of the Hermite Islands, as shewn by Captain King's plan. Evening was approaching, thick misty clouds shut out other land from our view, but being a weather shore, I trusted to finding anchorage somewhere, and stood on.

"The wind increased, and blew in very strong squalls off shore, obliging us to carry low sail until we had run several miles along the land in smooth water, when we anchored at the entrance of a bay, in thirteen fathoms water, over a coarse sandy bottom. A low projecting point covered us from the force of the wind as it then blew; and the land on each side from all other westerly winds: but the squalls increased so violently in the early part of the night, that although in smooth water, with eighty fathoms of chain out, the top-gallant masts down, and yards braced up, the vessel drove, and we were obliged to let go another anchor, and veer a long scope of cable; after which she held on firmly through the night.

"2d. At daylight we hove up the best bower, but found one fluke broken off. After getting the sheet anchor to the bows, and the broken one in-board, we weighed and made sail to windward, in search of a good anchorage. When the weather cleared in the morning, I had discovered that we were in Nassau Bay, near Orange Bay, and that the curiously-peaked headland we had passed was 'False Cape Horn,' the same which I had seen from Henderson Island. Finding this the case, I determined to turn the mistake to account, and at once set to work in this quarter, postponing our visit to the Hermite

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Islands. Short runs were essential, because of the chronometers, and this last had been a long one for them, with much motion, therefore it was necessary I should get observations.

" Towards noon the weather cleared and became very fine, with a light breeze from the northward. We stood across near the north end of the Hermite Islands, carrying soundings right across; but the view we obtained of the head of Nassau Bay, did not encourage us to hope for either interior waters or a passage, as the mountains seemed to continue in an unbroken chain to the eastward of New Island, and from the mast-head I saw other high mountains far to the eastward. In the afternoon we stood into a fine-looking clear bay, well sheltered, and with regular soundings, from twelve to twenty fathoms over fine sand. I afterwards found that this was Orange Bay, and that the bay at the south point of which we anchored last night was that called, by the Dutch, Schapenham Bay. Being a large, roomy place, with even bottom, we remained at single anchor; but the glass had been falling so much, and was then so extremely low, that I thought it prudent to prepare for the worst, and struck topmasts.

" During the latter part of our stay in Christmas Sound, and up to the present time, our sick-list had been considerable, therefore I was not sorry to gain a safe anchorage in a place which appeared likely to afford the means of recruiting our invalids, and restoring them to health. Colds and rheumatisms, owing to bleak winds and much wet, were the chief complaints. This was the only time since the Beagle left Rio de Janeiro that her sick-list had been worthy of notice.

" Notwithstanding the unusual fall of the barometer and sympiesometer and their still continuing to sink, this day was as fine, and seemed as likely to continue so, as any day I had ever seen, therefore we took advantage of it, by getting the necessary observations for time, latitude, and true bearing; by airing bedding, and cleaning the ship throughout. This appeared to be an excellent place for vessels: the land around is rather low, and looked much more cheerful than the high dismal mountains under which we last anchored. Wood and water

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were plentiful, and easily obtained. Wild-fowl were numerous, and our people brought on board a serviceable supply, enough for all the sick, and for most of those who were in health.

"3d and 4th. Still very fine weather, although the barometer and sympiesometer were lower than I had yet seen them in this country. Our Fuegians were becoming very cheerful, and apparently contented. We gave them as much fresh provision (birds and fish) as we could obtain with guns and lines, and hitherto they had fared very well. All that was shot went to one stock, from which it was divided in rotation to the messes, the sick being first provided for, and then the Fuegians.

"5th and 6th. Two more fine days, with a very low glass, shook my faith in the certainty of the barometer and sympiesometer.* During those days, the wind had been light from N.N.W., and twice before I had known these instruments to be similarly affected during exactly similar wind and weather: once at Port Desire, on the coast of Patagonia; and once at Port Gallant, while I was in the Otway Water.

"The master went towards the head of Nassau Bay, and Mr. Stokes set out in the opposite direction. Mr. Murray had one of our best chronometers, kept in a box, well packed in wool, but exposed to the temperature of the air. Before going away and after returning, it was kept and rated in the same box on deck, because the variations of temperature in the open air of this climate are small; much less than a chronometer would experience if alternating between a warm cabin and a cold boat. I was sadly grieved at finding that some Fuegians who arrived were not of the same tribe as our captives, nor even spoke the same language. On the contrary, much enmity appeared to exist between them; though their colour, features, and habits were similar. At first, 'York' and 'Boat' would not go near them; but afterwards took delight in trying to cheat them out of the things they offered to barter; and mocked their way of speaking and laughing; point-

* The mercury in the barometer fell to 28,94, and the oil in the sympiesometer to 28,52; the thermometer ranging from 40° to 48° (Faht.)

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ing at them, and calling them 'Yapoo, yapoo.' 'Fuegia' went on deck; but the instant she saw them, screamed and ran away. Some one told her, in jest, to go into their canoe and live with them, which frightened her so much, that she burst into tears and ran below to hide herself. After they were gone, 'Boat' and 'York' made us understand they had had fights with that tribe, and shewed the scars of wounds received from them. By the help of signs we could comprehend much of their meaning; but very few words were yet learned on either side. We afterwards found that these Yapoos built their wigwams in a manner differing from that of the western tribes, being made of a number of poles, or pieces of wood, placed on end around a small space, and meeting at the top.

"Our Yapoo acquaintances established themselves in the bay near our forge, but without attempting to steal any thing. They frequently came alongside the ship with fish, which they caught in the kelp. They take these fish by means of a line without a hook, having only a small piece of bait at the end, with which to entice them to the top of the water, close to the side of the canoe. A fish bites, and before it can detach its small teeth from the soft, tough bait, the hand holding the line jerks the prize above the water, and the other catches it. The fisher then bites out a large piece of its belly, takes out the inside, and hangs the fish on a stick by the fire in the canoe.

"10th. Still fine steady weather, notwithstanding the unusually low fall of the barometer already mentioned.

"12th. By the assistance of Mr. May, at the forge, we made one good anchor out of two broken ones, and fitted new hawse-plates where they were worn through, by constantly using the chains. Fortunately, we brought from San Carlos a good supply of iron and coals, and applied the latter only to the use of the armourer and the small stoves, so that we were enabled to use the forge very often; and between the wants of the ship and those of the boats, there was always much work for that most useful appendage.

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"The glasses had at last been rising; and during the past night and this day, the wind was very strong with much rain. The wind shifted from the northern quarter into the southern, drawing round to the S.E.; which, of course, would make the mercury rise higher after being so very low, though the weather might prove extremely bad.

"14th. The master returned, and surprised me with the information that he had been through and far beyond Nassau Bay. He had gone very little to the northward, but a long distance to the east, having passed through a narrow passage, about one-third of a mile wide, which led him into a straight channel, averaging about two miles or more in width, and extending nearly east and west as far as the eye could reach. Westward of the passage by which he entered, was an opening to the northwest; but as his orders specified north and east, he followed the eastern branch of the channel, looking for an opening on either side, without success. Northward of him lay a range of mountains, whose summits were covered with snow, which extended about forty miles, and then sunk into ordinary hills that, near the place which he reached, shewed earthy or clayey cliffs towards the water. From the clay cliffs his view was unbroken by any land in an E.S.E. direction, therefore he must have looked through an opening at the outer sea. His provisions being almost exhausted, he hastened back.

"On the south side of the channel there were likewise mountains of considerable elevation; but, generally speaking, that shore was lower than the opposite. Mr. Murray saw great numbers of natives near the narrow passage and upwards of a hundred canoes were seen in one day, each containing from two to six people. These Fuegians had much guanaco skin, and many of the bones of that animal made into spear-heads, but very little seal-skin. The wigwams were large and commodious, compared with those of the western tribes, being built of small trees piled up endwise, and tied together at the top, their outside being covered with bushes, grass, &c. to keep out the cold, and the earth inside scooped out much below the surface of the ground. Some could hold about twice as many people

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as the western wigwams: but all were not so large. Every canoe gave chase to our boat, eager to see the strangers, and exchange small fish, spear-heads, or arrows, for buttons, beads, and other trifles. No arms or offensive weapons were seen among them, excepting fish spears, bows, arrows, and slings: they had not even clubs, nor such lances as are used by the western tribes. They seemed to be more tractable, and less disposed to quarrel than those of the west. Wherever the boat went, she was followed by a train of canoes, each full of people, and having a fire smoking in the middle. Where they got the guanaco skins was a question not easy to answer. Was there a passage to the northward, by which they could trade with the people living there?—or were there guanacoes in the southern part of Tierra del Fuego? Both the bones and skins seemed abundant; but the people made signs to Mr. Murray that they came from the eastward:—none pointed towards the north. One native showed how they ran, and their shape, and how they were killed, also the kind of noise they made.

"15th. Mr. Stokes returned, after going a long way to the north and west, without finding a passage into New Year Sound. His examination, united to Mr. Murray's, almost completed the north and west part of Nassau Bay; and only the east side remained to be explored. Our anchorage, called Orange Bay, is excellent; and one of the few on this coast which are fit for a squadron of line-of-battle ships. Its approach from the sea is as easy as the harbour is commodious. There are three fathoms close to the shore; yet in no part are there more than twenty; and every where there is a sandy bottom. Water is abundant; wood grows close to the sea; wild-fowl are numerous; and although shell-fish are scarce, plenty of small fish may be caught with hook and line among the kelp, and in the summer a seine will furnish abundance.

"On the 16th we left Orange Bay, but light winds prevented our reaching the open sea that day, or during the following night. I was equally disposed to run out again to the Diego Ramirez—to look at the coast west of False Cape for about ten miles—or to run for the Bay of St. Francis; but the

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wind failed entirely. During the night we had a breeze that would have carried us down to the latter spot, but wishing to see, and take bearings of the land as I went, I did not profit by it; and in the morning was baffled with light airs and a current setting to the northward.

"17th. During the early part of the day we had light variable winds, scarcely sufficient to help us against the current which seemed to set constantly into the bay, from the sea, at the rate of about one knot an hour. The manner in which our compasses were affected in this bay was remarkable; all of them being extremely sluggish, and, unless continually shaken, they did not show the proper magnetic bearings, or agree together, nearer than two points. I sharpened the centres with much care, and examined the agate caps, without improving the results. The compasses considered the best in other places, were here as bad as the worst; an excellent one, upon Alexander's principle, with central jimbals, being nearly useless. In trying the compasses on shore, the heavy cards with large needles had been less affected by local influence than light delicate cards of Kater: the heavy ones having averaged 24° variation along the whole coast, though Kater's differed in some places as much as from 19° to 28°; agreeing nearly with each other, but not with Gilbert's or Alexander's compasses, in both of which were cards comparatively heavy.

"We passed much too close to West Cape, but having fortunately cleared it, ran along the land before a moderate breeze, and rounded Cape Spencer at dusk. The weather was so thick that Cape Horn could not be seen, and we mistook the former for the famous cape; especially as, in that view, the lower part of Cape Spencer looked like the head of a double-horned rhinoceros: but as we drew nearer, Cape Horn appeared. The wind failed as we entered the Bay of St. Francis, and left us to the alternative of anchoring in deep water, or driving about with the current: we therefore anchored off San Joachim Cove, near the Seal Rock. The night proved fine, so we lay quietly till next morning, and then made sail to a breeze from the northward and anchored in San Martin

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Cove. I afterwards went in a boat to Horn Island, to ascertain the nature of the landing, and whether it was practicable to carry any instruments to the summit of the Cape. Many places were found where a boat might land; and more than one spot where she could be hauled ashore: so that taking instruments to the summit did not seem likely to be a very difficult task. As the weather continued favourable I returned on board that night, and the next morning (19th) arranged for a visit to Cape Horn; a memorial having been previously prepared, and securely enclosed in a stone jar.

After taking observations at noon for latitude, we set out, carrying five days' provisions, a good chronometer, and other instruments. We landed before dark, hauled our boat up in safety on the north-east side, and established ourselves for the night on Horn Island.

"20th. At daybreak we commenced our walk across the island, each carrying his load; and by the time the sun was high enough for observing, were near the summit, and exactly in its meridian; so we stopped while I took two sets of sights and a round of angles. Soon afterwards we reached the highest point of the Cape, and immediately began our work; I and my coxswain, with the instruments; and Lieut. Kempe with the boat's crew raising a pile of stones over the memorial.

"At first the Diego Ramirez Islands were seen, but before I could get the theodolite fixed and adjusted, the horizon became hazy. At noon satisfactory sets of circum-meridional altitudes were obtained with two good sextants. A round of angles, compass bearings for the variation, and good afternoon sights for time completed our success. The pile made over our memorial was eight feet high, and in it were stones which required the united exertions of all seven men to raise to the top. We drank the health of His Majesty King George the Fourth, and gave three hearty cheers, standing round the Union Jack. Directly all was finished we travelled towards our boat as fast as possible: but darkness surrounded us before we were more than half-way. Those who had loads which would not be hurt by tumbling about among bushes, travelled

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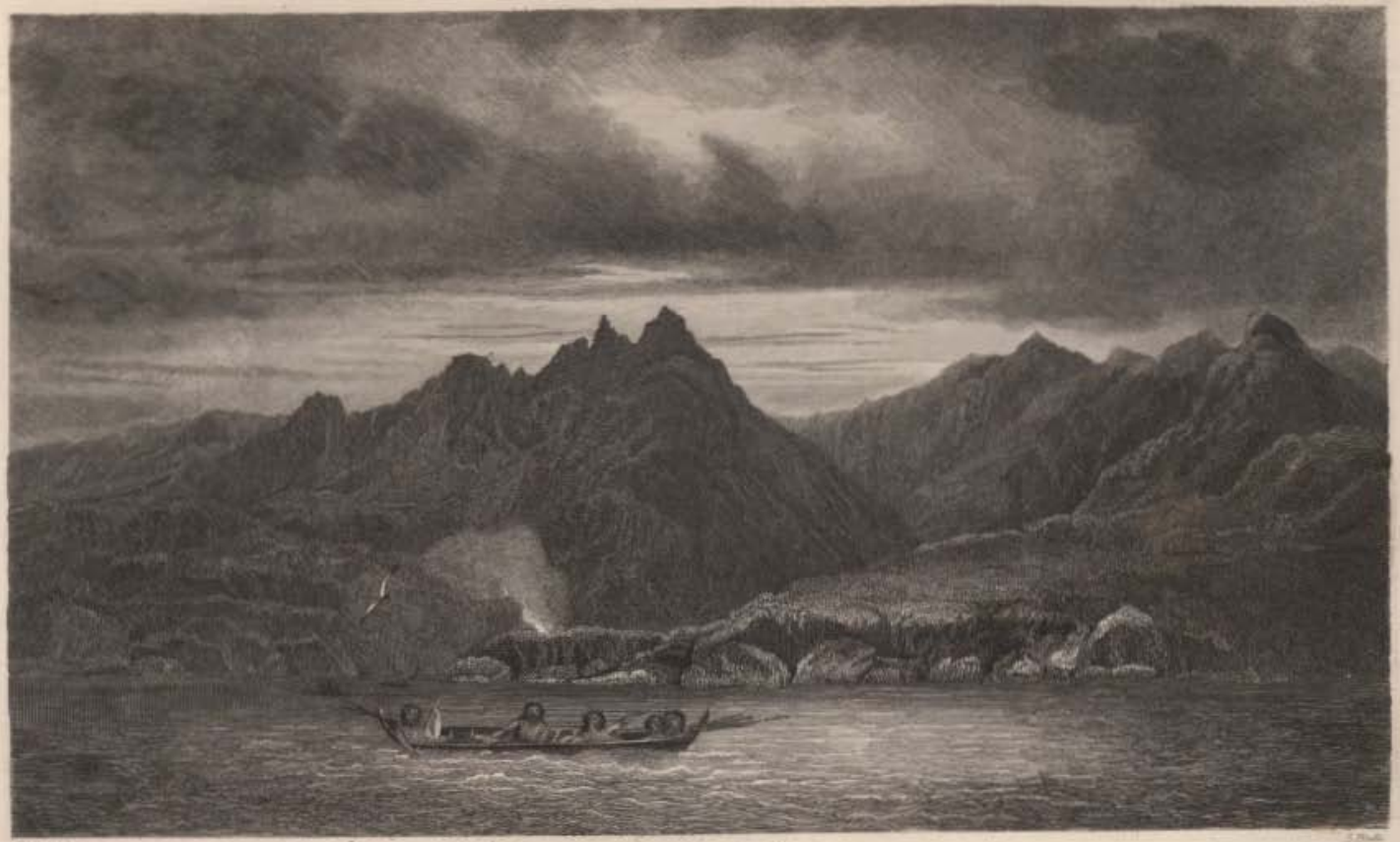

NORTH-EAST SIDE OF WOLLASTON ISLAND NEAR CAPE HORN.

Published by Henry Colburn, Great Marlborough Street, 1839.

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on; but, having the [illegible] and a sextant to take care of, I waited till [illegible] with a lantern. All reached the boat [illegible] losing or injuring any thing; but the [illegible] for [illegible], which each brought [illegible] materially.

"At [illegible] and stowed our boats and [illegible] the ship that afternoon [illegible] Hoen.

"[illegible] weather had been more [illegible] it on any part of [illegible] only just in time, [illegible] Being close [illegible]—though [illegible] the middle of it. [illegible] the Strait [illegible] marks of a very large [illegible] for the head of this cove appeared to have been [illegible] by the [illegible] many remains of wooden roads and wooden houses were visible every where.

"[illegible]. Bad weather. I was waiting anxiously for an opportunity of getting a trial bearing of Diego Ramirez, from the top of Kater Peak, or Cape Spencer, to cross the bearings obtained from Henderson Island.

"[illegible]. I went up to the summit of the Peak, but found so thick a haze, that no distant object could be seen. Leaving the instruments in the top, after taking a few angles, and observations of the sun for true bearings, I descended, and afterwards [illegible] Bernard Chart, which appeared to be a good [illegible]. By comparing the old charts with this place and [illegible] Bay, I [illegible] that there had been a great mistake, and that the Bay of [illegible], or rather [illegible], the bay of [illegible]; and that the plan given in the Admiralty charts is a very fair sketch of its west side, from False Cape to [illegible]; but the bottom and east side of the bay are [illegible] and would have been better left out as [illegible] the words, 'Land was seen in this direction.' [illegible] bearings, distance, or

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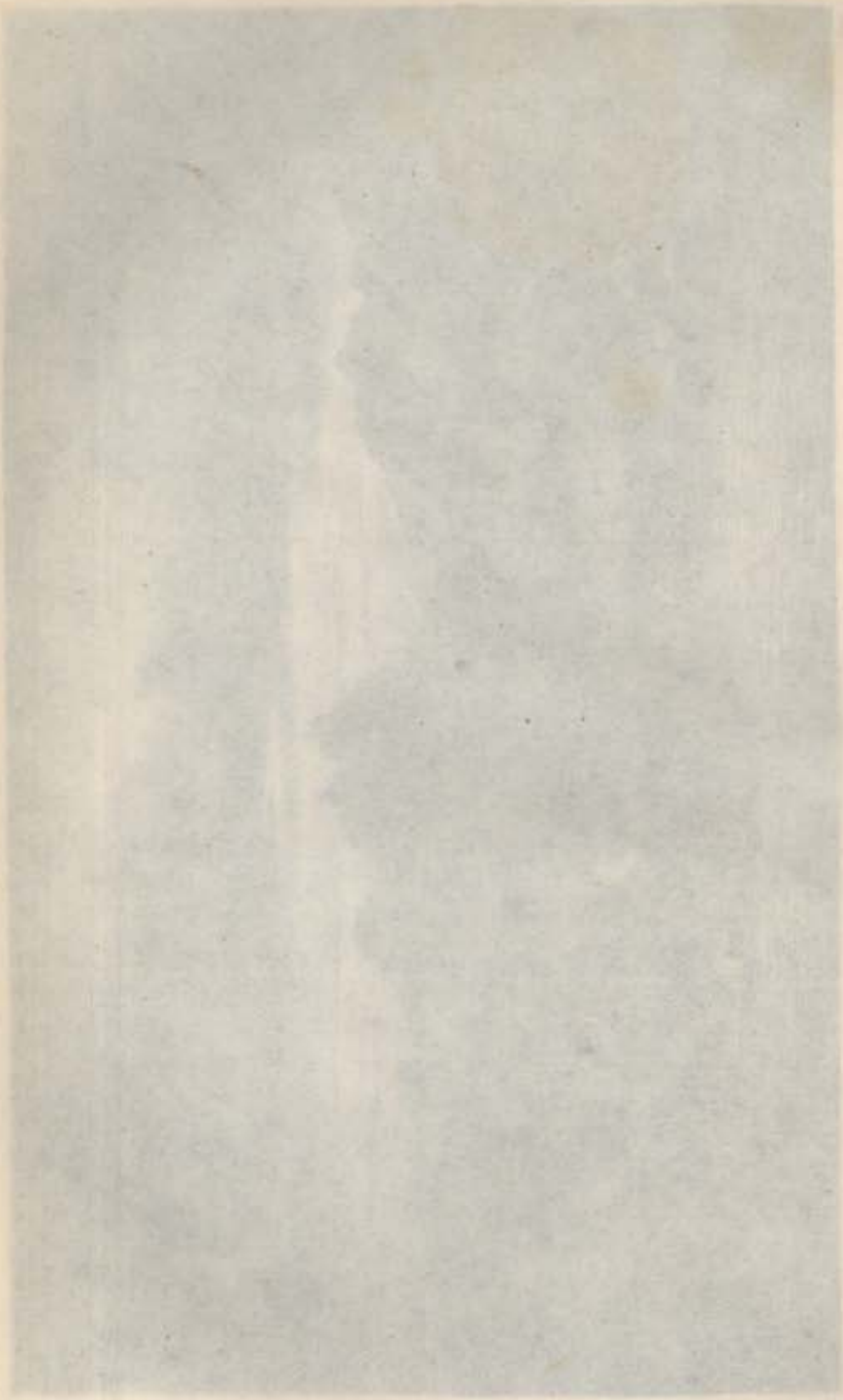

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on; but, having the chronometer and a sextant to take care of, I waited till one of the men returned with a lantern. All reached the boat before nine o'clock, without losing or injuring any thing; but the cargo of stones, for specimens, which each brought back, delayed our returning progress materially.

"At day-light (21st) we launched and stowed our boat, and set out on our return. We reached the ship that afternoon, well laden with fragments of Cape Horn.

"22d. Since the end of March the weather had been more settled, and much finer than we had yet had it on any part of the coast; but our visit to Horn Island was only just in time, for it soon changed again to blowing and raining. Being close to the head of the cove, we did not feel the williwaws—though they appeared to blow sharply enough about the middle of it. I did not wonder at the American, whom we met in the Strait of Magalhaens, saying that he saw 'marks of a very large establishment;' for the head of this cove appeared to have been colonized by the Chanticleer, so many remains of wooden roads and wooden houses were visible every where.

"23d—24th. Bad weather. I was waiting anxiously for an opportunity of getting a true bearing of Diego Ramirez, from the top of Kater Peak, or Cape Spencer, to cross the bearings obtained from Henderson Island.

"25th. I went up to the summit of the Peak, but found so thick a haze, that no distant object could be seen. Leaving the instruments at the top, after taking a few angles, and observations of the sun for true bearings, I descended, and afterwards examined St. Bernard Cove, which appeared to be a good harbour. By comparing the old charts with this place and Nassau Bay, I became convinced that there had been a great mistake, and that the Bay of Nassau is, or rather was, the bay of St. Francis; and that the plan given in the Admiralty charts is a very fair sketch of its west side, from False Cape to Packsaddle Island; but the bottom and east side of the bay are evidently put in at random, and would have been better left out to give place to the words, 'Land was seen in this direction.' Neither in shape, bearings, distance, or

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soundings, does that plan correspond with the place now called St. Francis Bay; but it does agree very closely, considering the date of its being made, with the part I have mentioned. The words Cape Horn may have misled the compiler, as the plan does not show any latitude or longitude, and those who since visited the place, previously to the Beagle's arrival, had not been in Nassau Bay.

"26th. Another fine day. I went up the peak again and obtained the desired angles; but Diego Ramirez appeared nearly as distant as when seen from the top of Henderson Island. Meanwhile the Beagle was unmoored and got under sail. I reached her outside the cove, and stood to seaward; but the day was too fine, there being little or no wind till dark, when a light breeze carried us out of the bay. I steered for the Diego Ramirez Islands, anxious to profit by the fine weather, and examine them more closely.

"27th. The water being smooth, we had a good opportunity of taking angles for placing the coast between West Cape and Cape Spencer, which completed what was wanting in that part; afterwards, we again steered towards the Diego Ramirez.

"28th. A fine morning with a fresh breeze, just such as we desired. Having kept our wind under easy sail during the night, we bore up, and, at daylight, ran along the east side of the rocky cluster, the wind being from the N.E. We hove-to frequently to take angles and soundings, and sailed quite round the islands at the average distance of half a mile, and then stood away to the northward. They are quite similar to the Ildefonsos; the top of a ridge of hills showing above the water, and broken through by the sea. The two largest are about two hundred feet high, and are covered with tussac: there is a shingle beach on one (the second in size), where a boat may be hauled up in safety; and there is enough good water on the east side of the same island to supply thirty men. A furious surf breaks against the west shore, and sends a spray over the whole island. There is no sheltered anchorage for a vessel: for though she might bring up in deep water, on the eastern side of the group, for a short time, she would even then risk

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losing her anchor. The least water I found was fifty fathoms, though Weddell's chart shows that there is less than forty off the S.E. end. The heavy swell prevented my landing; but the appearance of the rocks induced me to suppose that they were greenstone. If not of that nature, and similar to the rock about Cape Horn, they may be of very hard sandstone.

"29th. In this climate, during the few intervals of settled fine weather, the sky is frequently overcast soon after sunset, and a slight shower falls. I noticed this frequently here, as well as during the preceding April, May, and June, in the Strait.

"We stood into the bay which lies between False Cape and New Year Sound; but it offered nothing inviting to a ship, being a leeward bight, with rocks and islets scattered along it near the shore. Perhaps there is shelter for a vessel amongst them; but I would not choose their neighbourhood, if it could be avoided, as the bay is exposed to the S.W. winds, which on this coast are the worst. The breeze freshening, and drawing to the northward, enabled us to reach Cape Spencer in the evening, when, as the weather promised ill, I was glad to anchor in eighteen fathoms, over a sandy bottom, off the entrance of San Joachim Cove.

"Expecting wind, we sent top-gallant masts on deck, braced up, and veered to eighty fathoms. After eight the weather cleared, and appeared likely to remain fine, but the glasses continued to fall. At ten a sudden heavy squall came over the land, and the tops of the hills became thickly covered with clouds. Successive furious gusts followed: we let go a second anchor, and veered a whole cable on each. The squalls came most violently from the S.W., and in half an hour the bank of clouds disappeared; but a strong gale from S.W. continued till daylight, when it moderated. Cape Spencer protected us very well, both from wind and sea: should a ship wish to enter San Martin Cove, and the wind or daylight fail her, she will find this spot a convenient stopping-place.

"30th. The Beagle unmoored, got under sail, and stood towards Cape Horn: at noon she was close to the famous Cape, with beautifully fine weather, more like the climate of

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Madeira than that of fifty-six south latitude. During this day I had excellent opportunities of taking angles, bearings, and soundings, which I hoped would be sufficient for the south and east sides of the Hermite Islands. The following night we worked to the northward, near the Barnevelt Islands, the weather being fine, and the moon shining brightly.

"May 1st. A beautiful day—May-day indeed. I landed on the Barnevelt Islands, and took sights for time, latitude, and true bearing, besides a round of angles, while the Beagle was making slow progress to the northward, the wind being very light, and variable. There is no good landing-place on those islands; but as the water was then comparatively smooth, we were enabled to land upon a steep rocky part, where the surf did not break much. They are two low islets, lying nearly north and south, covered with grass, tussac, and weeds. The largest is about half a mile long, and one-third of a mile wide; the other is about two cables' length square. Several rocks lie off the south end, towards both the east and west; and one above water lies detached, towards the Hermite Islands, nearly in mid-channel: but no other appearance of danger was visible. The angles gained here, crossing those from Orange Bay, bounded the Hermite Islands towards the north—though the detail of their coast-line, northwards, yet remained to be ascertained.

"2d. As fine a day as the preceding. We were close to Evouts, an islet similar to the Barnevelts, but rather higher. The weather enabled Mr. Wilson to continue his sketches of the coast: but indeed no part along which we sailed had been quite omitted. In the afternoon we closed the shore near New Island, and were looking out sharply for banks and shoals, fancying, because the land looked lower, and the Nassau flat had shoal soundings, that we should find banks detached from the land. Shoaler water we certainly found, compared with that to which we had been lately accustomed, namely, from fifteen to twenty fathoms, gradually decreasing as we neared the shore, but we never had less than ten till we were standing into a harbour in the evening. I could here trace no

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resemblance whatever to any published chart; but seeing a place at the back of some low islets which appeared likely to afford sheltered anchorage, we steered for it, and at sunset anchored in a well-sheltered harbour on the east side of a large island, to the west of New Island. The water shoaled gradually, over a fine sandy bottom; but we ran in rather too far, and had only three fathoms after veering cable, so we were obliged to shift our berth.

"3d. Mr. Murray prepared to go along the coast towards Cape Good Success, carrying one of the chronometers, and other necessary instruments, and taking three weeks' provisions. He set out, in a whale-boat, with six men, well armed and equipped in every way. Having despatched the master, I prepared for an excursion into the interior passages of this part of Tierra del Fuego: while Mr. Stokes, in another boat, was to contiue the survey of the coast from the east side of the head of Nassau Bay to the vicinity of New Island; and Lieut. Kempe would take care of the ship, and forward her refitting, besides wooding and watering.

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CHAPTER XXIII.

Set out in boats—Find Guanacoes—Murray Narrow—Birch Fungus—Tide—Channel—Glaciers—View—Mountains—Unbroken chain—Passages—Steam-vessels—Jemmy Button—Puma—Nest—Accident—Natives—Murray's Journal—Cape Graham—Cape Kinnaird—Spaniard Harbour—Valentyn Bay—Cape Good Success—Natives—Lennox Island—Strait Le Maire—Good Success Bay—Accident—Tide Race—San Vicente—San Diego—Tides—Soundings—North-east Coast—San Sebastian—Reflections—Port Desire—Monte Video—Santa Catalina—Rio de Janeiro.

"4th. Mr. Stokes and I each began another trip in the boats, taking chronometers, and the necessary instruments. He steered to the northward, to get to the mainland; I kept outside to the south-westward, to make the most direct course towards the communication between Nassau Bay and the newly discovered passage or channel. I was surprised to find that the eastern shore of Nassau Bay resembled much of the coast of Patagonia (being a stratum of earth without rock), and differed entirely from the general character of the coasts and islands of Tierra del Fuego. At sunset we landed, and hauled up our boat on a shingle beach which extended several miles, and upon walking only a few yards inland I saw the prints of large cloven hoofs, almost the size of those of a cow. This discovery gave an answer to the question about the guanaco skins and bones found among the Fuegians, but made me less sanguine of finding a passage northward through the interior of the country. Much brushwood was found near this place; and a profusion of rich grass covered an extensive plain.

"5th. We launched the boat, and continued our course along-shore, finding rather shoal water (three to six fathoms within about half a mile), with a very thick bed of kelp, through which it was difficult to force the boat. We had not advanced far, when, passing round a low point of land, we saw

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four fine guanacoes feeding close to the water. They did not seem to be much alarmed; but walked away from us round a projecting part of the shore, which prevented our getting a shot at them. They appeared to be much larger than those I had seen near Port Desire, on the Patagonian coast, their bodies being far heavier, and their tails longer and more bushy. These differences might be the natural result of a different climate, as cool weather, with plenty of food and water, would probably increase their size. I would not delay, on their account, hoping to fall in with others, but pushed on along the shore. These animals were near what is called in the chart 'Windhond Bay.' In the afternoon, we were again among rocky mountains and deep-water shores, and being so fortunate as to get a fresh breeze from the S.E., made much progress before night. We saw several canoes, full of natives; but did not turn aside to speak to them, as time was too precious.

"6th. A very cold and blowing morning, the wind being against us, yet we made better progress than I had hoped for, as our boat proved to be so excellent; and whether sailing or pulling, was all we could wish for. This night we bivouacked close to the Murray Narrow, but took care not to land till after dark, and then carefully concealed the fire, so that our rest might not be disturbed by visits from the Fuegians. A sharp look-out was, of course, kept by the watch; and by my two dogs, who were very useful in that way.

"7th. Soon after we set out, many canoes were seen in chase of us; but though they paddled fast in smooth water, our boat moved too quickly for them to succeed in their endeavours to barter with us, or to gratify their curiosity. The Murray Narrow is the only passage into the long channel which runs so nearly east and west. A strong tide sets through it, the flood coming from the channel. On each side is rather low land, rising quickly into hills, behind which are mountains: those on the west side being high, and covered with snow. When we stopped to cook and eat our dinner, canoes came from all sides, bringing plenty of fish for barter. None of the natives had any arms; they seemed to be smaller in size, and less disposed

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to be mischievous, than the western race: their language sounded similar to that of the natives whom we saw in Orange Bay. We found a very large wigwam, built in a substantial manner, and a much better place to live in than many of the huts which are called houses in Chilóe. I think twenty men might have stood upright in it, in a circle; but, probably, of these Fuegians, it would house thirty or forty in the cold weather.

"While our men were making a fire and cooking, I walked into the wood, but found it bore little resemblance to that which our eyes had lately been accustomed to. The trees were mostly birch, but grew tall and straight. The ground was dry and covered with withered leaves, which crackled as I walked; whereas, in other parts where we had lately passed our time, the splashing sound of wet, marshy soil had always attended our footsteps, when not on rock. These Fuegians appeared to think the excrescences which grow on the birch trees, like the gall-nuts on an oak, an estimable dainty. They offered us several, some as large as an apple, and seemed surprised at our refusal. Most of them had a small piece of guanaco, or seal-skin, on their shoulders or bodies, but not enough for warmth: perhaps they did not willingly approach strangers with their usual skin dress about them, their first impulse, on seeing us, being to hide it. Several, whom I surprised at their wigwams, had large skins round their bodies, which they concealed directly they saw me. Fish and the birch fungus must be their chief food, for shell-fish are scarce and small; but they catch an abundance of excellent rock-fish, smelt, and what might be called a yellow mullet. Guanaco meat may occasionally be obtained by them, but not in sufficient quantity to be depended upon as an article of daily subsistence.

"Leaving the natives, we sailed across towards the western arm of the long channel, and continued making our way westward, with oar and sail, until dusk, when we landed, unperceived, as we thought, and established ourselves for the night. Just as we had moored the boat, kindled a fire, and pitched our tent, a canoe came into the cove; another and another followed, until we were surrounded with natives. Knowing

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we must either drive them away by force, or be plagued with them all night, we at once packed up our things, and wished them good evening. About three miles further westward, we again landed, and fixed our tent in a cove, which gave us good shelter through the night, without any interruption. It was high water this afternoon at four o'clock (being the day of full moon), and the tide rose three feet. The channel here, and opposite the Narrow, is about three miles wide; on its north side is an unbroken line of high mountains, covered with snow to within about a thousand feet of the water. Southward are likewise snow-covered heights, so that the channel is formed by the valley lying between two parallel ridges of high mountains.

"8th. This morning it froze very sharply. We started at sun-rise, with a fine breeze from the eastward, and made a long run before it. The channel preserved the same character, and nearly the same width; on the north, the mountains continued without any opening; but a few miles farther, we saw what appeared to be one. I soon found that there was one passage leading westward, and another rather to the southward of west, which appeared to open into the sea. The easterly breeze failing, and squalls from the N.W. succeeding, we did not make much progress in the afternoon; yet before dark had reached the place where the two channels commence, and stopped for the night on a small island. Soon after dark, one of the boat's crew was startled by two large eyes staring at him, out of a thick bush, and he ran to his companions, saying he had seen the devil! A hearty laugh at his expense was followed by a shot at the bush, which brought to the ground a magnificent horned owl.

"Next day, we continued our westerly route. No natives were seen, though a few wigwams, of the round-topped kind, were passed. The westernmost sharp-pointed, or Yapoo wigwam, was on the main-land, close to the island of the Devil; it was made of small trees, piled up in a circle (the branches and roots having been broken off) with the smaller ends meeting at the top. The boat's crew said it had been a 'Meeting-House,' and perhaps they were not far wrong; for being so

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large, and just on what might be called neutral ground between the two tribes, it is not unlikely that there may have been many a meeting there—perhaps many a battle. At the separation, or meeting of the two channels, it was high water at a quarter before five this morning, and the flood came from the west, about a knot an hour; the ebb-tide set to the west at about half that strength. Much drift-wood and large fragments of ice were carried along with it. Between some of the mountains the ice extended so widely as to form immense glaciers, which were faced, towards the water, by lofty cliffs. During a beautifully fine and still night, the view from our fireside, in this narrow channel, was most striking, though confined. Thickly-wooded and very steep mountains shut us in on three sides, and opposite, distant only a few miles, rose an immense barrier of snow-covered mountains, on which the moon was shining brightly. The water between was so glassy, that their outline might be distinctly traced in it: but a death-like stillness was sometimes broken by masses of ice falling from the opposite glaciers, which crashed, and reverberated around—like eruptions of a distant volcano.

"10. Before daylight this morning, we were on our oars; and by the time the sun was high enough for observing, were many miles westward of our resting-place. After sights, while the men were cooking, I obtained a few bearings, and prepared to return, not intending to go further westward. I saw water from that spot, more than twenty miles to the west (by compass); and then my view was limited by the channel turning towards the south. In those twenty miles, not the slightest appearance of an opening to the northward could be seen; mountain succeeded mountain, in unbroken succession. Three ridges, or ranges, could be traced, lying parallel to each other; and the nearest summits of those in the third, or furthest range, stretching from the northward and eastward of me, and continuing, as far as eye could reach, towards the north and west, were at least five leagues distant. Their height I supposed to be about four thousand feet: that of those nearest to me, about two thousand: and of those in the middle range, mentioned

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just now, about three thousand. At a distance, the channel appeared to trend to the southward of west, and there the sides of the mountains seemed to be very bare, and weather-beaten, while near me they were covered with wood. This led me to conclude that farther westward they were open to the sea winds, and that there the channel ended. By the observations, I found that we were* nearly in the longitude of Christmas Sound, and in latitude 54° 54′ S., being therefore twenty miles south of the end of Admiralty Sound, but considerably to the westward of it. This position, and the bearings and estimated distances, showed me that the other arm of this long channel opened near the spot where Mr. Murray laid down (near the head of Christmas Sound) a 'channel, running to the eastward, beyond eyesight;' and that the branch in which I was must lead towards the bay or sound to the N.W. of Christmas Sound, at the base of very high land, which Mr. Murray laid down as 'an unbroken range of snow-covered mountains.' The time of high water in this channel exactly corresponded with that on the adjacent sea-coast, but did not nearly agree wit that of the Strait of Magalhaens. These facts, and the appearance of the land, removed every doubt in my mind of the existence of an unbroken chain of mountains, reaching from the Barbara Channel to the Bell Mountain, and I therefore decided to spend no further time in searching thereabouts for a passage northward, but make all haste to examine the exterior shores.

"The channel here was about a mile wide, but the mountains on each side rising so abruptly, made it appear much narrower. It might be a good passage for a ship to sail through, from the westward, were it not for the trouble and anxiety of getting in with the land at the right place; and that a ship might sail on her course, in the open sea, by night as well as by day; but here she could hardly choose to run at night, because there are a few low islets, near mid-channel, in some parts. For a boat, in case of shipwreck, or other urgent reason, it might be convenient: but going through to the westward would be very difficult, because it would be

* In longitude 69.20. W.

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necessary to ply to windward all day, and every day, making half-mile boards in defiance of squalls strong enough to capsize a vessel. A steam-vessel might answer in this region, as there is plenty of wood every where. Directly the noon observations were finished, and the instruments safely stowed, we began our return, and as a fresh breeze sprung up from the westward, we dashed along with a favouring tide at a great rate.

"11th. Next day we landed, for dinner and rest, near the Murray Narrow, and close to a wigwam, whose inmates ran away; but soon returned, on seeing us seated quietly by their fire. We bought fish from them for beads, buttons, &c., and gave a knife for a very fine dog, which they were extremely reluctant to part with; but the knife was too great a temptation to be resisted, though dogs seemed very scarce and proportionably valuable. Afterwards we continued our route, but were stopped when in sight of the Narrow by three canoes full of natives, anxious for barter. We gave them a few beads and buttons, for some fish; and, without any previous intention, I told one of the boys in a canoe to come into our boat, and gave the man who was with him a large shining mother-of-pearl button. The boy got into my boat directly, and sat down. Seeing him and his friends seem quite contented, I pulled onwards, and, a light breeze springing up, made sail. Thinking that this accidental occurrence might prove useful to the natives, as well as to ourselves, I determined to take advantage of it. The canoe, from which the boy came, paddled towards the shore; but the others still paddled after us, holding up fish and skins to tempt us to trade with them. The breeze freshening in our favour, and a strong tide, soon carried us through the Narrow, and half an hour after dark we stopped in a cove, where we had passed the second night of this excursion. 'Jemmy Button,' as the boat's crew called him, on account of his price, seemed to be pleased at his change, and fancied he was going to kill guanaco, or wănăkāye, as he called them—as they were to be found near that place.

"12th. We continued our course with a fresh and favouring

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breeze from the N.E.; passed Windhond Bay, and at sunset hauled the boat up, though a surf on the stony beach made it a difficult task. Several guanacoes were seen near the shore as we passed along.

"At daylight this morning (13th), we went in search of guanacoes; but, seeing none, soon returned to the boat, and launched her. I lost my new dog in the bushes, yet we could not stop to recover him. During our walk this morning, I observed traces of a large land-animal, which I supposed to be a puma; and two of the men noticed a place, like a large nest, made in the trees by the natives, in which I have no doubt they watch for the guanacoes, to spear them as they pass underneath. We reached the Beagle in the evening, and found all well on board excepting one man, who, in carrying a guanaco,* shot by the cutter's crew, had slipped and broken his leg. Mr. Stokes, with whom he was, contrived to set it for him; but very properly made the best of his way to our ship with the man, whose leg was there found to be so well set, and bandaged up with splints, by those in the boat, that the surgeon had nothing to alter. Mr. Stokes went away again directly; and both he and Mr. Murray were absent at my return; but Lieut. Kempe, with the few men left on board, had done what was required, and gave a good account of the harbour, with respect to safety as well as shelter from wind. Ten canoes had come, at different times, to the ship; but the natives were extremely quiet and inoffensive, and sold our people a large quantity of fish. By success in shooting, Lieut. Kempe had been enabled to stop the issue of salt provisions for two days. Our Fuegians were in high spirits, and the meeting between them and Jemmy Button was droll enough: they laughed at him, called him Yapoo, and told us to put more clothes on him directly.

"17th. Mr. Murray returned from his excursion to Cape Good Success, having done all that was expected, but not without incurring considerable danger on so exposed a coast. Had not his boat been a very fine one, his crew good, and

* The stuffed skin is now in the British Museum.

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he himself a most skilful manager, I do not think he could have gone so far along an unprotected shore, through 'races' of tide, and yet have returned in safety."

The following are extracts from his Journal.

"'Near Cape Graham we saw a large party of Indians, with several canoes, one of which, paddled by two men and a woman, came alongside of our boat, and they sold us some fine fish, for the large price of two metal buttons and a small string of beads. Finding no place at which I could land, on account of the rocks and heavy swell, we steered for the shore about fifteen miles to the northward. Approaching a flat-topped bluff, covered with grass, I saw a large guanaco, and just afterwards a whole herd feeding, for which he seemed to be doing the duty of a sentinel. The shore was inviting, and earthy soil seemed abundant; but too many rocks showed their sharp points at the water's edge to allow of our landing. At last we found a small patch of shingle between two reefs of rocks, and there we succeeded in beaching the boat, through a heavy surf. I ascended a steep woody height to obtain a view of the neighbourhood, and found that for some miles the country was level, and apparently covered by thick grass. Traces of, and paths made by, guanacoes, were very numerous in every direction. Next day we pulled to the eastward against a tumbling sea, caused by a weather tide, and at sunset tried to land; but were disappointed, by finding that the shore was so fronted every where by rocks, that we could not approach. We therefore hastened towards a long reef of outlying rocks, which might afford some shelter, as a breakwater, during the night, but found such overfalls near them, that we were again obliged to continue our route alongshore in the dark. At last I heard the noise of a large waterfall, between the breakings of high surf on the rocks, and fancied a cove could be made out, towards which we cautiously advanced, sounding with the lead and a long pole, and succeeded in obtaining a place of temporary security.

"'In passing along the shore on the following day, many herds of guanacoes were seen feeding. At night we again had

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much embarrassment in obtaining a place for the boat. On the 7th there was too much sea and wind to admit of our proceeding, so I went to various points suited for obtaining angles and bearings. One of these stations was a large rock, looking like a tower, which stood alone on a level plain.

"'The weather being less unfavourable and the sea smoother on the 8th, we launched our boat and sailed to the eastward. In passing round Cape Kinnaird, great numbers of fur-seal were observed, so many indeed that they completely covered several of the large rocks.

"'Spaniard Harbour proved to be a shallow bay, full of rocks, and dangerous reefs lining the shore, and without shelter, although there is anchorage for a vessel.

"'In a large cave in a rock, which forms the south head of a little cove where our boat was secured, I found the recent traces of Indians, who had left bones of guanacoes and birds lying about near the ashes of a large fire. I went into the cave for a considerable distance, until it became too dark to find my way farther, but did not reach the end. Afterwards we sailed to the eastward again, under a treble reefed sail, and landed before dark in a corner between projecting rocks. Numbers of guanacoes were feeding around; but, after our shooting one of them, they made off. In every place at which we landed, traces of Indians had been found; yet hitherto we had seen only one party during this trip. The country near us, on the east side of Spaniard Harbour, or rather Bay, seemed level, though here and there were low hills, whose eastern sides were thickly covered with wood: some of the trees (beech) growing large and straight enough to make topmasts or lower yards for a small ship; though probably their qualities would be unsuitable.

"'May 10th. During a heavy gale, I ascended the highest hill, near the sea, and noticed many rocks, on which the sea was breaking, that I had not seen before. On the 11th we passed through a very dangerous 'tide-race' off Bell Cape. There was little or no wind, but it was scarcely possible to use our oars, so much was the water agitated: it was heaving

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and breaking in all directions, like water boiling in an immense caldron. When through, and again in safety, I was astonished at our fortunate escape. Looking back upon it, only a mass of breakers could be seen, which passed rapidly to the westward, and therefore led me to suppose that the 'race' was caused by a meeting of tides; not by a strong tide passing over a rocky ledge.

"'The land near Bell Cape is steep, high, and so rocky, that we could not find any place at which to land. We went into all the small coves, but they were so guarded by rocks as to be impracticable. Sailing eastward, I at last found a small cove, near Valentyn Bay, in which we hauled the boat ashore. A small stream ran into it, near which were many wigwams, but no natives could be seen.

"'12th. We crossed Valentyn Bay, and landed near Cape Good Success. I walked to the summit, and thence obtained a good view of Staten Island, on the east; and all the coast westward, as far as New Island. In the north-east corner of Valentyn Bay, we found some Indians, living in one large wigwam, without any canoes. There were eight men, each of whom had a bow and a few arrows in his hand, and all, except one, were clothed in guanaco-skins hanging down to their heels, the woolly side being outwards. We obtained several bows from them, by barter, but they were reluctant to part with many arrows. One of the number wore a large seal-skin, that I purchased with a knife, which, to my surprise, he distinctly called 'cuchillo.' They had some fine dogs, one being much like a young lion; but nothing we could offer seemed, in their eyes, to be considered an equivalent for his value. Afterwards we examined Valentyn Bay, and found it unfit for vessels, being exposed to a heavy swell, and affording but bad anchorage.

"'On the 13th and 14th, a heavy gale confined us to our cove, into which such numbers of wild-fowl came, for shelter I suppose, that we shot as many as we wanted.

"'On the 15th, 16th, and 17th, we were returning to the Beagle, not without meeting difficulties and risks similar to

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those already mentioned, but which it would be as tedious as unnecessary to relate.'"

"Soon after the Master came alongside, Mr. Stokes also returned, having been a long way into the channel first discovered by Mr. Murray, and having examined all the shores about its eastern communication with the sea. He met many groups of Indians, but managed so as not to have any collision or trouble with them.

"18th. Digging in various places on Lennox Island, showed me that the soil is unlike that where the guanacoes were seen on Navarin island, which is fit for cultivation; this being very moist, and too full of tussac and other roots, to be serviceable in any agricultural point of view.

"19th. Natives had come alongside at various times, during the last few days, to sell fish for old buttons and other trifles. It was amusing to witness York and Boat taking in these people, by their bargains. The same men who, two months back, would themselves have sold a number of fish for a bit of glass, were seen going about the decks collecting broken crockery-ware, or any trash, to exchange for the fish brought alongside by these 'Yapoos,' as they called them; not one word of whose language did they appear to comprehend. Lieut. Kempe returned from an unsuccessful excursion to Navarin island in search of guanacoes. He saw many, but could not get within shot. The footmarks of a puma were noticed by him in several places.

"23d. After obtaining a few sights of the sun, for the chronometer rates, we sailed from Lennox harbour, a very secure place for small vessels; but, as it is rather shallow, ships drawing more than fourteen feet of water should anchor outside the entrance, where they would be safe, and in smooth water, excepting when a south-east gale blows, with which wind they would not, in all probability, wish to remain at anchor. The soundings are regular in the offing, and there is anchoring ground every where in the vicinity. Wood and water may be obtained, in any quantity: wild fowl and fish are also to be had, but not in abundance. The easiest way

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of getting fish is to give bits of broken glass or buttons to the natives, who catch them in the kelp, by a baited line, without a hook, enticing the fish to the top of the water and then seizing them with the hand, or, if the fish has swallowed the bait, jerking it out of the water before it can disengage itself; as I mentioned before.

"At daylight (24th), being off Cape Good Success, we bore up, and ran towards the Strait of Le Maire, with a fresh gale at south, and thick snow squalls. The strait appeared clear of all obstacles, no rocks, nor even kelp being visible. The shore from Cape Success to the north head of Success Bay is high and bold, with water for a ship as near to it as she could desire, or ought to go. We hauled our wind during a severe snow squall, lest we should run beyond the harbour, and afterwards bearing up, ran into Good Success Bay, and anchored under the lee of its south head as a temporary berth. As soon as the ship was secure, I went to look for the best anchorage; and when it moderated, we weighed and shifted to a position where I supposed the ship secure when moored in smooth water, with sixty fathoms on our seaward anchor, and fifty on the other, the anchors lying respectively in eight and seven fathoms, over a clear, sandy bottom. The gale continued during the day, and towards night increased, drawing more to the eastward, and sending a swell into the bay. The wind was very cold, and the snow and hail froze fast, as they lodged upon any exposed part of the ship. Between eight and nine it blew heavily; afterwards it became much more moderate; and at midnight there was only a fresh wind from E.S.E. A long swell then began to set into the bay from the same quarter; but the ship rode so easily, and the night seemed to be improving so fast, with the glass rising steadily, that I went to bed without an anxious thought respecting her safety: however, I was hardly asleep when I was told that the small bower, our seaward cable, had parted. I ran instantly upon deck, when finding the night fine, and no increase of swell, I thought at first it was a mistake; but was quickly set right by the ship turning her broadside to the swell, and dropping

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down upon her lee anchor. The critical nature of our situation at once struck me: it was evident, that the frost had rendered our chains, so often tried, a doubtful security against the jerk of rollers which occasionally set into the bay—one or two, perhaps, in half an hour—though the swell was at other times trifling. We veered a whole cable on the in-shore anchor (a small one, got at San Carlos), cleared away and let go the sheet-anchor, shackled the remainder of the small bower chain to the best bower, and rode with two-thirds of a cable on the sheet, and a cable and a half on the bower, close to the beach, though in six fathoms water, keeping the cables constantly streaming wet at the hawse-holes, with sea-water, to prevent their freezing: the temperature of the water being 44°, though the snow and hail lay frozen on the weather-side of the masts. The link that broke, of the chain, was in the hawse exposed to a current of cold air through the hawse-hole. It certainly appeared defective, when examined next day; but as it had withstood many a heavy strain, I attribute its parting to the action of the frost, and would caution seamen to be on their guard when using chain cables in similar weather. The wind moderated, and the swell decreased towards morning; so we became again at ease with respect to the safety of the ship, after a few hours of anxious suspense, for we had no hemp cables, and were close to the surf of the shore.

"25th. The wind drawing southward brought the vessel's broadside to the swell, and prevented our getting the boats out for some time, as she rolled heavily, and I would not risk their being injured without absolute necessity. In the evening we crept for the end of the chain, weighed, and bent a stout hawser to it; and next day hove up the sheet anchor, and moored afresh, at a greater distance from the land.

"27th and 28th. Blowing a furious gale of wind.

"May 29th. The first tolerable day in this place was employed by the officers in taking bearings and soundings in the bay; and by the ship's company in wooding and watering. Some wigwams and the traces of guanacoes' hoofs were seen, but the land is high, and being thickly wooded shut us out

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from the best guanaco country. I was not sure which was the height Mr. Banks ascended; but the broad road mentioned by Cook is still a good mark for the bay, if the inbend of the land does not show it sufficiently. The weather here was colder than we had yet found it, the wind being so much in the south quarter; there were very sharp frosts at night, and snow lay deep, even close to the sea water-mark.

"May 30th. I was in hopes of finding a harbour between Cape San Diego and Cape San Vicente, or a little farther along the coast, where we might be able to fix the position of Cape San Diego and the adjacent land; for I did not like sending a boat along this coast, the tides being so very strong, and the shore so rocky, without any inlets, where she could be secured at night. (During Mr. Murray's last trip, he was extremely fortunate in having a fine interval; as the coast he passed would have been impracticable for a boat in blowing weather. Had these last strong southerly gales begun before he came back, his situation would have been extremely critical.) We therefore stood into the strait, the wind being variable and light with us, though blowing strongly over the tops of the hills, and striking the water nearest them in strong squalls. At half a mile from the land there was little wind; but from that distance to the shore was torn up by williwaws. This strange appearance must have been caused by the cold air rushing from the snow-covered hills and displacing the warmer air near the surface of the water.

"With the ebb tide and what flaws of wind we could catch we stood to the southward, to get some angles and bearings, and see more of the shore between Cape Good Success and the bay. In the afternoon we had a steady wind from N.N.W.; and having done what was necessary, to the southward, returned, and anchored after dark near the middle of the bay.

"May 31st. At daylight this morning, we weighed and made sail with a fresh northerly breeze. I trusted to the weather improving, as the glasses were rising; but, indeed, our time was becoming too short to allow of a choice of days. We worked to the northward with the flood-tide, taking the required

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angles and bearings, and at noon were close to Cape San Diego, where the flood-tide opposed the north wind very strongly, and in addition to a heavy swell from the northward, made such an irregular high sea, as nearly caused the loss of our new boat, and would have damaged many a vessel. The weather became worse; and as the swell continued high from the northward, I was obliged to stand to sea, and carry a press of sail to keep off the land, which by that time was too much obscured by haze and clouds to admit of our running back.

"June 1st. Bad weather, with rain nearly all day. At about twelve miles to the northward of Cape San Vicente, by estimation, we stood off and on until in the latter part of the day we got a breeze from south, to which sail was made to close the land about Cape San Vicente.

"At noon, on the 2d, we were well in-shore, and stood along the land, looking for a harbour. Seeing a promising place, we anchored off it, in twenty-two fathoms water; and, as the night proved to be fine, remained quiet in smooth water, with the wind off the land, and a regular tide setting past the ship.

"At daylight next morning, I went to look at the opening, which, from the masthead, seemed like a spacious harbour; but I found it to be so shallow an inlet, that at its entrance, just within the heads, there was no more than one fathom of water. Nevertheless this cove must be the place which the Spaniards dignified with the name of Port San Policarpo.

"We weighed and sailed along-shore, but the wind being scant, and the tide against us, it was late before we could get into San Vicente Bay, where we anchored in a line between that cape and Cape San Diego, but nearest to the former. In a cove at the head of this bay, Mr. Banks landed when Cook was here. During the night we were tossed about by a very heavy swell, opposing a strong tide; the wind being moderate, not enough to steady the vessel.

"Finding this morning (June 4th), that the swell was too high to allow a boat to be lowered in safety, I gave up my intention of examining the cove, and hastened back to the Bay

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of Good Success, to complete wood and water, and obtain rates for the chronometers, previously to leaving the coast. Wind and tide favoured us, and at noon we were moored in Good Success Bay. Soon afterwards I left the Beagle, in my boat, with a week's provisions, intending to try to land near Cape San Diego, and thence walk to the cape with the instruments; but I found a cross swell in the strait, and a rocky shore without a place in which the boat could land: though I risked knocking her to pieces by trying to land in the only corner where there seemed to be any chance. After this escape I tried farther on, without success; by which time it became dark, and if I had not returned immediately, while the ebb-tide made, the flood would have begun and obliged me to lie at a grapnel, during a frosty night, in a strong tide-way, with the boat's crew wet through: I turned back, therefore, and pulled towards Success Bay, assisted by the tide, but the cockling sea it made half filled the boat more than once, and we were thankful when again safely on board the Beagle.

"Having failed in this scheme for settling the latitude of Cape San Diego, I thought of effecting it by bringing the Beagle to an anchor in the strait, two or three miles to the eastward of Good Success Bay, and thence connecting the Cape to known points by triangulation; the heads of this bay and Cape Good Success, quite correctly placed, serving as the foundation.

"June 5th. I obtained some sights of the sun this morning and observations at noon, besides bearings and angles to verify former ones. All hands were busy wooding and watering, preparatory to returning to Monte Video. A large albatross was shot by my coxswain, which measured nearly fourteen feet across the wings.

"6th. The snow which covered the ground when we were first here was quite gone, and the weather was comparatively mild. The frost at night was not more than in a common winter's night in England, the thermometer ranging from 27° to 32°. The tide was carefully noticed this day, being full

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moon. It was high water at a quarter past four, and the tide rose seven feet.

"7th. We unmoored, weighed, stood to the eastward and anchored with the stream anchor, and a large hawser, in fifty fathoms water, about three miles from Success Bay. After taking the required angles and bearings we weighed at eleven, and stood towards Cape San Diego with the first of the flood. The tide being strong, we made rapid progress, and were soon out of the strait; but wishing to see as much of the N.E. coast as possible, in our progress northward, we hauled to the wind and kept near the land during the night, as the weather was fine and settled.

"Before leaving Good Success Bay and the Strait of Le Maire, I felt satisfied that we had acquainted ourselves with the tides, which are as regular and as little to be dreaded as in any part of the world where they run with strength. They will materially assist any vessel in her passage through the strait; which is very wide, perfectly free from obstacles of any kind, and has Good Success Bay close at hand, in case wind or tide should fail. When the tide opposes the wind and swell, there is always a heavy, and, for small vessels, dangerous 'race' off Cape San Diego, where the water is more shoal than elsewhere (*k*), we found it so at a neap flood-tide, but let it be remembered that on another day, at the top of the springs, being the day after full moon, we passed the same spot, at half flood, with the water perfectly smooth, and although strong eddies were seen in every direction, the vessel's steerage was but little affected by them. It is high water in Success Bay soon after four in the afternoon, on the full and change days, and low water exactly at ten in the morning. The flood tide-stream begins to make to the northward about an hour after low water, and the ebb, to the southward, about the same time after high water. The tides rise from six to eight feet, perpendicularly. At Cape Pillar the turn of tide, with high water, is at noon: but along the S.W. and S.E. coast the time

(*k*) Five fathoms only were found in one spot during the Beagle's last voyage.—R. F.

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gradually increases to this coast. From Cape San Diego the flood tide sets north and west along the shore, from one knot to three knots each hour, as far as twenty miles along shore; and the ebb in a contrary direction, but not so strongly, except in San Vicente Bay. The flood in the Strait of Le Maire runs about two knots in mid channel, more or less according to the wind, and the ebb about one knot an hour. Perhaps, at times, when a strong spring tide is retarded in its progress by a northerly wind, there will be a dangerous overfall off Cape San Diego, like the bores in some parts of the world.

"The soundings are tolerably regular, and may give notice of an approach to Staten Land, or to the N. E. coast, and may guide a ship to the fairway of the strait; but I should not place much confidence in them, near such a rocky coast as that of Staten Land.

"Good Success Bay is an excellent anchorage for vessels of any size to stop in for wood or water; but it would not answer if a vessel required to lie steady for repair, as a swell frequently rolls in. It is quite safe, yet, in the winter season, when easterly gales are common, no vessel should anchor so near the head of the bay as she might in summer; for heavy rollers at times (though rarely) set in. Fish we did not try to get, not having spare time, and only a few birds were shot.

"On the 8th, a very fine day with but little wind, we were off the flat-topped hill, called the Table of Orozco; and, from the mast-head, I had an extensive view of the adjacent country. About Success Bay and Bell Mount the land is high, but north of Success Bay it slopes away towards Cape San Diego, which is a long, low, projecting point. Thence, as far as I could see, the N.E. coast extended, low, excepting a few hills here and there, and unbroken by inlets; the country near it being a pleasant looking hill and dale land, well wooded and quite free from snow. I could distinguish a snow-covered chain of mountains which must have lain near Admiralty Sound, the country on this side of them appearing to be a continued succession of hill and valley, with only a few of the hills capped with snow, although this was the depth of winter.

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Smoke was seen at but one place, about two miles inland. In the evening we got a breeze off shore, and stood along the coast, the moon shining brightly and the weather being fine. I kept rather close to the land, during the night, in order to be near the entrance of the supposed St. Sebastian Channel in the morning.

"At midnight Cape Santa Inez was distant from us three or four miles, but thence we saw very little of the land, till three, near Cape Peñas, after which the weather became thick, and the wind drew round to the N.E., which made me keep more off shore until daylight (9th), when we bore up and stood for the land. Having found Cape Santa Inez and Cape Peñas correctly laid down on the chart we used, I thought Cape St. Sebastian would not be far wrong, and we had taken several observations during the early part of the night to correct our reckoning. Standing towards the shore, we quickly shoaled our water, and found a ground swell increasing. Having made what I supposed to be Cape Sebastian, and seeing from the mast-head a large opening to the northward of it similar to that laid down in the chart, with low distant land yet farther northward corresponding to the shores of 'Bahia de Nombre de Jesus,' I stood on confidently, thinking how well the chart of this coast had been laid down, and regardless of the soundings decreasing as we went on. Seeing, however, from the mast-head, what seemed to be a tide-ripple, two or three miles distant, I called the boatswain, who had been much among the tide-races on this coast, to ask his opinion of it: but before he could get up aloft to me, I saw that it was very low land, almost level with the sea, and what I thought the ripple, was the surf on the beach. Standing on a little farther we had but seven fathoms water over a bottom of dark muddy sand, with bits of black slate. At this time, the weather had cleared enough to see the land fifteen or twenty miles on each side, but nothing like an opening appearing, on the contrary, a plain extending to the westward, as horizontal as the sea, I hauled to the wind and stood alongshore to the S.E., to look for an inlet, fancying

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I had overshot the proper place; especially as the land continued flat, and unbroken, for many miles to the N.W., while to the S.E. it seemed hilly and irregular.

"Having ranged along shore several miles, yet still seeing from the mast-head a continuation of the same kind of coast-line, as far as an eye could trace the surf on the beach, without any opening, we wore ship and stood to the northward, satisfied that the St. Sebastian channel did not exist within many miles of the position laid down in the chart.

"In the afternoon the weather became very thick, with rain, a fresh wind blowing right on shore, and the glasses falling; so we carried sail to get off the land and out of the shoal water, in which there was a heavy ground swell. At midnight we had obtained a good offing.

"On the 10th, a fresh breeze from the N.E., a low glass, and thick weather, with constant rain, would have prevented my nearing the land again if I had been disposed to do so. Though reluctant to leave any part of the coast of Tierra del Fuego unexplored, while I had so effective a vessel, and all with me in good health, I was bound to remember our distance from the appointed rendezvous; the state of our provisions, of which we had only three weeks left on board; and that I was ordered to be at Rio de Janeiro on the 20th of this month. I therefore decided to hasten to Port Desire, for the sake of the chronometer measurements; and from thence proceed to Monte Video and Rio de Janeiro. I had previously made up my mind to carry the Fuegians, whom we had with us, to England; trusting that the ultimate benefits arising from their acquaintance with our habits and language, would make up for the temporary separation from their own country. But this decision was not contemplated when I first took them on board; I then only thought of detaining them while we were on their coasts; yet afterwards finding that they were happy and in good health, I began to think of the various advantages which might result to them and their countrymen, as well as to us, by taking them to England, educating them there as far as might be practicable, and then

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bringing them back to Tierra del Fuego. These ideas were confirmed by finding that the tribes of Fuegians, eastward of Christmas Sound, were hostile to York Minster's tribe, and that therefore we could not, in common humanity, land them in Nassau Bay or near the Strait of Le Maire. Neither could I put the boy ashore again, when once to the eastward of Nassau Bay, without risking his life; hence I had only the alternative of beating to the westward, to land them in their own districts, which circumstances rendered impracticable, or that of taking them to England. In adopting the latter course I incurred a deep responsibility, but was fully aware of what I was undertaking.

"The Fuegians were much slower in learning English than I expected from their quickness in mimickry, but they understood clearly when we left the coast that they would return to their country at a future time, with iron, tools, clothes, and knowledge which they might spread among their countrymen. They helped the crew whenever required; were extremely tractable and good-humoured, even taking pains to walk properly, and get over the crouching posture of their countrymen.

"When we were at anchor in Good Success Bay, they went ashore with me more than once, and occasionally took an oar in the boat, without appearing to harbour a thought of escape.

"During the night of the 13th, we were near the land about Sea Bear Bay; the wind, however, drew to the northward, and with a strong current setting to the S.E., drove us off again.

"The 14th was foggy; clouds preventing any observations, but at three in the afternoon we made the land, a little north of Port Desire, near what is called in the chart 'Rivers Peak.' The wind having hauled to the southward, and the current setting northward, prevented our approaching nearer to the port on that day.

"At daylight on the 15th, we were again off Rivers Peak, notwithstanding our having carried a press of sail in order to make southing during the night. We were set twenty miles to the northward during that time; but a slant of wind and

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the turn of tide in our favour carried us towards the entrance of the harbour, into which we worked, the tide of ebb having just ended; and we moored abreast of the ruins. My first care was to look for traces of the Adventure or Adelaide, but I found none. A bottle which I had deposited for the Adelaide, at our last visit, by Captain King's direction, was exactly where I then left it, and the papers it contained were untouched. While in this port I got good observations, the weather being clear, though very cold. No guanacoes were shot although many were seen, but numbers of sea-birds were brought on board.* A quince was given to me which was found in a place where the Spanish colony had made a garden. We remarked that the tracks of the guanacoes on shore here were not so large, by one-half, as those we had so lately seen in Tierra del Fuego. Having noticed the currents particularly, in order to compare them with what I observed formerly and with the tide in the port; I can now say, decidedly, that the flood tide comes from the southward, and that the ebb sets to the south-east. North of Port Desire, or from Port Desire to Cape Blanco, the flood is much the strongest, but off Penguin Island the ebb is, I think, the strongest, setting two or three knots an hour. It is high-water and slack-water, in Port Desire, at half-past twelve, on the days of full and change. The tides, if not attended to, would baffle a ship much in making this port.

"On the 21st we sailed, with a fresh breeze from the S.W.; and at nine A.M. on the 25th when about one mile southward of the alleged position of the Ariel rocks, and near the nominal longitude, I hauled to the wind and ran some distance on their parallel, looking out for broken water. There was a very irregular and heavy swell, as much as would be raised by a gale of wind, but caused apparently by a current; and while waiting for the meridian altitude, before bearing up, having run twenty miles on the same parallel, a heavy swell rose on the quarter, which struck our weather quarter boat, and turned

* The powder and shot expended here procured four meals of fresh provisions for all hands.

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her in upon the deck, breaking both iron davits. One of the davits of the lee-boat was also unshipped by the jerk, and the after-part of the vessel well drenched with water. We secured both boats again, but the one to windward was badly stove. For a moment, I thought we had indeed found the rocks, and the huge black back of a dead whale which just then shewed itself very near the vessel, much increased the sensation. I imagined that we were in a meeting of tides or currents; where old trees, dead whales, &c. are often found, and have frequently caused reports of rocks; for the water was not more shallow than we had found it during the day, the soundings having varied from forty to fifty fathoms; so having obtained the meridional altitude we bore up, and steered our course again.

"On the 26th we entered the Plata, and at one A.M. on the 27th, Lobos Island was seen, and soon afterwards the high land about Pan de Azucar. We continued working to the westward, and at daylight were off Whale Point, but the wind fell light, and the current being against us, we lost during the day what had been gained in the night. At seven P.M. the current set so strongly out of the river that we were obliged to drop a kedge with a stout hawser, and ride by it, though keeping all sail set and going between four and five knots through the water. When the hawser bore a strain, the log was hove, and the current found to be setting more than five knots. This was off Maldonado; Lobos bearing N.N.E., distant four miles. Soon after nine the stream slacked, we tripped the kedge and worked up the river, the wind being still westerly, but the current having turned in our favour. The U. S. frigate Hudson passed, steering to the eastward:—she was the first sail we had seen since leaving San Carlos de Chiloe. At daylight next morning (28th), we were in sight of Flores Lighthouse, which was reported to be a vessel under sail. Soon after which another vessel was reported as being under all studding sails; this was the Mount itself: so curiously were objects distorted by the haze. Soon after noon we anchored off Monte Video, and from Captain Talbot, of H.M.S. Algerine, I heard of the arrival there, and subsequent departure of the Adventure and the Adelaide.

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On the 9th of July we sailed from Monte Video,—on the 18th made the high land over the island of Santa Catalina, and after dark anchored in the bay. My object in calling there was to continue the chronometric chain, between Tierra del Fuego and Rio de Janeiro, by as short intervals as possible: and the results so obtained proved to be very satisfactory.

"While in Monte Video I tried to have the Fuegians vaccinated, but the virus did not take any effect on them. Little Fuegia was living several days with an English family, who were extremely kind to her; and the others were on shore at different times with me. No one noticed them; being so very like the Indians of the neighbourhood.

"The apparent astonishment and curiosity excited by what they saw, extraordinary to them as the whole scene must have been, were much less than I had anticipated; yet their conduct was interesting, and each day they became more communicative. It was here that I first learned from them that they made a practice of eating their enemies taken in war. The women, they explained to me, eat the arms; and the men the legs; the trunk and head were always thrown into the sea.

"On the 23d we sailed from Santa Catalina; and on the 2d of August anchored in the harbour of Rio de Janeiro."

Here the extracts from Captain Fitz Roy's Journal end.

The Adventure and the Beagle sailed together from Rio de Janeiro on the 6th of August, having left the Adelaide as a tender to the flag-ship, but reimbarked her officers and crew; and, after a most tedious passage, anchored in Plymouth Sound on the 14th of October. Both vessels were soon afterwards paid off; the Beagle at Plymouth, and the Adventure at Woolwich.

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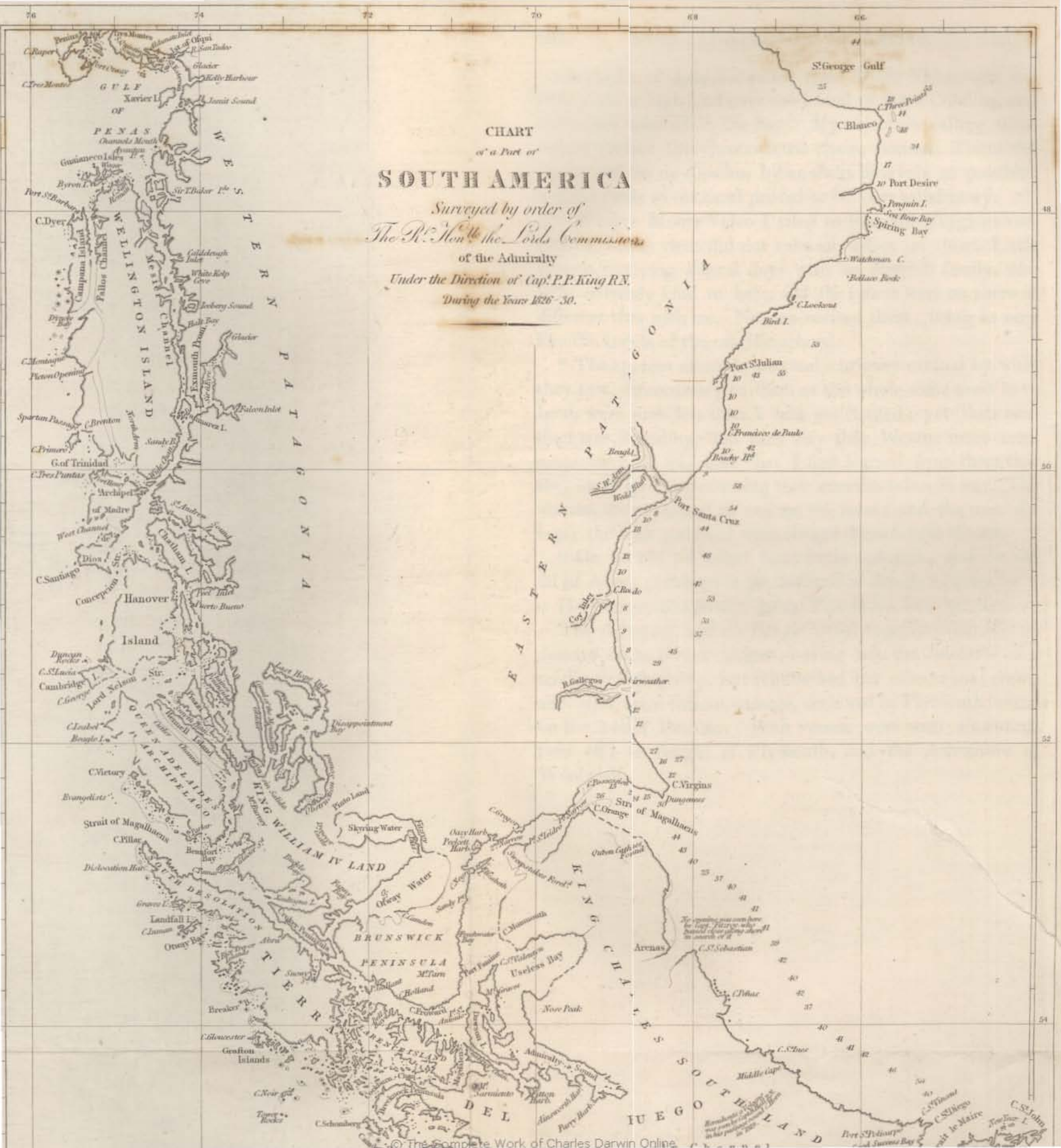
CHART
of a Part of
SOUTH AMERICA
Surveyed by order of
The Rt Hon.ble the Lords Commissioners
of the Admiralty
Under the Direction of Capt P.P. King R.N.
During the Years 1826–30.
WESTERN PATAGONIA
EASTERN PATAGONIA
TIERRA DEL FUEGO
Strait of Magalhaens
Port Desire
Port St Julian
Port Santa Cruz
Arenas
Hanover Island
Wellington Island
Queen Adelaide Archipelago
King William IV Land
Brunswick Peninsula
Clarence Island
Grafton Islands
Skyring Water
Otway Water
Oazy Harb.
Peckett Harb.
Useless Bay
Admiralty Sound
Sarmiento
Patton Harb.
Port Famine
Mt Graves
Mt Mammoth
Mt Burney
Nose Peak
Sandy Pt
Cape Virgins
C. Orange
C. Blanco
St George Gulf
Penguin I.
Spiring Bay
Watchman C.
Bird I.
C. Lookout
C. Fairweather
C. Buen Suceso
C. Pillar
C. Victory
C. Gloucester
C. Schomberg
C. Near
C. St Ines
C. St Sebastian
C. St Diego
C. St John
Middle Cape
Port St Julian
Port Desire
Three Points
Three Mountains
Gulf of Trinidad
Gulf of Otaqui
Xavier I.
Jesuit Sound
Penas
Guaianeco Isles
Byron I.
Port St Barbara
C. Dyer
Campana Island
Fallos Channel
Messier Channel
Golddelough Inlet
White Kelp Cove
Iceberg Sound
Hale Bay
Glacier
Exmouth Sound
Falcon Inlet
Messier I.
Sandy Bay
Spartan Passage
C. Brenton
C. Primero
C. Montagne
Pleasant Opening
Archipelago of Madre de Dios
West Channel
St Andrew Sound
Concepcion
C. Santiago
Port Inlet
Puerto Bueno
Duncan Rocks
C. St Lucia
Cambridge I.
Lord Nelson Str.
C. George
C. Isabel
Beagle I.
Outer Channel
Evangelists
Pitt I.
Bicknell Harb.
Dislocation Harb.
South Desolation
Graves I.
Landfall I.
C. Inman
Otway Bay
Breaker Pt
Grafton Islands
C. Near
Tierra del Fuego
C. Schomberg
Disappointment Bay
Last Hope Inlet
Pinto Land
Skyring Water
Oazy Harb.
Peckett Harb.
Sandy Pt
Cape Virgins
C. Orange
Strait of Magalhaens
Queen Catherine Forest
Arenas
C. St Sebastian
C. Pillar
C. St Ines
Middle Cape
Port St Julian
Port Desire
Three Points
C. Blanco
St George Gulf
Penguin I.
Spiring Bay
Watchman C.
Bird I.
C. Lookout
C. Fairweather
C. Buen Suceso
C. Pillar
C. St Ines
C. St Sebastian
C. St Diego
C. St John
Middle Cape
Port St Julian
Port Desire
Three Points

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CHAPTER XXIV.

A FEW NAUTICAL REMARKS UPON THE PASSAGE ROUND CAPE HORN; AND UPON THAT THROUGH THE STRAIT OF MAGALHAENS, OR MAGELLAN.

Ships bound from the Atlantic to any of the ports in the Pacific, will find it advantageous to keep within one hundred miles of the coast of Eastern Patagonia, as well to avoid the heavy sea that is raised by the westerly gales, which prevail to the eastward, and increase in strength according to the distance from the land, as to profit by the variableness of the wind when it is in the western board. Near the coast, from April to September, when the sun has north declination, the winds prevail more from the W.N.W. to N.N.W. than from any other quarter. Easterly gales are of very rare occurrence, but even when they do blow, the direction being obliquely upon the coast, I do not consider it at all hazardous to keep the land on board. In the opposite season, when the sun has south declination, the winds will incline from the southward of west, and frequently blow hard; but, as the coast is a weather shore, the sea goes down immediately after the gale. In this season, although the winds are generally against a ship's making quick progress, yet as they seldom remain fixed in one point, and frequently shift backward and forward six or eight points in as many hours, advantage may be taken of the change so as to keep close in with the coast.

Having once made the land, which should be done to the southward of Cape Blanco, it will be beneficial to keep it topping on the horizon, until the entrance of the Strait of Magalhaens be passed.

With respect to this part of the voyage, whether to pass through Strait Le Maire or round Staten Island, much difference of opinion exists. Prudence, I think, suggests the

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latter; yet I should very reluctantly give up the opportunity that might offer of clearing the strait, and therefore of being so much more to windward. With a southerly wind it would not be advisable to attempt the strait; for, with a weather tide, the sea runs very cross and deep, and might severely injure and endanger the safety of a small vessel, and to a large one do much damage. In calm weather it would be still more imprudent (unless the western side of the strait can be reached, where a ship might anchor), on account of the tides setting over to the Staten Island side; where, if it becomes advisable to anchor, it would necessarily be in very deep water, and close to the land. With a northerly wind the route seems not only practicable, but very advantageous, and it would require some resolution to give up the opportunity so invitingly offered. I doubt whether northerly winds, unless they are very strong, blow through the strait—if not, a ship is drifted over to the eastern shores, where, from the force of the tides, she must be quite unmanageable.

Captain Fitz Roy seems to think there is neither difficulty nor risk in passing the strait. The only danger that does exist, and that may be an imaginary one, is the failure of the wind. Ships passing through it from the south, are not so liable to the failure of the south-westerly wind, unless it be light, and then a breeze will probably be found from N.W., at the northern end of the strait. The anchorage in Good Success Bay, however, is at hand, should the wind or tide fail.

In passing to leeward of Staten Island, the tide race, which extends for some distance off Cape St. John, at the N.E. end of the island, must be avoided: otherwise there exist no dangers.

The anchorage under New Year Islands, although it is a wild one, the bottom bad, and the tide very strong, yet offers good shelter from south-west winds, and might be occupied with advantage during the existence of a gale from that quarter, which is so unfavourable for ships bound round the Horn.

After passing Staten Island, if the wind be westerly, the

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ship should be kept upon the starboard tack, unless it veer to the southward of S.S.W., until she reaches the latitude of 60° south, and then upon that tack on which most westing may be made. In this parallel, however, the wind is thought to prevail more from the eastward than from any other quarter. Never having passed round Cape Horn in the summer season, I may not perhaps be justified in opposing my opinion to that of others, who, having tried both seasons, give the preference to the summer months. The advantage of long days is certainly very great, but, from my experience of the winds and weather during these opposite seasons at Port Famine, I preferred the winter passage, and in our subsequent experience of it, found no reason to alter my opinion. Easterly and northerly winds prevail in the winter off the cape, whilst southerly and westerly winds are constant during the summer months; and not only are the winds more favourable in the winter, but they are moderate in comparison to the fury of the summer gales.

Having passed the meridian of Cape Pillar, it will yet be advisable to take every opportunity of making westing in preference to northing until the meridian of 82° or 84° be reached, which will enable a ship to steer through the North-westerly winds that prevail between the parallels of 50° and 54°. (See Hall's South America, Appendix.)

With respect to the utility of the barometer as an indicator of the weather that is experienced off Cape Horn, I do not think it can be considered so unfailing a guide as it is in the lower or middle latitudes. Captain Fitz-Roy, however, has a better opinion of the indications shewn by this valuable instrument: my opinion is, that although the rise or fall at times precedes the change, yet it more frequently accompanies it. The following sketch of the movement of the barometer, and of the weather that we experienced, may be not without its use.

Being to the north of Staten Island for three days preceding full moon, which occurred on the 3d April (1829), we had very foggy weather, with light winds from the eastward and

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northward, causing a fall of the mercury from 29·90 to 29·56. On the day of full moon the column rose, and we had a beautiful morning, during which the high mountains of Staten Island were quite unclouded, as were also those of Tierra del Fuego. At noon, however, a fresh gale from the S.W. set in, and enveloped the land with a dense mist. No sooner had the wind changed, than the mercury rose to 29·95, but fell again the next morning; and with the descent the wind veered round to N.W., and blew strongly with thick cloudy weather and rain, which continued until the following noon, when the wind veered to S.W., the barometer at 29·54, having slightly risen; but after the change it fell, and continued to descend gradually until midnight, when we had a fresh gale from W.S.W. When this wind set in, the mercury rose, and continued to rise, as the wind veered without decreasing in strength to S.S.W., until it reached 29·95, when it fell again and the weather moderated, but without any change of wind. During the descent of the mercury, the sky with us was dull and overcast, with squalls of wind and rain, but on shore it seemed to be very fine sunshiny weather.

The column now fell to 29·23, and during its descent the weather remained the same, dull and showery; but as soon as the mercury became stationary, a fresh breeze set in from the southward, with fine weather.

After this to new moon the weather was very unsettled, the wind veering between South and W.S.W.; the barometer rising as it veered to the former, and falling as it became more westerly; but on no occasion did it precede the change.

The mean height of the barometer is about 29·5.

The mercury stands lowest with N.W. winds, and highest with S.E.

With the wind at N.W. or northerly the mercury is low; if it falls to 29 inches or 28·80, a S.W. gale may be expected, but it will not commence until the column has ceased to descend. It frequently, however, falls without being followed by this change. In the month of June, at Port Famine, the barometer fell to 28·17, and afterwards gradually rose to 30·5,

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which was followed by cold weather, in which the thermometer stood at 12°.

The following Table shews the mean temperature and pressure as registered at the Observatory at Port Famine in the Strait.

1828.	Temperature.	Pressure.
February	51·1	29·40
March	49·4	29·64
April	41·2	29·57
May	35·5	29·30
June	32·9	29·28
July	33·0	29·57
August	33·2	29·28

The difficulties that present themselves to Navigators in passing round Cape Horn, as well from adverse winds as the severe gales and heavy sea to which they are exposed, are so great, that the Strait of Magalhaens has naturally been looked to as a route by which they may be avoided. Hitherto no chart has existed in which much confidence could be placed; but by the present survey, the navigation through it, independent of wind and weather, has been rendered much easier; since a correct delineation of its shores, and plans of the anchorages, have been made; and in the preceding pages, sufficient descriptions of them have been given to assure the navigator of his place, and furnish him with advice as to his proceedings. The local difficulties therefore have been removed; but there remain much more serious ones, which I should not recommend a large, or even any but a very active and fast-sailing square-rigged vessel to encounter, unless detention be not an object of importance.

For a square-rigged vessel bound through the Strait, the following directions will be useful:—

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In the eastern entrance the winds will frequently favour a ship's arrival off the First Narrow; where, if she selects a good anchorage on the bank which bounds the northern side of the channel, she may await an opportunity of passing through the First Narrow and of reaching Gregory Bay; where also a delay may safely be made for the purpose of passing the Second Narrow and arriving at the neighbourhood of Cape Negro; at which place the difficulties and dangers of the eastern entrance cease.

The dangers being carefully placed on the chart, and now sufficiently described, nothing need be repeated here; and indeed much must be left to the judgment and discretion of the navigator.

The tides answer best for vessels entering the Strait at the period of full and change of the moon, since there are two westerly tides in the day. In the winter season, if the morning tide be not sufficient to carry a vessel through the First Narrow, she may return to Possession Bay, select an anchorage, and be secured again before night; or, in the summer, if she has passed the Narrow, and has been enabled to anchor for the tide, there will be sufficient daylight for her to proceed with the following tide to Gregory Bay, or at least to a safe anchorage off the peaked hillocks on the north shore.

I have twice attempted to pass the First Narrow, and been obliged to return to the anchorage in Possession Bay; and twice I have passed through it against a strong breeze blowing directly through, by aid of the tide; which runs, in the narrower parts, at the rate of ten or twelve miles an hour. When the tide and wind are opposed to each other, the sea is very deep and heavy, and breaks high over the decks; it is therefore advisable to close reef, or lower the topsails on the cap, and drift through; for the tide, if at the springs, will generally be sufficient to carry a ship to an anchorage, although, not always to one where it would be safe to pass the night. On this account, it would be prudent to return; for, although the holding ground is exceedingly good, yet, to part in the night, or drift towards, or through the Narrow, could scarcely happen without accident.

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In leaving the anchorage in Gregory Bay, attention must be paid to the tide, which continues to run to the eastward in the Second Narrow, three hours after it has commenced setting to the S.W. at the anchorage.

With a leading wind through the Second Narrow, a ship will easily reach an anchorage off Laredo Bay, but, if the tide fails upon emerging from it, she should seek for a berth in the bay to the north of Elizabeth Island, as near to the island as possible, but to the westward of its N.E. end, to be out of the influence of the tide. The depth of water, however, will be the best guide.

Directions for passing round the south side of Elizabeth Island are given elsewhere; and as this part offers some dangers, the chart and the description should be carefully referred to.

The only advice that seems wanting, to improve the directions for the coast from this to Port Famine, is, with a south-westerly wind, to keep close to the weather shore, in order to benefit by the flaws down the valleys; but this must be done with caution, in consequence of the squalls off the high land, the violence of which cannot be well imagined by a person unaccustomed to them.

Of the anchorages between Port Famine and Cape Froward, the only convenient one for a ship is St. Nicholas Bay, to which, if defeated in passing round the Cape, she had better return; for it is easy to reach as well as to leave, and extremely convenient for stopping at, to await an opportunity of proceeding.

From Cape Froward to the westward, unless favoured by a fair wind, it is necessary to persevere and take advantage of every opportunity of advancing step by step. There are several anchorages that a ship may take up, such as Snug Bay, off Woods Bay, near Cape Coventry, in Fortescue Bay, Elizabeth Bay, and York Roads. To the westward, in Crooked Reach, the anchorages are not so good, and excepting Borja Bay, none seem to offer much convenience. Borja Bay, however, is well calculated to supply the deficiency, although for a square-rigged vessel there must be some difficulty in reaching it.

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Long Reach is both long and narrow, and ill supplied with anchorages for a ship; such as they are, Swallow Harbour, Playa Parda, Marian Cove, and Half Port Bay, seem to be the best. In thick weather, although the channel is very narrow, yet one side is scarcely visible from the other, and the only advantage it has over other parts of the strait is the smoothness of the water. In Sea Reach there is a heavy rolling swell, with a short and deep sea, which renders it very difficult to beat to windward.

Tamar Harbour, Valentine Harbour, Tuesday Cove, and the Harbour of Mercy, are the best anchorages; and the latter is particularly convenient to occupy, while awaiting an opportunity of sailing out of the strait.

In the entrance, the sea runs very heavy and irregularly during and after a gale; so that a ship should not leave her anchorage in the Harbour of Mercy, without a fair or a leading wind to get her quickly through it.

For small vessels, particularly if they be fore-and-aft rigged, many, if not all of the local difficulties vanish; and inlets which a ship dare not or cannot approach, may be entered with safety, and anchorage easily obtained by them. A large ship will perhaps be better off in entering and leaving the Strait where there is open space and frequently a heavy sea; but for the navigation of the Strait, a small vessel has considerably the advantage. She has also the opportunity of passing through the Cockburn Channel should the wind be north-westerly, which will very much reduce the length of the passage into the Pacific.

One very great advantage to be derived from the passage through the Strait is, the opportunity of obtaining as much wood and water as can be required, without the least difficulty; and another benefit is, that by hauling the seine during the summer months, from January to May, at the mouth of the river or along the beaches in Port Famine, at the first quarter flood, a plentiful supply of fish may be obtained. Excellent fish are also caught at the anchorage with the hook and line, at all seasons, early in the morning or late in the

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evening. Fish may also be obtained with the seine at any other place where there are rivers. Freshwater Bay and Port Gallant are equally productive. On the outer coast of Tierra del Fuego an excellent fish may be caught in the kelp.

The advantage which a ship will derive from passing through the Strait, from the Pacific to the Atlantic is very great; and it ought to be great to induce the seaman to entangle his ship with the land when fair winds and an open sea are before him. After passing through the Strait, the prevailing winds being westerly, and more frequently from the northward than from the southward of west, they are fair for his running up the coast; or if not, the ship is not liable to receive much injury from the sea, which is comparatively smooth; whereas, to a ship passing round the Horn, if the wind be north-west she must go to the eastward of the Falkland Islands, and be exposed to strong gales and a heavy beam sea, and hug the wind to make her northing. To a small vessel the advantage is incalculable; for, besides filling her hold with wood and water, she is enabled to escape the severe weather that so constantly reigns in the higher latitudes of the South Atlantic Ocean.

Coming from the northward, it will be advisable to keep an offing until the western entrance of the Strait is well under the lee, to avoid being thrown upon the coast to the northward of Cape Victory, which is rugged and inhospitable, and, forming as it were a breakwater to the deep rolling swell of the ocean, is for some miles off fringed by a cross hollow sea almost amounting to breakers.

The land of Cape Victory is high and rugged, and much broken; and if the weather be not very thick, will be seen long before the Evangelists, which are not visible above the horizon, from a ship's deck, for more than four or five leagues.* Pass to the southward of them, and steer for Cape Pillar,

* From the Adventure's deck, the eye being thirteen feet above the water, they were seen on the horizon at the distance of fourteen miles.

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which makes like a high island. In calm weather do not pass too near to the cape, for the current sometimes sets out, and round the cape to the southward; but with a strong wind, get under the lee of it as soon as you please, and steer along the shore. In the night it will be advisable to keep close to the land of the south shore; and if a patent log be used, which no ship should be without, your distance will be correctly known. The course along-shore, by compass, is E. $\frac{3}{4}$ S.; and if the weather be hazy, by keeping sight of the south shore, there will be no difficulty in proceeding with safety.

The Adventure entered the Strait on the 1st of April, 1830, at sunset; and after passing within half a mile of the islets off the Harbour of Mercy, steered E. $\frac{3}{4}$ S. magnetic, under close-reefed topsails, braced by, the weather being so squally and thick that the land was frequently concealed from us; but being occasionally seen, the water being quite smooth, and the course steadily steered, with the patent log to mark the distance run, we proceeded without the least anxiety, although the night was dark, and the squalls of wind and rain frequent and violent. When abreast of Cape Tamar, that projection was clearly distinguished, as was also the land of Cape Providence, which served to check the distance shewn by the patent log; but both giving the same results, proved that we had not been subjected to any current; whereas the account by the ship's log was very much in error, in consequence of the violence of the squalls and the long intervals of light winds, which rendered it impossible to keep a correct account of the distance. At daybreak we were between Cape Monday and the Gulf of Xaultegua; and at eight o'clock we were abreast of Playa Parda, in which, after a calm day, the ship was anchored.

In the summer season there is no occasion to anchor any where, unless the weather be very tempestuous, for the nights are short, and hardly dark enough to require it, unless as a precautionary measure, or for the purpose of procuring wood and water; the best place for which is Port Famine, where

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the beaches are strewed with abundance of logs of well-seasoned wood, which is very superior to the green wood that must otherwise be used.

Notwithstanding that the Adventure experienced no current in the western part of the Strait, there is generally a set to the eastward, which is more or less felt according to circumstances. The direction and strength of the currents are caused by the duration of the gales.

The chart will be a sufficient guide for vessels bound through from the westward as far as Laredo Bay; after which a few directions will be necessary. The land here should be kept close on board, to avoid the Reef off the south-west end of Santa Magdalena. Being abreast of it, bear away, keeping the N.E. extremity of Elizabeth Island on the starboard bow, until you see Santa Marta in one with, or a little to the southward of, the south trend of the Second Narrow (Cape St. Vincent), which is leading mark for the fair channel until you pass the spit of shoal soundings, which extends across to Santa Magdalena. There are also shoal soundings towards the south-west end of Elizabeth Island; at half a mile off we had five fathoms,—Cape St. Vincent being then the breadth of Santa Marta open to the northward of that island. Keeping the cape just in sight to the northward of Santa Marta, steer on and pass round the low N.E. extremity of Elizabeth Island, off which are several tide eddies. The tide here sets across the channel.

Now steer for the Second Narrow, keeping Cape Gregory, which will be just discernible as the low projecting extreme of the north side of the Second Narrow, on the starboard bow, until you are three miles past Santa Marta; the course may then be directed for the cape, opening it gradually on the larboard bow as you approach it, to avoid the shoal that extends off it.

If you anchor in Gregory Bay, which is advisable, in order to have the whole of the tide for running through the First Narrow, haul up and keep at a mile and a half from the shore. When

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the north extremity of the sandy land of the Cape is in a line with the west extreme of the high table-land, you will be near the anchorage; then shorten sail, and when the green slope begins to open, you will have fourteen fathoms: you may then anchor or keep away to the N.E., and choose a convenient depth, taking care not to approach the shore, so as to bring Cape Gregory to the southward of S. by W.$\frac{1}{4}$W. (by compass). The best berth is with the Cape bearing S.S.W.

Hence to the First Narrow, the course by compass is due N.E. by E.* The land at the entrance being low, will not at first be perceived; but, steering on, you will first see some hummocky land, making like islands. These are hills on the eastern, or Fuegian side of the Narrow. Soon afterwards, a flat, low sand-hill will be seen to the northward, and this is at the S.W. extremity of Point Barranca. On approaching the narrow, at four miles off, keep a cliffy head, four or five miles within the east side of the narrow, open of the trend of Point Barranca, by which you will avoid the shoal that extends off the latter point. You should not go into less depth than six fathoms. At most times of the tide there are long lines and patches of strong ripplings, through which you must pass. The shoal is easily distinguished by the kelp.

When the channel through the narrow bears by compass N. by E.$\frac{3}{4}$E., steer through it; and that, or a N.N.E. course, will carry you through. On each side, the bank extends off for some distance; but by keeping in mid-channel, there is no danger until the cliffy coast be past, when reefs extend off either shore for some distance, particularly off Cape Orange. The N.N.E. course must be kept until the peak of Cape Orange bears south, and the northern Direction Hill W.S.W., or W. by S.$\frac{1}{2}$S. by compass. Then steer E.N.E. for Cape Possession, taking care not to approach too near to the bank

* If from the Second Narrow, N.E.$\frac{1}{4}$E. will be the compass course; but I should recommend a ship to haul up to the northward until abreast of Cape Gregory, and then to steer as above.

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off Cape Orange, or to that on the north side of Possession Bay, for which the chart must be consulted.

For a small vessel, the passage through the strait, from west to east, is not only easy, but strongly to be recommended as the best and safest route. Indeed, I think the passage would be quite as expeditious, and perhaps much safer, to enter the Gulf of Trinidad, and pass down the Concepçion Strait, the Sarmiento or St. Estevan Channels, and Smyth Channel, and enter the Strait at Cape Tamar. In these channels northerly winds prevail, and there is no want of convenient and well-sheltered anchorages for the night, many of which have already been mentioned, and multitudes of others, perhaps much better ones, might be found.

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APPENDIX.

TABLES of LATITUDE and LONGITUDE, VARIATION of the COMPASS, TIDE, and HEIGHT.

MAGNETIC OBSERVATIONS, discussed by Major Sabine, R.A., F.R.S.

ZOOLOGY; including Mammalia—Birds—and Shells.

COPIES of ORDERS.

EXTRACTS from a Paper published in the Journal of the Royal Geographical Society.

EXTRACT from a Game-book.

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TABLES

OF

LATITUDE AND LONGITUDE, VARIATION OF THE COMPASS, AND TIDE.

I.

COASTS OF BRAZIL, RIVER PLATA, AND EASTERN PATAGONIA.

The Latitudes to which the character ⊙ is prefixed, have resulted from Astronomical Observation. The Longitudes which have been determined by Chronometers, are designated by C.; and those by Lunar Distances by ⊙☽. Those without distinguishing marks are the result of Triangulation.

The Longitudes in the following Tables depend upon that of Villegagnon Island at Rio de Janeiro, which was found by fourteen Chronometers from Plymouth to be 43° 05′ 03″ West of Greenwich.

Coast, &c.	Name of Place.	Name of Particular Spot.	Latitude South.	Longitude West.	Variat. East.	Tide. H. W. at F. & C.	Tide. Direction of Flood, and Rise of Tide.
			° ′ ″	° ′ ″	° ′	H. M.	
Coast of Brazil.	Santos	Arsenal	⊙23 55 51	C. 46 16 33	4 22		
	—	Moela Lighthouse	⊙24 03 06	C. 46 12 20			
	Alcatrasse Island	Centre	⊙24 08 10	C. 45 39 15			
	Abrigo Island	Centre	⊙25 07 28	C. 47 52 51			
	Figuera Island	Centre	⊙25 21 29	C. 47 54 11			
	Paranagua	Fort on the Bar	⊙25 30 14	C. 48 17 10	5 44		
	—	West Point of Cotinga	⊙25 29 50	C. 48 26 32	5 34		
	—	Church of Stª Antonina	⊙25 25 42	C. 48 39 52			
	St. Catherine	Stª Cruz d'Anhatomirim	⊙27 25 35	C. 48 29 41	6 30		
	—	City, President's House	⊙27 35 30				
	Cape St. Mary	Extremity	34 40 20	C. 54 05 58			
River Plata.	Gorriti Island	Well at N.E. end	⊙34 57 00	C. 54 53 38 ⊙☽ 54 53 40	13 48		
	Monte Video	Rat Island, Flagstaff	⊙34 53 23	56 09 30	11 23		
	—	Cathedral, Cupola	⊙34 54 37	56 07 35	12 07		
	—	Lighthouse on Mount	⊙34 53 21	56 11 04			
	Buenos Ayres	Cathedral	34 35 50	C. 58 17 53			
East Coast of Patagonia.	Port Stª Elena	Observ^y marked on Plan	⊙44 30 45	C. 65 17 25	19 10	4 0	17 feet
	Cape Two Bays	Hill at projecting Point	44 58 00				
	Cape Blanco	North Point	47 15 00				
	Port Desire	Ruins	⊙47 45 05	C. 65 51 45	19 42	12 10	18½ feet

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Coast, &c.	Name of Place.	Name of Particular Spot.	Latitude South.	Longitude West.	Variat. East.	Tide. H. W. at F. & C.	Tide. Direction of Flood, and Rise of Tide.
			° ′ ″	° ′ ″	° ′	H. M.	
East Coast of Patagonia.	Penguin Island.	Mount at North end...	47 54 45	65 41 30			
	Sea Bear Bay...	Sandy Beach at S. side	⊙47 56 49	C. 65 44 00	20 47	12 45	North 20 feet
	Shag Rock	Rock	48 08 25	65 52 56			
	Watchman Cape	Monte Video.....	48 18 55	66 18 00			
	Bellaco Rock...	Rock	⊙48 30 50	C. 66 09 25			Northward, rises 38 feet, (observed off the River's Mouth).
	Port St. Julian .	Shag Island, in Harbour	⊙49 16 00	C. 67 38 02	22 17	10 30	
	—	Wood Mount.....	49 14 00	67 43 34			
	—	Cape Curioso.....	49 11 10	67 34 30			
	C. Franc. de Paulo	Extremity	49 41 18	67 34 30			
	Santa Cruz ...	Observatory opposite Sea-Lion Island ...	⊙50 06 43	68 25 00 C. 68 22 42	20 54	10 15	33 feet
	—	Mount Entrance	⊙50 08 30	68 19 10			
	—	Station up the River...	⊙49 57 30	68 52 55			
	—	—	⊙50 07 30	69 08 00			
	Broken Cliff Peak	Brink	50 14 30	68 31 15		12 15	Northw.
	Lion Mount. ...	Summit	50 20 00	68 49 30			
	Observation Mt.	Summit	⊙50 32 35	69 00 40			
	Coy Inlet.....	Height on South side of Entrance	⊙50 58 27	69 06 50 C. 69 05 17		9 30	
	—	Station up the Inlet...	51 06 30	69 24 10			
	Cape Sanches...	Extremity	51 06 56	69 03 30			
	Tiger Mount ...	Summit	51 21 36	69 01 50 C. 69 03 28			
	C. Fairweather..	South extreme	51 32 05	68 55 15		9 0	N. W. 28 feet
	Gallegos River..	Observatory Mound...	⊙51 33 21	68 57 50 C. 68 56 42	21 47	8 50	46 feet
	North Hill	—	51 49 56	69 24 30			
	Friars	Smallest & Northernm.	51 49 12	69 10 00			
	—	Largest & Southernm.	51 50 08	69 09 00			
	Convents.....	Northern	51 52 09	69 18 40			
	—	Southern	51 53 01	69 17 00			

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TABLE II.

STRAIT OF MAGALHAENS,

INCLUDING

THE COCKBURN AND BARBARA CHANNELS, AND THE OTWAY AND SKYRING WATERS.

Coast, &c.	Name of Place.	Name of Particular Spot.	Latitude South.	Longitude West.	Variat. East.	Tide. H. W. at F. & C.	Tide. Direction of Flood, and Rise of Tide.
			° ′ ″	° ′ ″	° ′	H. M.	
East Entrance.	Cape Virgins ...	S.E. extreme.....	⊙52 18 35	68 16 55 C. 68 17 46	22 30		North-ward
	Dungeness	Extremity	52 22 40	68 21 50			
	Mount Dinero..	Summit	52 18 25	68 30 00			
Possession Bay.	Cape Possession	Centre of Cliff	52 16 35	68 53 35			
	Mount Aymond	Summit	52 06 35	69 30 30			
	Cape Orange..	Peak on the S. side of the entrance of the first Narrow ..	52 28 10	69 26 05		H. W. about 3 0, but the tide begins to set to the N.E. at noon.	36 feet.
	C. Espiritu Santo	Summit 5 miles inland	52 42 30	68 40 51			
Eastern part (2d Narrow to Port Famine).	Cape Gregory...	Extremity	52 38 18	70 09 50			
	—	Bush on summit of land	⊙52 38 03	C. 70 09 51	23 34		
	Elizabeth Island	North-east bluff.....	⊙52 49 18	C. 70 33 25			
	Oazy Harbour..	Entrance	52 42 20	70 31 06			
	Pecket Harb.	Beach opposite the anchorage outside .	52 46 45	70 40 31	23 49	12 0	
	Cape Negro.....	South-east extreme ...	52 56 44	C. 70 45 30			
	Sandy Point ...	Extremity	53 09 00	70 49 31			
	Point St. Mary.	—	⊙53 21 40	70 54 01 C. 70 53 26	23 26		
	Rocky Point ...	—	53 35 18	70 51 58			
	Port Famine ...	Observatory	⊙53 38 12	C. ⊙☾ 70 54 01	23 30	12 0	South. 5 or 6 ft.
	—	Point Santa Anna.....	53 37 55	70 51 19			
	Cape Monmouth	Extremity	53 23 30	70 24 01			
	Point Boqueron	—	53 28 35	70 12 01			
	Cape St Valentyn	Summit at extreme ...	53 33 30	70 30 01			
	Nose Peak	Summit	53 32 30	70 01 36			

continued..

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Coast, &c.	Name of Place.	Name of Particular Spot.	Latitude South.	Longitude West.	Variat. East.	Tide. H. W. at F. & C.	Tide. Direction of Flood, and Rise of Tide.
			° ′ ″	° ′ ″	° ′	H. M.	
Admiralty Sound.	Port Cooke.....	Rivulet in the Bay ...	54 17 10	69 58 01			
	Latitude Point.	Extremity	⊙54 16 45	69 50 51			
	Bottom of Admiralty Sound	Summit of Mount Hope	54 26 30	68 59 11			
	Curious Peak ...	Summit	54 19 35	70 08 31			
East Coast of Dawson Island.	Mount Seymour	Summit	54 19 05	69 46 36			
	Ainsworth Harb.	Project. point on W. side	54 23 00	69 34 01			
	Parry Harbour...	Outer point on W. side	54 25 20	69 16 31			
	Card Point	Point	54 21 00	69 12 01			
	Willes Bay	Islet in Ph. Gidley Cove	⊙53 48 15	70 31 46			
	Cannon Point...	Extremity	⊙54 03 47	70 25 31			
	Soapsuds Cove...	Rivulet	⊙54 16 28	70 13 46			
	Sharp Peak.....	Summit	54 06 50	70 23 01			
	Cape Expectation.....	South Extremity, or trend at entrance of Gabriel Channel ...	54 19 00	70 15 21			
Gabriel Channel.	Port Waterfall...	Port.	54 20 20	69 19 01			
	Nar. of Gabriel C.	Midway	54 15 08	69 32 31			
	Cone Point.....	Summit	54 06 35	70 48 01			
Dawson Island.	Mount Graves..	South summit.	53 45 00	70 33 46			
	St. Peter and St. Paul Islet.	Centre.	53 42 10	70 42 01			
	Port San Antonio	Humming Bird Cove	⊙53 53 52 53 54 25	70 50 26			
	—	S.W. pt. of North Island	53 54 03	70 51 51			
Coast from Pt. Famine to C. Froward.	Mount Tarn...	Peak at North end	53 45 06	70 58 26			
	Cape San Isidro	Extremity	53 47 00	70 55 03	23 30	1 0	8 feet Southw.
	C. Remarquable	Extremity	53 49 25	71 00 31			
	Nassau Island...	South-east point	53 50 23	71 00 56			
	St. Nicholas Bay	Islet in the centre.....	53 50 38	71 03 13		2 6	

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Coast, &c.	Name of Place.	Name of Particular Spot.	Latitude South.	Longitude West.	Variat. East.	Tide. H. W. at F. & C.	Tide. Direction of Flood, and Rise of Tide.
			° ′ ″	° ′ ″	° ′	H. M.	
Cape Froward to the Jerome Channel, and North shore of Clarence Island.	Cape Froward...	Summit of the Morro.	53 53 43	71 14 31		1 0	N. E.
	Cape Holland...	S. point of Wood Bay	53 48 33	71 35 41			
	Bougainville Sugar Loaf	Summit of Peak.....	53 57 32	71 24 13			
	Cascade Harb...	Small rock in Harbour	⊙53 57 48	71 27 46	24 18		
	Cordes Bay.....	Outer-point West side	53 42 55	71 53 08			
	Bell Bay.....	N. W. pt. Bradley Cove	⊙53 53 15	71 47 16			
	Cape Inglefield.	Islet off it	53 50 20	71 51 41			
	Cape Gallant ...	Extremity	⊙53 42 11	71 59 01	24 35		
	Port Gallant ...	Wigwam Point	⊙53 41 43	C. 71 56 57	24 04	9 3	5 or 6 ft.
	Charles Island ..	Wallis Mark	53 43 57	72 02 00			
	Rupert Island...	Summit	53 42 00	72 08 00			
	Monmouth Isl[ds]	Summit of largest island	53 39 40	72 08 39			
	Point Elizabeth	Passage Point Reef ...	53 37 00	72 08 41			
	Point York.....	Extremity	⊙53 32 35				
	Bachelor River.	Entrance	53 33 00	C. 72 17 11 72 15 41	24 06	1 46	
	Jerome Channel	Bluff extremity, or W. point of entrance	53 31 00	72 20 41			
Crooked Reach.	Cape Cross-tide	Extremity	53 33 03	72 22 16		At Borja Bay.	
	El Morrion, or St. David Head	Extremity.....	53 33 20	72 28 31		1 50	6 feet
	Cape Quod.....	Extremity	53 32 10	72 29 41			
Long Reach.	Snowy Sound...	Centre of Ulloa Island	53 31 30	72 36 13			
	Cape Notch.....	Extremity	53 25 00	72 45 11			
	Playa Parda Cove	Anchorage.....	53 18 30	72 56 00		1 8	
	Half-port Bay...	Centre.....	⊙53 11 36	C. 73 14 57			
	Cape Monday...	Extremity	53 09 12	73 18 16			
Sea Reach.	St. Anne Island	Centre.....	53 06 30	73 12 46			
	Cape Upright...	Extremity, North trend	53 04 03	73 32 16			

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Coast, &c.	Name of Place.	Name of Particular Spot.	Latitude South.	Longitude West.	Variat. East.	Tide. H. W. at F. & C.	Tide. Direction of Flood, and Rise of Tide.
			° ′ ″	° ′ ″	° ′	H. M.	
Sea Reach.	Cape Providence	—	52 59 00	73 31 00	23 22		
	Cape Tamar. ...	Observat^{y}, Tamar Bay	⊙52 55 06	C. 73 44 02	23 24	3 5	5 feet
	—	Extremity of Cape	52 55 30	73 44 26			Eastwd.
	Beaufort Bay ...	Stragglers, Southernmst	52 48 03	73 46 00			
	Cape Phillip ...	Sholl Bay	⊙52 44 05	C. 73 48 20			
	—	Summit over the Cape	52 44 20	73 53 00			
	Cape Parker	Station near it	⊙52 41 49	C. 74 07 10			
	Point Felix	Station on its East side	⊙52 56 31				
	—	Extremity	52 56 00	74 09 00			
	Valentine Harb.	Mount (see Plan)	52 55 00	74 15 00		2 0	
	Cape Cuevas....	Extremity	⊙52 53 19	74 17 30			
	Cape Cortado ...	Extremity	52 49 37	74 22 56	23 40		
	Westminst. Hall	Eastern summit.....	52 37 18	74 20 26			
	Observation Mt.	—	⊙52 28 58	C. 74 32 18	25 09	3 0	
	Harb^{r}. of Mercy	Observation Islet	⊙52 44 57	C. 74 35 31	23 48	1 47 or 0 58	4 feet
	Cape Pillar	Extremity	52 42 53	C. 74 37 41 74 39 31		1 0	
	Cape Victory ...	Extremity	⊙52 16 10	C. 74 50 55			
	Evangelists, or Islesof Direction	Sugar Loaf to South Eastward.....	52 24 18	75 02 56			Variable
Magdalen Channel.	Vernal.....	Pinnacle on summit ...	54 06 28	70 57 40			
	Anxious Point..	Extremity	54 06 50	70 53 26			
	Mount Boqueron	Centre pinnacle..... ...	54 10 40	70 56 00			
	Labyrinth Islan^{ds}	Summit of Jane Island	54 19 10	70 57 36			
	Cape Turn	Extremity	54 24 08	71 04 00			
	Warping Cove...	—	54 24 08	C. 71 05 25	24 57		
	Mnt. Sarmiento.	N.E. peak (6800 feet)	54 27 00	70 47 30			

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Coast, &c.	Name of Place.	Name of Particular Spot.	Latitude South.	Longitude West.	Variat. East.	Tide. H. W. at F. & C.	Tide. Direction of Flood, and Rise of Tide.
			° ′ ″	° ′ ″	° ′	H. M.	
Cockburn Channel.	King Island	Summit	54 22 38	71 13 15			Westw^d 6 or 8 ft.
	Prowse Islands.	Station	54 22 13	71 20 57			
	Park Bay.	Beach on isthmus.....	54 19 00	71 15 00	24 56	0 30	6 or 7 ft.
	Bayne Islands...	Cove at the N. end of South-east island..	54 18 15	71 35 50			
	Eliza Bay.	Centre	54 17 45	71 37 00			
	Kirke Rocks ...	Body	54 22 30	71 42 30			
	Enderby Island.	Centre	54 13 00	71 53 31			
Melville Sound.	Mount Skyring .	Summit (3000 feet) ...	54 24 44	72 07 40			
	Tom Harbour...	Cove near it	⊙54 24 23	C. 72 02 07 72 02 31	25 19		
	North Cove	Entrance	⊙54 24 27	C. 72 14 51 72 14 30			
	Fury Harbour...	West point.....	54 28 25	72 15 00			
	West Furies	Body	54 34 30	72 17 00			
	East Furies.....	Body	54 38 00	72 08 00			
	Cape Schomberg	Summit over extremity	54 36 48	72 02 46			
	Cape Kempe ...	Peaks over.....	54 23 30	72 26 46			
	Copper Kettle ..	Summit	54 23 50	72 21 41			
Barbara Channel.	Bynoe Island ...	Centre	54 19 30	72 09 00			
	Mortimer Island	Summit	54 18 12	72 16 00			
	Hewett Bay. ...	South point	54 15 30	72 16 51	24 0	0 30	6 or 7 ft. Southw.
	Brown Bay.....	Anchorage.....	54 12 20	72 16 00			
	Bell Mount.....	Summit	54 09 54	72 11 51			
	North Anchor^age	—	54 09 25	C. 72 11 21	24 12		
	Bedford Bay....	Entrance	54 00 15	72 18 31	24 0	0 30	7 or 8 ft. Southw.
	Field Bay.	Point Cairncross	53 51 06	72 16 31			
	Cayetano Peak .	Summit	53 53 04	72 06 00			
	Shag Narrow. ...	North end	53 51 24	72 10 31		0 0*	

* The Tide begins to set to the Southward at Noon, at Full and Change.

continued..

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Coast, &c.	Name of Place.	Name of Particular Spot.	Latitude South.	Longitude West.	Variat. East.	Tide. H. W. at F. & C.	Tide. Direction of Flood, and Rise of Tide.
			° ′ ″	° ′ ″	° ′	H. M.	
Barbara Channel.	Dighton Bay ...	Latitude Beach.....	⊙53 48 40	72 09 36			
	Point Elvira	Extremity	53 49 12	72 00 11			
	Cape Edgeworth	Extremity	53 47 03	72 05 16			
Jerome Channel.	Bachelor Peak .	Northernmost	53 29 30	72 15 46			
	Three Island Bay	Centre	53 28 30	72 20 20			
	Real Cove.	Centre	53 24 30	72 23 55			
Indian Sound	Cutter Cove. ...	Centre	53 21 45	72 23 20		4 0	
	False Corona ...	Smallest islet.....	⊙53 21 49	C. 72 28 55 72 26 00			
Otway Water.	Bennett Island.		⊙53 13 14	72 16 46			
	Fanny Bay	Gidley islet at S. entrance.....	53 11 00	72 08 30		5 0	
	Point Martin ...		⊙53 07 00	C. 72 00 51 71 58 00	23 58	5 0	
	Inglefield Island	North point	⊙53 04 20	C. 71 52 27 71 49 30	23 56	4 0	
	Shell-note Point	Extremity	⊙52 51 34	71 29 50			
	Point Hall	Extremity	52 49 45	71 22 10		4 0	N.W.
Fitz-Roy Passage.	Donkin Cove ...	Spot marked on Plan.	⊙52 45 30	C. 71 21 36 71 19 55	23 40		
	Wigwam Cove .	Do.	⊙52 39 30	C. 71 25 20 71 24 10	23 34	Sets to East until 1 30	
Skyring Water.	Euston opening	Centre	52 52 40	72 18 00			
	Dynevor Castle.	Summit	52 34 30	72 28 40			

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TABLE III.

THE WESTERN COAST, AND INTERIOR SOUNDS,

FROM

THE STRAIT OF MAGALHAENS TO THE NORTH EXTREMITY OF THE GULF OF PEÑAS.

Coast, &c.	Name of Place.	Name of Particular Spot.	Latitude South.	Longitude West.	Variat. East.	Tide. H. W. at F. & C.	Tide. Direction of Flood, and Rise of Tide.
			° ′ ″	° ′ ″	° ′	H. M.	
Smyth Channel.	Fairway Isles ...	—	52 43 25	73 44 25			
	Deep Harbour ..	South point of entrance	⊙52 41 10	73 44 40	23 04		
	Good Bay	North point	⊙52 34 16	73 42 45	23 20	0 30	6 or 7 ft.
	Oake Bay.	Larch Island	⊙52 25 38	73 43 25			
	Otter Bay	Anchorage	52 23 50	73 40 15			
	Summer Isles ...	Summit of larger island	52 20 25	73 39 20			
	Fortune Bay ...	Rivulet	52 15 48	73 41 25	23 40	0 50	7 or 8 ft.
	Point Palmer ...	Extremity	52 13 38	73 38 40			
	Isthmus Bay ...	Centre.....	52 10 30	73 36 40			
	Welcome Bay...	Entrance of Cove	52 09 15	73 43 03	23 40	0 50	7 or 8 ft. (Flood sets to the North-ward.)
	Point St. Julian	Extremity	52 00 50	73 45 40			
	Island Bay ...	Island at south side of port	51 59 05	73 49 00			
	Hamper Bay ...	Anchorage.....	51 54 08	73 53 15			
	Rocky Cove. ...	N.W. point	⊙51 50 04	74 05 20			
	Cape Cheer.....	Summit	51 41 35	74 15 00			
Lord Nelson Strait.	Narrow Creek...	—	⊙51 47 22	74 09 30	24 09		
	Mount Trafalgar	Summit	51 48 10	74 21 00			
	Point West.....	Extremity	51 31 45	74 04 57			
	Cape Kendall ...	Extremity	51 27 15	74 06 20			
	Relief Harbour.	Rock on West side. ...	⊙51 26 27	74 07 00	24 40		
St. Estevan Channel.	Escape Bay. ...	Anchorage	51 22 00	74 12 00			Northw.
	Mount Trigo	Summit	51 15 04	74 12 00			
	Cape Donaldson	Extremity	51 06 10	74 16 40			

continued..

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Coast, &c	Name of Place.	Name of Particular Spot.	Latitude South.	Longitude West.	Variat. East.	Tide. H. W. at F. & C.	Tide. Direction of Flood and Rise of Tide.
			° ′ ″	° ′ ″	° ′	H. M	
St. Estevan Channel.	Rejoice Harbour	North point of entrance	51 02 12	74 16 00			
	Anchor Bay	North point of entrance	50 55 00	74 16 40			
	Latitude Cove	—	⊙50 50 54	74 16 00			
	Guia Narrow	North extremity in mid channel.....	50 43 00	74 23 10		2 8	Southw.
Sarmiento Channel.	Bonduca Island	Centre.....	50 55 00	74 09 40			
	Puerto Bueno...	N. pt. of Schooner Cove	⊙50 58 35	74 07 10	21 00	1 40	Flood sets to the South.
	Blanche Passage	Entrance.....	51 13 40	73 59 00			
	Port San Mateo	.....	51 23 50	74 00 35			
	Cape St. Vincent	Northern trend	51 30 00	73 58 35			
	Point Balthazar	Extremity	51 38 05	73 56 55			
	Cape San Bartholomew...	.....	51 46 05	73 51 15			
	Staines Peninsul.	Isthmus	51 40 35	73 37 00			
	Cape Flamstead	Rock off the Extremity	51 46 35	73 48 00			
Union Sound.	Shingle Road ...	Anchorage	51 51 30	73 42 30			
	Point Maskelyne	Extremity	51 55 00	73 42 30			
	Brinkley Island	Summit	51 58 45	73 39 10			
	Peñas de Altura	.....	52 06 05	73 36 55			
	Crater Cove.....	.....	52 04 10	73 27 20			
	Stony Bay	West point	⊙52 06 03	73 23 58			
	Cape Año Nuevo	North Extremity	52 07 30	73 27 40			
Interior Sounds.	Mount Burney	Centre peak	52 19 42	73 22 00			
	Ancon Sin Salida	Summit of large island opposite to Cape Earnest	52 12 20	73 15 15			
	Cape Earnest...	Extremity	52 10 52	73 14 30			
	Leeward Bay ...	Islets within anchorage	52 11 00	73 10 30			
	Whale Boat Bay	Beach.....	⊙52 05 32	73 08 35			
	Cape Retford ...	Extremity	52 04 38	73 02 20			
	Point Return ...	,, ,,	⊙52 03 39	72 58 50			

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Coast, &c	Name of Place.	Name of Particular Spot.	Latitude South.	Longitude West.	Variat. East.	Tide. H. W. at F. and C.	Tide. Direction of Flood, and Rise of Tide.
			° ′ ″	° ′ ″	° ′	H. M.	
Interior Sounds.	Virginia Island	S. E. Point	⊙52 06 16	72 58 00			
	Easter Bay	Beach	⊙51 53 10	C.72 53 16			
	Canal of the Mountains	Bottom	51 34 00	73 23 00			
	Last Hope Inlet	—	51 25 38	73 09 48			
	Focus Island	Summit (centre)	51 53 23	72 44 15			
	Obstruction Sd.	Bottom	52 29 00	72 53 35			
	—	S. E. bight, or the nearest part to Skyring Water	52 22 35	72 29 40			
	Point San Juan	S. W. Extremity	50 39 52	74 29 38			
Concepçion Strait.	Guard Bay	Anchorage	50 34 10	C.74 32 57			
	Innocent Island	Summit at North End	50 31 55	74 43 00			
	Tapering Point	Extremity	50 28 55	74 38 30			
	Point Hocio de Cayman	—	50 24 30	74 48 35			
	Walker Bay	Beach	50 21 15	74 48 00			
	Molyneux Sound	Rock to N. of Point Michael	⊙50 16 48	74 44 45			
	Portland Bay	Centre of island fronting the anchorage	50 14 42	74 36 48			
	Expectation Bay	Anchorage	50 25 08	74 13 15			
	Tom Bay	Beach near anchorage	50 11 00	74 41 30			
	Open Bay	Summit of Island off	50 07 00	74 31 00			
	Pt. Brazo Ancho	Extremity	50 08 35	74 37 25			
Gulf of Trinidad.	Red Bill Island	Summit	⊙50 05 30	74 44 15			
	Windward Bay	Beach	50 03 12	74 38 00			
	Double Peak Mt.	Eastern Peak	49 57 35	74 36 00			
	Cathedral Mount	Summit	49 46 03	74 40 50			
	Neesham Bay	Beach	⊙49 53 54	C.74 55 57			
	Easter Peak	Summit	50 00 15	75 09 35			
	Port Henry	Observatory	⊙50 00 18	C.75 15 11	20 50	Noon.	5 feet

continued..

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Coast, &c.	Name of Place.	Name of Particular Spot.	Latitude South.	Longitude West.	Variat. East.	Tide. H. W. at F. & C.	Tide. Direction of Flood, and Rise of Tide.
			° ′ ″	° ′ ″	° ′	H. M.	
Gulf of Trinidad.	Seal Rocks	Body	49 54 48	75 14 02			
	Cape Tres Puntas.....	Pillar Rock at the extremity.....	50 02 00	75 19 30			
	Cape Primero...	Extremity	49 50 04	75 32 07	20 58		
Wide Channel.	Mount Corso ...	Summit	49 4 02 5	75 28 55			
	Small-craft Bight	.....	50 01 20	74 27 00			
	Sandy Bay	East Point.....	50 45 25	74 13 10			
	Saumarez Island	Bold Head	49 32 18	74 03 20			
	Fury Cove	Head	⊙49 31 46	74 00 00		1 15	W.S.W.
Sir Geo. Eyre Sd.	Falcon Inlet ...	Cape Wellesley, extrem.	49 28 15	73 51 30			
	Bottom of the Sd.	.....	48 56 50	73 40 00			
Mesier Channel.	Rocky Bight ...	West point.....	49 25 35	74 10 40			
	Level Bay	Outer point, N. side...	49 07 35	74 11 30			
	English Narrow	South end	49 06 00	74 13 20	12 45		
	—	North end.....	48 55 30	74 13 38			
	Halt Bay.....	.....	⊙48 53 50	74 13 10		12 30	S.S.E.
	Iceberg Sound	Station Rock, on the N. side of entrance	⊙48 39 23	74 11 20			
	—	Bottom	48 47 00	74 10 10			
	White Kelp Cove	Rock off the entrance	⊙48 30 46	74 15 35			
	Middle Island...	North point	48 27 35	74 20 50		12 0	Northw.
	Waterfall Bay...	Bottom	48 17 00	74 22 00			N. by W.
	Island Harbour	West point.....	48 06 25	74 28 38			
	Millar Island	South extreme	48 03 20	74 35 30			
	—	Millar's Monument, North extreme ...	47 55 12	74 41 50			
	Campana Island	Summit at South end...	47 45 10	74 37 30			
	Cape Roman ...	Extremity	47 44 37	74 52 45			
Guianeco Islands.	Ayautau Island	Summit on the largest	47 34 22	74 40 30			
	Wager Island ...	Easternmost point	47 41 05	74 55 25			
	—	Supposed position of the Wager's wreck	47 39 40	75 06 30			

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Coast, &c.	Name of Place.	Name of Particular Spot.	Latitude South.	Longitude West.	Variat. East.	Tide. H. W. at F. & C.	Tide. Direction of Flood, and Rise of Tide.
			° ′ ″	° ′ ″	° ′	H. M.	
Guianeco Islands.	Speedwell Bay	North beach	⊙47 40 17	C. 75 08 34 75 10 20			
	Rundle Pass ...	South end	47 45 30	75 05 45			
	Islet, the most Northern of the group...	Summit	47 38 30	75 14 25			
	Good Harbour	Isthmus at the bottom	47 45 00	75 20 50			
	Byron Island ...	Most western point ...	47 44 50	75 24 32			
Gulf of Peñas.	Channel's Mouth	Body of rocks off the South entrance ...	47 30 20	74 33 20			
	—	Hazard Isles, centre and westernmost	47 29 30	74 24 50			
	—	E. side of northern islet	⊙47 28 56	C. 74 24 13			
	—	Bottom of east arm ...	47 35 12	73 53 52			
	—	Bottom of south arm...	47 46 10	74 09 20			
	Xavier Island...	Ignacio Bay (beach)...	⊙47 10 28	C. 74 25 49	19 50		
	—	XavierBay(LyndseyPt)	47 05 00	74 16 40			
	Jesuit Sound	North point of entrance, or head of False Harbour.....	47 07 15	74 12 30			
	Kelly Harbour.	North point of entrance	⊙46 58 54	C. 74 05 41			
	Cirujano Islet ...	North-east point	46 51 15	74 21 50			
	San Tadeo River	Sand Hills on East side of entrance ...	46 47 40	74 15 50		11 45	(Head of St. Quintin Gulf.) 6 feet.
	Purcell Island...	Summit	46 55 30	74 39 55			
	Isthmus	Centre	46 50 20	74 41 35			
	Port Otway.....	Observatory	⊙46 49 31	C. 75 19 00	20 32	11 37	6 feet.
	Sugar Loaf	Summit	46 42 40	75 15 00			
	Dome of St. Paul	—	46 36 56	75 13 20			
Peninsula of Tres Montes	Pt. Mitford Rees	Extremity	46 43 08	75 40 55			
	Cape Raper.....	—	46 48 20	75 39 35			
	Cape Tres Montes	—	46 58 57	75 27 30			
	Bynoe Island ...	Entrance of Fallos Ch.	47 57 55	75 23 45			
	Break Sea Island	Northernmost point ...	48 01 00	75 29 15			

continued..

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Coast, &c.	Name of Place.	Name of Particular Spot.	Latitude South.	Longitude West.	Variat. East.	Tide. H. W. at F. & C.	Tide. Direction of Flood, and Rise of Tide.
			° ′ ″	° ′ ″	° ′	H. M.	
Coast of Wellington and Campana Islands.	Port Santa Barbara	Observation Inlet	⊙48 02 15	C.75 29 12	19 10	11 45	3to4feet at Neaps
	Dundee Rock	Summit	48 06 16	75 42 00			
	Cape Dyer	Extremity	48 05 55	75 34 35			
	Sisters	Centre peak	48 37 40	75 28 10			
	Parallel Peak	Summit	48 45 40	75 29 35			
Coast of Madre de Dios	Cape Montague	—	49 07 20	75 33 40			
	April Peak	—	50 10 52	75 17 35			
	Cape Santiago	—	50 42 02	75 24 00			
	Cape Sta. Lucia	—	51 30 00	75 25 00			
	Cape Isabel	—	51 51 40	75 09 30			

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TABLE IV.

OUTER, OR SEA COAST, OF TIERRA DEL FUEGO.

In order to adapt the longitudes of the places mentioned in this Table to the meridians of Port Famine and St. Martin Cove, at Cape Horn, the following corrections* have been made to Captain Fitz-Roy's chronometrical results, *viz* :—

Townshend Harbour, Stewart Harbour, Doris Cove, March Harbour, Good Success Bay } have been placed { 0′ 11″ / 0 23 / 0 33 / 1 6 / 2 0 } to the Eastward of Captain Fitz-Roy's chronometrical deductions.

By Captain Fitz-Roy's observations St. Martin Cove would be in long. 67° 31′ 18″, which is 2′ 15″ to the Westward of the mean of upwards of thirty chronometrical results from Monte Video. The difference has, therefore, been equally divided between North Cove and St. Martin Cove; the longitude of the latter being taken at 67° 29′ 03″, and of Port Famine at 70° 54′.

Coast, &c.	Name of Place.	Name of Particular Spot.	Latitude South.	Longitude West.	Variat. East.	Tide. H. W. at F. & C.	Tide. Direction of Flood, and Rise of Tide.
			° ′ ″	° ′ ″	° ′	H. M.	
Sea Coast of Tierra del Fuego.	Dislocation Har.	Near the projecting pt.	⊙52 54 13	C. 74 33 03	23 53	1 40	4
	Week Islands.	Saturday Harbour	53 11 26	74 14 36	24 0	2 0	4
	Latitude Bay	West point of entrance	⊙53 18 40	C. 74 12 6	23 56	2 5	4
	Deepwater Snd.	.....	⊙53 34 58	C. 73 34 46			
	Laura Basin ...	North point	⊙54 06 58	C. 73 15 20		1 0	4
	Noir Roads ...	Penguin Point	54 28 15	72 56 00	24 40	2 30	4
	Cape Noir	Extremity	54 30 00	73 01 30	25 00		
	Tower Rock ...	South Easternmost ...	54 37 05	72 59 00			
	Cape Gloucester	Summit	54 30 00	73 01 30			
	Fury Harbour ..	Island in the entrance	54 28 00	72 14 00	24 30	2 30	4
	Isabella Sound	.....	⊙54 13 00				
	North Cove ...	.....	⊙54 24 26	C. 72 14 46	24 30	2 30	4
	Mount Skyring	Summit	54 24 44	72 07 40			
	St. Paul	South-east Peak	54 39 48	71 56 50			
	Townshend Har.	Islet on N. side of Harb.	⊙54 42 15	C. 71 51 49	24 34	1 30	4
	Cape Castlereagh	Extremity	54 56 40	71 25 00			
	Stewart Harbour	E. side of Shelter Island	⊙54 54 24	71 25 05	24 14	2 50	4
	Doris Cove ..	East Point entrance...	⊙54 58 45	71 05 35	24 16	3 0	4
	Cape Alikhoolip	Extremity	55 11 55	70 47 50			
	York Minster...	Summit	55 24 30	70 01 50			

continued..

* In the Appendix to the second volume these alterations are discussed.—R. F.

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Coast, &c.	Name of Place.	Name of Particular Spot.	Latitude South.	Longitude West.	Variat. East.	Tide. H. W. at F. & C.	Tide. Direction of Flood, and Rise of Tide.
			° ′ ″	° ′ ″	° ′	H. M.	
Sea Coast of Tierra del Fuego.	March Harbour	Entrance of the Basin	⊙55 22 35	69 53 57	24 4	3 10	4
	Adventure Cove	Rocky Pt. N. end of Beach	⊙55 21 12	60 50 00	24 40	3 10	4
	Ildefonsos	.....					
	Henderson I^{d}.	....	⊙55 35 46	?			
	—	.....	⊙55 35 54	ʃ 68 58 00	(Mount Beaufoy.)		
	Orange Bay.....	Middle of Bay	⊙55 30 50	C. 68 00 23	23 56	3 30	4
	St. Martin Cove	Head of the Cove	⊙55 51 19	C. 67 29 03			
	Cape Horn	Summit	⊙55 58 41	67 10 53			
	Lennox Harbour	Point at N. end of Beach	⊙55 17 04	66 44 03	23 40	4 40	8
	Evouts Island..	Centre	55 33 00	66 40 03			
	Diego Ramirez	S. or Boat Island, summit	56 26 35	68 36 20	24 0		
	—	Northernmost Rock...	56 22 25	68 36 45			
	Barnevelt Islds.	Centre	⊙55 48 54	66 39 48			
	Spaniard Harb.	Point Kinnaird	54 57 05	65 42 54			
	Good Success Bay	S. side, near Sandy Beach	⊙54 48 02	C. 65 09 18	22 42	4 15	9
	Cape San Diego	Extremity	54 40 35	65 01 53			

TABLE V.

COAST OF CHILE.

Coast, &c.	Name of Place.	Name of Particular Spot.	Latitude South.	Longitude West.	Variat. East.	Tide. H. W. at F. & C.	Tide. Direction of Flood, and Rise of Tide.
			° ′ ″	° ′ ″	° ′	H. M.	
Coast of Chile.	S^{an} Carlos. Chilóe	Sandy Point	⊙41 51 34	C. 73 50 25	18 33	11 15	6
	Talcahuano.....	Fort Galvez	⊙36 41 58	C. 73 03 05	16 47		
	Valparaiso.....	Cerro Alegre.....	⊙33 01 58	C. 71 34 12	15 18		
	Juan Fernandez	Fort San Juan, in Cumberland Bay...	⊙33 37 36	C. 78 46 04	17 13		

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TABLE

OF

OBSERVED OR ESTIMATED HEIGHTS OF MOUNTAINS

AND

PARTICULAR PARTS OF THE SEA COAST.

Ang. denotes the height to have been ascertained by Angular Measurement; Bar. by Barometer; and Est. by Estimation.

NORTH ATLANTIC OCEAN.

CAPE VERD ISLANDS.

	FEET.	
Peak at the N.W. end of San Antonio	7086	Ang.
Pico Antonio, on St. Jago	4725	Ang.
Pico of Fuego	8815	Ang.

SOUTH ATLANTIC OCEAN.

COAST OF BRAZIL.

Corcovado, at Rio de Janeiro	2330	Bar. 5 Obs.
Sugar Loaf, do	1275	Ang.
Cubatoa, at Santos (Telegraph House)	2502	Bar. 5 Obs.
City of San Paulo (Base of the Cathedral)	2444	Bar. 16 Obs.

EAST COAST OF PATAGONIA.

Cliffy Coast, near Port St. Julian	300 to 330	Est.
Mount Entrance (Santa Cruz)	356	Ang.
Cape Fairweather and the Cliffs to the Northward	300	Est.
Cape Virgins and the Cliffs to the Northward	300	Est.

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STRAIT OF MAGALHAENS.

	FEET.	
Cape Possession	300	Est.
Table Mountain behind Cape Gregory	1500 to 2000	Est.
Point Santa Anna (Port Famine)	104	Ang.
Mount St. Philip do.	1308	Ang.
Mount Graves, North Summit (Dawson Island)	1315	Ang.
Do. South do. do.	1498	Ang.
Lomas Range, the highest part over Port San Antonio	2963	Ang.
Mount Tarn (Peak at the N.E. end)	2602 2852	Bar. 4 Obs. Ang.
Mount Buckland, Gabriel Channel	4000	Est.
Mount Boqueron (entrance of Magdalen Channel)	3000	Est.
Mount Sarmiento (bottom of do.)	6800	Ang.
Pyramid Hill (do. do.)	2500	Ang.
Cape Froward (Land behind the Morro)	2500	Est.
Cape Holland	1800	Est.
Mount Pond	2500	Est.
Mount Cross, Port Gallant	2290 2264	Bar. Ang. 3 Obs.
Average height of the land near Sea Reach	1000 to 2500	Est.

OUTER COAST OF TIERRA DEL FUEGO.

Kater Peak, on Hermite Island	1742	Bar. 4 Obs.
Bell Mount, near Strait le Maire	4000	Est.*
Noir Island	600	Est.

SOUTH PACIFIC OCEAN.

WESTERN COAST OF PATAGONIA.

Mount Burney	4800	Ang.
Cape Three Points	2000	Est.
Mountain within Kelly Sound	1540	Ang.
Sugar Loaf (Marine Islands, in Holloway Sound)	1836	Ang.
Dome of St. Paul (do. do.)	2284	Ang.
Highest peak of Juan Fernandez (The Yungue, or Anvil)	3005	Ang.

* 2,600 Ang. R. F.

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MAGNETIC OBSERVATIONS,

DISCUSSED BY

MAJOR SABINE, R.A., F.R.S.

1. *Observations of the Dip.*

Captain Fitz-Roy was furnished with two Dip Circles, one by Gambey, and the other by Dollond; the latter supplied by Government, and Gambey's purchased by himself.

Gambey's, being found to give results more accordant with each other than Dollond's, was used at all the stations, except Rio de Janeiro. The Circle was nine and a-half inches in diameter, and was furnished with two needles. This instrument was, in all respects, a very superior one. It was placed for observation on a stand, which raised it from two to three feet above the ground. The needle was observed in eight positions, and as the readings accorded sufficiently well with each other, their arithmetical mean has been taken as the dip resulting from the observation. The eight positions were as follows: 1, with the graduated face of the circle towards the east; 2, with the same towards the west. The needle was then taken out and replaced with the ends of the axle changed, so that each end rested on a different plane to what it did before; it was then observed, 3, with the face of the circle towards the west, and 4, with the same to the east. The poles were then inverted, so that the end of the needle which was before a north pole became a south pole, and the four positions were again repeated. The arc indicated by both ends of the needle was read in every position: an observation of the dip consisted, consequently, of sixteen readings. In the subjoined tabular record these are comprised in four entries, a mean being taken of the arc read at the two extremities of the needle, and of the positions 1 and 3, 2 and 4: 1 and 3 form the column, a; 2 and 4 the column, a′; and the same positions, with the poles reversed, the columns a″ and a‴.

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Magnetic Dip.

Station.	Date.	Above the Sea.	Therm.	Observer.	Needle.	Needle: Marked end a N. Pole. a	Needle: Marked end a N. Pole. a′	Needle: Marked end a S. Pole. a″	Needle: Marked end a S. Pole. a‴	Dip deduced.		Place of Observation.
	1831.	Feet.	°			° ′	° ′	° ′	° ′	° ′		
Plymouth	Nov. 20	50	58	F.	1	69 49	69 06,5	69 53	69 08	69 29,1	69 27,6N	Athenæum.
		50	58	F.	2	69 23,5	69 29,5	69 26	69 25,5	69 26,1		
	1832.											
Port Praya	Jan. 28	20	71	F.	1	46 46,5	46 19	46 36	45 40	46 20,4	46 20,2N.	Landing Place.
		20	71	F.	2	46 16,5	46 23,5	46 23	46 17	46 20,0		
Bahia.....	Mar. 6	16	83	S.		6 18	6 02	3 27,5	3 38	4 51,5	4 55,8N.	San Antonio. (Dollond's Instr.)
		16	83	S.		7 19,5	7 02	1 39	1 54,5	4 28,7		
		16	84	S.		7 59	9 29,5	1 08,5	1 54	5 07,7		
		16	84	S.		6 29	6 02,5	4 11,5	4 11	5 13,5		
Rio de Janeiro.....	Apr. 30	10	78	S.		13 42	12 05,5	14 27	14 05,5	13 34,2	13 37,4 S.	Villegagnon Island. (Dollond's Instr.)
		10	78	S.		13 02	11 54,5	15 15,5	15 16,5	13 52,7		
		10	79	S.		14 24	14 06	12 04,5	13 03	13 24,5		
Blanco Bay.....	Sept. 5	18	49	F.	1	40 45	42 50	40 50	43 42,5	42 01,9	41 54 S.	The Wells at Point Johnson.
		18	49	F.	2	42 34	41 47,5	41 15	41 57	41 53,4		
	Sept. 19	18	67	F.	1	41 28	42 02,5	41 32,5	42 22	41 51,2		
		18	67	F.	2	41 48	41 52	41 46,5	41 51	41 49,4		
	1833.											
Falkland Islands...	Mar. 12	8	48	F.	1	53 23	53 27	56 22	51 48	53 45	53 30,4 S.	Berkeley Sound, Magellan or Johnson Cove.
		8	49	F.	2	53 25	53 32	50 47	54 45	53 07,2		
	Mar. 13	8	50	F.	1	53 08	53 53	53 19	53 59	53 34,7		
		8	51	F.	2	53 40	53 38	53 27	53 34	53 34,8		
Monte Video	Nov. 25	10	84	F.	1	35 10	34 40	35 28,5	34 40	34 59,4	34 51,2 S.	Rat Island.
		10	84	F.	2	34 55	34 47,5	34 20	34 50	34 43,1		

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Port Desire	Dec. 30 1834.	43	58	F.	1	53 05	52 29	53 20	52 22,5	52 49,1	52 43,5 S.	Spanish Ruins.
		48	58	F.	2	52 45	52 27,5	52 49	52 30	52 37,9		
Falkland Islands ...	Mar. 19	60	45	F.	1	53 16,5	53 21,5	52 58	54 05	53 25,2	53 19,6 S.	Berkeley Sound, Port Louis.
		60	45	F.	2	53 40	52 58	53 23	52 58	53 14,7		
		60	45	F.	1	53 23	52 45	53 59	53 08,5	53 18,9		
		60	45	F.	2	53 19	53 19	53 22	53 19	53 19,7		
River Santa Cruz ...	May 10	20	48	F.	1	55 37	54 37	55 45	54 48	55 11,7	55 15,7 S.	Keel Point.
		20	48	F.	2	55 30	55 21	55 21	55 07	55 19,7		
Port San Andres ...	Dec. 24 1835.	8	62	F.	1	54 32	54 12	54 40	54 00	54 21,0	54 13,6 S.	Christmas Cove.
		8	62	F.	2	54 19	54 10	54 07	53 49	54 06,2		
Port Low	Jan. 15	6	57	F.	1	51 27	50 44	51 42	51 00	51 13,2	51 20,1 S.	Observation Islet.
		6	57	F.	2	51 48	51 40	51 10	51 10	51 27,0		
Chiloe	Jan. 26	10	66	F.	1	49 12	48 29	49 30	48 41	48 58	48 58,9 S.	San Carlos, Pt. Arena.
		10	66	F.	2	49 09	49 02	48 57	48 51	48 59,8		
Valdivia	Feb. 18	8	69	F.	1	46 58	46 18	47 22	46 34	46 48	46 46,5 S.	Corral.
		8	69	F.	2	46 56	46 42	46 44	46 38	46 45		
Concepçion	Apr. 13	90	59	F.	1	43 30	42 47	43 47	42 58	43 15,5	43 15,4 S.	Fort Galvez.
		90	59	F.	2	43 25	43 15	43 11	43 10	43 15,2		
Valparaiso	June 27	15	57	Sg.	1	38 24	37 26	38 33,5	37 46	38 02,4	38 03,1 S.	Near Fort St. Antonio.
		15	57	Sg.	2	38 17,5	38 01,5	38 00	37 56	38 03,8		
Callao	Aug. 26	12	64	Sg.	1	6 46,5	6 50	7 34,5	7 24	7 08,7	7 02,8 S.	Arsenal.
		12	64	Sg.	2	7 05	6 35	6 54,5	7 04,5	6 56,9		
Galapagos Islands.	Sept. 22	6	72	Sg.	1	9 08	8 53,5	8 35	8 30	8 46,6	8 41,2N.	Chatham Island, Stephen Bay.
		6	73	Sg.	2	8 29,5	8 40,5	8 42,5	8 31	8 35,9		
Galapagos Islands.	Oct. 16	8	70	F.	1	9 47,5	9 41	9 17	9 13,5	9 29,7	9 28,6N.	Charles Island.
		8	70	F.	2	9 24,5	9 32,5	9 26	9 27,5	9 27,6		
Otaheite, or Tahiti	Nov. 16	4	79	Sg.	1	30 02	30 06	30 39,5	29 51	30 09,6	30 13,5 S.	Point Venus.
		4	79	Sg.	2	30 21	29 58	30 10,5	30 13	30 10,6		
	Nov. 23	4	80	Sg.	1	30 17,5	30 11	30 58	30 05,5	30 23		
		4	80	Sg.	2	30 18	30 07,5	30 08	30 09	30 10,6		

(*continued*)

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MAGNETIC DIP, *continued.*

Station.	Date.	Above the Sea.	Thermom.	Observer.	Needle.	Needle: Marked end a N. Pole. a	Needle: Marked end a N. Pole. a′	Needle: Marked end a S. Pole. a″	Needle: Marked end a S. Pole. a‴	Dip deduced.		Place of Observation.
	1835.	Feet.	°			° ′	° ′	° ′	° ′	° ′	° ′	
New Zealand	Dec. 23	10	63	Sg.	1	59 44	59 04,5	60 09,5	59 14	59 33	59 32 S.	Paihia Islet.
		10	64	Sg.	2	59 43,5	59 28,5	59 32,5	59 19,5	59 31		
	1836.											
Sydney	Jan. 15	24	72	Sg.	1	63 00,5	62 26,5	63 19	62 35	62 50,2	62 49,4 S.	Fort Macquarie.
		24	72	Sg.	2	62 55,5	62 48,5	62 53,5	62 35,5	62 48,5		
Hobart Town	Feb. 6	35	51	Sg.	1	70 51,5	70 13	71 02,5	70 15,5	70 35,6	70 34,9 S.	Fort Mulgrave.
		35	51	Sg.	2	70 43,5	70 27	70 37	70 25,5	70 34,2		
King George Sound	Mar. 8	4	67	Sg.	1	64 57,5	64 17,5	65 09	64 25	64 42,2	64 41,3 S.	Landing Place.
		4	67	Sg.	2	64 49,5	64 35	64 44,5	64 33	64 40,5		
Keeling Islands ...	Apr. 4	3	79	Sg.	1	38 48,5	37 45,5	39 08	38 24	38 31,5	38 33,1 S.	Direction Inlet.
		3	79	Sg.	2	38 43,5	38 32	38 35,5	38 28	38 34,7		
Mauritius	May 3	5	81	Sg.	1	54 21,5	53 23	54 41	53 46,5	54 03,1	54 00,8 S.	Cooper Island.
		5	81	Sg.	2	54 08,5	54 00,5	53 58	53 47,5	53 58,6		
Cape of Good Hope	June 2	4	64	Sg.	1	52 53	51 53	53 14,5	52 22	52 35,6	52 34,4 S.	Simon Town.
		4	64	Sg.	2	52 40,5	52 32,5	52 34	52 26	52 33,2		
	June 10	35	65	Sg.	1	53 03	52 37	53 14	52 27,5	52 35,4	52 35,5 S.	Observatory (outside).
		35	65	Sg.	2	52 39	52 40	52 38	52 25	52 35,5		
St. Helena	July 11	17	70	Sg.	1	18 01	17 18,5	18 43,5	18 10,5	18 03,4	18 01.2 S.	James Town.
		17	70	Sg.	2	18 06,5	17 48,5	17 55	18 05,5	17 59,0		
Ascension Island...	July 21	15	72	Sg.	1	2 02,5	2 01	1 22,5	1 15,5	1 40,4	1 39,2N.	Barrack Square.
		15	72	Sg.	2	1 25,5	1 52	1 48,5	1 26	1 38,0		
Bahia.....	Aug. 4	6	74	Sg.	1	5 34,5	5 29	6 28	6 10,5	5 55.5	5 53,5N.	San Antonio.
		6	74	Sg.	2	6 01	5 48,5	5 35	6 01,6	5 51,5		

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Pernambuco.....	Aug. 13	5	76	F.	1	13 37	13 24	13 05	12 52	13 14,5	13 12,9N.	Arsenal.
		5	76	F.	2	13 10	13 15	13 15	13 05	13 11,5		
Port Praya.....	Sept. 1	18	80	Sg.	1	46 19,5	45 22,5	45 52	45 01	45 38,9	45 46,5N.	Landing Place.
		18	80	Sg.	2	45 42,5	45 40,5	45 47	45 36,5	45 41,6		
	Sept. 2	25	81	Sg.	1	46 49,5	45 53,5	46 07,5	45 16,5	46 01,7		
		25	81	Sg.	2	46 04	45 52,5	45 54,5	46 02,5	45 58,6		
	Sept. 3	50	80	Sg.	1	45 15	45 22	45 48	45 08,5	45 38,4		Quail Island.
		50	80	Sg.	2	45 42,5	45 33	47 47,5	45 37	45 40,0		
Terceira	Sept. 21	4	72	Sg.	1	68 39	67 45	68 24	67 45,5	68 08,4	68 06 N.	Angra.
		4	72	Sg.	2	67 58,5	67 59	68 14	68 02,5	68 03,5		
Falmouth	Oct. 4	100	58	F.	1	69 29	69 26	69 16	69 19	69 22,5	69 19,5	Mr. Fox's.
		100	58	F.	2	69 17	69 06,5	69 27,5	69 15,5	69 16,6		
Plymouth	Oct. 12	50	54	Sg.	1	69 54	68 59,5	69 46,5	68 40,5	69 20,1	69 18,5N.	Mount Wise.
		50	54	Sg.	2	69 15,5	69 09	69 33	69 10	69 16,9		
Plymouth	Oct. 15	100	56	Sg.	1	69 57	68 54	69 16,5	68 43	69 20,1	69 17,6N.	Athenæum.
		100	56	Sg.	2	69 17	69 02,5	69 29,5	69 11	69 15		

Observers :—F. Capt. Fitz-Roy. S. Lieut. Sulivan. Sg. Mr. Stebbing.

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2. *Observations of Intensity.*

The method employed by Captain Fitz-Roy to determine the variations of the magnetic force was that of noting the time of vibration of a magnetic cylinder suspended horizontally.

The cylinder was one which had been given by M. Hansteen, in 1826, to Captain Phillip Parker King, R.N., and had been used by him during the survey of the coast of South America, which he conducted from 1826 to 1830. The apparatus in which it was vibrated, both in Captain King's and Captain Fitz-Roy's voyages, was the well-known one of M. Hansteen.

By observations made with this cylinder on the 22d March 1826, and again on the 24th January 1830, in the garden of the Royal Observatory at Greenwich, it appeared that its time of performing 300 vibrations had increased from 734,45 seconds in 1826, to 775,80 seconds in 1831; or 41,35 seconds in 1,770 days. A change of such magnitude in the magnetic intensity of the instrument employed to measure the variations of the terrestrial intensity, and which ought itself, therefore, to be invariable, would, in the generality of cases, have prevented any satisfactory conclusion whatsoever being drawn from the observations. Fortunately from the nature of the duties in which Captain King was engaged, he had occasion to return frequently to the same anchorages, and by his extreme care to repeat observations on every such return, he has provided a means of computing the decrease of the intensity of the cylinder, proportioned to intervals of time, between 1826 and 1831; and of thus introducing compensations for it, which render the results on the whole nearly as satisfactory as if the cylinder had preserved an uniform magnetic condition throughout.

The voyage which Captain Fitz-Roy had to perform promised to furnish few, if any, such opportunities of examining the state of the magnetism of the cylinder, between the departure from and the return to England; and,—as it cannot but be extremely discouraging to officers to make observations which they have reason to apprehend may prove unavailing from defect in the instrument employed,—it must be regarded as exceedingly creditable to Captain Fitz-Roy and his officers, that, with the knowledge of the

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change which the cylinder had undergone in the preceding voyage, they persevered in diligently observing, and carefully recording, its time of vibration, at most of the principal ports which they visited in their voyage of five years' duration. Nor was it until their return to the Cape Verd Islands, in September 1836, that they could infer, from observations repeated at the same spot as in their outward passage in 1832, that the cylinder had not varied in any thing like the degree that it had done in the preceding voyage, and that the care and pains they had bestowed were therefore likely to be recompensed by success.

This appears a fitting opportunity to remark, how much the establishment in England of a depository for magnetic needles is needed; whence officers, and persons desirous of making such observations, might be supplied with instruments, which had been kept a sufficient time to have attained their permanent magnetic state, and had been examined from time to time to prove that they had done so. The correction for temperature should be ascertained for each needle, and given with it; as well as the time of vibration (or whatever else constituted the measure of intensity,—as, for example, the angle of deflection in Mr. Lloyd's statical needles,)—observed at the spot which should be selected as most suitable for a point of general comparison; and the observations should be repeated at the same spot on the return of the needle. The want of such an establishment has long been greatly felt; and opportunities, where nothing was wanting but proper instruments, have been lost in consequence, where determinations of great value might have been obtained, in parts of the world of the highest magnetic interest, and where such opportunities are of rare occurrence.

The corrections necessary to render the times of vibration at the different stations strictly comparable with each other, are as follows.

1st, For the rate of the chronometer.

2d, For the temperature of the needle.

3d, For the arc of vibration.

4th, For any change in the magnetic condition of the cylinder.

In extensive voyages, the last-named correction, or that for the change in the cylinder itself, is the one which requires principal consideration. The corrections for temperature, and for the arc, on the first of which particularly much stress has sometimes been

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laid, are important when extreme accuracy is sought; as for example, in comparing the force at stations which have served as the unities of different observers: their effect is, however, of little moment in observations which include great differences of the terrestrial intensity. But when the magnetic condition of the needle has varied, and interpolation becomes necessary, the instances are rare in which it can be done with entire satisfaction.

The time of vibration of this cylinder at Plymouth, with corrections applied for the chronometer's rate, the temperature, and the arc, was, in December 1831, 770,8 seconds, with a dip of 69° 27′,6, and in October 1836, 777,3 seconds with a dip of 69° 17′, 5. The difference in its magnetic state, at the two periods, is shown by the squares of the times of vibration multiplied by the cosine of the dip observed at the respective periods. This makes known what the time of vibration of the same cylinder would have been, had it been free to move in the direction of the dipping-needle, instead of being suspended horizontally; and, consequently, if it had been acted upon by the total magnetic intensity, instead of by the horizontal component only. It is here assumed that the total terrestrial intensity is constant at the same place. This is doubtless not strictly true; but the amount of the change must be too small to require consideration in the period occupied by Captain Fitz-Roy's observations. The horizontal component must, however, necessarily vary with the changes in the dip: and it is, therefore, from the time of vibration in the direction of the dipping-needle, and not from the time of horizontal vibration, that the change, or otherwise, in the magnetism of the needle is to be inferred. We find, then, the equivalent time of vibration of this cylinder in the direction of the dipping-needle to have been 456,4 seconds in December 1831, and 462,2 seconds in October 1836; showing a difference of 5,8 seconds in fifty-eight months. If we compare this amount with the far greater loss of intensity sustained by this cylinder in the preceding voyage, it seems a probable supposition that, at the commencement of Captain Fitz-Roy's voyage, the cylinder had nearly attained its permanent magnetic state; and that its further loss of magnetism, occasioning an increase of 5,8 seconds in the time of vibration, took place in the early part of the voyage: supposing the loss to have been progressive, and not sudden, as from accidents, of which the observations give no indications. Con-

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sistently with this supposition, the loss has been distributed through the first half, or twenty-nine months, of this voyage, in the proportion of three-tenths of a second per month in the first ten months, commencing December 1st 1831; two-tenths per month in the next nine months; and one-tenth per month in the remaining nine months. In the last twenty-nine months of the voyage, the intensity of the cylinder is supposed to have been uniform, and the same which it was found to possess on the return to England in 1836.

It is satisfactory that, with this compensation, the observations at Port Praya, in January 1832, and in September 1836, assign almost identically the same relative magnetic intensity to that station.

The correction for temperature for this cylinder not having been previously examined, I received it from Captain Fitz-Roy for that purpose, and made with it the following observations. The cylinder, in its own apparatus, was placed in a large earthen jar, glazed at the top, and standing in a larger earthen vessel, into which warm water could be poured at pleasure, and the cylinder was then vibrated alternately in heated air and in air of the natural temperature. These experiments were made at Tortington, in Sussex.

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	Day.	Hour.	Thermom. (Reaumur.)	Time of Vibration.				
		h. m.	°	s		h. m.	°	s.
Exp. 1	June 12	11 50 A.M.	12,00	774,91				
	—	0 12 P.M.	12,00	775,37	Mean,	0 12 P.M.	12,0	775,33 Natural Temperature.
	—	0 34 P.M.	12,00	775,71				
	—	1 58 P.M.	31,65	777,31				
	—	2 21 P.M.	32,20	777,09	Mean,	2 20 P.M.	31,72	777,09 Heated Air.
	—	2 42 P.M.	31,30	776,86				
	—	4 00 P.M.	15,45	774,00				
	—	4 22 P.M.	15,80	774,25	Mean,	4 22 P.M.	15,65	774,16 Natural Temperature.
	—	4 44 P.M.	15,70	774,23				
Exp. 2	June 13	10 49 A.M.	14,90	773,77				
	—	11 16 A.M.	15,10	773,37	Mean,	11 02 A.M.	15,0	773,57 Natural Temperature.
	—	0 20 P.M.	34,80	775,94				
	—	0 42 P.M.	36,55	775,89	Mean,	0 31 P.M.	35,7	775,92 Heated Air.
	—	1 30 P.M.	17,70	774,06				
	—	1 52 P.M.	15,90	774,11	Mean,	1 41 P.M.	16,8	774,08 Natural Temperature.

In the first Experiment, $T=777,09$; T' 774,74; $t=103°,4$ Faht.; and $t'=63°,1$ Faht.

In the second Experiment, $T=775,92$; T' 773,83; $t=112°,3$ Faht.; and $t'=67°,8$ Faht.

The first Experiment gives $$\frac{T-T'}{T\,(t-t')} = \frac{2{\cdot}35}{777,09\times 40,3} = {\cdot}000075.$$

The second Experiment gives $$\frac{T-T'}{T\,(t-t')} = \frac{2,09}{775,92\times 44,5} = {\cdot}000061.$$

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Whence the formula $T'=T\,[1\times 0{\cdot}000068\ (60^\circ - t)]$, in which T is the time of vibration at any station, t, the temperature of the cylinder in degrees of Fahrenheit, and T′ is the equivalent time at a standard temperature of 60°. The thermometer was noted at the beginning and ending of every set of vibrations, and was always placed in the box with the cylinder.

At all Captain Fitz-Roy's stations the apparatus was placed for observation on a stand, which raised it from two to three feet above the ground, thereby rendering the cylinder somewhat less liable to be disturbed by local influences: it was not furnished with a means of examining the strict horizontality of the cylinder, that improvement having been introduced into M. Hansteen's apparatus at a later period. On this point Captain Fitz-Roy remarks: "A small leaden tripod was used as a stand, whose upper surface " was adjusted by a small spirit-level—or roughly by the trough " of an artificial horizon, filled with mercury. Upon the leaden " stand the box containing the needle was adjusted by its foot- " screws, so that the suspending fibre of silk hung centrally in " the wooden tube, the needle's centre being over that of the " graduated circle, and the needle itself near, but not touching, " the bottom of the box. The needle was not always strictly " parallel to the bottom of the box, nor strictly horizontal, be- " cause I would not move the brass stirrup in which it was sus- " pended, but its deviation from strict horizontality *never* exceeded " two degrees, and was seldom nearly so much."

The time of completing every tenth vibration was recorded. The time of performing 300 vibrations is deduced from a mean generally of seven partial results: *i. e.* from the 0th to the 300th; 10th to the 310th; and so on, to the 60th and 360th vibrations; the commencing vibration being always at an arc of 20°. In a very few instances the number of vibrations observed, after the commencing arc of 20°, was less than 360; in such cases the first vibration after the arc had become 20° has still been taken as the commencing one, though previous ones may have been recorded; it being kept strictly in view, to obtain the relative time of vibration in arcs as nearly the same as possible, and not exceeding 20° as the initial. The arc was reduced to 10° generally about the 100th vibration; and one thousandth of the time of vibration has been taken throughout the series as the correction to infinitely small arcs.

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The object of noting the time of every tenth vibration is to check errors in the counting, which will sometimes occur in the course of the 360, particularly with the very short and quick-moving needles of M. Hansteen's very portable apparatus, and at stations of low dip, where the horizontal force is greatest, and the needle consequently moves most quickly. Several such mistakes evidently occurred. When the time of completing every supposed tenth vibration is observed with tolerable exactness, and the duration of each pair of vibrations decidedly exceeds any irregularity of probable occurrence, apart from miscounting the number of vibrations, such mistakes can be discovered with ease, and rectified with certainty. This has been done in every case where no doubt could exist of a mistake of the kind having occurred; such as when all the intervals are of nearly equal duration, with one or two exceptions, which differ as much as three or four seconds from the general body. There are two stations, however, Callao and Keeling Islands, where the rectification is not so clear, or the true result so obvious. At Callao there are three series of horizontal intensities, each of forty observed intervals, which should be of ten vibrations each. Several of these intervals are between 17,5 and 18,5 seconds, and several others between 20,5 and 21,5 seconds. These can hardly represent an equal number of vibrations, because the difference between them is greater than can easily be supposed due to any uncertainty in seizing the particular beat of the chronometer at which the vibration was completed; it is, moreover, about the time that would be occupied by two vibrations more or less. The question then arises, do the longer intervals represent 12, and the shorter 10 vibrations, or do the longer represent 10, and the shorter 8? In the former supposition the intensity at Callao would be about 1.01(Paris=1.348): in the latter about 0.75. The difference shews how great an error would be risked by either assumption. If we take a mean of all the intervals as they stand, the amount of error risked would be certainly lessened; but we should assuredly not have the true time of three hundred vibrations, except on one supposition: namely, that the irregularities in question are not errors in estimating the number of vibrations, but that each interval really represented an equal number, and that some unusual and accidental cause occasioned the needle to differ so greatly in successive intervals. But this

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supposition would imply a disturbing cause vitiating the series as a measure of the magnetic intensity at the station. I have not ventured, therefore, to draw any conclusion from these observations, farther than to notice, as above, the limits within which, in either of the two first suppositions, the intensity would fall.

A nearly similar reasoning applies to the observations at Keeling Islands; of three series, one is decidedly so irregular, that no inference could be drawn from it; in the two other series the irregularities are neither so frequent, nor so large: my general impression (in the uncertainty created by the irregularity of the first series), is, that the majority of the intervals are of twelve vibrations, and not of ten: if of twelve, the intensity would be about 1,21; if of ten, about 0,85.

The inconvenience of the rapid motion of the needle, occasioned, at one part of the voyage, the practice to be discontinued of observing every tenth vibration, and every twentieth was substituted. This no doubt relieved the perplexity in which the observer occasionally found himself, in having to observe, and record, and be prepared again to observe, at every twenty seconds or less, and so far the change enabled him to observe better. But still, the disadvantage remains, in so quick moving a needle, that if a mistake of two vibrations is made, the difference of time occasioned is not of so marked and decided a character as to be at all times at once distinguished. It is of much more importance that there should be no miscount of the vibrations, than that the times should be recorded correctly to the fraction of a second. It is only the earlier and later times that are finally influential; but every undetected error in the number of vibrations falls with its whole weight upon the result.

The occasional discrepancies in the results of the same, or of different, observers, or on the same, or on different, days, which are seen in the subjoined table, are not, I believe, traceable to the source I have been discussing, nor apparently to any other than an actual difference in the time of the cylinder performing its vibration. A mean has been taken as the result at each station, except at St. Helena, where the discrepancy on the 11th and 13th of July was so considerable, that it has been thought more satisfactory to collect the observations of each day into separate results.

The subjoined table comprises the result of each observation,

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and the general results deduced for each station. The column entitled "Time" is that of 300 vibrations; and the "Corrected Time" is the mean of these, corrected for the rate of the chronometer and the arc, and reduced to an average temperature of 60°. The dips are those observed by Captain Fitz-Roy; except at Port Famine, where, as Captain Fitz-Roy did not observe, it has been supplied from Captain King's observations; and at Coquimbo, where, for the purpose of computing the intensity, it has been supplied by estimation from the other geographic positions on this coast, at which Captain Fitz-Roy observed the dip. In the column showing the time of vibration as a dipping-needle at Plymouth corresponding to the periods of observation at the several stations, the compensations have been introduced for the variation in the intensity of the cylinder, agreeably to what has been said above on that subject. The two final columns exhibit the values of the total magnetic intensity at the different stations derived from these observations. In the first of the two columns, the values are given relatively to the force at Plymouth, considered as unity; and in the second column, relatively to the force at Plymouth, expressed by 1.375; for the purpose of exhibiting Captain Fitz-Roy's results in direct comparison with the determinations of continental observers, who have taken Paris as their basis, giving the force at Paris the arbitrary expression of 1.3482. I have taken the ratio of the force at Plymouth to that at Paris to be as 1.375 to 1.348, which I believe will prove a very near approximation; it is that which results from Captain Fitz-Roy's observations at Plymouth, in October 1836 (page 17), and mine, at Tortington, in Sussex, in June 1837 (page 10): the dip at Tortington, at the period in question being 68° 57′, and the intensity, compared with Paris, through the medium of London, 1.368.

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MAGNETIC INTENSITY.

Station.	Date.	Time.	Chron.'s Rate.	Therm.	Observer.	Corrected Time.	Observed Dip.	Time of Vibration as a Dipping-Needle.		Intensity.	
								At each Station.	At Plymouth.	1.	2.
	1831.	s.	s.	°		s.	° ′	s.	s.		
Plymouth	Dec. 1	770,79	−3,0	50	Kg.	770,6	69 27,6	456,4	456,4	1,000	1,375
	1832.										
Port Praya	Jan. 27	600,17	−6,4	83	F.	600,1	46 20,2	498,8	457,0	0,839	1,154
	— 27	604,58	−6,4	76	K.						
	— 28	598,33	−6,4	75	F.						
	— 31	602,19	−6,4	85	K.						
	Feb. 1	602,50	−6,4	85	F.						
Rio de Janeiro.....	May 1	582,78	−4,3	82	S.	581,3	13 37,8	573,1	457,9	0,638	0,878
Blanco Bay.....	Sept. 21	592,33	0,0	68	F.	591,9	41 54	510,7	459,4	0,810	1,113
	— 21	593,34	0,0	68	F.						
	1833.										
Falkland Islands, Magellan Cove	Mar. 12	603,22	+1,5	50	F.	603,0	53 30,4	465,0	460,6	0,981	1,349
	— 14	604,56	+1,5	63	F.						
	— 15	603,12	+1,6	55	F.						
	— 15	603,40	+1,6	64	F.						
Monte Video	Nov. 25	583,93	+7,1	90	F.	581,9	34 51,2	527,1	461,8	0,767	1,055
	— 25	583,61	+7,1	90	F.						
Port Desire	Dec. 29	597,68	+3,9	62	F.	597,1	52 43,5	464,7	461,9	0,988	1,359
	— 29	597,98	+3,9	62	F.						
	1834.										
Falkland Islands, Port Louis	Mar. 26	603,10	+5,0	60	K.	595,9	53 19,6	460,5	462,1	1,007	1,385
	— 26	598,72	+5,0	60	K.						
	— 26	596,36	+5,0	60	K.						
	— 26	590,29	+5,0	60	K.						
	— 26	594,20	+5,0	61	K.						

(continued)

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Magnetic Intensity, *continued.*

Station.	Date.	Time.	Chron.'s Rate.	Therm.	Observer.	Corrected Time.	Observed Dip.	Time of Vibration as a Dipping-Needle.		Intensity.	
								At each Station.	At Plymouth.	1.	2.
	1831.	s.	s.	°			° ′	s.	s.		
R. Santa Cruz	May 10	601,67	+8,0	53	K.	601,1	55 15,7	454,0	462,2	1,037	1,425
	— 10	601,72	+8,0	54	St.						
	— 10	601,03	+8,0	50	St.						
Port Famine	June 4	613,25	+6,0	70	S.	612,6	59 52,6	434,0	462,2	1,135	1,560
	— 4	614,03	+6,0	70	S.						
Chiloé	Dec. 10	586,31	+9,2	62	K.	586,0	48 58,9	474,7	462,2	0,948	1,304
	— 10	587,14	+9,2	62	K.						
	1835.										
Port Low	Jan. 15	587,14	+8,8	56	K.	588,7	51 20,1	465,3	462,2	0,964	1,260
	— 15	591,16	+8,8	56	K.						
Valdivia	Feb. 19	587,67	+8,0	60	K.	588,7	46 46,5	487,2	462,2	0,900	1,238
	— 19	591,01	+8,0	61	K.						
Concepcion	Apr. 13	584,63	+10,5	65	K.	583,1	43 15,4	497,7	462,2	0,863	1,186
	— 13	585,30	+8,6	65	K.						
	— 14	584,94	+8,6	64	K.						
	— 14	581,03	+8,6	64	K.						
Coquimbo	June 4	566,81	+7,6	64	K.	565,8	34 20	514,2	462,2	0,808	1,111
	— 4	566,37	+7,6	64	K.						
Galapagos Islands, Charles Island	Oct. 16	529,66	—0,4	88	St.	527,9	9 28,6	524,2	462,2	0,777	1,069
	— 16	529,21	—0,4	88	St.						
Otaheite, or Tahiti	Nov. 16	580,33	+6,0	91	K.	578,4	30 13,5	537,6	462,2	0,739	1,017
	— 16	580,66	+6,0	93	K.						
	— 23	578,44	+6,0	85	K.						
	— 23	581,00	+6,0	85	K.						

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New Zealand	Dec. 22	604,76	+7,8	80	K.	603,6	59 32,0	429,8	462,2	1,157	1,591
	— 22	605,37	+7,8	80	K.						
	1836.										
Sydney	Jan. 14	620,63	−5,4	78	S.	617,9	62 49,4	417,6	462,2	1,225	1,685
	— 14	619,83	−5,4	82	S.						
	— 22	618,14	−5,8	86	K.						
	— 22	619,21	−5,8	87	K.						
Hobart Town	Feb. 6	698,63	+2,3	65	S.	697,4	70 34,9	402,1	462,2	1,321	1,817
	— 6	698,13	+2,3	65	S.						
King George Sound	Mar. 7	634,17	−5,6	72	S.	634,1	64 41,3	414,6	462,2	1,243	1,709
	— 10	636,71	+2,4	80	S.						
Mauritius	May 3	647,95	−9,2	87	K.	647,7	54 00,8	496,5	462,2	0,867	1,192
	— 3	650,79	−9,2	94	K.						
	— 3	650,37	−9,2	94	K.						
Cape of Good Hope	June 1	691,13	−7,2	68	S.	690,6	52 35,0	538,4	462,2	0,737	1,014
	— 1	691,42	−7,2	69	S.						
	— 10	691,62	+0,4	61	F.						
	— 10	692,00	+0,4	63	F						
St. Helena	July 11	612,90	−8,0	78	S.	613,2	18 01,2	598,0	462,2	0,598	0,822
	— 11	615,30	−8,0	79	St.						
	— 11	615,40	−8,0	78	S.						
St. Helena	— 13	604,69	−8,0	76	S.	602,9	18 01,2	587,9	462,2	0,618	0,850
	— 13	605,23	−8,0	77	S.						
	— 13	602,34	−8,0	72	S.						
Ascension	July 21	581,58	−9,4	75	S.	580,2	1 39,2	580,1	462,2	0,635	0,873
	— 21	581,31	−9,4	75	S.						
	— 21	581,09	−9,4	75	S.						
Bahia	Aug. 3	583,78	−9,4	75	S.	582,3	5 53,5	580,7	462,2	0,633	0,871
	— 3	583,26	−9,4	75	S.						
	— 4	583,13	−9,4	79	S.						
	— 4	583,89	−9,4	79	S.						

continued.

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MAGNETIC INTENSITY, *continued.*

Station.	Date.	Time.	Chron.'s Rate.	Therm.	Observer.	Corrected Time.	Observed Dip.	Time of Vibration as a Dipping-Needle.		Intensity.	
								At each Station.	At Plymouth.	1.	2.
		s.	s.	°			° ′	s.	s.		
Pernambuco	Aug. 13	576,12	−9,2	80	S.	574,5	13 12,9	566,2	462,2	0,665	0,914
	— 13	576,00	−9,2	81	S.						
	— 17	575,96	−9,2	85	S.						
	— 17	575,71	−9,2	87	S.						
Port Praya	Sept. 1	603,13	−9,8	91	S.	603,4	45 46,5	503,9	462,2	0,841	1,157
	— 1	602,84	−9,8	92	S.						
	— 1	607,63	−9,8	91	S.						
	— 1	607,49	−9,8	89	S.						
Terceira	Sept. 21	736,73	−9,2	77	S.	735,3	68 06	449,1	462,2	1,059	1,457
	— 21	737,01	−9,2	77	S.						
Plymouth	Oct. 15	778,10	+5,0	63	Ss.	777,3	69 17,5	462,2	462,2	1,000	1,375
	— 15	778,26	+5,0	64	Ss.						
	— 15	778,65	+5,0	64	Ss.						

Observers:—F. Captain Fitz-Roy. Ss. Mr. J. L. Stokes. Kg Capt. King.
S. Lieut. Sulivan. St. Mr. P. B. Stewart. K. Mr. P. G. King.

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3. *Captain King's Observations of Dip and Intensity.*

Captain King, having hitherto made known his observations with the same cylinder in the years 1826 to 1830 only by communicating them to M. Hansteen, from whom he received the apparatus, has now given permission to Captain Fitz-Roy to publish them with his own. I have already noticed the great loss of magnetism which took place in this cylinder during Captain King's voyage, and the care with which that officer availed himself of every opportunity of ascertaining, by direct observation, the proportion of the loss sustained in separate portions of the voyage. There are twelve stations of observation on the east and west coasts of South America, besides three stations in ports of the Atlantic on the outward voyage. By the practice of repeating observations at the same station at distant intervals, the South American stations are so linked together and connected, that by adopting a method similar to that used in determining longitudes by means of chronometers, we may compute the intensity at all the South American stations referred to and dependent on the force at Rio de Janeiro; regarding Rio in the same light as a first meridian is considered in determinations of longitude. We may then make Rio the means of connecting the whole series with Europe; for which it is remarkably well suited, the intensity there having been determined, independently of Captain King, by four observers of different nations, whose results are extremely accordant.

The dip observations of Captain King were communicated, in occasional correspondence during the voyage, to M. Hansteen, who computed them by Mayer's formula, and arranged them in a table, of which a copy was given by Captain King to Captain Fitz-Roy, and is printed in the next page. At some of the stations Captain Fitz-Roy also observed the dip in the subsequent voyage, and, as will be seen, the results of the two observers sometimes differ considerably. This may have been caused, either by instrumental or other error of observation, or by actual differences of dip existing in different localities at the same station.

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Dips, observed by Capt. P. P. King, 1826 to 1831.

Station.	Needle.	Marked end a N. Pole. a	Marked end a N. Pole. a′	Marked end a S. Pole. a″	Marked end a S. Pole. a‴	Dip deduced. ,	Dip deduced. ,	Remarks.
		° ′	° ′	° ′	° ′	° ′	° ′	
Rio de Janeiro	1	15 58,5	13 02,4	15 05,7	13 18,0	14 16,2	14 00,1 S.	
	2	14 39,4	12 30,4	14 49,0	13 07,3	13 44,1		
Stª Catharina	1	22 54,1	24 04,7	21 55,6	22 46,0	22 49,6	22 12,4 S.	
	2	23 22,8	20 32,3	23 34,2	21 00,7	22 03,6		
	3	21 17,8	21 08,5	23 26,2	22 57,2	21 44,0		
Monte Video	1	36 48,4	37 49,3	35 25,4	37 26,9	37 00,7	36 28,4 S.	
	2	37 17,2	34 53,8	37 17,1	34 37,4	35 59,3		
	3	36 36,1	35 10,3	37 12,4	36 13,2	36 25,3		
Port Famine	1	64 41,7	52 42,6	65 51,2	54 54,0	59 44,9	59 52,6 S.	
	2	60 41,9	59 32,2	60 32,1	59 33,6	60 04,5		
	3	60 03,9	58 43,4	60 35,5	59 37,5	59 48,5		
Gorriti	1	41 09,9	30 50,9	41 04,6	31 32,6	35 38,3	35 05,9 S.	
	2	36 29,2	33 26,4	35 17,1	34 02,7	34 43,8		
	3	34 52,3	34 18,5	36 06,9	35 01,3	34 55,6		
Sea Bear Bay	1	58 26,5	47 53,8	60 34,8	47 53,4	53 13,5	53 13,5 S.	
St. Martin Cove	1	65 24,7	54 23,8	65 47,7	54 43,6	59 46,4	59 43,8 S.	
	2	60 25,6	59 28,3	59 49,9	58 48,6	59 38,4		
	3	59 48,9	58 40,7	60 43,4	59 53,3	59 46,6		
Chiloe	1	54 23,9	45 38,3	56 19,2	45 11,1	49 59,4	49 52,6 S.	
	2	50 24,0	49 12,9	50 28,4	48 29,6	49 38,7		
	3	49 43,9	48 48,3	51 24,5	50 02,2	49 59,7		
Valparaiso	1	43 04,5	33 59,9	44 38,8	34 54,6	38 40,1	40 10,7 S.	
	2	40 48,2	40 49,7	40 53,7	41 09,7	40 55,4		
	3	40 54,9	40 45,4	40 49,8	41 16,7	40 56,7		
Juan Fernandez	1	50 22,7	39 16,0	51 08,2	40 03,2	44 40,5	44 49,9 S.	
	2	44 19,3	45 57,6	43 45,8	46 13,7	45 04,6		
	3	45 50,4	45 07,9	44 34,8	43 25,7	44 44,7		
Talcahuano	..	.....	.....	.....	.....	.....	45 10,0 S.*	* The particulars of this observation are wanting.

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The following TABLE contains Captain KING's Observations of Intensity, with the times of vibration corrected for the arc and reduced to a standard temperature of 60°.

MAGNETIC INTENSITY, *observed by* Capt. P. P. King *between* 1826 *and* 1831.

Station.	Date.	Time.	Therm.	Corrected Time.	Particular place.
		s.	°		
Greenwich	1826 Mar. 22	734,45	55,0	733,97	Observatory.
	1831 Jan. 24	775,80	41,6	776,01	
Madeira	1826 May 31	628,68	66,0	627,79	Consul's Garden.
Teneriffe	— June 12	607,96	75,0	606,73	Fort St. Pedro.
Port Praya	— — 22	559,53	81,5	557,08	Landing Place, Quail Island.
	— — 24	557,58	85,0		
Rio de Janeiro	— Aug. 29	546,36	77,0	545,16	Rat Island.
	1827 Sept. 12	552,06	75,5		
	— — 15	552,95	80,0	551,70	
	— — 15	553,73	83,0		
	— — 15	553,48	85,0		
	1828 Dec. 21	562,55	84,0	561,05	
Stª Catharina	1827 Nov. 3	554,42	67,5	553,58	Anhatomirim.
Gorriti	1826 Oct. 29	550,68	63,0	549,44	The Well.
	— Nov. 6	549,63	66,0		
	1829 Jan. 10	564,12	80,0	562,78	
Monte Video	1827 Dec. 18	555,12	78,3	553,87	South point near the Sea.
	1828 Oct. 8	562,00	72,5	560,95	
	1830 June 1	565,41	59,0	564,89	
Port Stª Elena	1826 Dec. 4	557,26	68,0	556,42	Landing-place.
Sea Bear Bay	1829 Mar. 20	577,36	70,0	576,37	Landing-place.
St. Martin Cove	1827 Jan. 15	584,88	56,0	584,29	Head of the Cove.
	— — 15	583,48	58,0		
	— — 22	585,82	55,0		
	— Mar. 27	585,82	64,0	585,08	
Port Famine	1828 Jan. 28	589,75	55,0	589,36	Observatory.
	— May 8	596,49	43,8	596,54	
	— June 18	595,86	32,7	595,81	
	— July 30	594,85	36,2		
	1830 Apr. 30	598,95	45,0	598,97	
Chilóe	1829 Sept. 1	565,40	54,0	565,23	San Carlos.
	— Dec. 15	565,69	53,0		
Juan Fernandez	1830 Feb. 19	552,77	70,0	551,83	Landing-place.
Talcahuano	1829 Dec. 18	556,42	67,0	555,59	Fort Galvez.
	1830 May 12	557,18	60,5	557,18	
Valparaiso	1829 Aug 4	549,10	59,0	548,59	Almendral.
	1830 Jan. 11	551,77	77,0	551,60	
	— Feb. 1	553,50	68,5		

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At Rio de Janeiro, which was the first station observed at in South America, the cylinder was vibrated in August 1826, September 1827, and December 1828; in the intervals between these dates are comprised the greater part of the observations on the east side of South America. There is no direct observation at Rio subsequently to December 1828; but we are enabled to supply the time of vibration, which would have been observed had the cylinder been employed at Rio on June 1, 1830, in the following manner. We have seen that on the 15th September 1827 the time of vibration was observed at Rio; on the 18th December following it was observed at Monte Video. These observations give the intensity at Monte Video relatively to that at Rio, subject to whatever change of magnetism the cylinder may have undergone in the interval of three months. This comparison was repeated in the following year, on Captain King's return from Monte Video to Rio, the interval being nearly of the same duration, and the order of the experiment reversed, the passage being in this instance from Monte Video to Rio, it having been before from Rio to Monte Video. On the supposition of an uniform, or nearly uniform rate of change in the cylinder, the errors arising therefrom during the two passages would be of opposite kinds, and should compensate each other in a mean of the two comparisons. Calling the force at Rio unity, these comparisons give its value at Monte Video respectively as follows, namely,

September and December 1827 ...	1·197	} Mean 1·202.
October and December 1828 ...	1·207	

On the 1st of June 1830, being then on his return from the west coast of South America, and on the eve of sailing for England, Captain King again observed the time of vibration of the cylinder at Monte Video; whence, through the preceding comparison, we obtain the time of vibration at Rio, which should belong to the same date. We have thus a fourth date at Rio, which, added to those enumerated above, will include the whole of the South American stations; and we have only to distribute in each interval the loss of magnetism which the observations shew to have taken place from one date to the next, in the manner which may appear most suitable. There is no very obvious indication that the loss was other than gradual; and by considering it uniform in each separate

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interval, the results are found extremely accordant at several other stations at which observations were repeated at distant intervals.

In the first of the subjoined tables are given the times of vibration at Rio at the four periods referred to; and the corresponding times as a dipping needle. In its three last columns are shewn,—the number of days comprised in each interval,—the increase in the time of vibration owing to the loss of magnetism,—and the resulting daily correction, on the supposition in each case of the loss having been uniform in the interval during which it occurred.

The second table contains the corrected times of horizontal vibration at each of the South American stations, at the dates respectively inserted,—the corresponding times as a dipping needle,—the times of vibration as a dipping needle at Rio de Janeiro at the same dates, derived from the observations in the first table,—and the resulting intensity at each station relatively to unity at Rio. Thus far the results are derived from Captain King's observations, unmixed with those of any other observer: but in order to bring Captain King's series into connexion with the general body of results of other observers, the values of his intensities are expressed in the final column in terms of the scale in common use, in which the force at Paris = 1,348, and at Rio de Janeiro 0,884; the latter being the mean of four independent determinations by the following observers, namely,

1817 and 1820	Freycinet	0,890	0,884
1827.....	Lütke	0,886	
1830.....	Erman	0,879	
1836.....	Fitz-Roy	0,878	

Port St. Elena is not included in this table, as no dip was observed there, and the total intensity consequently cannot be computed. The three stations, Madeira, Teneriffe, and Port Praya, at which the cylinder was vibrated in the outward voyage, are also without dips observed by Captain King. The deficiency at Port Praya has been supplied from Captain Fitz-Roy's observations and my own, both having been made at the same place at which Captain King's intensity was observed,—Captain Fitz-Roy's at a later, and mine at an earlier date. At Madeira also the dip has been supplied from my observations, which were made in the British consul's garden at Funchal, where Captain King's cylinder was vibrated. I have

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deducted, from my determination of the dip, 12′ for the probable change between 1822 and 1826. At Teneriffe the dip has been frequently observed; but the values assigned by different observers vary so much as to indicate a more than usual frequency of local disturbance, which might also be expected from the geological character of that island. It would be unsafe therefore to employ any dip for that station but one which was certainly obtained at the same spot at which the horizontal intensity was observed.

The dates of the observations at these three stations fall between the observations at Greenwich in March 1826, and those at Rio de Janeiro in August of the same year. Having the intensity at Greenwich = 1,372 and at Rio = 0,884, and the dip at Greenwich 69° 52′, and at Rio 14° 00, we have the time of vibration of Captain King's cylinder as a dipping needle at Rio at the respective dates as follows, namely,

March 1826	536,2.
August 1826	537,0.

It appears therefore that but a very slight change took place in the magnetism of the cylinder during the outward voyage, and we may take 536,6 as the time of vibration at Rio, corresponding to the dates of the intermediate observations; and this is done in the table for Madeira and Port Praya.

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Table I.

Rio de Janeiro.	Time of Vibration.		Interval.	Loss.	Per Diem.
	Horizontal.	As a Dipping Needle.			
	s.	s.	Days.	s.	
August 29, 1826...	545,2	537,0	382	6,5	·017
September 15, 1827	551,7	543,5			
December 21, 1828	561,1	552,7	462	9,2	·020
June 1, 1830	563,8	555,4	527	2,7	·005

Table II.

Station.	Date.	Time of Vibration.			Intensity.		
		At the Station.		At Rio.	Rio=1,000.		Rio=0,884.
		Horizon.	As a Dipping Needle.	As a Dipping Needle.			
		s.	s.	s.			
Madeira.....	1826 May 31	627,79	430,1	536,6	1,556		1,377
Port Praya...	1826 June 22 and 24	557,08	465,4	536,6	1,330		1,177
Sta Catharina	1827 Nov. 3	553,58	532,7	544,5	1,045		0,920
Gorriti	1826 Oct. 29 and Nov. 6	549,44	497,0	538,1	1,172		
—	1829 Jan. 10	562,78	509,0	552,8	1,179	1,175	1,041
Monte Video	1827 Dec. 18	553,87	496,7	545,4	1,206		
—	1828 Oct. 8	560,95	503,0	551,3	1,201	1,203	1,065
—	1830 June 1	564,89	506,6	555,4	1,202		
Sea Bear Bay	1829 Mar. 20	576,37	446,0	553,1	1,538		1,361
St. Martin Cove	1827 Jan. 15 and 22	584,29	414,9	539,4	1,691		
—	— Mar. 27	585,08	415,4	540,6	1,694	1,692	1,498
Port Famine	1828 Jan. 28	589,36	417,5	546,2	1,712		
—	— May 8	596,54	422,6	548,2	1,683		
—	— June 18 and July 30	595,81	422,1	549,3	1,694	1,700	1,505
—	1830 April 26	598,97	424,3	555,1	1,712		
Chiloe	1829 Sept. 1 and Dec. 15	565,23	453,7	554,2	1,402		1,321
Juan Fernandez	1830 Feb. 19	551,83	464,7	554,8	1,425		1,262
Talcahuano	1829 Dec. 18	555,59	466,5	554,6	1,413	1,412	1,250
—	1830 May 12	557,18	467,4	555,3	1,412		
Valparaiso...	1829 Aug. 4	548,59	479,5	553,9	1,334	1,329	1,176
—	1830 Jan. 11 and Feb. 1	551,60	482,1	554,6	1,324		

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4.—The following Table exhibits the MAGNETIC OBSERVATIONS of Captains King and Fitz-Roy collected in one view.

Stations.	Latitude.	Longitude.	Variation.	Dip.	Intensity, Paris=1,348.
	° ′	° ′	° ′	° ′	
Madeira	32 38 N.	16 56 W.	.....	.....	K. 1,377
Terceira	38 39 N.	27 13 W.	24 18 W.	F. 68 06 N.	F. 1,457
Port Praya	14 54 N.	23 30 W.	16 30 W.	.....	K. 1,177
				F. 46 20,2 N.	F. 1,154
				F. 45 46,5 N.	F. 1,157
Ascension	7 56 S.	14 24 W.	13 30 W.	F. 1 39,2 N.	F. 0,873
St. Helena	15 55 S.	5 43 W.	18 00 W.	F. 18 01,2 S.	F. 0,822
					F. 0,850
Falkland Islands	51 32 S.	58 07 W.	19 00 E.	F. 53 30,4 S.	F. 1,349
				F. 53 19,6 S.	F. 1,385
Pernambuco	8 04 S.	34 51 W.	5 54 W.	F. 13 12,9 N.	F. 0,914
Bahia	12 59 S.	38 30 W.	4 18 W.	F. 4 55,8 N.	F. 0,871
				F. 5 53,5 N.	
Rio de Janeiro	22 55 S.	43 09 W.	2 00 E.	K. 14 00,1 S.	F. 0,878
				F. 13 37,4 S.	
Stª Catharina	27 26 S.	48 33 W.	.....	K. 22 12,4 S.	K. 0,920
Gorriti	34 57 S.	54 57 W.	.....	K. 35 05,9 S.	K. 1,041
Monte Video	34 53 S.	56 13 W.	12 00 E.	K. 36 28,4 S.	K. 1,065
				F. 34 51,2 S.	F. 1,055
Blanco Bay	38 57 S.	61 59 W.	15 00 E.	F. 41 54,0 S.	F. 1,113
Port Desire	47 45 S.	65 55 W.	20 12 E.	F. 52 43,5 S.	F. 1,359
Sea Bear Bay	47 51 S.	65 48 W.	.....	K. 53 13,5 S.	K. 1,361
R. Santa Cruz	50 07 S.	68 24 W.	20 54 E.	F. 55 15,7 S.	F. 1,425
St. Martin Cove	55 51 S.	67 34 W.	.....	K. 59 43,8 S.	K. 1,498
Port Famine	53 38 S.	70 58 W.	23 00 E.	K. 59 52,6 S.	K. 1,505
					F. 1,560
Port San Andres	46 35 S.	75 35 W.	20 48 E.	F. 54 13,6 S.	
Port Low	43 48 S.	74 02 W.	19 48 E.	F. 51 20,1 S.	F. 1,326
Chiloé	41 51 S.	73 56 W.	18 00 E.	K. 49 52,6 S.	K. 1,321
				F. 48 58,9 S.	F. 1,304
Valdivia	39 53 S.	73 29 W.	17 30 E.	F. 46 46,5 S.	F. 1,238
Concepçion	36 42 S.	73 10 W.	16 48 E.	K. 45 10,0 S.	K. 1,250
				F. 43 15,4 S.	F. 1,186
Valparaiso	33 02 S.	71 41 W.	15 18 E.	K. 40 10,7 S.	K. 1,176
				F. 38 03,1 S.	
Coquimbo	29 59 S.	71 26 W.	14 24 E.	.....	F. 1,111
Callao	12 04 S.	74 14 W.	10 00 E.	F. 7 02,8 S.	
Galapagos Islands	0 50 S.	89 37 W.	9 30 E.	F. 8 41,2 N.	
Ditto	0 15 S.	90 31 W.	9 30 E.	F. 9 28,6 N.	F. 1,069
Juan Fernandez	33 38 S.	78 53 W.		K. 44 49,8 S.	K. 1,262
Otaheite	17 29 S.	149 30 W.	7 54 E.	F. 30 13,5 S.	F. 1,017
Cape of Good Hope	34 11 S.	18 26 E.	28 30 W.	F. 52 35,0 S.	F. 1,014
Mauritius	20 09 S.	57 31 E.	11 18 W.	F. 54 00,8 S.	F. 1,192
Keeling Islands	12 05 S.	96 55 E.	1 12 W.	F. 38 33,1 S.	
New Zealand	35 16 S.	174 00 E.	14 00 E.	F. 59 32,0 S.	F. 1,591
King George Sound	35 02 S.	117 56 E.	5 36 W.	F. 64 41,3 S.	F. 1,709
Hobart Town	42 53 S.	147 24 E.	11 06 E.	F. 70 34,9 S.	F. 1,817
Sydney	33 51 S.	151 17 E.	10 24 E.	F. 62 49,4 S.	F. 1,685

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General Remarks.

1. *Variation.*

Captain Fitz-Roy's observations are so well distributed over the southern hemisphere, that a good view of the changes which the variation is undergoing throughout its meridians may be obtained by comparing his determinations with those of earlier observers at the same stations. The following table has been formed for the purpose of exhibiting such a comparison at all those stations where materials for it exist; and I may here remark how much such comparisons are facilitated by the valuable collection of early observations contained in the Appendix to the Magnetismus der Erde.

Cape of Good Hope.

Observer.	Date.	Variation.
		° ′
Davis	1605	0. 30 E.
Keeling	1609	0. 12 W.
Leydecker ..	1675	8. 28 W.
Mathews ..	1724	16. 22 W.
La Caille ..	1752	19. 0 W.
Wales	1772	20. 26 W.
Wales	1775	21. 14 W.
Bligh	1788	23. 16 W.
Dentrecasteaux	1792	24. 30 W.
Freycinet ..	1818	26. 31 W.
Fitz-Roy ..	1836	28. 30 W.

St. Helena.

Davis	1610	7. 13 E.
Halley	1677	0. 40 E.
Halley	1691	1. 0 W.
Mathews ..	1724	7. 30 W.
Wales	1775	12. 18 W.
Hunter	1789	15. 30 W.
Macdonald ..	1796	15. 48 W.
Krusenstern ..	1806	17. 18 W.
Fitz-Roy ..	1836	18. 00 W.

Rio de Janeiro.

Cook	1768	7. 34 E.
Hunter	1787	6. 12 E.
Freycinet ..	1820	2. 54 E.
Rumker	1821	3. 21 E.
Erman	1830	2. 10 E.
Fitz-Roy ..	1836	2. 00 E.

Falkland Islands.

Observer.	Date.	Variation.
		° ′
Freycinet ..	1820	19. 26 E.
Duperrey ..	1822	19. 07 E.
Fitz-Roy	1833	19. 00 E.

Port Famine.

Wallis	1766	22. 30 E.
Carteret	1766	22. 22 E.
Fitz-Roy	1831	23. 00 E.

Concepçion.

La Perouse ..	1786	15. 15 E.
B. Hall	1821	15. 30 E.
Duperrey ..	1823	16. 16 E.
Fitz-Roy	1835	16. 48 E.

Valparaiso.

Don G. Juan ..	1744	12. 30 E.
Vancouver ..	1793	14. 49 E.
Lütke	1827	15. 00 E.
Fitz-Roy	1835	15. 18 E.

Callao.

Ulloa	1740	9. 02 E.
Duperrey ..	1823	9. 30 E.
Fitz-Roy	1835	10. 36 E.

Galapagos Islands.

Vancouver ..	1794	8. 00 E.
B. Hall	1821	8. 20 E.
Fitz-Roy	1835	9. 30 E.

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Observer.	Date.	Variation.
Otaheite.		
Cook	1769	4. 45 E.
Wales	1773	5. 40 E.
Bayley	1774	5. 49 E.
Vancouver ..	1794	6. 12 E.
Duperrey ..	1823	6. 40 E.
Fitz-Roy	1835	7. 34 E.
Bay of Islands, N. Zealand.		
Tasman	1643	8. 40 E.
Cook	1769	11. 25 E.
Duperrey ..	1824	13. 22 E.
Fitz-Roy	1835	14. 00 E.
Sydney.		
Cook	1770	8. 00 E.
Hunter	1787	8. 30 E.
Flinders	1803	8. 51 E.
Freycinet	1819	9. 15 E.
Duperrey	1824	8. 56 E.
Fitz-Roy	1836	10. 24 E.
Van Diemen's Land.		
Tasman	1642	3. 00 E.
Bayley	1777	7. 29 E.
Bligh	1778	8. 33 E.
Fitz-Roy	1836	11. 06 E.
Mauritius.		
Keeling	1609	21. 0W.
Mathews	1722	19. 4W.
Freycinet ..	1818	12. 46W.
Duperrey ..	1824	13. 46W.
Fitz-Roy	1836	11. 18W.

We may derive from the facts in the above table the following general and easily remembered conclusion in regard to the changes of the variation in the southern hemisphere; namely, that taking for our point of departure the meridian of 65° west in South America, we find that at all the stations east of that meridian to the Cape of Good Hope inclusive, the north pole of the needle has moved towards the west; and that all the stations west of the same meridian to Mauritius inclusive, the north pole of the needle has moved towards the east.

An almost equally simple generalization may be drawn in respect to the changes of situation of the lines of equal variation in the southern hemisphere: but here it must be supposed either that the reader is thoroughly familiar with the general arrangement of these lines, or that he has a map of them before him. He will find such a map of the variation lines in 1787 in the Fifth Report of the British Association; but any other map, corresponding to any epoch within the last hundred years, will equally serve the purpose. Referring to such a map, it will be seen that the lines of variation in the South Pacific, form a system of nearly concentric curves, of an oval, or pear-shaped form, the outside curves having a higher variation, which progressively diminishes to the centre. We may regard this system as comprehending the whole of the geographical space between the coast of South America and the meridian of New Zealand. Throughout this space the variation is easterly, and increases: we may consequently characterize the change in the situation of the lines of equal variation as a progressive closing-in

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of the curves from all sides towards the centre, by which the areas severally comprehended by them become less; and the lower variations, as they successively reach the centre, disappear, and are replaced by the closing-in of those of next higher amount. The changes which have taken place at all Captain Fitz-Roy's stations comprised within the space referred to, are accordant with the systematic alteration thus described.

In all other parts of the hemisphere the lines of variation have a progressive westerly movement, and to this also Captain Fitz-Roy's observations correspond.

It follows, from what has been stated, that the lines on the western side of the concentric system in the South Pacific have an eastward movement, which presents an apparent anomaly to the general progress of the lines of variation in the southern hemisphere, which is from east to west.

Otaheite, and the Bay of Islands in New Zealand, present examples of changes in the variation corresponding to this apparent anomaly. The consistency, however, both of the movement and of the configuration of the lines of variation in this quarter, with those in other parts of the southern hemisphere, and with the general system of the magnetic phenomena, has been shewn by Mr. Hansteen in the Magnetismus der Erde, and in the Annalen der Physik, vol. xxi.

The annual amount of the change of the variation appears considerably greater at the Cape of Good Hope and Mauritius than at any other of Captain Fitz-Roy's stations, amounting to about eight minutes; shewing that the variation lines in that quarter are changing their position more rapidly than elsewhere. The north pole of the needle is moving to the west at the Cape, and to the east at Mauritius; but it will be seen, by a reference to the map, that these opposite movements are in perfect correspondence with the uniform westerly progression of the variation lines, and result from their configuration.

At the stations in the vicinity of the meridian of 65° west, the change appears to be very small.

[The variation at Ascension (13° 30′ W.) is correctly inserted in the tables: it is the only one of Captain Fitz-Roy's stations at which his observations are not accordant with those of other observers: the discordance may be occasioned by the great prevalence of local disturbances at Ascension.]

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II. *Dip.*

The following table exhibits the comparison of Captain Fitz-Roy's observations of the dip in the southern hemisphere, with those of earlier observers, at stations where the materials for such a comparison exist.

Observer.	Date.	Variation.
Ascension.		
La Caille ..	1754	11. 10 N.
Cook	1775	8. 57 N.
Sabine	1822	4. 30 N.
Duperrey ..	1825	1. 58 N.
Fitz-Roy ..	1836	1. 39 N.
St. Helena.		
La Caille ..	1754	9. 0 S.
Cook	1775	11. 25 S.
Fitz-Roy	1836	18. 01 S.
Cape of Good Hope.		
La Caille ..	1751	43. 0 S.
Bayley	1772	45. 37 S.
Bayley	1775	45. 19 S.
Abercrombie ..	1775	46. 26 S.
Bayley	1776	46. 31 S.
Freycinet ..	1818	50. 47 S.
Fitz-Roy ..	1836	52. 35 S.
Mauritius (Port Louis).		
La Caille	1754	52. 17 S.
Duperrey ..	1824	53. 51 S.
Fitz-Roy ..	1836	54. 01 S.
Otaheite.		
Cook	1773	29. 43 S.
Cook	1774	29. 59 S.
Bayley	1777	29. 47 S.
Duperrey ..	1823	30. 03 S.
Erman	1830	30. 29,5 S.
Fitz-Roy ..	1835	30. 13,5 S.
Lima and Callao.		
Feuillée	1710	10. 30 S.
Humboldt ..	1799	9. 59 S.
Duperrey ..	1823	8. 33 S.
Fitz-Roy	1835	7. 03 S.
Valparaiso.		
Malaspina ..	1793	44. 58 S.
Vancouver ..	1795	44. 15 S.
Lütke	1827	39. 56 S.
King	1829	40. 11 S.
Fitz-Roy	1835	38. 03 S.
Concepçion.		
Feuillée	1710	55. 30 S.
Perouse	1786	50. 00 S.
Duperrey ..	1823	44. 55 S.
Lütke	1827	45. 33 S.
King	1829	45. 10 S.
Fitz-Roy	1835	43. 15 S.
King George Sound.		
Vancouver ..	1791	64. 54 S.
Flinders	1801	64. 01 S.
Fitz-Roy	1836	64. 41 S.
Van Diemen's Land.		
Cook	1777	70. 15 S.
Bertrand	1792	70. 50 S.
Dentrecasteaux	1792	70. 30 S.
De Rossel ..	1793	70. 10 S.
Fitz-Roy	1836	70. 35 S.
Sydney.		
Flinders	1803	62. 52 S.
Freycinet ..	1819	62. 47 S.
Brisbane	1821	62. 36 S.
Duperrey ..	1824	62. 20 S.
Fitz-Roy	1836	62. 49 S.
N. Zealand (Bay of Islands).		
Duperrey	1824	59. 45 S.
Fitz-Roy	1835	59. 32 S.
Tierra del Fuego.		
Bayley .. .. Lat. 55°. 22′; Long. 70. 03.	1774	66. 54 S.
King .. .. Lat. 55°. 51′; Long. 67. 34.	1828	59. 44 S.
Falkland Islands.		
Freycinet	1820	55. 20 S.
Duperrey ..	1822	54. 49 S.
Fitz-Roy	1833-4	53. 25 S.
Sta Catharina.		
Duperrey ..	1822	22. 54 S.
King	1827	22. 12 S.
Rio de Janeiro.		
La Caille	1751	20. 0 S.
Freycinet ..	1817	14. 42 S.
King	1826	14. 00 S.
Lütke	1827	14. 35 S.
Erman	1830	13. 31 S.
Fitz-Roy	1832	13. 37 S.

We may classify the changes which are taking place in the dip in the southern hemisphere in four divisions, characterised by an

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alternate increase and decrease of dip. Commencing with the meridian of Greenwich, and proceeding eastwardly round the hemisphere, we may distinguish the divisions as follows, in the order of their geographical succession.

1st. South dip increasing.

		annually.			annually.
St. Helena	1754 to 1775	6,9′	Cape of Good Hope	1775 to 1836	6,6
Do.	1775 to 1836	6,5	Mauritius	1754 to 1824	1,3
Cape of Good Hope	1751 to 1775	7,2	Do.	1824 to 1836	0,8

To this division also belongs Ascension; but as the north end of the needle dips at that island, the change is *north dip diminishing*, instead of *south dip increasing*.

Ascension	1754 to 1775	..	6,3 annually.
Do.	1775 to 1836	..	7,2 ——

2d. South dip decreasing.

New Zealand	1824 to 1835	..	1,2 annually.*

3d. South dip increasing.

Otaheite	1775 to 1836	..	0,5 annually.

4th. South dip decreasing.

		annually.			annually.
Lima and Callao ..	1710 to 1799	0,4′	Tierra del Fuego	1774 to 1828	8,0
Do.	1799 to 1835	4,9	Falkland Islands	1820 to 1834	8,2
Valparaiso	1794 to 1835	10,0	St^{a} Catharina ..	1822 to 1827	8,4
Concepçion	1710 to 1786	3,7	Rio de Janeiro ..	1751 to 1817	4,8
Do.	1786 to 1835	8,3	Do.	1817 to 1832	4,3

In the 2d and 3d divisions the annual change is small; in the 1st and 4th considerably greater. It is greatest at the southern station in South America; the observations at Valparaiso, Concepçion, Tierra del Fuego, and the Falkland Islands, concur in shewing it to exceed 8′. The observations at Ascension, St. Helena, and the Cape of Good Hope, concur in shewing an annual change in that quarter of the 1st division exceeding 6′.

As the south dip decreases in South America, and increases in Africa, it is obvious that somewhere intermediately the dip must be stationary. Between Africa and New Zealand, for the same reason, there must be a second locality so characterised. Between New Zealand and Otaheite, a third; and between Otaheite and the west coast of South America, a fourth. Captain Fitz-Roy has

* This is derived from the observations of Captains Duperrey and Fitz-Roy at the Bay of Islands, in Lat. 35°. 16′. The interval is short; but the indication receives confirmation from the observations of Captains Cook and Vancouver at Dusky Bay, New Zealand, in Lat. 45°. 47′.

Cook	1773	..	70°. 06′	1′.4 annual decrease.
Vancouver ..	1791	..	69. 43	

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stations in the second of these localities only, between Africa and New Zealand. At Hobart Town, Sydney, and King George Sound, there appears to have been little or no change in the dip since the commencement of the present century.

The arrangement of the changes of dip in the southern hemisphere in four divisions, characterised by an alternate increase and decrease of dip, is in correspondence with the *double flexure* of the lines of dip; and is a consequence of the western motion of the two southern magnetic poles.

Careful observations made at St. Petersburgh, have shewn that the annual change of the dip in the northern hemisphere takes place altogether between the months of May and December; there being in fact a small movement in an opposite direction between December and May. This fact is of great interest in its bearing on the study of the causes of the magnetic phenomena. We have as yet no corresponding knowledge in regard to the southern hemisphere. The magnitude of the annual change which Captain Fitz-Roy's observations show is now taking place at the Cape of Good Hope, is deserving of attention in this respect. A large amount of annual change is obviously highly favourable for a determination of all the circumstances belonging to it; and its existence at the Cape, where there is already a fixed observatory, points to that station as most eligible for this investigation.

The observations at Ascension shew that the epoch is fast approaching when the needle will pass from north to south dip at that island: it is extremely desirable that the period at which this change takes place should be determined with as much precision as possible.

III. *Intensity.*

I have discussed in the Seventh Report of the British Association, the very important inferences in regard to the general distribution of magnetism in the southern hemisphere, afforded by Captains King and Fitz-Roy's most valuable series of intensity observations; but no inferences in regard to the *changes* which this phenomenon may be supposed to undergo can be drawn, as has been done in the cases of the variation and dip, because we possess no observations of the intensity made at a sufficiently early period to afford good materials for such a comparison.

EDWARD SABINE.

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Catalogue of the more interesting Specimens of Natural History that were collected during the voyage.

MAMMALIA.

1. Mustela Zorilla. Desm:*

The skunk. This animal was found abundantly on the coast of Patagonia, between Monte Video and Cape Gregory, at the eastern entrance of the Strait of Magalhaens. It appeared to be the same species throughout the whole extent of the coast.—Mus. Zool. Soc.

2. Mustela lutris.—Lin.

Lutra marina, Steller. Erxleb. Harlau; *Enhydra marina*, Fleming.

The sea otter exists, but not very plentifully, on the coast of Tierra del Fuego; we saw very few. The Fuegian Indians hunt them with dogs which are trained for the purpose.—Museum Zool. Soc.

3. Canis.

The dogs belonging to the Fuegian Indians are certainly of the domesticated kind, originally obtained, probably, from the Spanish settlements at Buenos Ayres; generally they resemble the Esquimaux breed, but are much more diminutive in size.

4. Canis Vulpes.

Two if not three distinct species of the fox were brought home; one, of a small size, was thought to be a novelty; the other, perhaps, was only remarkable for its large size. Mr. Vigors thought the small one was quite new; the last is perhaps *C. cinereo argenteus*. —Museum of Zool. Soc.

5. Felis puma.

Several were seen: a skeleton was found on the shores of the Strait, supposed to be one of the above species.

* Or *Mephitis Americana?*

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6. Felis pajeros.—Desm. E. M. p. 231.

Chat pampa, D'Azara, 1. 179.

A variety of this species was given to me, by the Patagonian Indians, that had been recently killed; the skin was preserved, and is now in the museum of the Zoological Society. The following is the description of my specimen:—

The prevailing colour is a yellowish grey, deeper above, and gradually blending into the colour of the belly, chin, neck, inner part of the legs, the region of the anus, and below the root of the tail, which are white; the under part of the neck and belly also are spotted with black, disposed in transverse bands; the fore arms have three similar transverse bands, and the thighs four encircling the legs; ears white inside and tipped black; eyes dark blue, eyelids whitish, corner of the eyes black, particularly at the anterior or inner angle; claws whitish, and paws black; whiskers white, and some long white hairs over the eyes; the canine teeth are very acute, and have the longitudinal grooves or angles deeply marked.

	Inches.
Length of the body from the extremity of the nose to the root of the tail	29
Length of tail	$11\frac{3}{4}$
Ditto head	6
Breadth of head between the ears	$2\frac{7}{8}$
Height at the shoulder	12

7. Otaria jubata.—Desm. E. M. No. 380.

The sea lion of Anson and other voyagers; numerous in the eastern entrance of the Strait, and particularly at Port San Julian and the neighbourhood of Port Desire.

8. Otaria flavescens.—Desm: E. M. 250.

A young male was found on the beach, near Port Famine, that had been recently wounded by the Indians, and had crawled on shore to die.

9. Ctenomys Magellanicus. n. s.—Bennet.

This little animal possesses fur as soft as the chinchilla. It abounds in the neighbourhood of Cape Gregory, at the eastern entrance of the Strait of Magalhaens, and burrows under the

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ground, which is so much undermined by them that it gives way at almost every step. It is a timid little fellow, feeds upon grass, and is eaten by the Patagonian Indians.—See Bennet in the Proceedings of the Zool. Soc. Dec. 22, 1835. A specimen is preserved in the Museum.

10. KERODA KINGII. n. s.

See Bennet ut supra, in Museum of Zool. Soc.

11. CAVIA CUTLERI, n. s. nob.—See Bennet ut supra.

This specimen is in the collection of the Society. It was known in the voyage by the name of the Peruvian cavy: it was presented to one of the officers of the Beagle by an American sailing master, Mr. Cutler, of Stonington, U.S., a very intelligent person, to whom we are much indebted for information. The name which I have proposed for it is in recollection of the benefit we derived from his experience and knowledge of the intricate navigation of the south-western coast of Patagonia, which was freely imparted to us on several occasions.—See Bennet in Proceedings of Zool. Soc. ut supra.

12. DASYPROCTA PATACHONICA.—Desm. E. M. 358.

I regret very much that the only specimen obtained was not preserved. Desmaret seems to suspect that it differs sufficiently in its dentition from the agouti to constitute a new genus, for which he has proposed the name *Dolichotis*.—See E. M. 359.

13. DASYPUS MINUTUS.—Desm.

Procured at Port Sta Elena, and corresponds exactly with the description of the above species. It is the Tatou pichiy, or Tatou septième of D'Azara.

14. AUCHENIA GLAMA.—Desm. E. M. 655.

A living female guanaco was brought home in the Adventure, and placed in the garden of the Zoological Society. The guanaco inhabits Patagonia from Buenos Ayres to the Strait of Magalhaens: we also found it on King Charles Foreland, the eastern island of Tierra del Fuego, and on Navarin Island, at the north side of Nassau Bay, in the vicinity of Cape Horn.

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BIRDS.

1. Sarcoramphus Gryphus.—Dumerel. The Condor.
Vultur Gryphus.—Lin.

2. Cathartes Iota.—Chilian Eagle.

3. Polyborus vulgaris.—*Falco Brasiliensis.* Latham.
Caraçara Eagle.
Strait of Magalhaens.

4. Miloago ochrocephala.—Spix. Young birds.
Strait of Magalhaens.

5. Haliætus erythronotus.—Nob. in Zool. Journal, iii. 424.

Hal. capite alisque fusco-griseis; dorso scapularibusque rufis, corpore caudáque subtus albis, fasciis fuscis gracilibus leviter notatis, hâc fasciâ latâ prope apicem nigrâ.

The total length of the bird from the *apex* of the bill to the extremity of the tail is 2 feet; of the bill from the *rictus* to the *apex* 2 inches; from the cere 1 inch; of the wing, from the end of the carpal joint to the end of the third quill feather, 18 inches; of the tail 10½ inches; of the *tarsus* three inches.
Strait of Magalhaens.

6. Falco sparoerius.—Latham.
Strait of Magalhaens.

7. Falco peregrinus?
Strait of Magalhaens.

8. Polyborus Brasiliensis.
Polyborus Novæ Zealandiæ.
Falco Novæ Zealandiæ of Latham.

9. Circus histrionicus.—Nob. in Zool. Journal, iii. 425.
Falco histrionicus, Quoy and Gaimard.

Circo cineraceus uropygio corporeque subtus albis: hoc fasciis frequentibus rufis notato.

The length from the *apex* of the bill to that of the tail is 18

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inches; bill 1 inch; wing, from the carpal joint to the end of the third quill feather, 13½ inches; tail 9 inches; *tarsus* 2½ inches.

Strait of Magalhaens.

10. STRIX RUFIPES.—Nob. in Zool. Journ., iii. 426.

Str. saturate brunnea, albido fulvoque maculata fasciataque femorum tarsorumque plumis rufis.

The total length is 15½ inches; that of the bill 1 inch; of the wing, from the *carpus* to the end of the fourth quill feather, 11 inches; of the tail 7½ inches; of the *tarsi* 2⅜.

11. STRIX NANA.—Nob. in Zoological Journal iii. 427.

Str. fusco brunnea, fronte nuchâ alisque albo-notatis, gulâ albâ, caudâ fasciis frequentibus rufis notatâ.

The total length is 5⅘ inches; of the bill ½ inch; of the wing, from the *carpal* joint to the extremity of the fourth quill feather, 3¾ inches; of the tail 2¾ inches; of the *tarsi* ⅞.

N.B.—Three other species of this genus *Spix* are in the collection which appear to be new.

12. HIRUNDO.—Sp.*

13. HIRUNDO.—Sp.*

14. HIRUNDO.—Sp.*

* Three distinct species of swallow, very much resembling the British species,—Hir. *rustica, urbica*, and *riparia*.

Strait of Magalhaens.

15. TURDUS MAGELLANICUS.—Nob. in Proceedings of Zool. Soc.

Turd. corpore supra grisescenti olivaceo, subtus pallidè rufescenti, capite supra, remigibus, caudâque fusco-atris gulâ-alba, fusco-atro lineatâ.

Strait of Magalhaens.

16. SYNALLAXIS ANTHOIDES.—Nob. in Proceedings of Zool. Soc.

Syn. supra brunnea plumis in medio fusco latè striatis, tectricibus alarum superioribus rufo tinctis subtus pallidè cinerea; rectricibus lateralibus ad marginem externum, fasciâque alarum, rufis. Statura. Syn. Spinicaudæ.

Strait of Magalhaens.

17. SILVIA SPINICAUDÆ.—Latham.

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18. SILVIA DORSALIS.—Nob. in Zool. Journ. iii. 428.

Syl. nigra, dorso scapularibusque rufis, remigibus rectricibusque fuscis.

The length from the end of the bill to that of the tail is $4\frac{1}{2}$ inches.

19. SILVIA OBSCURA.—Nob. in Zool. Journ. iii. 429.

Syl. corpore unicolore fusco-nigro, alis brevibus rotundatis caudâ brevi, pedibus elongatis, fortibus pallidis.

The length from the *apex* of the bill to that of the tail is $4\frac{1}{4}$ inches; of the wing, from the carpal joint to the end of the fourth quill feather, $1\frac{7}{8}$; of the tail $1\frac{1}{4}$; of the *tarsi* $\frac{3}{4}$.

20. TROGLODYTES. Fursa, Veillot.

21. FRINGILLA.—(Several species, probably new.)

22. STURNUS MILITARIS.—Lin.
MOTACILLA PATACHONICA.—Lin.
Patagonian warbler of Dixon's voyage.

23. STURNUS.—Sp. (black)? Leistes sp. Vigors.

24. DENDROCOLAPTES ALBO-GULARIS.
Nob. in Proceedings of Zool. Soc.

Dend. corpore supra, abdominisque lateribus, rufo brunneis; remigibus secundariis, dorso imo, caudâque rufis; mandibulâ inferiori ad basim, gulâ, jugulo, pectore, abdomineque medio, albis, hujus plumis brunneo ad apicem marginatis; rostro sursum recurvo.

Length $6\frac{4}{10}$ inches.—Strait of Magalhaens.

25. PSITTACUS SMARAGDIMIS.—Gmel.

26. PSITTACARA LEPTORHYNCA.
Nob. in Proceedings of Zool. Soc.

Psitt. viridis: fronte, strigâ per oculos, caudâque rufis: capite nigro, abdomine imo rufo, variegatis; mandibulâ superiori elongatâ, gracillimâ.

Staturâ.—*Psitt. Lichtensteinii æqualis.*
Habitat in insulâ Chiloe.

27. PICUS MAGELLANICUS.—Nob. in Zool. Journ. iii. 430.

Pic. niger, capite cristato colloque coccineis, remigibus albo notatis.
Fœm. *Capite cristato nigro, fronte mentoque coccineis.*

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The length of the bird from the tip of the bill to the extremity of the tail is 17 inches; of the bill $2\frac{1}{2}$; of the wing, from the carpal joint to the fourth quill feather, $8\frac{3}{4}$; of the tail $7\frac{1}{2}$; of the *tarsi* $1\frac{1}{8}$; of the external hind toe, the nail included, 2.

Strait of Magalhaens.

28. Picus melanocephalus.—Nob. in Proceedings of Zool. Soc.

Pic. capite corporeque supra nigris, hoc albo maculato; pectore abdomineque albis, illo albo lineato, hoc albo fasciato.

Length 6 or 7 inches.—Strait of Magalhaens and Chiloe.

29. Mellisuga Kingii.—Vigors in Zool. Journal, iii. 432.

Ornismya sephanoides.—Lesson et Garn.

Mell. supra metallicè viridis, infra alba viridi variegata, vertice splendide rubeo, rectricibus acuminatis.

This bird was found in the Strait of Magalhaens, so late in the year as the month of May, when it was seen flying in a snow-squall. It seemed regardless of the cold, and so long as the *fuchsia* and *veronica* were in blossom, so long did this hitherto supposed to be delicate little bird, remain to cull their sweets, or rather to prey upon the insects which buried themselves in the flowers; for, innocent as it seems, it is insectivorous. The bird was long known to naturalists, but was not described until November 1827, when Mr. Vigors described it, from a specimen transmitted by me to the Museum of the Zoological Society. It was found by MM. Lesson and Garnot, on the coast of Chile, where we also subsequently found it. M. Lesson described it in his useful little Manuel d'Ornithologie, ii. p. 80, as above, and has given a detailed account. Had not Mr. Vigors previously described it, I should have had pleasure in referring it to their description, and their excellent plate, in Lesson's Monograph upon the Trochilidæ.

30. Trochilus Fernandensis.—Nob. in Proceedings Zool. Soc.

Troch. ferrugineo-rufus; capitis vertice splendenti-coccineo; remigibus fuscis.

Length, 5 inches.

Island of Juan Fernandez, South Pacific.

31. Trochilus Stokesii.—Nob. in Proceedings of Zool. Soc.

Troch. corpore supra viridi-splendente, subtus albo viridi-guttato; capite supra, guttisque confertis gulæ lazulino-splendentibus;

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remigibus fusco-atris ; remigum omnium, mediis exceptis, pogoniis internis albis.

Length 5 inches.

Island of Juan Fernandez.

HYLACTES.—*Novum genus. Megapodio affine.*

Characteres Generici.

Rostrum subelongatum, subtenue, apice subemarginato: naribus basalibus, longitudinalibus, membraná subtumescenti pilisque per mediam longitudinem tectâ.

Alæ, brevissimæ, rotundatæ ; remige 5ta longissimâ.

Cauda, subelongata, gradata.

Pedes, fortes : tarsis subelongatis, in fronte scutellatis ; digitis unguibusque elongatis, hic fortioribus subcompressis ; halluce fortissimo, incumbente.

This genus appears to have some resemblance to MM. Quoy and Gaimard's genus *Megapodius :* but no specimen of it being in this country, and my bird differing in essential points from its generic characters, particularly in the length and form of the wings, which in my bird are rounded, and so short as not to reach beyond the base of the tail, I have formed it into a new genus, for which the term Hylactes (from its note, which very much resembles the sharp bark of a dog) has been selected.

32. HYLACTES TARNII.—Nob. in Proceedings of Zool. Soc.

Hyl. saturate fusco-brunneus ; fronte, dorso, abdomineque rufis, hoc fusco fasciato.

At Chiloé and Port Otway, in the Gulf of Peñas.

The specific name I have selected is in compliment to Mr. John Tarn, surgeon of the Adventure, to whose attention, in procuring and preserving numerous specimens in ornithology, I am greatly indebted.

33. STRUTHEO RHEA.—Lin. (223.)

The American ostrich. Maldonado.

34. COLUMBA FITZ ROYII.—Nob. in Proceedings of Zool. Soc.

Col. rinacea ; alis, dorso imo, caudâque plumbeis, hujus fasciâ remigibusque atris : nuchæ plumis viridi-splendentibus ; fascia occipitali albâ.

In the woods of Chiloé.

Dedicated to Captain Robert Fitz Roy, who succeeded to the command of H.M.S. Beagle upon the death of Captain Stokes.

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35. COLUMBA MERIDIONALIS.—Nob. in Zool. Journal, iv. 92.

Col. brunnescenti-plumbea, subtus rufescens; colli lateribus purpureo nitore splendentibus, genis pennisque secundariis nigro maculatis, rectricibus apice griseo fasciâque sub-apicali nigrâ.

Length, 9½ inches.

36. ARDEA.—Sp. One of the night bitterns.

37. ARDEA MAJOR.—Bonat., E. M. 1148.

Port Otway, Gulf of Peñas.

38. IBIS MELANOPIS.—Bonat., E. M. 1148.

Port San Julian.

In the Ency. Méth. the length of the bird is stated to be 21 inches, but in the Dict. d'Histoire Naturelle 27 inches is given, which is correct.

39. TOTAMUS FUSCUS?

40. SCOLOPAX MAGELLANICUS.—Nob. in Zool. Jour. iv. 93.

Scol. supra brunneus, rufo fulvo nigroque maculatus undulatusque; abdomine medio albo; pectore brunneo rufoque sparso; tarsis brevibus.

The length of the bird from the front to the end of the tail is 8½ inches; of the beak 2½; of the wing, from the carpal joint to the end of the quill feather, 5; of the tail 2½; and of the *tarsi* $1\frac{1}{16}$.

Strait of Magalhaens.

41. RHYNCHÆA OCCIDENTALIS.—Nob. in Zool. Jour. iv. 94.

Rhync. supra brunnea, capite summo pectore alisque saturatioribus, fulvo undulata strigataque; abdomine, maculâ utrinque pectorali, maculisque alarum, albis, stringâ frontali brunneâ.

The length of the bird from the forehead to the end of the tail is seven inches; of the bill $1\frac{3}{8}$; of the wing from the carpal joint to the extremity of the first quill feather, 4¼; of the *tarsus* $1\frac{5}{16}$; of the tail 1¾.

Strait of Magalhaens.

This bird may be considered as one of the most interesting acquisitions made in our voyage. The singular and strongly marked genus has been hitherto considered peculiar to the Old World; and two species only having been discovered, an additional species from the New World is an important accession to science. The form of our Magellanic bird accords accurately with that of the Old World species, the bill being distinguished chiefly by its infe-

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rior length. The general appearance of the plumage also is similar, although it possesses sufficiently distinctive characters to authorize this species being separated from the other.

42. Rallus Setosus.—Nob. in Zool. Journ. iv. 94.

Rall. supra brunneus, dorso alisque nigro notatis, subtas plumbeus; remigibus primariis rectricibusque fuscis, his saturatioribus; fronte setoso.

The length of the bird from the forehead to the extremity of the tail is 10 inches; of the bill $1\frac{5}{16}$; of the wing, from the carpal joint to the end of the second quill feather, $4\frac{7}{8}$; of the tail 3; of the *tarsus* $1\frac{5}{8}$.

43. Rallus antarcticus. Nob. in Zool. Jour. iv. 95.

Rall. supra brunneus, nigro strigatus; subtus plumbeus, femorum tectricibus crissoque atris, albo-fasciatis.

The length of the body is $7\frac{1}{2}$ inches; of the bill $1\frac{1}{4}$; of the wing, from the carpal joint to the end of the second quill feather, $3\frac{3}{4}$; of the tail, $1\frac{3}{4}$; of the *tarsus* $1\frac{5}{16}$.

44. Fulica chloropoïdes.—Nob. in Zool. Journ. iv. 95.

Ful. capite, coll. superiore, caudâque atris; corpore reliquo atro-fusco, crisso albo.

The length of the body is 15 inches; of the bill $1\frac{1}{4}$; of the wing, from the carpal joint to the extremity of the second quill feather, $6\frac{1}{2}$; of the tail 3; of the *tarsi* 2.

45. Fulica gallinuloïdes.—Nob. in Zool. Jour. iv. 96.

Ful. atro-fusca; dorso saturatiore, capite atro, gulâ albo-notatâ crisso albo, rostro angusto, in frontem parum extendente.

44. Chionis alba.—Forster.

Seen at Cape Horn, and at sea, four hundred miles from the nearest land. Captain Foster, of H.M.S. Chanticleer, saw some at South Shetland.

47. Hœmatgpus palliatus.—Temminck.

Strait of Magalhaens.

48. Hœmatopus leucopus.—Gam.

Strait of Magalhaens.

The above two species of Hœmatopus were frequently seen on

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the shores of the Strait; the latter appears to answer the description of M. Bougainville. See Lesson, Manuel d'Ornithologie, ii. 30.

49. CHARADRIUS PLUVIALIS.—Var.

Not to be distinguished from the golden plover.

50. CHARADRIUS RUBECOLA.—Nob. in Zool. Jour. iv. 96.

Char. capite summo, dorso, alis, caudâque supra grisescenti-fuscis, thorace nuchâque pallide griseis; pectore rufo, collari subpectorali nigro; fronte, striga superciliari, abdomine, crisso, rectricibusque lateralibus albis.

The length of the body is $8\frac{2}{3}$ inches; of the bill $\frac{3}{4}$; of the wing, from the carpal joint to the end of the first quill feather, $5\frac{5}{8}$; of the tail 3; of the *tarsi* $1\frac{1}{4}$.

Mountains of the Strait of Magalhaens 2,000 feet above the level of the sea.

51. VANELLUS CAYANENSIS.—Ency. Méth. 1073. pl. 57, fig. 2.

Maldonado, River Plate.

52. PODICEPS.—Sp.

Very much resembling P. minor.

53. PODICEPS.—Sp.

54. PODICEPS LEUCOPTERUS.—Nob. in Zool. Jour. iv. 101.

Pod. capite colloque superioribus nigris, gulâ grisco-albidâ, collo inferiore rufo; dorso fusco-atro; abdomine strigâque latâ alarum albis.

The length of the body is 20 inches; of the bill 3; of the wing, from the carpal joint to the *apex* of the second quill feather, $7\frac{1}{4}$; of the *tarsi* 2.

55. APTENODYTES MAGELLANICA.—E. Méth.

56. APTENODYTES CHRYSOCOME. ?—A young bird.

57. PHALACROCORAX NIGER.—Nob. in Zool. Journal, iv. 101.

Phal. intensè niger, circulo angusto ab oculis descendente, mandibulasque circumcingente, paucisque genarum capitisque plumis albis.

The length of the bird is 31 inches; of the bill $3\frac{3}{8}$; of the wing, from the carpal joint to the extremity of the third quill fea-

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ther, 11; of the tail $7\frac{1}{2}$; of the *tarsi* 2. The irides a bright blue green; the pupils black.

This bird is probably D'Azara's black Zaramagullon (No. 432 of his Birds of Paraguay), but it has not hitherto been described.

58. PHALACROCORAX ATRICEPS.—Nob. in Zool. Journal, iv. 102.

Phal. capite supra corporeque superiore atris, inferiore albo; rostro pedibusque flavescentibus, rectricibus duodecim.

The dimensions are nearly the same as those of the last bird, except those of the bill, which is a quarter of an inch longer.

59. PHALACROCORAX CIRRIGER.

Phal. supra fusco-griseus, subtus albidus; gulâ, cirroque longitudinali per collum utrinque descendente, albis; rostro pedibusque rubris; rectricibus quatuordecim.

The length of the body is 26 inches; of the bill $3\frac{3}{16}$; of the wing, from the carpal joint to the extremity of third quill feather, 10; of the tail 6; of the *tarsi* $1\frac{3}{4}$.

60. PHALACROCORAX IMPERIALIS.—Nob. in Proceedings of Zoological Society.

Phal. capite cristato, collo posteriori, corporeque supra intense purpureis; alis scapularibusque viridi atris; remigibus rectricibusque duodecim fusco-atris; corpore subtus, fasciâ alarum, maculâque dorsi medii sericeo-albis; rostro nigro; pedibus flavescentibus.

Statura.—Phal. carbonis.

Hab.—Interior Sounds of Western Patagonia.

61. PHALACROCORAX SARMIENTONUS.

Phal. capite, collo, dorsoque imo atro-purpureis; pectore abdomineque albis; dorso superiori, scapularibus, alisque viridi-atris; remigibus rectricibusque duodecim atris; gulâ, genis, femorumque tectricibus superioribus albo-notatis; rostro nigro; pedibus flavescentibus.

Staturâ præcedentis.

Strait of Magalhaens.

62. PHALACROCORAX ERYTHROPS.—Nob. in Proceedings of Zoological Society.

Phal. capite, collo, corporeque supra purpureo-atris; pectore abdomeneque albis; genis pariè albo-notatis; facie nudâ rubrâ;

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remigibus, rectricibus duodecim, rostroque sub-brevi atris: pedibus flavescentibus.

Staturâ paulo minor præcedentibus duobus.

63. LARUS HÆMATORHYNCHUS.—Nob. in Zool. Journ. iv. 103.

Lar. corpore plumbeo-griseo, dorso medio alisque nigris, his albo notatis; rostro pedibusque sanguineis.

The length of the bird is 18 inches; of the bill 2; of the wing, from the carpal joint to the end of the first quill feather, 13; of the tail 6; of the *tarsi* 2. Irides green silvery colour, pupil dark.

64. LARUS FUSCUS?

65. LARUS RIDIBUNDUS?

66. LESTRIS CATARRHOCTES?

67. PROCELLARIA GIGANTEA. A young bird.

68. PROCELLARIA CAPENSIS.

This beautiful, but well-known petrel, was, of course, our constant companion on all occasions of our being at sea, and was particularly numerous off the entrance to the river Plata, feeding probably upon the exuviæ that drift out with the current. One being taken with the hook, was killed, and in its entrails several small fragments of granite were found mixed with the half-digested food. A remarkable instance of the natural habits of this bird has lately come to my knowledge, which deserves to be recorded. The late Mr. George Fairfowl, surgeon R.N., on his return from New South Wales, in the year 1831, caught one of these birds, and let it go, with a ribbon tied round the body, by which it was easily distinguished; the bird was thereby observed to follow the ship, from day to day, for the space of 5,000 miles.

69. PROCELLARIA BERARDI.

70. PROCELLARIA WILSONII.—Prince of Musignano.
Thalassidroma Wilsonnii—Vigors.

71. DIOMEDEA EXULANS.

72. CYGNUS ANATOÏDES.

Cygn. albus, remigibus primariis ad apicem nigris; rostro pedibusque rubris, illo lato, subdepresso, tuberculo nullo.

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Interior Sounds on the west coast of Patagonia.

Molina describes a Chilian duck, *anas coscoroba*, thus: *A. rostro extremo dilatato rotundato; corpore albo;* but I do not think it can be the same as mine, or he would have noticed its red feet and bill. It certainly is not *A. candidus*, of Viellot; the *ganso blanco* of D'Azara, which the author of the article in the Dict. d'Hist. Nat. xxiii. supposes to be the one and the same with *A. coscoroba*. Molina gives but a short description of that bird.

73. Anser inornatus.—Nob. in Proceedings of Zool. Society.

Mas. Ans. albus: dorso inferiori, caudâ, fasciis nuchæ dorsique superioris femorumque tectricum, pteromatibus, remigibusque atris: rostro nigro, pedibus flavescentibus. Fœm. *Capite colloque canis; dorso superiori corporeque inferiori albis, nigro confertim fasciatis; dorso imo remigibus, rectricibusque nigris; ptilis speculoque albis; tarsis subelongatis.*

Strait of Magalhaens.

74. Micropterus brachypterus.—Quoy and Gaimard. Zool. de l'Uranie, pl. 39.

Oidemia patachonica.—Nob. Zool. Journal, iv. 100.

Anas brachyptera.—Latham.

Racehorse.—Cook.—Byron.

Micropt. supra plumbeo-grisescens, abdomine albescente speculo alarum albo; rostro luteo; ungue nigro.

75. Micropterus Patachonicus.—Nob. in Proceedings of Zool. Soc.

Micropt. supra plumbeo grisescens; gulâ scapularibusque rufescentibus; abdomine speculoque alarum albis; rostro virescenti-nigro, ungue nigro.

Smaller than *M. brachypterus.*

This bird having a smaller body than the first, is enabled to fly; which with the scapulars and the feathers of the throat being of a redder hue than those of *M. Brachypterus*, authorizes its being considered as specifically new.

76. Anas nigricollis.—Ind. Orn. ii. 834.

This bird has a wide range on the South American continent It frequents the River Plata, Strait of Magalhaens, and several parts of the Western Coast, as far up as Chiloe.

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77. ANAS CHILOENSIS.—Nob. in Proceedings of Zool. Society.

An. fronte, genis, abdomine, uropygio, pteromatibusque albis; capite posteriori, collo, dorso inferiori, ptilis, remigibusque primariis, caudâque fuscis; dorso superiori, pectoreque fusco et albo fasciatis; remigibus secundariis et tertiis scapularibusque nitidè atris, his albo lineatis; abdominis lateribus crissoque rufescentibus; strigâ post oculos, latâ splendidè purpurascenti-viride.

Length about 16 inches. Island of Chiloé.

78. ANAS FRETENSIS.—Nob. in Proceedings of Zool. Soc.

An. gulâ, genis, collo, pectore, dorsoque anteriori pallidè badiis; collo graciliter undulato; pectore dorsoque anteriori atro maculato; dorso abdomineque imis, crisso, caudâque albis nigro fasciatis; dorsi fasciis latis, abdominis gracillimus, caudæ sublatioribus, crissi sparsim undulatis; capite supra, remigibus, scapularibusque virescenti-atris; his albo in medio lineatis; tectricibus plumbeo-canis, fasciâ apicali albâ; speculo supra viridi, deinde purpureo, fasciâ atrâ apice albo terminatâ.

Statura Anatis creccoidis, Nob.

Strait of Magalhaens.

79. ANAS RAFFLESII.—Nob. in Zool. Jour. iv. 97.

An. castaneo-rufa, capite abdomineque medio saturatiorbus; notis dorsi, remigibus, caudâ supra, crissoque nigris; ptilis cæruleis, pteromatibus albis, speculo alarum viridi.

A figure of the bird is given in the supplementary plates of the Zool. Jour. Supp. XXIX.

Length, 20 inches.

Strait of Magalhaens, and Western coast to Chiloé.

This beautiful bird bears the name of the late Sir J. Stamford Raffles, to whose exertions the science of Zoology is under no trifling obligation.

80. ANAS SPECULARIS.—Nob. in Zool. Jour. iv. 98.

An. capite summo, dorso, alis, caudâque nigris: subtus pallidè griseus, pectore brunneo undulato: speculo lato purpurascenti-aureo splendente, fasciâ atrâ alteráque albâ marginato: maculâ utrinque suboculari, mento, thoraceque albis.

The length of the bird is 26 inches; of the bill $2\frac{3}{8}$; of the wing,

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from the carpal joint to the extremity of the second quill feather, 11 ; of the tail 6 ; of the *tarsi* $2\frac{1}{4}$.

81. ANAS SPECULARIOIDES.—Nob. in Zool. Jour. iv. 98.

An. capite summo corporeque supra fuscis: subtùs pallidè griseus, pectore rufo-brunneo fasciato: remigibus, crisso, rectricibusque atris: speculo subangusto purpurascenti-aureo splendente, fasciâ atrâ, alteráque apicali albâ.

The length of the bird is 24 inches ; of the bill $2\frac{1}{8}$; of the wing, from the carpal joint to the extremity of the second quill feather, $10\frac{1}{2}$; of the tail 6 ; of the *tarsus* $1\frac{1}{2}$.

Strait of Magalhaens.

This is the common duck in the vicinity of Port Famine, and in the winter months is excellent eating.

82. ANAS CRECCOIDES.—Nob. in Zool. Jour. iv. 99.

An. pallidè brunneo-griseus, fusco sparsus notatusque ; dorso imo, ptilisque fuscis, his apice rufo ; speculo nigro, fulvo marginato.

The length of the bird is $16\frac{1}{2}$ inches ; of the bill $1\frac{3}{4}$; of the wing, from the carpal joint to the extremity of the second quill feather, $8\frac{3}{16}$; of the tail $4\frac{3}{8}$; of the *tarsus* $1\frac{1}{4}$.

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SHELLS.

Description of the CIRRHIPEDA, CONCHIFERA, and MOLLUSCA, in a Collection formed by the Officers of H.M.S. Adventure and Beagle, employed between the years 1826 and 1830 in surveying the Southern Coasts of South America, including the Strait of Magalhaens and the coast of Tierra del Fuego. By Captain Phillip P. King, R.N., F.R.S., &c., assisted by W. J. Broderip, Esq., F.R.S., &c. (From the Zoological Journal.)

The testacea, of which the following paper is a descriptive list, were principally collected upon the coast of South America; and, upon my arrival in England, were submitted to the examination of Mr. George Sowerby; who very obligingly selected the undescribed species from the collection which had been formed under my superintendence by the Officers of H.M.S. Adventure and Beagle, employed under my command in surveying the southern coast of South America.

To these gentlemen I am greatly indebted for the unwearied assiduity which they at all times displayed, and for the extent of the collection in this, as well as in other departments of Natural History.

In the description of the species I have had the benefit of the advice and assistance of my friend Mr. Broderip; and to his knowledge of the subject, and the attention which he has devoted to my collection, I owe in a great measure the paper which I have now the satisfaction of presenting to the public through the medium of the Zoological Journal.

Upon examining my specimens, Mr. George Sowerby found that he possessed several species not in my collection. These had been obtained during the voyage, and had been purchased from some of the crew by Mr. Sowerby, who handsomely put his acquisitions into my hands for description.

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1. BALANUS PSITTACUS.

Syn. Lepas Psittacus. Molina, 1., 223.

B. testâ albido-rosaceâ, subconicâ, elongatâ, rudi, longitudinaliter creberrimè striatâ; radiis transversim striatis; operculo transversim

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profundè sulcato, lineis elevatis creberrimè plicatis ; valvis posticis valdè productis, acuminatis.

Habitat ad oras Concepçionis et insulam Chiloé. *Mus. Brit., nost., Broderip, &c.*

This cirrhiped which, at Concepçion de Chile, is frequently found of a larger size than 5½ inches long and 3½ in diameter, forms a very common and highly esteemed food of the natives, by whom it is called *Pico*, from the acuminated processes of the two posterior opercular valves. The anterior and posterior opercular valves, when in contact, present some resemblance to a parrot's beak, whence Molina's name. It is also found very abundantly at Valdivia and at Calbuco, near the north end of the island of Chiloé. It occurs in large bunches, and presents somewhat of a cactus-like appearance. The parent is covered by its progeny, so that large branches are found composed of from fifty to one hundred distinct individuals, each of which becomes in its turn the foundation of another colony. One specimen in the possession of my friend W. J. Broderip, Esq., consists of a numerous group based on two large individuals. They are collected by being chopped off with a hatchet. At Concepçion, where they are found of larger size than to the southward, they are principally procured at the Island of Quiriquina, which lies across the entrance of the bay; whence they are exported in large quantities to Valparaiso and Santiago de Chile, where they are considered as a great delicacy, and indeed with some justice, for the flesh equals in richness and delicacy that of the crab, which, when boiled and eaten cold, it very much resembles.

2. Elminius Leachii.*

E. testâ albidâ, truncatâ, longitudinaliter striatâ, radiis creberrimè longitudinaliter substriatis ; operculo ad basin transversim striato, quadripartito ; long. ⅝ *; lat.* ⅜ *; poll.*

Habitat. In Museo Geo. Sowerby et nost.

3. Scalpellum papillosum.

S. pedunculo creberrimè papilloso ; testâ lævi valdè compressâ ; long. omnino 11/16 *;* 4/16 *pedunculi ; lat.* 5/16*, poll.*

* *Elminius Kingii*, Gray in Zool. Miscell. from a specimen collected during the voyage.—Ed.

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Habitat in mare alto circa oras Patagonicas. Mus. nost., G. Sowerby.

Taken by a dredge in 40 fathom water, off the coast of South America, in latitude 44½° south, and found adhering to a Terebella.

4. Pholas Chiloensis. Molina.

P. testâ elongatâ posticè ovato-rotundatâ, costis posticis dentato-muricatis; anticè attenuatâ striis transversis posticè undato-muricatis, anticè muticis; lat. 5 : *long.* 2 ; *poll.*

Habitat ad insulam Chiloei. Mus. Brit., nost., Brod., Stokes.

Some doubt has been thrown upon the existence of this shell, notwithstanding the description of Molina. A species very nearly approaching it, if not identical, was found at Rio de Janeiro ; but as only single valves were obtained, and these were in a very imperfect state, I have not ventured to characterise it.

The soft parts of *Pholas Chiloensis* are considered very delicate by the inhabitants of the Island of Chiloé, by whom the animal is called "*Co-mes.*" They are found in great abundance at low water imbedded in the rocks near Sandy Point, at San Carlos de Chiloé.

5. Solen scalprum.

S. testâ lineari subrectâ extremitatibus subrotundatis ; cardine bidentato; long. $\frac{13}{16}$; *lat.* $3\frac{1}{16}$; *poll.*

Habitat ad Patagoniæ oras Orientales (Sea Bear Bay). *Mus. nost.*

6. Anatina elliptica.

A. testâ ellipticâ, subtenui, transversim striatâ, anticè sub-truncatâ, epidermide fuscâ, tenui ; long. $1\frac{3}{8}$; *lat.* $2\frac{3}{8}$; *poll.*

Habitat ad oras Antarcticas (New South Shetland). *Mus. Brit., nost.*

This shell was found at New South Shetland, by Lieutenant Kendall, of his Majesty's sloop, Chanticleer, by whom it was presented to me.

7. Mactra edulis.

M. testâ subtrigonâ, tumidâ, sublævi, fulvo-squalidâ, intus albâ, dentibus lateralibus prominentibus ; long. 2 ; *lat.* $2\frac{4}{8}$; *poll.*

Habitat in freto Magellanico (Port Famine). *Mus. Brit., nost., Brod.*

This shell was found in great abundance on the flat of sandy mud, which fronts the west shore of Port Famine, and proved a

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valuable article of food to the ship's company, particularly during the winter months, when sea-birds and game were not to be procured, and the fish had deserted us. I have named it, in allusion to its affording us a grateful, as well as seasonable, supply of fresh food.

8. ERYCINA SOLENOIDES.

E. testâ subellipticâ, transversim creberrimè substriatâ, albidâ, epidermide fusco-griseâ; long. 1 *paulo minus; lat.* 2; *poll.*

Habitat in freto Magellanico (sandy mud flats of Port Famine). *Mus. Brit., nost., Brod.*

9. TELLINIDES ROSACEA.

T. testâ subtrigonâ, planulatâ, striis concentricis creberrimis; long. $\frac{6}{8}$; *lat.* $1\frac{5}{16}$; *poll.*

Habitat ad littora Brasiliæ (Santos). *Mus. nost.*

10. VENUS INFLATA.

V. testârotundatâ, concentricè substriatâ, albente, intus albâ, lunulâ obsoletâ; long. $1\frac{9}{16}$; *lat.* $1\frac{5}{8}$; *poll.*

Habitat in freto Magellanico (Port Famine). *Mus. nost.*

11. VENUS ANTIQUA.

V. testâ sub-ovali, convexiusculâ, creberrimè cancellatâ, sub-fuscâ, intus albidâ; lunulâ cordatâ; long. $2\frac{5}{8}$; *lat.* 3; *poll.*

Obs. in junioribus, striis transversis concentricis elevatis, acutis.

Habitat ad littora occidentalia Patagoniæ (Gulf of Peñas and its vicinity). *Mus. Brit., nost., Brod.*

12. ARCA ANGULATA.

A. testâ transversâ, subcordato-quadratâ, intus fusco-violascente; latere antico producto, elevato, undulatim lamellato, postico rotundato; umbonibus valdè remotis, areâ cardinali maximâ, striatâ; margine hiante; long. $1\frac{1}{8}$; *lat.* $1\frac{7}{8}$; *poll.*

Habitat ad Juan Fernandez. *Mus. nost.*

This shell was dredged up from 80 fathoms water in the offing of Cumberland Bay, at Juan Fernandez; it was attached to a branch of coral.

The hinge is broad and smooth, with distinct markings; the gape is rather wide, and the anterior part of the shell rises rather elegantly, like the stern of some Indian canoes, and in all the specimens but one, terminates in a point. The one above

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described has a rounded form; the bows or front being rather elegantly and finely lamellated in a wavy form; the colour of the hinge is red, and the inside is generally of a brownish purple; in some it has a more yellow tinge.

13. Arca pectinoides.

A. testâ auriculatâ, cordatâ, ventricosâ, multi-costatâ, transversim striatâ, albâ, epidermide rufo nigricante, pilosâ; umbonibus sub-approximatis, incurvatis, margine crenulato; long. 1; *lat.* $1\frac{9}{8}$; *poll.*

Habitat ad Rio de Janeiro. *Mus. Brit., nost., Brod.*

14. Nucula striata.

N. testâ striatâ, subtumidâ, crassâ, sub-trigonâ, albâ; latere antico productiori, sub-rostrato; long. $\frac{9}{32}$; *lat.* $\frac{3}{8}$; *poll.*

Habitat in mari alto circa oras Patagonicas. Mus. nost.

Taken by a dredge in 40 fathoms water, 20 miles from the coast of South America, in the neighbourhood of Port Sta Elena.

15. Modiola sinuosa.

M. testâ ventricosâ, subovatâ, longitudinaliter striatâ; intus irides-cente, margine sinuoso, epidermide fuscâ; long. $\frac{7}{16}$; *lat.* $\frac{14}{16}$ *fere; poll.*

Habitat ad littora Brasiliæ (Santos). *Mus. nost.*

16. Pecten Patachonicus.

P. testâ sub-æquivalvi, brunneâ, longitudinaliter creberrimè elevato-radiatâ; intus albidâ, longitudinaliter sub-radiatâ; long. $2\frac{4}{8}$; *lat.* $2\frac{4}{8}$; *poll.*

Obs. auribus inæqualibus.

Habitat in freto Magellanico passim. Mus. nost.

17. Pecten vitreus.

P. testâ subæquivalvi, translucente, longitudinaliter multi-sulcatâ; sulcis convexis flavidulis, valvâ inferiore pallidiori; long. $1\frac{9}{16}$; *lat.* $1\frac{4}{8}$; *poll.*

Obs. Auribus inæqualibus.

Habitat in freto Magellanico passim. Mus. nost.

This shell is found attached to the leaves of the *Fucus giganteus*, and, with other *Mollusca*, is the food of the Steamer or Race-horse Duck (*Micropterus brachyptera and M. Patachonica*).

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18. TEREBRATULA FLEXUOSA.

T. testâ rotundato-cordatâ, gibbâ, sub-fuscâ, longitudinaliter creberrimè sulcatâ; margine valdè flexuoso; long. $1\frac{3}{8}$; *lat.* $1\frac{4}{8}$ *paulo minus; poll.*

Habitat in freto Magellanico (Port Famine). *Mus. Brit., nost., Brod.*

This shell, which was dredged up from deep water in the bay of Port Famine, attached to stones, is not a common shell in the Strait.

19. TEREBRATULA SOWERBII.

T. testâ subrotundâ, planiusculâ, subfuscâ, longitudinaliter radiatim transversim substriatâ, medio supernè depressâ, infra convexâ, subglabrâ; margine utrinque crenulato, medio glabro; long. $1\frac{7}{16}$; *lat.* $\frac{7}{16}$ *paulo plus; alt.* $\frac{11}{16}$ *poll.*

Habitat in freto Magellanico. Mus. nost., Geo. Sowerby.

20. CHITON SETIGER.

C. testâ ovali, anticè subattenuatâ; valvis subdentatis, tenuiter concentricè striatis, anticâ 10-*radiatâ, posticâ lævi, parvulâ; areis lateralibus striis duabus elevatis marginalibus; ligamento marginali lævigato, setigero; long.* $2\frac{3}{8}$; *lat.* $1\frac{3}{8}$; *poll.*

Habitat ad oras insulæ Tierra del Fuego *et in freto Magellanico. Mus. Brit., nost., Brod.*

Shell ovate, rather attenuated towards the anterior end, generally of a light blue-green colour, variegated with markings of dark slate. Valves slightly beaked with minute concentric striæ, the lateral compartments with two marginal ridges, which in some specimens are granulose, in others smooth. The anterior valve has eight, besides two marginal, ridges of the same character; the posterior valve is very small and smooth. Border coriaceous, and set with bristles produced from three rows of tufts or pores. In some of the specimens in my possession the bristles are rubbed off.

The shell is found in all parts of the shores of Tierra del Fuego, particularly on its seaward coast, and the western parts of the Strait of Magalhaens.

21. CHITON BOWENII.

C. testâ oblongo-ovatâ, castaneo-rufâ; dorso elevato; valvis subdentatis, sublævibus concentricè tenuiter striatis; areis lateralibus radiatim sulcatis; ligamento marginali granuloso, nigro; long. $3\frac{2}{8}$; *lat.* $1\frac{1}{2}$; *poll.*

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Habitat ad oras insulæ Tierra del Fuego *et in freto Magellanico. Mus. Brit., nost., Brod.*

Shell oblong-ovate, and generally of a chestnut red, and the granulose ligament black; the colour of the younger specimens is more brilliant, and sometimes interspersed with yellow. Middle valves slightly toothed, and very delicately lineated, the lines forming an obtuse angle in the direction of the axis of the shell; the lateral compartments are marked with deeper striæa or grooves, radiating from the upper angle to the base, which, crossing the transverse markings of the valve, have a reticulated appearance: the anterior and posterior valves are radiated with fine lines.

This Chiton was discovered by Mr. Bowen, surgeon of the Beagle, by whom it was presented to me. The specimen was sent home among a collection of Natural History, transmitted in the year 1827.

22. Fissurella coarctata.

F. testâ ovatâ, anticè attenuatâ, elevatâ; radiis frequentibus elevatis; internè virescenti; foraminis margine externo juxta medium coarctato, subdentato; long $2\frac{5}{16}$; *lat.* $1\frac{13}{16}$; *alt.* $\frac{14}{16}$; *poll.*

Habitat ad Portum Praya. *Mus. Brit., nost.*

23. Helix translucens.

H. testâ subglobosâ, translucente, levissimè transversim striatâ; anfractu basali lineâ longitudinali castaneâ sub-mediâ ornato; long. $\frac{11}{32}$; *lat.* $\frac{9}{16}$; *poll.*

Habitat ad Rio de Janeiro, *Mus. Brit., nost., Brod.*

24. Helix pusio.

H. testâ rotundo-complanatâ, creberrimè striatâ, translucente, maculis castaneo-rufis ornatâ; long. $\frac{1}{16}$; *lat.* $\frac{3}{16}$; *poll.*

Habitat ad Juan Fernandez. *Mus. Brit., nost., Brod.*

25. Helicina sordida.

H. testâ globoso-conoideâ; anfractibus rotundatis longitudinaliter striatis; operculo castaneo; long. $\frac{8}{8}$ *paulo plus; lat* $\frac{5}{16}$ *paulo plus; poll.*

Habitat ad Rio de Janeiro. *Mus. Brit., nost.*

The colour of this shell is of a dirty yellowish white, with a slight tinge of diaphanous violet within the margin of the lip.

26. Pupa subdiaphana.—No. 194. MSS.

P. testâ cylindraceâ, albâ, subdiaphanâ, transversim creberrimè substriatâ; long. $\frac{4}{8}$ *paulo minus; lat.* $\frac{3}{16}$ *paulo minus; poll.*

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Habitat ad Portum Praya. (Cape Verd Islands.) *Mus. Brit., nost.*

27. Bulinus Gravesii.

B. testâ subventricosâ, longitudinaliter subrugosâ, sub-albidâ, fusco-maculatâ, spirâ longitudinaliter striatâ; long. $1\frac{1}{8}$; *lat.* $\frac{13}{16}$ *paulo minus; poll.*

Habitat ad Valparaiso. *Mus. nost.*

I have named the shell after my shipmate and friend, Lieutenant Thomas Graves, whose zeal and assiduity in assisting and increasing my collections of Natural History was as unwearied as the alacrity and ability which he displayed in the primary and more important objects of the voyage, of which, in his Majesty's ship Adventure, he filled the appointment of assistant surveyor. To Lieutenant Graves I am principally indebted for my land-shells, and I therefore take the opportunity of recording the valuable assistance he rendered me during the whole period of his serving under my command.

28. Bulinus Gravesii, var.

B. testâ subpyramidali, scabrâ, albidâ, aliquando lineolis raris; epidermide lutescente; long. $1\frac{9}{16}$; *lat.* $\frac{11}{16}$ *paulo plus. poll.*

Habitat ad Valparaiso. *Mus. Brit., nost., Brod.*

This is certainly a variety of No. 27, Bulinus Gravesii.

29. Bulinus dentatus.

B. testâ cylindraceâ, punctatâ, sub-diaphanâ, fusco maculatâ; aperturâ dentatâ, clausiliam mentiente; long. $\frac{15}{16}$; *lat.* $\frac{5}{16}$; *poll.*

Habitat ad oras Brasiliæ (St. Catherine). *Mus. Brit., nost.*

30. Bulinus lutescens.—No. 140. MSS.

B. testâ obovatâ, ventricosâ, subscabrâ, lutescente; long. $1\frac{1}{8}$; *lat.* $\frac{11}{16}$; *poll.*

Habitat ad Maldonado (Gorriti). *Mus. Brit., nost., Brod.*

31. Bulinus corrugatus.—No. 941 MSS.

B. testâ subalbidâ, transversim et longitudinaliter rugoso-striatâ, maculis fuscis, obsoletis; aperturâ purpurascente; columellâ nigricante purpureâ; long. $1\frac{6}{8}$ *paulo plus; lat.* $\frac{13}{16}$; *poll.*

Habitat ad Concepcion. *Mus. Brit., nost., Brod.*

The body-whorl of the older specimens of this shell is rather roughly striated or wrinkled, the last but one slightly so, and the remaining whorls are quite smooth. The colour is whitish, with

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purple spots more or less obsolete: the old specimens are sometimes of a dull yellowish white. A specimen is deposited in the British Museum.

The young shells of this species are of a whitish brown, with darker coloured *striæ*. They are very fragile and semi-transparent.

32. BULINUS SORDIDUS.—No. 803 MSS.

B. testâ pyramidali, transversim striatâ, fuscâ; anfractu basali ad suturam subalbido, lineâ subcentricâ pallidâ; labii vix reflexi margine albo; long. $1\frac{5}{16}$; *lat.* $\frac{7}{8}$ *poll.*

Habitat ad Brasiliam (Rio de Janeiro). *Mus. nost.*

33. BULINUS MULTICOLOR.*—No. 791 MSS.

B. testâ ovato-pyramidali, longitudinaliter et transversim creberrimè substriatâ, luteo-fuscâ maculis albis et purpureo-atris fucatâ; labio roseo subreflexo; columellâ subalbidâ, aperturâ intus subatro-purpureâ; long. $1\frac{5}{16}$; *lat.* $\frac{9}{16}$; *poll.*

Habitat ad Brasiliam. Mus. nost., Geo. Sowerby.

33.* BULINUS ROSACEUS.

B. testâ ovato-oblongâ, scabriusculâ; apice et anfractibus primis, rosaceis, cæteris viridi-fuscis; labro albo; suturis crenulatis seu plicatis; long. $2\frac{1}{8}$; *lat.* 1; *poll.*

Habitat ad oras Americæ meridionalis (Chile). *Mus. Brit., nost., Brod., Geo. Sowerby, &c.*

Soon after the return of the expedition, my friend Mr. Broderip, to whose inspection Lieutenant Graves had submitted his collection, observing symptoms of life in some of the shells of this species, took means for reviving the inhabitants from their dormant state, and succeeded. After they had protruded their bodies, they were placed upon some green leaves, which they fastened upon and ate greedily. These animals had been in this state for seventeen or eighteen months, and five months subsequently another was found alive in my collection, so that this last had been nearly two years

* Whilst this sheet was printing, the September number of the Annales des Sciences made its appearance in England, containing a description of the above shell by M. Sander Rang, accompanied by an excellent figure (Annales des Sciences Naturelles, September 1831, p. 55, pl. 3, f. 1). It is there named *Helix multicolor*. In my description I have considered it to be a *Bulinus*, but its specific name has been altered to that given to it by M. Rang.

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dormant. The shells were all sent to Mr. Loddige's nursery, where they lived for eight months, when they unfortunately all died within a few days of each other. Soon after the shells were first deposited at Mr. Loddige's, one got away, and escaped detection for several months, until it was at last discovered in a state of hybernation; it was removed to the place where the others were kept, when it died also. The upper surface of the animal when in health is variegated with ruddy spots and streaks on an ash-coloured ground.

34. PARTULA FLAVESCENS.

P. testâ subfusiformi, pallide flavâ, interdum castaneâ vel flavo et castaneo variâ; long. $\frac{1}{16}$; *lat.* $\frac{5}{16}$ *paulo plus; poll.*

Habitat ad oras Americæ meridionalis (Valparaiso). *Mus. Brit., nost., Brod.*

This shell varies in its colour almost as much as *Bulinus citrinus*.

35. ACHATINA DONELLII.—No. 413 MSS.

A. testâ subalbidâ, transversim substriatâ, anfractu basali ventricosâ; long. $\frac{7}{16}$ *paulo plus; lat.* $\frac{2}{8}$; *poll.*

Habitat ad Lima. *Must. nost.*

36. ACHATINA DIAPHANA.

A. testâ subcylindraceâ, diaphanâ, transversim striatâ; long. $\frac{5}{16}$; *lat.* $\frac{5}{32}$; *poll.*

Habitat ad insulam Juan Fernandez, *in montibus. Mus. Brit., nost., Brod.*

37. ACHATINA STRIGATA.—No. 462 MSS.

A. testâ diaphanâ, subalbidâ, creberrimè transversim substriatâ, strigis longitudinalibus castaneis raris; anfractu basali subangulato; long. $\frac{1}{16}$ *paulo plus; lat.* $\frac{6}{16}$ *paulo minus; poll.*

Habitat in paludibus Brasiliæ (Santo Paulo). *Mus. nost.*

38. ACHATINA SORDIDA.—No. 798 MSS.

A. testâ subdiaphanâ, subconicâ, anfractu basali ventricoso; long. $\frac{6}{8}$ *paulo plus; lat.* $\frac{3}{8}$ *paulo plus; poll.*

Habitat ad Brasiliam (Rio de Janeiro). *Mus. nost.*

39. ACHATINA SELLOVII.

A. testâ cylindraceâ transversim striatâ subdiaphanâ; long. $\frac{5}{16}$; *lat.* $\frac{2}{16}$; *poll.*

Habitat ad Brasiliam (St. Catherine). *Mus. Brit., nost., Brod.*

This shell, which I found at the city of Nossa Sen^{a}. de Estero,

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I have dedicated to my friend, Dr. Sellow, whose researches in Natural History for several years past in the interior of Brazil, are well known to the scientific world.

40. Succinea fragilis.

S. testâ ovato-acutâ, diaphanâ, ventricosâ, transversim striatâ, obliquè subrugosâ; spirâ brevi; long. $\frac{9}{16}$ *paulo minus; lat.* $\frac{6}{16}$; *poll.*

Habitat ad insulam Juan Fernandez. *Mus. Brit., nost., Brod.*

41. Succinea patula.

S. testâ diaphanâ, ovato-rotundatâ, ventricosissimâ, transversim creberrimè striatâ; spirâ brevissimâ; aperturâ patulâ; long. $\frac{4}{8}$ *paulo plus; lat.* $\frac{3}{8}$ *paulo plus; poll.*

Habitat ad insulam Juan Fernandez.

Marinula. *Nov. Genus.*

Character Genericus.

Testâ ovato-productâ, sub-solidâ; aperturâ ovatâ, integrâ; columellâ bidentatâ, et basin versus uniplicatâ; dentibus magnis subremotis conniventibus, superiore maximo; operculum nullum.

42. Marinula pepita.

M. testâ ovato-productâ, viridi-fuscâ; anfractibus sub-tumidis; spirâ brevi; aperturâ nigricante; dentibus plicâque albidis; long. $\frac{7}{16}$; *lat.* $\frac{4}{16}$; *poll.*

Habitat ad insulam Chilóe. *Mus. Brit., nost., Brod., G. Sowerby.*

This animal, which I have thought it necessary to assign to a new genus, appears to have for its nearest neighbours the genera *Auricula* and *Pedipes*. It was found on the wooden piles which support the mole in the Bay of San Carlos, in Chilóe, below the wash of the high water. The mole stands out into the sea, and there is no fresh water near it, save a very little rill, which discharges its tiny stream more than fifty yards off.

43. Lymnæa diaphana.—No. 349 MSS.

L. testâ turritâ, transversim substriatâ, anfractibus ventricosis; long. $\frac{11}{16}$; *paulo plus; lat.* $\frac{5}{16}$; *poll.*

Habitat ad fretum Magellanicum (Cape Gregory). *Mus. Brit., nost., Brod.*

This shell was found in the fresh-water ponds in the neighbourhood of Cape Gregory, which is on the continental side of the eastern end of the Strait of Magalhaens.

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44. AMPULLARIA CUMINGII.

A. testâ globosâ, transversim striatâ, subalbidâ, longitudinaliter castaneo-lineatâ et fasciatâ, epidermide virescente; umbilico parvo; lat. $1\frac{7}{16}$; *long.* $1\frac{6}{16}$; *poll.*

Habitat in Sinu Panamæ (island of Saboga, in a small hill-stream). *Mus. Brit. nost., Brod.*

From Mr. Cuming's collection. I have named this shell after Mr. Cuming, from whom I received it.

45. NATICA GLOBOSA.

N. testâ globosâ, tenui, ventricosissimâ, corneâ, vel subalbidâ, subtilissimè striatâ; spirâ brevi; umbilico parvo; operculo valdè tenui; long. $\frac{15}{16}$ *paulo plus; lat.* $\frac{7}{8}$; *poll.*

Habitat ad fretum Magellanicum (Cape Gregory). *Mus. Brit., nost., Brod.*

46. NATICA CASTANEA.

N. testâ ovato-acutâ castaneâ, albo-lineatâ; aperturâ mediocri; columellâ valdè callosâ; umbilico mediocri; long. $\frac{13}{16}$; *lat.* $\frac{21}{32}$; *poll.*

Habitat ad Brasiliæ oras, circa Santos. *Mus. nost.*

47. TURBO LUGUBRIS.

T. testâ nigricante, striatâ; aperturâ argenteâ; labri margine nigrâ, subcrenulatâ; operculo valdè lapidoso, albo; long. $2\frac{1}{8}$; *lat.* $2\frac{2}{8}$ *fere; poll.*

Habitat ad Sinum Peñas. *Mus. Brit., nost., Brod.*

48. ODONTIS SUBPLICATA.

O. testâ granuloso-striatâ, viridi-fuscâ, nigro maculatâ; umbilico mediocri; labri margine sub-plicato; long. $\frac{10}{16}$; *lat.* $\frac{13}{16}$ *paulo plus; poll.*

Habitat ad Brasiliam (Rio de Janeiro). *Mus. Brit., nost.*

49. LITTORINA FLAVA.

L. testâ longitudinaliter striatâ, sub-flavâ; spirâ brevi; anfractu basali ventricoso; columellæ purpurascentis margine et aperturâ sub-flavâ; operculo nigricante; long. $\frac{5}{8}$ *paulo plus; lat.* $\frac{7}{16}$ *poll.*

Habitat ad Brasiliam (Rio de Janeiro). *Mus. Brit., nost.*

In young shells there are a few obscure reddish brown streaks crossing the striæ.

50. LITTORINA PERDIX.

L. testâ striis elevatis balteatâ, albidâ, fusco-maculatâ, striis interstitialibus minus elevatis, ambabus sub-cancellatis; aperturâ albâ,

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labri margine tenui, castaneo-maculatâ; long. $\frac{13}{16}$; *lat.* $\frac{17}{32}$; *poll.*
Habitat? *Mus. nost.*

51. LITTORINA STRIATA.

L. testâ ovato-conicâ, fuscâ, striis elevatis scabrâ; spirâ brevi; anfractu basali tumido; aperturâ nigricante, basin versus strigâ luteo-albâ ornatâ; labri margine crenulato albo-fulvido; operculo nigro; long. $\frac{4}{8}$ *paulo plus; lat.* $\frac{7}{16}$ *ferè; poll.*
Habitat in Mari Atlantico boreali (Port Praya). *Mus. Brit., nost.*

52. MARGARITA FASCIATA, n. s.

M. testâ albidâ, creberrimè striatâ, purpureo fasciatâ, aperturâ argenteâ; long. $\frac{4}{16}$; *lat.* $\frac{5}{16}$ *ferè; poll.*
Habitat in Mari Pacifico. Mus. nost.
Portions of the striated surface are elevated into belts, which are of a purple colour.

53. MARGARITA VIOLACEA.

M. testâ sub-ovatâ, violaceâ, spirâ brevi; anfractibus tumidis; aperturâ iridescente; long. $\frac{7}{16}$; *lat.* $\frac{8}{16}$ *fere; poll.*
Habitat ad fretum Magellanicum. Mus. Brit., nost., Brod.
Of this shell the Indians make their necklaces; it is found adhering to the leaves of the *Fucus giganteus*, and is the principal food of the Steamer or Racehorse Duck (*Micropterus Patachonicus*, nob. in Proceedings of the Zoological Society, December 14, 1830, page 15).

54. MARGARITA CŒRULESCENS.

M. testâ sub-complanatâ, cæruleâ, striatâ, albido-lineatâ, aperturâ iridescente; lat. $\frac{13}{16}$ *ferè; long.* $\frac{15}{16}$; *poll.*
Habitat ad fretum Magellanicum (Cape Gregory). *Mus. Brit., nost., Brod.*

55. TURRITELLA TRICARINATA.

T. testâ turritâ, anfractibus tricarinatis; carinis nodulosis; long. $1\frac{5}{8}$; *lat.* $\frac{9}{16}$ *paulo minus; poll.*
Habitat ad oras Americæ meridionalis (Valparaiso). *Mus. Brit., nost., Brod.*
The *Carinæ* are nodulous, or twisted like the strands of a rope; the twists of the upper *carina* are in the direction of a water-laid,

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or right-handed rope, and those of the two lower *carinæ* are in the opposite direction, or like what is termed a hawser-laid rope. Between these nodulous *carinæ* are elevated lines, and the base is very strongly striated. Found in deep water in the Bay of Valparaiso. Dead shells of this species are occasionally found thrown upon the beach, near the Almendral.

56.—TURRITELLA NODULOSA.

T. testâ elongato-turritâ; anfractibus striatis; striis duabus maximis subnodulosis; long. $1\frac{11}{16}$; *lat.* $\frac{7}{16}$ *fere; poll.*

Habitat? *Mus. Brit., nost.*

The two large *striæ*, which are remarkable for the nodules, are not far from the middle of each whorl, and generally are nearer the upper suture: of these the lowest is the largest.

57. MUREX SALEBROSUS.

M. testâ elongato-ovatâ, subalbidâ, fasciis fuscis, epidermide cinereâ; spirâ brevi; anfractibus angulatis, nodulosis; aperturâ oblongâ ad basin angustâ, castaneâ, intus albâ; labro internè denticulato, dentibus obtusis albis; columellâ rectâ, lævi; canali brevi; long. $3\frac{7}{16}$; *lat.* 2; *poll.*

Habitat? *Mus. nost., Geo. Sowerby.*

This species approaches *Murex vitulinus* very nearly; the body-whorl is very much elongated, and the nodules which mark the angles of the whorl are formed of the more elevated parts of what may be termed coarse longitudinal plaits.

58. MUREX RHODOCHEILUS.

M. testâ ventricosâ, albâ, fasciis elevatis striatis; septemfariam varicosâ, varicibus roseis denticulatis; aperturâ rotundatâ, roseâ, intus albidâ; labri margine asperrimè denticulato; caudâ mediocri, sub-recurvâ; long. $3\frac{13}{16}$; *lat.* $2\frac{7}{16}$; *poll.*

Habitat? *Mus. nost.*

59. TRITON RANELLIFORMIS.

T. testâ ovato-fusiformi, subdepressâ, albidâ fusco fasciatâ, costatâ; costis granulosis, interstitiis striatis; aperturâ subrotundâ, albidâ; columellâ subrugosâ; labro internè obtusè denticulato; margine undulato; epidermide viridi-fuscâ, scabrâ; long. $3\frac{3}{16}$; *lat.* $1\frac{6}{8}$; *poll.*

Habitat ad Sinum Peñas *et oram occidentalem Americæ meridionalis.* *Mus. Brit., nost., Brod.*

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The denticules of the outer lip are ranged in pairs, at regular and somewhat distant intervals.

60. TRITON SCABER.

T. testâ ovato-acutâ, cancellatâ; spirâ elongatâ; epidermide fuscâ, setosâ; aperturâ albâ granulosâ; labro interne obtusè denticulato; long. ; lat. ; poll.

Habitat ad oras Americæ meridionalis (Valparaiso). *Mus. nost.*

The denticules of the inner lip are more elevated than those of the last (T. ranelliformis), and are equidistant. It was fished up with the anchor in Valparaiso Bay.

61. MONOCEROS FUSOIDES.

M. testâ ventricosâ, spirâ mediocri, anfractibus bicarinatis; anfractu basali lineis elevatis admodum distantibus cincto; aperturâ patulâ; dente labiali brevi, lato, obtuso; canali producto, recto, integro; operculo corneo; long. $2\frac{3}{4}$; *lat.* $1\frac{5}{8}$; *poll.*

Habitat ad oras Americæ meridionalis (Concepcion). *Mus. Brit., nost., Brod.*

Approaching *Fusus* in its elongated and entire canal, while its exterior lip has the labial tooth which distinguishes *Monoceros*. The columella is not straight, as in all the other species, but curved, so as to make an angle in some specimens at the commencement of the canal, and in all it becomes very broad at the point where it is opposite to the tooth. The shell is of a reddish colour, ventricose, and girt with elevated lines, about a quarter of an inch apart. The spire has only two of these lines on each whorl, and has a bicarinated appearance. The aperture is wide, the outer lip sinuous, its tooth short, broad, and obtuse, and the operculum horny. The shell is seldom found in a perfect state, the beak being generally broken off, and the surface is, in all the specimens that I have seen, covered with a calcareous encrustation, entirely concealing the colours.

62. BUCCINUM MURICIFORME.

B. testâ ovato-fusiformi, cinereâ; anfractibus tumidis, costellatis, costellis cancellatis; aperturâ castaneo-nigricante; labri margine crenulato. Muricem mentiens; long. 1; *lat.* $\frac{9}{16}$; *poll.*

Habitat ad fretum Magellanicum. Mus. Brit., nost., Brod.

The eggs of this species were found, and are preserved in spirits.

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63. BUCCINUM SQUALIDUM.

B. testâ conico-fusiformi, fuscâ; anfractu basali ventricoso; spirâ mediocri; aperturâ fuscâ, lutescenti, patulâ; long. $1\frac{15}{16}$; *lat.* $1\frac{1}{8}$; *poll.*

Habitat? *Mus. Brit., nost., Brod.*

64. BUCCINUM DEFORME.

B. testâ ovatâ, subponderosâ, subalbidâ, fasciis duabus fuscis obscuris; spirâ brevi; anfractu basali subdepresso, suturam versus crasso; columellâ valdè callosâ; long. $1\frac{9}{16}$; *lat.* 1 *paulo plus; poll.*

Habitat ad flumen Plata (Gorriti). *Mus. Brit., nost.*

The eggs of this shell, contained in a transparent orbicular nidus, the size of a turtle's egg, were found thrown up on the sea-beach of the island. In the month of January they were observed in all stages of growth. A series was preserved in spirits, and presented to the College of Surgeons.

65. COLUMBELLA MITRIFORMIS.

C. testâ fusiformi, luteo-rufescente, fasciis nigro-castaneis, maculis albis tessellatâ; long. $\frac{7}{16}$; *lat.* $\frac{3}{16}$; *poll.*

Habitat? *Mus. Brit., nost., Brod.*

66. MITRA PUSILLA.

M. testâ ovato-acutâ, ventricosâ, fulvâ, creberrimè costatâ; costis interstitiisque striatis, basi granulosâ; spirâ brevi, anfractibus suturam supereminentibus; columellâ quinque-plicatâ; long. $\frac{5}{8}$; *lat.* $\frac{5}{16}$ *paulo plus; poll.*

Habitat? *Mus. nost.*

The denticules of the outer lip are arranged in pairs, at regular, and somewhat distant, intervals.

67. VOLUTA.

A fragment of a turbinated shell, bearing marks more assignable to *Voluta* than to any other genus, was found on the sea-beach in the neighbourhood of Cape Fairweather, on the east coast of Patagonia, in latitude $51\frac{1}{2}°$ south. The remains appear to differ from *Voluta Ancilla* and *V. Brasiliana*.

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COPIES OF ORDERS.

His Majesty's surveying vessel Adventure, Sea Bear Bay.

SIR; 27th March 1829.

It is my direction, that when finally parting company from me, you proceed to the execution of the following orders, in company with the Adelaide schooner, the commander of which, upon our meeting him, will receive instructions to put himself under your command.

You will, as soon as possible, make the best of your way to Port Famine, stopping at Pecket Harbour to communicate with the Indians, should they be there, for the purpose of securing a supply of guanaco meat for the ship's company.

At Port Famine you will immediately detach Lieutenant Skyring, with a boat and boat's crew, in the Adelaide, to co-operate with Lieutenant Graves in surveying the Magdalen Channel and its communication with the sea; after which you will direct him to rejoin you, by the Barbara Channel, at Port Gallant, whither you will proceed, after completing your water at Port Famine; on your way to which, if you should have an opportunity, the following bays, on the south side of the Strait, might be planned, *viz.* Lyell Bay, Cascade Bay, San Pedro Bay, and Freshwater Bay (or Cove). The coast also to the west of the Barbara Channel, behind the islands of Charles and Ulloa, should be examined; and of the northern arm of the Jerome Channel, called in the chart, Indian Sound, we know nothing.

If, after the return of the Adelaide, you should find the weather so favourable as to permit your extending your exploration of those parts of the Strait which are yet unknown to us, you will remain for that purpose; but, at all events, you are to leave the Strait by the middle of June, or the first of July at latest, and repair with the Adelaide to San Carlos, at the north end of Chiloe, where you will find or hear of me, by the 10th of August.

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In performing the above orders you will act as you may consider best for their most effectual execution, keeping in mind that the most desirable part is the survey of the Magdalen Channel.

From our experience, last year, of the weather during the months of April and May, I am in hopes of your being able to work during those months, with success; but should you meet with bad weather, you will be most careful in not exposing your people unnecessarily to the severity of the climate.

Upon detaching the Adelaide you will appoint Lieutenant Skyring to the superintendence of the service upon which she is sent, giving Lieutenant Graves instructions to that effect accordingly.

I have, &c.

(Signed) PHILLIP PARKER KING,
Commander and Senior Officer.

His Majesty's surveying sloop Beagle, Port Famine.

SIR; April 19, 1829.

In obedience to the orders I have received from Commander Phillip Parker King, senior officer of the Expedition for the survey of a part of South America, it is my direction that you proceed immediately, in the Adelaide schooner, to survey as much of the Magdalen Channel and the Strait or Channel of Santa Barbara as you find practicable at this season of the year.

If, in the execution of this service, you should find the season too much advanced to proceed without much risk to the vessel, or exposing yourself and the men to much bad weather, you will give up the design, and hasten to Port Gallant.

Should the Beagle not be in Port Gallant at your return, and no letter left for you in a bottle, you will wait there one week, and then return to Port Famine. At all events, you will endeavour to rejoin the Beagle before the first week in June has ended.

I have, &c.

(Signed) ROBERT FITZ-ROY,
Commander.

To Lieut. Wm. Geo. Skyring,
His Majesty's sloop Beagle.

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SIR; Beagle, Port Famine, 19th April 1829.

In obedience to the orders I have received from Captain King, it is my direction that you put yourself under the orders of Lieut. Skyring, and proceed with him as he may think best for the execution of the service upon which he is ordered, and in which you will give him every assistance that you can afford.

Mr. Kirke, with a boat and boat's crew, will be sent to assist you.

I have, &c.

(Signed) ROBERT FITZ-ROY,
Commander.

To Lieut. Thos. Graves,
Commanding His Majesty's schooner Adelaide.

SIR; Beagle, Port Gallant, 19th June 1829.

It is my direction that you put yourself under the orders of Lieutenant Skyring, and co-operate with him in the execution of the service on which he is about to be employed.

Mr. Kirke, with a boat and five men, will be sent to assist.

I have, &c.

(Signed) ROBERT FITZ-ROY.
Commander.

To Lieut. Thos. Graves,
His Majesty's schooner Adelaide.

SIR; Beagle, Port Gallant, June 19th 1829.

It is my direction that as soon as you consider the rates of the chronometer on board the Adelaide sufficiently settled, you proceed in her to search for, and, if practicable at this season of the year, survey such part of the passage which is supposed to lead from the vicinity of Cape Tamar to Concepcion Strait and the Gulf of Trinidad, as your time and provisions will allow.

Your chief object will be to open a passage from Cape Three Points to Cape Tamar, between the mass of islands which lie between those capes.

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When to the northward of Cape Tamar, and before reaching as far north as Oracion Bay, or the latitude of 52° 6′, should you notice an opening to the eastward, with a current or stream of tide setting through it, and an appearance of its joining another body of water, of considerable extent, you will endeavour to ascertain whether it communicates with the Skyring Water, provided that in so doing you do not turn from your chief object more than a few days.

In the execution of the above orders you will act as you may consider best for the service of his Majesty; and if, at any time before its completion, you find your provisions getting short, the climate too severe, or yourself, or those under your orders, in bad health, you will immediately make the best of your way to Chilóe.

You will endeavour to be at San Carlos, in the island of Chilóe, before the 20th of September, and will let nothing that can be avoided detain you beyond that time.

I have, &c.

(Signed) Robert Fitz-Roy,
Commander.

To Lieutenant Wm. Geo. Skyring,
His Majesty's sloop Beagle.

By Phillip Parker King, Esq., Commander of His Majesty's surveying vessel Adventure, and Senior Officer of an Expedition for the survey of a part of South America.

As soon as you shall have completed the rates of your chronometers and be otherwise ready, it is my direction that you proceed to sea in His Majesty's sloop under your command, to survey the sea-coast of Tierra del Fuego, from Cape Pillar to the east entrance of the Strait of Magellan, in the progressive examination of which you will be guided by the state of the weather, and other circumstances, keeping in view that the most interesting part of the coast is that portion between Christmas Sound and the Strait Le Maire, particularly the openings of New Year Sound and Nassau Bay, and the openings to the eastward of the latter as far as New Island; as there is reason to believe that there is a considerable body of water to the eastward of the termination of Admiralty

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Sound, communicating with the sea by some one if not many openings in the neighbourhood of Nassau Bay, and with an outlet on the N.E. coast (St. Sebastian Channel); and as the existence of such a strait would be of the greatest importance to small vessels bound to the westward round Cape Horn, you will see it fitting not to spend so much time to the westward of Cape Noir as may in the least impede the determination of the question, or prevent it being completely explored. It is my intention to be at Port Famine by the 1st of April, and at Rio de Janeiro by the 1st June, calling in my way at Monte Video, or Gorriti, for chronometrical observations; and if I can, conveniently, I shall also go to Port Desire for the same purpose. But as it is at present uncertain what orders I may find for me at Valparaiso, you are to act according to your own discretion, so that you arrive at Rio by the 20th of June to rejoin me.

Given under my hand, on board the Adventure, at St. Carlos de Chiloe, November 18th, 1829.

PHILLIP P. KING, Commander.

To Robert Fitz-Roy, Esq.,
Commander of H.M.S. Beagle.

By Phillip Parker King, Esq., Commander of His Majesty's surveying vessel Adventure, and Senior Officer of an Expedition for the survey of a part of South America.

As soon as the Adelaide Tender is ready, you will proceed to sea, in the execution of the following orders:—

As your principal object will be to trace the main-land from the peninsula of Tres Montes to the southward, by penetrating into all the openings that lead easterly, you will commence at the Channel Mouths, and explore them to their termination.

In the event of their affording a communication with the Gulf of Trinidad, and your having time, you will examine the channels that you have reported to exist in the neighbourhood of Neesham Bay, so as to complete the Fallos Channel, which separates Campana from the land within it.

Should the Channel Mouths not afford the expected termination, you will proceed through the Mesier or Fallos Channels, in

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which, and in the channels more to the southward, you will explore all openings leading into the interior, and, if possible, not lose sight of the main-land until you reach the Strait of Magellan; by doing which it is expected, from the results of your last survey, that you will pass through the Skyring and Otway Waters, and enter the Strait by the Jerome Channel. The above being the principal object of your operations, you will take every opportunity of examining all other interesting parts of the coast, in the vicinity of your anchorages, among which the following seem to be of most interest:—

The Guaianeco Islands, and the probable place of the Wager's wreck, which would seem to be to the southward of, and not far from the Dundee Rock of your former survey.

If time afforded, it would be interesting to lay down the shores of Concepcion Strait; also to examine the deep opening on the west side of St. Estevan Channel, in the latitude of 51° 8′.

Lord Nelson Strait is also of much interest, and any extension of our knowledge of the land that bounds the western side of Smyth Channel.

But in these you will be guided by your own discretion, keeping in mind the principal object of the present survey, that of tracing the shores of the main-land.

The Adventure will be at Port Famine by the 1st of April, if nothing occurs to prevent it; and at Rio de Janeiro by the 1st of June, where you will rejoin me; but you are at liberty to call at Monte Video, on your way, for any supplies which you may require.

(Signed) PHILLIP P. KING.

7th Dec. 1829. San Carlos de Chiloe.

To Lieutenant W. G. Skyring,
commanding H.M. schooner Adelaide,
Tender to H.M.S. Adventure.

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Some Observations relating to the Southern Extremity of South America, Tierra del Fuego, and the Strait of Magalhaens; made during the Survey of those Coasts in his Majesty's ships Adventure and Beagle, between the years 1826 and 1830. By Captain Phillip Parker King, F.R.S., Commander of the Expedition.

[The original paper, from which the following observations have been extracted, was read before the Geographical Society of London on the 25th of April and 9th of May 1831; and was printed in the Journal of that Society for the same year.

It is here reprinted, with a few omissions and very slight alterations, in order that this volume may contain all that the Author has yet published respecting South America; excepting particular Sailing Directions.]

Considering the vast extent of the sea-coast of the southern extremity of America, it is not a little surprising that it should have been so frequently passed by, during the last century, without having been more explored. Within the last twenty years, however, it has been very much resorted to by English and American vessels in the seal trade, and to the observing portion of their enterprising crews many of its intricacies are well known; but as the knowledge they have derived from their experience has only in one instance, that of Mr. Weddell's voyage, been published to the world, our charts cannot be said to have been much improved for the last fifty years.

The eastern coast of Patagonia, by which name the country between the River Plata and the Strait of Magalhaens* is known,

* There has existed much difference of opinion as to the correct mode of spelling the name of this celebrated navigator. The French and English usually write it Magellan, and the Spaniards Magallanes; but by the Portuguese, (and he was a native of Portugal,) it is universally written Magalhaens. Admiral Burney and Mr. Dalrymple spell it Magalhanes, which mode I have elsewhere adopted: but I have since convinced myself of the propriety of following the Portuguese orthography for a name, which to this day is very common both in Portugal and Brazil.

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was coasted, as well as the north-eastern side of Tierra del Fuego, by Malaspina; and the charts of his voyage not only vie with any contemporaneous production for accuracy and detail, but are even now quite sufficient for the general purposes of navigation.

The Strait of Magalhaens has been explored by several navigators; but, among the numerous plans of it extant, those of Sir John Narborough and Cordova are the most correct. The first is particularly noticed in the late Admiral Burney's very useful work, and the result of the last has been published in the Spanish language, and is entitled "Ultimo Viage al Estrecho de Magallanes." A second voyage was also made by Cordova to the Strait, the proceedings of which form an appendix to the above work. It is furnished with a good general chart of the coast, another of the Strait, and many plans of the anchorages within it. Byron, Wallis, Carteret, and Bougainville, had already made considerable additions to Narborough's plan, from which a chart had been compiled that answered all the purposes of general geographical information, and might even have been sufficient for navigation: for the latter purpose, however, Cordova's chart was much superior; but, being published in Spain only, and its existence little known in England, I found great difficulty in procuring a copy before I sailed, for my own use.

The southern coast of Tierra del Fuego, between Cape Good Success, the southern limit of Strait le Maire, and Cape Pillar at the western end of the Strait of Magalhaens, was very little known. Cook's voyage affords several useful notices of the coast between Cape Deseado and Christmas Sound, and the Dutch fleet under Hermite partially explored the neighbourhood of Cape Horn: a confused chart of this coast, however, was the best that could be put together; and although Mr. Weddell has more recently published an account of the harbours and anchorages near Cape Horn and New Year Sound, yet little available benefit was derived from it, because these different navigators having confined their examinations to small portions of the coast, it was difficult to connect their respective plans, even on so small a scale as that of the general chart.

The western coast of South America, which is very intricate, extending from Cape Victory (the north-west entrance of the

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Strait of Magalhaens) to the island of Chiloé, may be said to have been wholly unknown; for since the time of Sarmiento de Gamboa nothing in the least descriptive of it had been published, with the exception of the brief notices of two missionary voyages in piraguas, from Chiloé to the Guiateca and Guaianeco islands.

Every person conversant with South American geography, must be acquainted with the voyage of Sarmiento. From the determined perseverance shown by that excellent and skilful navigator, through difficulties of no ordinary nature, we are possessed of the details of a voyage down the western coast, and through the Strait of Magalhaens, that has never been surpassed. His journal has furnished us with the description of a coast more difficult and dangerous to explore than any which could readily be selected—for it was at that time perfectly unknown, and is exposed to a climate of perpetual storms and rain: yet the account is written with such minute care and correctness, that we have been enabled to detect upon our charts almost every place described in the Gulf of Trinidad, and the channels to the south of it, particularly their termination at his Ancon sin Salida.

It would be irrelevant to enter here into the history of Sarmiento's voyage, or indeed of any other connected with these coasts. Modern surveys are made so much more in detail than those of former years, that little use can be made of the charts and plans that have been hitherto formed; but the accounts of the voyages connected with them are replete with interesting and useful matter, and much amusement as well as information may be derived from their perusal, particularly Sir John Narborough's journal, and Byron's romantic and pathetic narrative of the loss of the Wager.

The Cordillera of the Andes, which is known to extend from the northern part of the continent almost to its southern extremity, decreases in elevation near the higher southern latitudes. In the neighbourhood of Quito, Chimborazo and Pinchincha rear their summits to the height of nearly twenty-two thousand feet above the level of the sea; near Santiago de Chile the highest land is supposed to be fourteen thousand feet; farther south, near Concepcion, it is lower; and near Chiloé there are few parts of the range exceeding seven thousand feet. Between Chiloé and the

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Strait of Magalhaens the average height may be taken at three thousand feet; though there are some mountains which may be between six and seven thousand feet high.

By a reference to the chart it will be seen that about the parallel of 40° the coast begins to assume, and retains to its furthest extremity, a very different appearance from that which it exhibits to the northward, where the sea, which is kept at a distance from the Cordillera by a belt of comparatively low land for continuous intervals of some hundred miles, washes a long unbroken shore, affording neither shelter for vessels nor landing for boats; but, to the southward of that parallel, its waters reach to the very base of the great chain of the Andes, and, flowing as it were into the deep ravines that wind through its ramifications, form numerous channels, sounds, and gulfs, and, in many instances, insulate large portions of land. In fact, the whole of this space is fronted by large islands and extensive archipelagoes, of which the most conspicuous are the great island of Chiloé, Wellington Island, the Archipelago of Madre de Dios, Hanover Island, and Queen Adelaide Archipelago. The last forms the western entrance of the Strait on its north side. The land of Tres Montes, however, is an exception: it is a peninsula, and is the only part of the continent within the above limits that is exposed to the ocean's swell. It forms the northern part of the Gulf of Peñas, and is joined to the main by the narrow isthmus of Ofqui, over which the Indians, in travelling along the coast, carry their canoes, to avoid the extreme danger of passing round the peninsula. It was here that Byron and his shipwrecked companions crossed over with their Indian guides: but it is a route that is not much frequented; for this part of the coast is very thinly inhabited, and the trouble of pulling to pieces and reconstructing the canoes,* an operation absolutely necessary to be performed, is so great, that I imagine it is only done on occasions of importance. In this way the piraguas which conveyed the missionary voyagers to the Guaianeco Islands were transported

* During our examination of this part, our boats ascended the river San Tadeo, and endeavoured in vain to find any traces of the road; an almost impenetrable jungle of reeds and underwood lined the banks of the river, and time was too valuable to admit of further delay, in search of an object comparatively of minor importance.

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over the isthmus; the particulars of which are fully detailed in their journals.*

The river San Tadeo, although of small size, being navigable only for eleven miles, is the largest river of the coast south of the archipelago of Chiloe, and therefore merits a particular description. At seven miles from the mouth it is fed by two streams or torrents, the currents of which are so strong that a fast-pulling boat can hardly make way against it. One of these streams takes its rise in a mountainous range, over which perhaps the communicating road passes; and the other is the drain of an extensive glacier or plain of ice of fifteen miles in extent. The river falls into the Gulf of St. Estevan over a shallow bar, upon which there is scarcely two feet water, and at low tide is probably dry.

At the head of St. Estevan Gulf is St. Quintin Sound; both were examined and found to afford excellent anchorage, and they are both of easy access should a ship, passing up the coast, find herself upon a lee shore and not able to weather the land, as was the case with the ill-fated Wager.†

The Guaianeco islands form the southern head of the Gulf of Peñas; then follows Wellington Island, separated from the main by the Mesier Channel, which had not been previously explored, its mouth only being laid down in the charts, compiled from the information of Machado, a pilot who was sent in 1769 by the Viceroy of Peru to examine the coast from Chiloe to the Strait

* Agüeros, Descripcion Historial de la Provincia y Archipielago de Chiloe, 1791, p. 229.

† The precise situation of the wreck of this vessel had hitherto been very vaguely marked on our charts: a careful perusal, however, of Byron's narrative, and of Agüeros' account of the Missionary Voyages in 1779, sufficiently points out the place within a few miles. It is on the north side, near the west end of the easternmost of the Guaianeco islands, which we named, in consequence, Wager Island. At Port Santa Barbara, seventeen miles to the southward of this group, a very old worm-eaten beam of a vessel was found, which there is reason to think may be a relic of that unfortunate ship. It was of English oak, and was found thrown up above the high-water mark upon the rocks at the entrance of the port. No other vestige was detected by us;—the missionaries, however, found broken glass bottles, and other evident traces of the wreck. At Chiloe I saw a man who had formed one of this enterprising party, and obtained from him a curious and interesting account of those voyages.

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of Magalhaens.* This channel is also noticed in one of the two missionary voyages above mentioned; but the object of these expeditions being for the purpose of converting the Indians to Christianity,† and not for the extension of geographical knowledge, little information of that nature could be obtained from their journal: the entrance of the Mesier, however, is described by them; and on one occasion they were obliged to take refuge in it for fifteen days.‡ With this exception I cannot find that it had ever been entered before our visit.

The length of the channel is one hundred and sixty miles, and it joins the Concepcion Strait behind the Madre de Dios archipelago, at the Brazo Ancho of Sarmiento. Lieutenant Skyring, who superintended this particular part of the survey, called the land which it insulates, Wellington Island; the seaward coast of which is fronted by several islands. Fallos Channel, which separates the Campaña and Wellington Islands, was examined, from its northern entrance, for thirty-three miles, and was conjectured, after communicating with the sea at Dynely Sound, to extend to the southward, and fall into the Gulf of Trinidad by one of the deep sounds which were noticed on the north shore.

About thirty miles within the Mesier Channel, from the northern extremity, the west side appears to be formed by a succession of large islands, many of which are separated by wide channels leading to the south-west, and probably communicating with the Fallos Channel. On the eastern shore the openings were found to be either narrow inlets or abruptly terminating sounds.

On both sides of the channel the coast is hilly, but not very high, and in many places there is much low and generally thickly wooded land. This character distinguishes the Mesier from other channels in these regions.

The trees here are nearly of the same description as those which are found in all parts between Cape Tres Montes and the Strait of Magalhaens. Of these the most common are an evergreen beech (*Fagus betuloides*), a birch-like beech (*Fagus antarctica*), the Winter's bark (*Winterana aromatica*§), and a tree with all the appearance and habit of a cypress, of which the Indians make their

* Agüeros, p. 205, et seq. † Ibid. p. 181, et seq. ‡ Ibid. p. 237.

§ Living plants of the above trees, and other vegetable productions from the Strait of Magalhaens, were introduced into England upon the return of the expedition, and have since thriven exceedingly well.

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spears. Among others there is one, the wood of which being extremely hard and weighty, answers better than the rest for fuel: the sealers call it 'the red wood,' from its colour. From the great quantity of timber which grows here it would be naturally supposed probably that spars for masts could be easily obtained, or at least wood useful for less important purposes; but although many trees were found that were sufficiently large at the base, they grew to no great height; and, in consequence of the moisture of the climate, and the crowded state of the forests preventing the admission of the sun's rays, the wood generally proved to be decayed in the heart; besides being very apt, even after a long seasoning, to warp and split when exposed to a dry air.

Ten miles beyond White-kelp Cove, which is fifty miles within the entrance, the character of the Mesier Channel changes entirely; the shore on either side being formed of mountainous and precipitous ridges rising abruptly from the water. After this, at Halt Bay, twenty-three miles beyond White-kelp Cove, the channel narrows for a considerable distance, and in three particular places is not more than four hundred yards wide. This part of the channel is called in the chart the English Narrow. It is long and intricate, with many islands strewed throughout; and preserves its tortuous and frequently narrow course to its junction with the Wide Channel, in which the breadth increases to two miles and a half; and then, running thirty-four miles with a direct and unimpeded course, falls into the Concepcion Strait as above stated.

At the point where the Mesier and the Wide Channels unite, a deep sound extends to the N.N.E. for forty-six miles. It was named Sir George Eyre Sound. An extensive glacier sloping into the sea from the summit of a range of high snowy mountains, that are visible from many parts of the Mesier Channel, terminates this sound; and near the head of it several large icebergs, containing no inconsiderable blocks of granite, were found aground.*

* Near Falcon Inlet, seven miles up the eastern side of Sir George Eyre Sound, are some large 'rookeries,' or breeding-haunts, of fur-seal. Many thousands of these animals were congregated together, which probably had been driven from the sea-coast by the activity of the seal-fishers; and perhaps, for many years, if not ages, have been breeding undisturbed in this hitherto unknown, and therefore safe and quiet recess. Two seals that were killed appeared to be of the same description as the species which frequents the sea-coasts.

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Of the archipelago of Madre de Dios we know very little. It has probably many deep openings on its seaward face, and is fronted by islands and rocks. Its character is rocky and mountainous, and by no means agreeable. The wide and safe channel of Concepcion Strait separates it from the main land, which in this part is much intersected by deep sounds, the principal of which, the Canal of San Andres, extends to the base of the snowy range of the Cordillera, and there Lieutenant Skyring describes it to be suddenly closed by immense glaciers.

Behind Hanover Island, which is separated from Madre de Dios by the Concepcion Strait, the main-land is very much intersected by sounds like the San Andres Channel, extending to the base of the Andes.

South of Hanover Island is Queen Adelaide Archipelago, through which are several channels that communicate with the Strait of Magalhaens; of which the principal, Smyth Channel, falls into the Strait at Cape Tamar.

In the winter of 1829, Captain Robert Fitz-Roy, then commanding the Beagle, in examining the Jerome Channel, which communicates with the Strait in that part called Crooked Reach, discovered 'Otway Water,' an inland sea fifty miles long, trending to the N.E., and separated from the eastern entrance of the Strait by a narrow isthmus; the actual width of which was not ascertained, for in the attempt the boats were nearly lost. The south-eastern shore is high and rocky, and generally precipitous, but the northern is formed by low undulating grassy plains, free from trees, and precisely like the country about the eastern entrance of the Strait. At the north-west corner of the water a passage was found leading in a north-west direction for twelve miles, when it opened into another extent of water, about thirty-four miles long and twenty wide. This he called the Skyring Water. Its southern and western sides are bounded by mountainous land, but the northern shore is low, apparently formed of undulating downs and grassy plains, and in some places watered by rivulets. At the western extremity of the water two openings were observed, separated by a remarkable castellated mountain which was called Dynevor Castle. Beyond the southernmost opening there was no land visible, not even a distant mountain, which induced Captain Fitz-Roy to suppose that it was a channel communicating with the

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western coast; but from what we now know, it is not probable that it can lead to anything of consequence. It is, perhaps, backed by low marshy land reaching to the hills at the bottom of Glacier Bay, which, from the distance being seventy miles, were not visible above the horizon. The northern opening probably passes Dynevor Castle, and, perhaps, nearly reaches the bottom of Obstruction Sound. The Skyring Water was not further explored; partly from want of a sufficient quantity of provisions to undertake it with any prospect of succeeding, and partly from a strong south-westerly gale, from which there was no shelter for the open boats in which this examination was performed. The remainder, therefore, of Captain Fitz-Roy's time was spent in completing what he had commenced; and, after an absence of thirty-two days, he rejoined his ship at Port Gallant.

At the western end of the passage, which unites the waters, the shore is well clothed on the north side with luxuriant grass and trefoil, with here and there a sprinkling of brushwood, but is entirely destitute of trees. The soil, although dry, is light, and tolerably good; but the ground is perforated everywhere by some burrowing animal, probably skunks, or *cavias*. The tracks of horses were noticed in many places, and the bones of guanacoes were scattered about. Water was not very plentiful, but several small brooks and springs in the sides of the hills were observed, sufficient for all useful purposes.

On the south side of the passage the land is low, but wooded: the banks are from five to forty feet high, sloping to the water, and covered with grass. In the entrance the tide ran five or six knots at the neaps, but inside with only half that rapidity. On the north side, at the distance of a mile and a-half, there is a ridge of hills, to the summit of which Captain Fitz-Roy made an excursion, which is described in the Narrative.

In consequence of the supposed communication of the Skyring Water with some part of the western coast, a careful examination was made of every opening trending into the interior behind the islands and archipelagoes that line the western coast; the result of which has proved that the hypothesis so naturally formed was not confirmed by fact. A reference to the chart will show how carefully the search was carried on, and with what want of success it was concluded. The deep opening discovered by Sarmiento, and

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named by him, 'Ancon sin salida,' was found, upon examination, to extend so far into the interior, and in the direction of the Skyring Water, that the most strict investigation of the numerous sounds and canals was made, in the perfect conviction of finding the desired communication. But after a patient, laborious, and minute examination, particularly of those openings which led to the southward, among which Obstruction Sound held the most flattering appearance, Lieutenant Skyring, who performed this service, was obliged to give up the search and return. At one part, near the south-eastern end of the sound, he entered an opening, which at first had an appearance that was favourable to the desired communication, but it terminated in low, woody land. There was, however, a hill near the shore, which he ascended with the hope of obtaining a view of the country; but the sides and summit of the hill were so thickly wooded as to obstruct his view, and with the exception of some distant high land in the south-east quarter, and a sheet of water about six miles off in the same bearing, nothing was discerned to repay him for the fatigue and trouble of the ascent. Whether the water is a lagoon, or a part of the Skyring Water, or whether it communicates with the opening trending round the north side of Dynevor Castle, yet remains to be ascertained.

Being foiled in this attempt, Lieutenant Skyring proceeded onward in a S.S.W. direction, and after a pull of ten miles came to the bottom of the sound, which was terminated by high, precipitous land encircling every part. Neither wigwams nor traces of Indians were seen, another proof, were one required, of the sound not communicating with the Skyring Water; for the Indians very rarely visit these deep inlets, but are always to be found in narrow straits or communicating channels, where, from the strength of the tide, seals and porpoises, which constitute the principal food of the Fuegian Indians, abound. Sarmiento's name, therefore, of 'Ancon sin salida,' which we had hoped to have expunged from the chart, must now remain, a lasting memorial of his enterprising character, and of a voyage deservedly one of the most celebrated, as well as most useful, of the age in which it was performed.

The termination of Obstruction Sound is one of the most remarkable features in the geography of this part of South America.

In this examination the southern extremity of the Cordillera was

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ascertained. The eastern shores of the interior channels were found to be low plains, with no hills or mountains visible in the distance; and such being characteristic also of the northern shores of the Otway and Skyring Waters, it is probable that all the country to the east of the sounds is a continued plain.

Recent traces of Indians were seen in some places; but at the time our party was there, they were either absent or had concealed themselves. I should not think that these interior sounds are much frequented by them; a family was, however, met in the passage between the Otway and the Skyring Water, clothed with guanaco skins, like the Patagonian tribes, but in manners and disposition resembling the wandering inhabitants of the Strait and Tierra del Fuego; and they had canoes, which the Patagonians do not use. They had probably come thus far for the purpose of communicating with the latter tribes, with whom they frequently have friendly intercourse. No guanacoes were seen either on the shores of the inland waters or of the sounds within the 'Ancon sin salida,' although the country, being open and covered with luxuriant grass, was peculiarly suited to their habits; but as several large herds of deer were observed feeding near the sea-shore of Obstruction Sound, and the neighbouring country, the presence of these latter animals may probably be the cause; for on the eastern coast, where the guanacoes are every where abundant, the deer do not make their appearance. Sea-otters were the only other animals that we met with; but they were only occasionally noticed, swimming about the kelp. The shores of the sounds were in many places crowded with the black-necked swan (*Anas nigricollis*, Linn.), and there were a few seen, but only one captured, whose plumage, excepting the tips of the wings, which were black, was of a dazzling white colour. I have described it in the first part of the Proceedings of the Zoological Society as a new species (*Cygnus anatoïdes.*)

The Strait of Magalhaens, being a transverse section of the continent, exhibits a view of its geological structure. The Strait may be divided into three portions; the western, the central, and the eastern. The western and central are of primitive character, rugged and very mountainous; but the eastern portion is of recent formation and low. The western tract is composed of a succession of stratified rocks, a difference at once distinguishable by the form

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and nature of the ranges, and the direction of the shores: the hills are irregularly heaped together; the sounds are intricate and tortuous in their course, and the shores are formed by deep sinuosities and prominently projecting headlands: the channels, also, are studded with innumerable islands and rocks extremely dangerous for navigation. In this portion the rock is, for the most part, granite and greenstone.

Near the centre of the Strait, the rock being clay-slate, the mountains are higher, and more precipitous and rugged in their outline; and consequently not easily to be ascended. They are in general three thousand feet, but some are found to be four thousand feet, in height; and one, Mount Sarmiento, is upwards of six thousand feet high, and is covered throughout the year with snow. The line of perpetual snow in the Strait seems to be about three thousand five hundred feet above the sea: the mountains, whose height does not exceed three thousand, are, during the summer, frequently free from any, excepting in holes, where a large quantity is accumulated by drifting, and protected from the sun. The Strait here is quite free from islands, and it is a remarkable fact, that where the greenstone formation terminates, there the islands cease to appear.

The slate formation continues as far as Freshwater Bay, where the stratified rocks leave the coast and extend in a north-west direction. The soil then becomes apparently a mixture of decomposed slate and clay; the slate gradually disappearing on approaching to Cape Negro, where the rock partakes of the character of the east coast. Here again we observe, along with the change of geological character, the re-appearance of islands, the soil of which is clayey, but with masses of granite, hornblende rock and clay slate protruding in many places through the superficial soil, which, although it yields a poor grass, is entirely destitute of trees.

In that portion of the Strait to the eastward of Cape Negro the hills are remarkable for the regularity and parallelism of their direction, and their general resemblance to each other. On the north shore, near Cape Gregory, a range of high land commences suddenly, with rather a precipitous ascent, and extends for forty miles to the north-east, where it terminates in detached rocky hills. The south-western end of the range is a ridge of flat-topped

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land covered with soil, but with here and there a protruding mass of primitive rock: one of these appeared to be of sienite or granite. The north-eastern end of this range is perhaps more bare of soil, and, therefore, exposes the rock, which shows itself in detached hills. Precisely similar in appearance and direction is a range on the south shore, about fifty miles in length, commencing at Cape Monmouth and terminating in detached hills in the vicinity of the south side of the First Narrow. The courses, also, of both the First and Second Narrow, which are just within the eastern entrance of the Strait, are nearly parallel with these hills; and the smaller ranges of eminences, Elizabeth Island and the cliffy land of Cape Negro, where the clay formation commences, all trend to the N.N.E., preserving a general resemblance of form and character to the two ranges above mentioned.

The irregularity of the topographic features of the western portion of the Strait, combined with its confused assemblage and immense number of islands and rocks;—the regularity of the strata —the coinciding parallelism of all the bays, channels, and sounds, —and the total absence of islands in the central portion or slate formation;—together with the remarkable similarity of the direction of the hills and coast line, and the stratification of the north-eastern tract, which is very different from that of the centre;— are very striking facts, and, geologically considered, are of great interest.

No less remarkable, however, and equally interesting, is the character of the vegetation; not so much in the variety of plants, as in their stunted growth to the westward, their luxuriance in the centre, and the total absence of trees to the eastward. For this modification the following reasons seem to me to account sufficiently. To the westward the decomposition of granite, and the other primitive rocks which are found there, forms but a poor, unproductive soil; so that, although the land is thickly covered with shrubs, they are all small and stunted: the torrents of water also that pour down the steep sides of the hills, wash away the partial accumulations of soil that are occasionally deposited; consequently, few trees are to be found, excepting in clefts and recesses of the rock, where decomposed vegetable matter collects and nourishes their growth; but even there they are low and stunted, for the most luxuriant seldom attain a larger diameter than nine or ten inches.

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From the regularity of the direction of the strata in the slate districts the vallies are very extensive, and, being bounded on either side by precipitous mountains much intersected by deep ravines, receive large streams of water, which, uniting together in their course to the sea, form no inconsiderable rivers. During the winter months these rivers become swollen and overflow their banks, and deposit a quantity of alluvium, which, blending with the fallen leaves and other putrescent substances, produces a good superficial soil, in which trees grow to a large size, and the shrubs and smaller plants become particularly luxuriant and productive.

At Port Famine, and in its neighbourhood, the evergreen beech (*Fagus betuloides*) grows in the greatest abundance, and reaches a very large size. Trees of this species, of three feet in diameter, are abundant; of four feet, there are many; and there is one tree (perhaps the very same noticed by Commodore Byron*), which measures seven feet in diameter for seventeen feet above the roots, and then divides into three large branches, each of which is three feet through. This venerable tree seemed to be sound, but from our experience of several others that were cut down, might be expected to prove rotten in the centre. This tendency to decaying in the heart may be attributed to the coldness of the schistose sub-soil upon which the trees are rooted, as well as to the perpetual moisture of the climate above alluded to.

The slate formation ceases at Port St. Mary, but there is no decided change in the vegetation until we come to Cape Negro, where the clay commences; and from thence onwards there is not a tree to be found. The nature of the soil is not favourable to plants which take a deep root, and, therefore, only shrubs and grasses are found: the former are thinly scattered over the extensive plains which characterise this country; but the grasses are abundant, and although of a harsh and dry appearance, must be nourishing, for they form the chosen food of numerous and large herds of guanacoes.

Besides the evergreen beech above-mentioned, there are but few other trees in the Strait that can be considered as timber trees. Such an appellation only belongs to two other species of beech and the Winter's bark. The last, which is also an evergreen, is to be found mixed with the first, in all parts of the Strait; so that

* Hawkesworth, Voyages, i. 38.

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the country and hills, from the height of two thousand feet above the sea, to the very verge of the high-water mark, are covered with a perpetual verdure which is remarkably striking, particularly in those places where the glaciers descend into the sea; the sudden contrast in such cases presenting to the view a scene as agreeable as it seems to be anomalous. I have myself seen vegetation thriving most luxuriantly, and large woody-stemmed trees of Fuchsia and Veronica* (in England considered and treated as tender plants), in full flower, within a very short distance of the base of a mountain, covered for two-thirds down with snow, and with the temperature at 36°. The Fuchsia certainly was rarely found except in sheltered spots, but not so the Veronica; for the beaches of the bays on the west side of San Juan Island at Port San Antonio are lined with trees of the latter, growing even in the very wash of the sea. There is no part of the Strait more exposed to the wind than this, for it faces the reach to the west of Cape Froward, down which the wind constantly blows, and brings with it a succession of rain, sleet, or snow; and in the winter months, from April to August, the ground is covered with a layer of snow, from six inches to two or three feet in depth.

There must be, therefore, some peculiar quality in the atmosphere of this otherwise rigorous climate which favours vegetation; for if not, these comparatively delicate plants could not live and flourish through the long and severe winters of this region.

In the summer, the temperature at night was frequently as low as 29° of Fahrenheit, and yet I never noticed the following morning any blight or injury sustained by these plants, even in the slightest degree.

I have occasionally, during the summer, been up the greater part of the night at my observatory, with the internal as well as the external thermometers as low as freezing point, without being particularly warmly clad, and yet not feeling the least cold; and in the winter, the thermometer, on similar occasions, has been at 24° and 26°, without my suffering the slightest inconvenience. This I attributed at the time to the peculiar stillness of the air, although, within a short distance in the offing and overhead, the wind was high.

Whilst upon this subject, there are two facts which may be

* The stems of both from six to seven inches in diameter.

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mentioned as illustrative of the mildness of the climate, notwithstanding the lowness of the temperature. One is the comparative warmth of the sea near its surface, between which and the air, I have in the month of June, the middle of the winter season, observed a difference of 30°, upon which occasion the sea was covered with a cloud of steam. The other is, that parrots and humming-birds, generally the inhabitants of warm regions, are very numerous in the southern and western parts of the Strait—the former feeding upon the seeds of the Winter's bark, and the latter having been seen by us chirping and sipping the sweets of the Fuchsia and other flowers, after two or three days of constant rain, snow, and sleet, during which the thermometer had been at freezing point. We saw them also in the month of May upon the wing, during a snow shower: and they are found in all parts of the south-west and west coasts as far as Valparaiso. I have since been informed that this species is also an inhabitant of Peru; so that it has a range of more than 41° of latitude, the southern limit being 53½° south.*

Tierra del Fuego is divided by several channels; a principal one of which is opposite to Cape Froward, and another fronts Port Gallant. The easternmost, called Magdalen, trends in a due south direction for nineteen miles, and separates the clay slate from the more crystalline rocks, which seem to predominate in Clarence Island, and are chiefly of greenstone; though, at the eastern end, there is much mica slate. At the bottom of Magdalen Sound the channel turns sharply to the westward; and, after a course of about forty miles, meets the Barbara Channel, which, as above-mentioned, communicates with the Strait opposite to Port Gallant, and both fall into the sea together. Magdalen Sound and its continuation, Cockburn Channel, are almost free from islands and rocks; but the Barbara Channel, which separates

* This bird, although not rare in several English collections had never been noticed until I forwarded it to England in the early part of the year 1827, when my friend Mr. Vigors described it in the Zoological Journal for the month of November 1827 (vol. iii. p. 432), under the name of *Mellisuga Kingii*. Shortly afterwards, M. Lesson published it in his Manuel d'Ornithologie (vol. ii. p. 80), as *Ornismya sephaniodes*, as a discovery belonging to the Coquille's voyage, in the illustrations of which it is figured at plate 31.

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the granite from the greenstone and mica slate districts, is throughout thickly strewed with islands, which reduce the channel in some parts to a mile, and, in one place, to not more than fifty yards in width. Here, of course, the tide sets with great strength. Several vessels, however, have passed through it under sail; and one ship, a whaler belonging to Messrs. Enderby, working through the Strait, and finding much difficulty in passing to the westward, bore up, and, the wind being fair and the distance to sea only fifty miles, ran through it without accident. The land to the westward of the Barbara Channel is high and rugged; and although in the vallies, ravines, and sheltered nooks, there is no want of vegetation, yet, in comparison with the eastern part of the Strait, it has a very dismal and uninviting appearance. It was called by Sarmiento, 'Santa Ines Island';* but Narborough called it, 'South Desolation; it being,' as he says, 'so desolate land to behold.'†

Clarence Island, which is fifty-two miles long and twenty-three broad, although equally rocky, is much more verdant in appearance. The uniform direction of the headlands of the north shore of the island is remarkable. Upon taking a set of angles with the theodolite placed upon the extremity of the west end of Bell Bay, opposite to Cape Holland, the most prominent points to the south-east, as far as could be seen, were all visible in the field of the telescope at the same bearing. The same thing occurred on the opposite shore of the Strait, where the projections of Cape Gallant, Cape Holland, and Cape Froward, are in the same line of bearing; so that a parallel ruler placed on the map upon the projecting points of the south shore, extended across, will also touch the headlands of the opposite coast.

The eastern island, which had been previously called, and of course retains on our chart the name of King Charles South Land, extends from the entrance of the Strait to the outlet of the Barbara and Cockburn Channels, at Cape Schomberg. The northern part partakes of the geological character of the eastern portion of the Strait. The centre is a continuation of the slate formation, which is evident at a glance, from the uniformity of the direction of the shores of Admiralty Sound, the Gabriel Channel, and all the bays and mountain ranges of Dawson Island. The south shore, or seaward coast line, is principally of greenstone,

* Sarmiento, p. 180. † Narborough's Voyage, p. 78

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excepting the shores of the Beagle Channel, which extends from Christmas Sound to Cape San Pio, a distance of a hundred and twenty miles, with a course so direct that no points of the opposite shores cross and intercept a free view through; although its average breadth, which also is very parallel, is not much above a mile, and in some places is but a third of a mile across. The south shores of Hoste and Navarin Islands are of horn-blende rock, which is also the principal component of the islands in the neighbourhood, as well as of the island itself of Cape Horn. The eastern part of King Charles South Land is low, with plains like the Patagonian coast; but the range of high land interrupted at Port Famine extends down the north side of Admiralty Sound, and perhaps, with some few intervals, continues to the south-east extremity of the land, near Cape Good Success, which is the south cape of the west side of Strait Le Maire, and there terminates in lofty mountains covered with snow, one of which, called in the charts 'The Sugar Loaf,' is probably four thousand feet high.

The eastern shore of King Charles South Land, towards the south part, is lofty, but near the northern part is very low. The interior is also low, with extensive plains, abounding with guanacoes, some of which also were found, and shot by the officers of the Beagle, within fifty miles of Cape Horn.

The eastern coast of Patagonia, from the entrance of the Strait of Magalhaens to the River Plata, is comparatively low. From Cape Virgins to Port St. Julian, where porphyritic claystone commences, the coast is formed of clay cliffs, horizontally stratified, and the country is undulating, with extensive plains, or pampas, covered with grass, but without trees. At Port St. Julian, the country becomes hilly, and continues so as far to the northward as latitude 44°, the rock being porphyritic. The clay formation to the southward has been likened to the appearance of the coast of Kent, and at a short distance it bears certainly a very great resemblance to it; but the cliffs, instead of being of chalk, are composed of a soft marly clay, without any gravel or impressions of organic remains, excepting at Port St. Julian, where fossil shells, both bivalves and univalves, are found imbedded in clay cliffs; and on the surface are lying, strewed about, large oyster-shells.

In the clay formation there are two rivers: the Gallegos, in lat. 51° 38′; and Port Santa Cruz, in lat. 50° 7′. The Gallegos, at

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high water, may be easily entered, but at low water the banks are dry to a great extent; a channel, however, is left on its south side, of sufficient depth for a small vessel: the tide rises forty-six feet, and the stream is very strong.

Port Desire, in 47° 45′ south latitude, has a narrow entrance with strong tides; but affords in the offing very good anchorage as well as shelter from the prevailing winds, which are off shore, or westerly. The inlet extends up the country, nearly in a west direction, for eighteen miles; but the land is dry and parched, and very unsuitable for the establishment which the Spanish government formed there not many years since, and of which evident traces remain to this day.

St. George's Gulf, called in the old charts 'Bahia sin Fondo,' or Deep-Sea Gulf, was formerly considered to be a deep sinuosity of the coast, into which a river emptied its waters after winding through a large tract of country; for, until the Descubierta and Atrevida's voyage of discovery, very vague accounts had been given of this, or indeed of any other part of the coast. The Gulf, upon that examination, was found to possess no river or creek in any part excepting on the north side, where there are several deep bays and coves, which are, and have been frequented by our sealing vessels. The country about is dry and parched, although partially covered with small shrubs, and a wiry grass on which large herds of guanacoes feed.

According to Falkner (the Jesuit missionary, who resided many years among the Indian tribes inhabiting the country about Buenos Ayres), the eastern coast between the latitudes of 41° and 51° is frequented by the natives for the purpose only of burying the dead: they have, however, been occasionally met with travelling along the coast, apparently without any particular object in view. Near Port Desire I have seen the graves of the Indians on the summit of the hills, but the bodies had been removed, probably by the Indians themselves; for we are informed by Falkner, that, after the dead have been interred twelve months, the graves are visited by the tribe, for the purpose of collecting the bones and conveying them to their family sepulchres, where they are set up and adorned with all the beads and ornaments the friends and family of the deceased can collect for the occasion. The ceremony

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is performed by certain women of the tribe whose peculiar office it is to attend to these rites.

In the year 1828, from the commencement of January to the middle of August, the Adventure (the ship I commanded) was at anchor at Port Famine, in the Strait of Magalhaens, in latitude 53° 38¼′ south, and longitude 70° 54′ west of Greenwich; and during the whole of that time a careful meteorological journal was kept. The temperature was registered from a very good thermometer of Fahrenheit's scale, suspended within a copper cylindrical case of nine inches diameter, and perforated above and below with holes, to admit a free current of air. The cylinder was fixed to the roof of a shed, thatched with dried leaves to shelter it from the sun, while the sides were open. The barometer (a mountain barometer made by Newman, with an iron cylinder) was hung up in the observatory, five feet above the high-water mark, and both instruments were examined carefully and regularly at the following hours, namely: six and nine o'clock in the morning, at noon, and at three and six o'clock in the evening. The state of the atmosphere was observed daily, by Daniel's hygrometer, at three o'clock in the afternoon. The maximum and minimum temperatures were also observed twice in twenty-four hours, from a Six's thermometer, namely: at nine o'clock in the morning, and at nine in the evening. From this journal the following abstract has been drawn up:—

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SUMMARY OF METEOROLOGICAL OBSERVATIONS.

Table I.

Mean height of the Barometer, corrected for Neut^{l}. P^{t}. and Capill^{y}. and reduced to the temperature of 32°.

Hour.	AUTUMNAL PERIOD.			BRUMAL PERIOD.			12 Days of August.	MEANS.		
	Feb.	March.	April.	May.	June.	July.		Autumn.	Brumal.	Au. & Br.
	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.
VI.	29·404	29·631	29·569	+29·322	+29·279	29·581	29·230	29·531	+29·394	29·463
IX.	+·415	+·655	+·581	·311	·277	+·584	·257	+·550	·391	+·470
XII.	·405	−·641	·574	·292	·272	·576	·308	·540	·380	·460
III.	−·399	·647	−·555	−·285	−·271	−·542	·318	−·534	−·366	−·450
VI.	·404	·657	·579	·308	·294	·571	·318	·540	·391	·465
Means	29.405	29·646	29·572	29·304	29·279	29·571	29·286	29·539	29·384	29·462

Table II.

Thermometer—Fahrenheit.

Hour.	AUTUMNAL PERIOD.			BRUMAL PERIOD.			12 Days of August.	MEANS.		
	Feb.	March.	April.	May.	June.	July.		Autum.	Brumal.	Au. & Br.
	°	°	°	°	°	°	°	°	°	°
VI.	44·30	44·20	35·82	34·74	30·67	30·53	33·46	41·44	31·98	36·71
IX.	51·38	49·87	40·61	36·36	31·83	31·50	35·11	47·29	33·23	40·26
XII.	54·23	52·53	45·42	40·68	36·02	35·93	37·92	50·73	37·54	44·13
III.	54·44	52·39	44·88	39·62	34·36	34·59	36·24	50·57	36·19	43·38
VI.	51·16	47·84	39·83	35·97	31·98	32·58	33·54	46·13	33·51	39·82
Means	51·10	49·37	41·22	35·47	32·97	33·03	33·25	47·23	34·49	40·86

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Table III.

Daniel's Hygrometer, observed at 3 P.M., daily, and compared with the mean temperature.

	AUTUMNAL PERIOD.			BRUMAL PERIOD.			12 Days of August.	MEANS.		
	Feb.	March.	April.	May.	June.	July.		Autum.	Brumal.	Au. & Br.
	°	°	°	°	°	°	°	°	°	°
Monthly mean tem. from Table II.	51·10	49·37	41·22	35·47	32·97	33·03	33·25	47·23	34·49	40·86
Temperature of dew point	41·31	40·75	34·83	34·88	30·28	29·41	30·28	38·96	31·52	35·24
Difference between mean temperat. and dew point	9·79	8·62	6·39	0·59	2·69	3·62	2·97	8·27	2·30	5·28
Dryness (the point of Saturation being 1000)	711·8	736·42	809·9	980·6	903·8	876·3	894·6	752·71	920·23	836·47
Elasticity of vapour	295·7	289·0	238·64	239·04	202·24	196·46	202·2	274·44	212·58	243·51
Weight of a cubic foot of vapour in grains	3·3441	3·2801	2·7550	2·7926	2·3731	2·3048	2·3421	3·1264	2·4902	2·8083

Table IV.

Months.	Pressure.			Temperature.						Dew Point, Hygrometer.		
				Air.			Water.					
	Max.	Min.	Range.	Max.	Min.	Range	Max.	Min.	Range	Max.	Min.	Range
	inches.	inches.	inches.	°	°	°	°	°	°	°	°	°
February	30·087	28·768	1·319	66	28	38·0	52·5	43·7	8·8	51·2	31	20·2
March	30·099	29·004	1·095	68	30·5	37·5	50·5	41·5	9·0	47	35	12
April	30·055	28·844	1·211	57·5	28	29·5	47·8	40·5	7·3	42	27	15
May	29·850	28·795	1·055	49·5	20·5	29·0	48·2	42·8	5·4	43	21	22
June	30·079	28·274	1·805	48·7	19·2	29·5	47·0	40·3	6·7	41·5	20	21·5
July	30·500	28·942	1·558	44·2	12·6	31·6	45·0	41·8	3·2	39·7	19	20·7
August 12 days	29·782	28·709	1·073	49·2	18·5	30·7	43·1	40·2	2·9	37·2	20·5	16·7

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From the preceding tables it will be seen that the mean temperature for the autumnal period (the months of February, March, and April) was 47°·2; the maximum and minimum were respectively 68° and 28°. For the brumal period, the three following months, the mean temperature was 34°·5, and the maximum and minimum 49° 5 and 12°·6. During the former, or autumnal period, the barometer ranged between 30·099 and 28·768 inches, and for the latter it was between 30·5 and 28·274 inches. The range for the first being 1·331 inches, and for the last 2·226 inches.

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EXTRACT

FROM THE

BEAGLE'S 'GAME' BOOK, 1830.

Date.	Giver.	Given for Fresh Provisions.
May 16	Mr. May	4 Ducks, 2 Redbills.
—	George West	3 Gulls, 1 Goose.
17	Mr. Murray	90 lbs. of Guanaco meat.
19	Capt. Fitz-Roy.....	36 Fish (from Natives).
19	Do.	10 Shags, 4 Redbills.
27	J. Bennett	2 Shags, 1 Goose, 3 Penguins.
June 6	J. Bennett	7 Shags, 14 Fish.
7	Capt. Fitz-Roy.....	1 Albatross, 1 Bittern.
16	Lieut. Kempe	5 Shags, 2 Geese.
16	Mr. Brailey	1 Hawk, 1 Owl.
16	Jas. Forsyth	17 Redbills, 5 Sea-pigeons.
17	Do.	15 Redbills, 1 Hawk.
19	Do.	6 Shags.
—	Lieut. Kempe	16 Shags, 4 Ducks, 6 Redbills, 4 Sea-pigeons.
20	Lieut. Kempe, Mr. Stokes, and J. Forsyth	41 Shags, 3 Steamer-ducks, 11 Redbills, 5 Sea-pigeons, 3 Hawks, 2 Owls.

Note.—Otters, foxes, and seal, were tried more than once, but discarded. Very young seal, however, were liked, as well as young penguins.

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EXTRACT

FROM THE

BEAGLE'S 'GAME' BOOK, 1830.

Date.	Given as Fresh Provisions.	To whom.
May 17	4 Ducks, 1 Goose.....	The Sick.
—	3 Gulls, 2 Redbills	The Fuegians.
18	90 lbs. of Guanaco meat	All Hands.
19	36 Fish.....	Sick & Fuegians.
20	6 Shags, 2 Redbills	Sick.
21	4 Shags, 2 Redbills	Fuegians.
28	2 Shags.....	Sick.
29	1 Goose, 3 Penguins ...	Fuegians.
June 7	7 Shags, 14 Fish	Sick.
8	1 Albatross, 1 Bittern.	Fuegians.
17 / 18	5 Shags, 17 Redbills, 1 Owl, 5 Pigeons, 2 Hawks, 2 Geese	All Hands.*
19	6 Shags.....	Sick and Fuegians.
20	16 Shags, 4 Ducks, 6 Redbills	All Hands.†
21	20 Shags, 9 Pigeons, 2 Owls	All Hands.
23	11 Shags, 6 Redbills, 3 Hawks	All Hands.‡
24	5 Shags, 5 Redbills.....	Sick and Fuegians.
25	5 Shags, 3 Steamers ...	

* Except gun-room, second and third messes.

† Except cabin, fourth and fifth messes.

‡ Except cabin, sixth and seventh messes.

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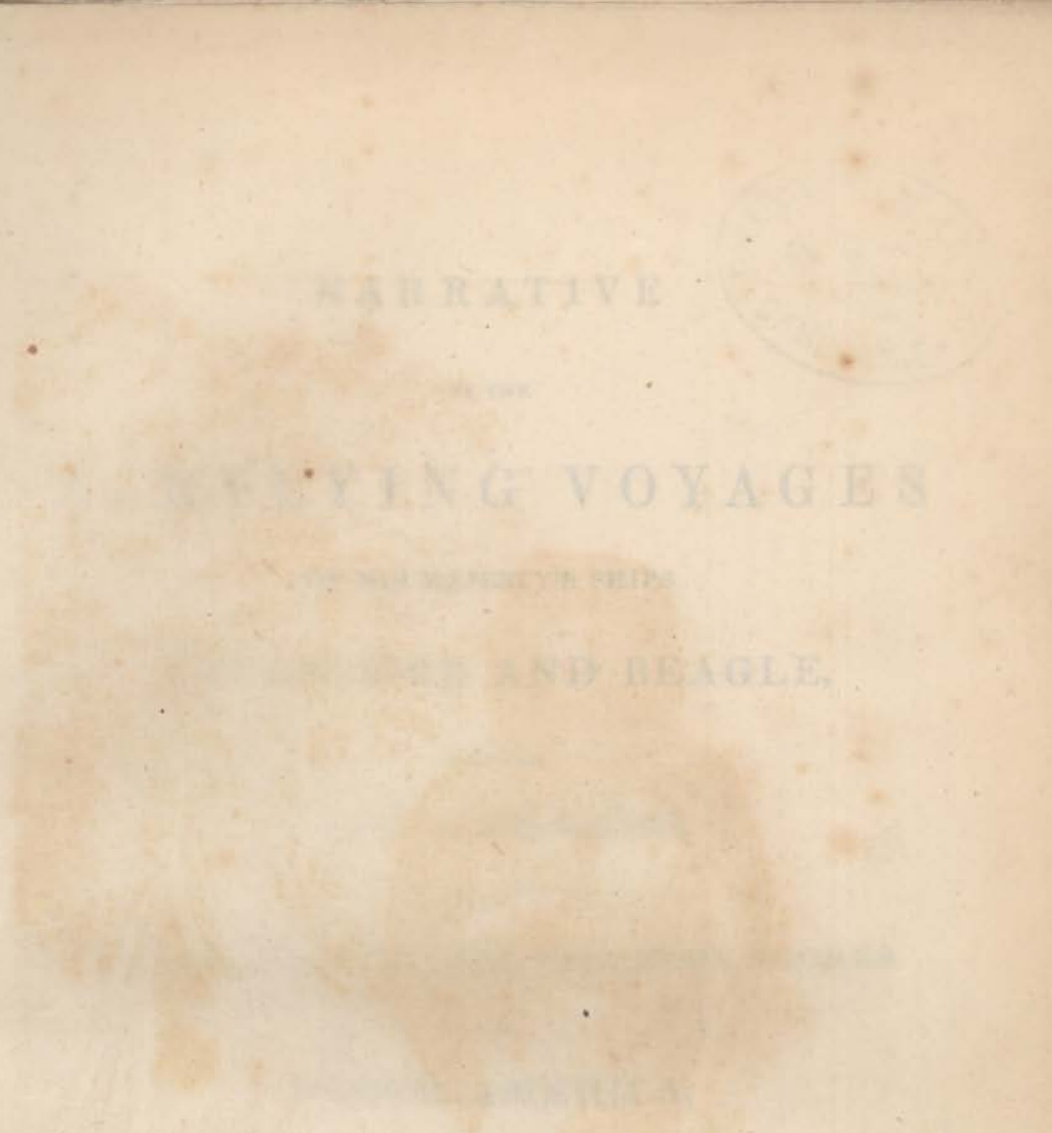

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FOR PLACING THE PLATES.

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SURVEYING VOYAGES

OF

THE BEAGLE.

1831—1836.

CHAPTER I.

Explanation—Natives of Tierra del Fuego, or Fuegians—Passages across the Equator (Atlantic)—Letters—Small-pox—Hospital—Boat Memory—Fuegians in London—At Walthamstow—At St. James's—Beagle recommissioned—Correspondence with Mr. Wilson—Fuegians re-embark.

As the following narrative of the Beagle's second voyage to South America is a sequel to the "Surveying Voyages of the Adventure and the Beagle," which are related in the preceding volume, it may be advisable that this chapter should contain a sketch of some few incidents intimately connected with the origin and plan of the second Expedition.

Captain King has already mentioned that the two ships under his orders sailed from Rio de Janeiro, on their homeward passage, early in August 1830.

During the time which elapsed before we reached England, I had time to see much of my Fuegian companions; and daily became more interested about them as I attained a further acquaintance with their abilities and natural inclinations. Far,

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very far indeed, were three of the number from deserving to be called savages—even at this early period of their residence among civilized people — though the other, named York Minster, was certainly a displeasing specimen of uncivilized human nature.

The acts of cannibalism occasionally committed by their countrymen, were explained to me in such terms, and with such signs, that I could not possibly misunderstand them ; and a still more revolting account was given, though in a less explicit manner, respecting the horrible fate of the eldest women of their own tribes, when there is an unusual scarcity of food.

This half-understood story I did not then notice much, for I could not believe it ; but as, since that time, a familiarity with our language has enabled the Fuegians to tell other persons, as well as myself, of this strange and diabolical atrocity ; and as Mr. Low (of whom mention will often be made in the following pages) was satisfied of the fact, from the concurrent testimony of other Fuegians who had, at different times, passed months on board his vessel, I no longer hesitate to state my firm belief in the most debasing trait of their character which will be found in these pages.

At the sea-ports which the Beagle visited in her way from Tierra del Fuego to England, animals, ships, and boats seemed to engage the notice of our copper-coloured friends far more than human beings or houses. When any thing excited their attention particularly, they would appear, at the time, almost stupid and unobservant ; but that they were not so in reality was shown by their eager chattering to one another at the very first subsequent opportunity, and by the sensible remarks made by them a long time afterwards, when we fancied they had altogether forgotten unimportant occurrences which took place during the first few months of their sojourn among us.

A large ox, with unusually long horns, excited their wonder remarkably ; but in no instance was outward emotion noticed, to any great degree, excepting when they saw a steam-vessel going into Falmouth Harbour. What extraordinary monster it was, they could not imagine. Whether it was a

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huge fish, a land animal, or the devil (of whom they have a notion in their country), they could not decide; neither could they understand the attempted explanations of our sailors, who tried to make them comprehend its nature: but, indeed, I think that no one who remembers standing, for the first time, near a railway, and witnessing the rapid approach of a steam-engine, with its attached train of carriages, as it dashed along, smoking and snorting, will be surprised at the effect which a large steam-ship, passing at full speed near the Beagle, in a dark night, must have had on these ignorant, though rather intelligent barbarians.

Before relating occurrences subsequent to our arrival in England, I must ask permission to make the first of a few nautical remarks that will be found in this volume, some of which, I hope, may be useful to young sailors.

Our passage across the Atlantic, from Rio de Janeiro to Falmouth, was unusually long. In order to sail within sight of the Cape Verd Islands, for a particular purpose, we steered eastward from the coast of Brazil, and crossed the equator far east. This course, unavoidable in our case, carried us into that tract of ocean, between the trade-winds, which in August and September is subject to westerly winds—sometimes extremely strong—and we encountered a very heavy gale, although so near the equator. Afterwards, when close to our own shores, we were unfortunate enough to be delayed by what seamen call a hard-hearted easterly wind; and not until the middle of October were we moored in a British port.

As a remarkable contrast, a Falmouth packet, which sailed from Rio de Janeiro some time after our departure, steered northward, as soon as she had cleared the coast of Brazil, crossed the line far to the west, and arrived in England a fortnight before us.

My own humble opinion, with respect to crossing the equator, is, that an outward-bound ship ought to cross near twenty-five—and that one homeward-bound may go even beyond thirty degrees of west longitude—but should not attempt to pass eastward of twenty-five. Ships crossing the line between

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twenty-five and thirty degrees west, are, I believe, far less subject to detention—taking the year through—than those which adopt easterly courses.

Cape St. Roque, St. Paul Rocks, Fernando Noronha, and the Roccas, ought not to be thought of too lightly; but in avoiding them, and the lee current near St. Roque, many ships have encountered the tedious calms, extremely hot weather, frequent torrents of rain, and violent squalls, which are more or less prevalent between the longitudes of twenty and ten degrees west.

To return to the Fuegians. While on our passage home I addressed the following letter to my commanding officer and kind friend, Captain King.

" Sir, Beagle, at sea, Sept. 12, 1830.

" I have the honour of reporting to you that there are now on board of his Majesty's sloop, under my command, four natives of Tierra del Fuego.

" Their names and estimated ages are,

York Minster	26
Boat Memory	20
James Button	14
Fuegia Basket (a girl)	9

" I have maintained them entirely at my own expense, and hold myself responsible for their comfort while away from, and for their safe return to their own country: and I have now to request that, as senior officer of the Expedition, you will consider of the possibility of some public advantage being derived from this circumstance; and of the propriety of offering them, with that view, to his Majesty's Government.

" If you think it proper to make the offer, I will keep them in readiness to be removed according to your directions.

" I am now to account for my having these Fuegians on board, and to explain my future views with respect to them.

" In February last, the Beagle being moored in ' Townshend Harbour,' on the south-west coast of Tierra del Fuego, I sent Mr. Matthew Murray (master), with six men, in a whale-boat, to Cape Desolation; the projecting part of a small,

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but high and rugged island, detached from the main land, and twelve miles distant from Townshend Harbour.

"Mr. Murray reached the place, and secured his party and the boat in a cove near the cape: but during a very dark night, some Fuegians, whose vicinity was not at all suspected, approached with the dexterous cunning peculiar to savages and stole the boat.

"Thus deprived of the means of returning to the Beagle, and unable to make their situation known, Mr. Murray and his party formed a sort of canoe, or rather basket, with the branches of trees and part of their canvas tent, and in this machine three men made their way back to the Beagle, by his directions: yet, although favoured by the only fine day that occurred during the three weeks which the Beagle passed in Townshend Harbour, this basket was twenty hours on its passage.

"Assistance was immediately given to the master and the other men, and a chase for our lost boat was begun, which lasted many days, but was unsuccessful in its object, although much of the lost boat's gear was found, and the women and children of the families from whom it was recovered, were brought on board as hostages. The men, excepting one of them, escaped from us, or were absent in our missing boat.

"At the end of February the Beagle anchored in Christmas Sound; but before this time all our prisoners had escaped, except three little girls, two of whom we restored to their own tribe, near 'Whale-boat Sound,' and the other is now on board.

"From the first canoe seen in Christmas Sound, one man was taken as a hostage for the recovery of our boat, and to become an interpreter and guide. He came to us with little reluctance, and appeared unconcerned.

"A few days afterwards, traces of our boat were found at some wigwams on an island in Christmas Sound, and from the families inhabiting those wigwams I took another young man, for the same purpose as that above-mentioned. No useful information respecting our lost boat was, however, gained from them, before we were obliged to leave that coast, and she remained the prize of their companions.

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"Afterwards, when in Nassau Bay, our captives informed us that the natives of that part of the coast, and all to the eastward, were their enemies, and that they spoke a different language. This intelligence was extremely disappointing, and made me anxious to persuade one of this eastern tribe to come on board and stay with us; but I had then no hopes of doing so, and gave up the idea: however, some time afterwards, accidentally meeting three canoes, when away in my boat exploring the Beagle Channel, I prevailed on their occupants to put one of the party, a stout boy, into my boat, and in return I gave them beads, buttons, and other trifles. Whether they intended that he should remain with us permanently, I do not know; but they seemed contented with the singular bargain, and paddled again towards the cove from which they had approached my boat. We pulled on along shore, attended by other canoes, which had been endeavouring to barter with us whenever we stopped; but at dusk they ceased following, us and went ashore.

"When about to depart from the Fuegian coast, I decided to keep these four natives on board, for they appeared to be quite cheerful and contented with their situation; and I thought that many good effects might be the consequence of their living a short time in England. They have lived, and have been clothed like the seamen, and are now, and have been always, in excellent health and very happy. They understand why they were taken, and look forward with pleasure to seeing our country, as well as to returning to their own.

"Should not his Majesty's Government direct otherwise, I shall procure for these people a suitable education, and, after two or three years, shall send or take them back to their country, with as large a stock as I can collect of those articles most useful to them, and most likely to improve the condition of their countrymen, who are now scarcely superior to the brute creation.

"I have, &c.
ROBERT FITZ-ROY,
Commander."

"Phillip Parker King, Esq.
Commander H.M.S. Adventure,
Senior officer of the Expedition."

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This letter was forwarded to the Admiralty by Captain King, as soon as he arrived in England; and a few days afterwards the following answer was received.

"Sir, Admiralty Office, 19th Oct. 1830.

"Having laid before my Lords Commissioners of the Admiralty your letter and its enclosure from Commander Fitz-Roy, of the Beagle, relative to the four Indians whom he has brought from Tierra del Fuego under the circumstances therein stated; I am commanded to acquaint you that their Lordships will not interfere with Commander Fitz-Roy's personal superintendence of, or benevolent intentions towards these four people, but they will afford him any facilities towards maintaining and educating them in England, and will give them a passage home again.

"I am, &c.

"To Commander King, (Signed) JOHN BARROW."
H.M.S.V. Adventure."

I was, of course, anxious to protect the Fuegians, as far as possible, from the contagion of any of those disorders, sometimes prevalent, and which unhappily have so often proved fatal to the aboriginal natives of distant countries when brought to Europe; and, immediately after our arrival in England, they landed with me, after dark, and were taken to comfortable, airy lodgings, where, next day, they were vaccinated, for the second time.

Two days afterwards they were carried a few miles into the country, to a quiet farm-house, where I hoped they would enjoy more freedom and fresh air, and, at the same time, incur less risk of contagion than in a populous sea-port town, where curiosity would be excited.

Meanwhile, the Beagle was stripped and cleared out; and the Adventure went to Woolwich for a similar purpose, preparatory to being paid off. On the 27th of October, the Beagle's pendant was hauled down; and on the 15th of November, the Adventure was put out of commission.

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Both vessels' crews were dispersed, as usual, unfortunately; and of those who had passed so many rough hours together, but few were likely to meet again. I much regretted the separation from my tried and esteemed shipmates, and from our excellent little vessel.

Soon afterwards, Captain King and Lieutenant Skyring were promoted: a gratifying proof of the good opinion of their exertions and conduct, which was entertained by the Lords Commissioners of the Admiralty.

Early in November I received the sad intelligence that the young man, called Boat Memory, was taken ill; and that the symptoms of his disorder were like those of the small-pox. Dr. Armstrong, of the Royal Hospital at Plymouth, whose advice I solicited, suggested that he and the other three Fuegians should be received immediately into the hospital, with the view of preventing further infection, and ensuring the best treatment for the poor sufferer. Dr. Armstrong applied to the physician, Dr. Dickson (now Sir David Dickson), as well as Sir James Gordon, the superintendent, and by their advice and permission the Fuegians were removed into the hospital without delay; and an application was made to the Admiralty, of which the following is a copy.

"Sir, "Devonport, 7th Nov. 1830.

"I have the honour of addressing you to request that the four Fuegians, whom I brought to England in the Beagle, may be received into the Royal Naval Hospital.

"The Lords Commissioners of the Admiralty have stated in a letter to Commander King, dated 19th Oct. 1830, that 'their Lordships will not interfere with Commander Fitz-Roy's personal superintendance of, or benevolent intentions towards these four people, but they will afford him any assistance in maintaining and educating them in England, and will give them a passage home again.'

"In consequence of this assurance, I now beg that you will draw their Lordships' attention to the circumstance of an eruption having broken out upon one of the Fuegian men, since he

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was vaccinated, which is supposed, by the medical officers of the hospital, to be the small-pox.

"As the other three individuals have been always in company with him, it is to be feared that they also are affected; and as the vaccination has not yet taken a proper effect, it is the opinion of the medical officers that it would be safer to receive them into the hospital, until the present critical period is passed, than to allow them to remain in private care.

"I have further to request, that my late coxswain, James Bennett, may be permitted to accompany, and remain with the Fuegians, in order to attend upon them, in the event of their Lordships allowing them to be admitted into the hospital; and I hope, Sir, that the peculiar nature of the case may be thought to justify this application.

"I have, &c.

"The Secretary of the Admiralty. ROBERT FITZ-ROY, Commander."

"Sir, Admiralty-Office, 10th Nov. 1830.

"I am commanded by my Lords Commissioners of the Admiralty to acquaint you, in answer to your letter of this day's date, that directions have been given for the admission of the four Fuegians therein alluded to, into the Naval Hospital at Plymouth, and that James Bennett be allowed to attend them, agreeably with your request.

"I am, Sir, &c.

"Commander Fitz-Roy. (Signed) "JOHN BARROW."

The Admiralty having thus sanctioned the admission of the Fuegians into one of the best hospitals, and assured that they could not be under better treatment than that of the well-known gentlemen whom I have mentioned, I felt less anxiety in leaving them for a time, as I was obliged to do, in order to attend to duties connected with the survey; but I had hardly reached London, when a letter from Dr. Dickson informed me of the untimely fate of Boat Memory. He had been vaccinated four different times; but the three first opera-

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tions had failed, and the last had just taken effect, when the disease showed itself. It was thought that the fatal contagion must have attacked him previously.

This poor fellow was a very great favourite with all who knew him, as well as with myself. He had a good disposition, very good abilities, and though born a savage, had a pleasing, intelligent appearance. He was quite an exception to the general character of the Fuegians, having good features and a well-proportioned frame. It may readily be supposed that this was a severe blow to me, for I was deeply sensible of the responsibility which had been incurred; and, however unintentionally, could not but feel how much I was implicated in shortening his existence. Neither of the others were attacked, the last vaccination having taken full effect; but they were allowed to remain in the hospital for some time longer, until I could make satisfactory arrangements for them. While they were under Dr. Dickson's care, in the hospital, his own children had the measles; and thinking that it would be a good opportunity to carry the little Fuegian girl through that illness, he prepared her for it, and then took her into his house, among his own children; where she had a very favourable attack, and recovered thoroughly.

Of course, I was anxious that no time should be lost in arranging a plan for their education and maintenance; and deeming the Church Missionary Society to be in some measure interested about the project I had in view, I applied to their secretary, through whose kindness I became acquainted with the Rev. Joseph Wigram; to whom I am under great obligations for the friendly interest taken at that time in my wishes with respect to the Fuegians, and for introducing them and myself to the notice of the Rev. William Wilson, of Walthamstow. Mr. Wilson at once relieved my mind from a load of uncertainty and anxiety, by saying that they should be received into his parish, and that he would talk to the master of the Infant School about taking them into his house, as boarders and pupils. In a short time, it was arranged that the school-

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master should receive, and take entire charge of them, while they remained in England, and should be paid by me for their board and lodging, for his own trouble, and for all contingent expenses.

Mr. Wilson proposed to keep a watchful eye over them himself, and give advice from time to time to their guardian and instructor. Mr. Wigram also lived at Walthamstow, and as he would have frequent opportunities of offering a useful caution, in case that the numerous calls upon Mr. Wilson's attention should at any time render additional thoughts for the Fuegians an unfair or unpleasant trouble to him—I did indeed think that no plan could be devised offering a better prospect; and immediately made arrangements for conveying them to London.

The inside of a stage-coach was taken, and under the guidance of Mr. Murray (the Beagle's late master), attended by James Bennett, they arrived in Piccadilly, and were immediately carried to Walthamstow, without attracting any notice. Mr. Murray told me that they seemed to enjoy their journey in the coach, and were very much struck by the repeated changing of horses.

I took them myself from the coach-office to Walthamstow; they were glad to see me, but seemed bewildered by the multitude of new objects. Passing Charing Cross, there was a start and exclamation of astonishment from York. 'Look!' he said, fixing his eyes on the lion upon Northumberland House, which he certainly thought alive, and walking there. I never saw him show such sudden emotion at any other time. They were much pleased with the rooms prepared for them at Walthamstow; and the schoolmaster and his wife were equally pleased to find the future inmates of their house very well disposed, quiet, and cleanly people; instead of fierce and dirty savages.

At Walthamstow they remained from December 1830 till October 1831; and during all that time were treated with the utmost kindness by the benevolent men whose names I have mentioned; by their families, and by many others in the

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neighbourhood, as well as casual visitors, who became much interested in their welfare, and from time to time gave them several valuable presents.

The attention of their instructor was directed to teaching them English, and the plainer truths of Christianity, as the first object; and the use of common tools, a slight acquaintance with husbandry, gardening, and mechanism, as the second. Considerable progress was made by the boy and girl; but the man was hard to teach, except mechanically. He took interest in smith's or carpenter's work, and paid attention to what he saw and heard about animals; but he reluctantly assisted in garden work, and had a great dislike to learning to read. By degrees, a good many words of their own languages were collected (the boy's differed from that of the man and the girl), and some interesting information was acquired, respecting their own native habits and ideas. They gave no particular trouble; were very healthy; and the two younger ones became great favourites wherever they were known. Sometimes I took them with me to see a friend or relation of my own, who was anxious to question them, and contribute something to the increasing stock of serviceable articles which I was collecting for their use, when they should return to Tierra del Fuego. My sister was a frequent benefactress; and they often talked, both then and afterwards, of going to see 'Cappen Sisser.'

During the summer of 1831, his late Majesty expressed to Colonel Wood a wish to see the Fuegians, and they were taken to St. James's. His Majesty asked a great deal about their country, as well as themselves; and I hope I may be permitted to remark that, during an equal space of time, no person ever asked me so many sensible and thoroughly pertinent questions respecting the Fuegians and their country also relating to the survey in which I had myself been engaged, as did his Majesty. Her Majesty Queen Adelaide also honoured the Fuegians by her presence, and by acts of genuine kindness which they could appreciate, and never forgot. She left the room, in which they were, for a minute, and returned with one

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of her own bonnets, which she put upon the girl's head. Her Majesty then put one of her rings upon the girl's finger, and gave her a sum of money to buy an outfit of clothes when she should leave England to return to her own country.

I must now revert to matters more immediately connected with the Beagle's second voyage.

My own official duties, relating to the survey, were completed in March 1831; when my late commanding officer, Captain King, addressed a letter to the Lords Commissioners of the Admiralty expressive of his approbation of the part I had taken, under his direction, and recommending me to their Lordships.*

From various conversations which I had with Captain King, during the earlier period of my service under him, I had been led to suppose that the survey of the southern coasts of South America would be continued; and to some ship, ordered upon such a service, I had looked for an opportunity of restoring the Fuegians to their native land.

Finding, however, to my great disappointment, that an entire change had taken place in the views of the Lords of the Admiralty, and that there was no intention to prosecute the survey, I naturally became anxious about the Fuegians; and, in June, having no hopes of a man-of-war being sent to Tierra del Fuego, and feeling too much bound to these natives to trust them in any other kind of vessel, unless with myself—because of the risk that would attend their being landed anywhere, excepting on the territories of their own tribes—I made an agreement† with the owner of a small merchant-vessel, the John of London, to carry me and five other persons to such places in South America as I wished to visit, and eventually to land me at Valparaiso.

My arrangements were all made, and James Bennett, who was to accompany me, had already purchased a number of goats, with which I purposed stocking some of the islands of Tierra del Fuego—when a kind uncle, to whom I mentioned

* Appendix. † Ibid.

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my plan, went to the Admiralty, and soon afterwards told me that I should be appointed to the command of the Chanticleer, to go to Tierra del Fuego.

My agreement with the owner of the John was, however, in full force, and I could not alter it without paying a large proportion of the whole sum agreed on for the voyage.

The Chanticleer was not, upon examination, found quite fit for service; and, instead of her, I was again appointed to my well-tried little vessel, the Beagle. My commission was dated the 27th of June, and on the same day two of my most esteemed friends, Lieutenants Wickham and Sulivan, were also appointed.

While the Beagle was fitting out at Devonport, I received the following letter from Mr. Wilson.

" Sir, Walthamstow, 5th Aug. 1831.

" I am informed that the Fuegians who have been lately resident in this place are shortly to return to their native country under your care. Will you permit me to ask whether, if two individuals should volunteer to accompany and remain with them, in order to attempt to teach them such useful arts as may be thought suited to their gradual civilization, you will give them a passage in the Beagle? and whether, upon your arrival on the coast of Tierra del Fuego, you will be able to give them some assistance in establishing a friendly intercourse with, and settlement amongst the natives of that country? Would these individuals be required to pay you for their passage, and maintenance on board? or would his Majesty's Government allow them to be maintained on board at the public expense? Do you think that you would be able to visit them, after their first settlement, supposing so desirable an object should be attained, in order to give them some encouragement, and perhaps assistance; or to remove them if they should find it impracticable to continue their residence among the natives?

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"A subscription has been set on foot by gentlemen who are extremely desirous that this opportunity of extending the benefits of civilization should not be lost; and, in consequence of their united wishes, I now take the liberty of asking these questions.

"I am, &c.

(Signed) "WILLIAM WILSON."

"To Captain Fitz-Roy, R.N."

After reading this communication, I wrote to the Secretary of the Admiralty, and enclosed a copy of Mr. Wilson's letter. The answer is subjoined.

"Sir, Admiralty Office, 10th Aug. 1831.

"Having laid before my Lords Commissioners of the Admiralty your letter of yesterday's date, with the letter which accompanied it, from the Rev. William Wilson, respecting the natives of Tierra del Fuego who were brought to England in his Majesty's ship Beagle; I am commanded to acquaint you that their Lordships will give the necessary orders for the passage of these individuals, and of the two persons who are to accompany them; and that your request to be allowed to visit these people, after their arrival, will be taken into consideration in preparing your instructions.

"I am, &c.

(Signed) "JOHN BARROW."

"To Commander Fitz-Roy,

"H.M.S. Beagle."

In consequence of this reply, it was wished that two persons should accompany the Fuegians, and endeavour to pass some time in their country: but it was not easy to find individuals sufficiently qualified, and in whom confidence could be placed, who would willingly undertake such an enterprise. One young man was selected by Mr. Wilson, but a companion for him could not be found in time to embark on board the Beagle.

In October the party from Walthamstow arrived, in a

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steam-vessel, at Plymouth, and not a few boats were required to transport to our ship the large cargo of clothes, tools, crockery-ware, books, and various things which the families at Walthamstow and other kind-hearted persons had given. In the small hold of the Beagle, it was not easy to find places for the stowage of so many extra stores; and when dividing the contents of large chests, in order to pack them differently, some very fair jokes were enjoyed by the seamen, at the expense of those who had ordered complete sets of crockery-ware, without desiring that any selection of articles should be made.

Instructions were given, by the Secretary of the Church Missionary Society, to the young man who wished to accompany the Fuegians, which will be found in the Appendix; and although he was rather too young, and less experienced than might have been wished, his character and conduct had been such as to give very fair grounds for anticipating that he would, at least, sincerely endeavour to do his utmost in a situation so difficult and trying as that for which he volunteered.

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CHAPTER II.

Hydrographer's Opinion—Continuation of Survey—Chain of Meridian Distances—Efficient Arrangements—Repair and raise Deck—Outfit—Boats—Lightning-Conductors—Rudder—Stove—Windlass—Chronometers—Mr. Darwin—Persons on board—Changes—List of those who returned—Supplies—Admiralty Instructions—Memorandum—Hydrographer's Memorandum.

When it was decided that a small vessel should be sent to Tierra del Fuego, the Hydrographer of the Admiralty was referred to for his opinion, as to what addition she might make to the yet incomplete surveys of that country, and other places which she might visit.

Captain Beaufort embraced the opportunity of expressing his anxiety for the continuance of the South American Surveys, and mentioning such objects, attainable by the Beagle, as he thought most desirable: and it was soon after intimated to me that the voyage might occupy several years. Desirous of adding as much as possible to a work in which I had a strong interest, and entertaining the hope that a chain of meridian distances might be carried round the world if we returned to England across the Pacific, and by the Cape of Good Hope; I resolved to spare neither expense nor trouble in making our little Expedition as complete, with respect to material and preparation, as my means and exertions would allow, when supported by the considerate and satisfactory arrangements of the Admiralty: which were carried into effect (at that time) by the Navy Board, the Victualling Board, and the Dockyard officers at Devonport.

The Beagle was commissioned on the 4th of July 1831, and was immediately taken into dock to be thoroughly examined, and prepared for a long period of foreign service. As she required a new deck, and a good deal of repair about the upper works, I obtained permission to have the upper-deck

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raised considerably,* which afterwards proved to be of the greatest advantage to her as a sea boat, besides adding so materially to the comfort of all on board. While in dock, a sheathing of two-inch fir plank was nailed on the vessel's bottom, over which was a coating of felt, and then new copper. This sheathing added about fifteen tons to her displacement, and nearly seven to her actual measurement. Therefore, instead of 235 tons, she might be considered about 242 tons burthen. The rudder was fitted according to the plan of Captain Lihou: a patent windlass supplied the place of a capstan: one of Frazer's stoves, with an oven attached, was taken instead of a common 'galley' fire-place; and the lightning-conductors, invented by Mr. Harris, were fixed in all the masts, the bowsprit, and even in the flying jib-boom. The arrangements made in the fittings, both inside and outside, by the officers of the Dock-yard, left nothing to be desired. Our ropes, sails, and spars, were the best that could be procured; and to complete our excellent outfit, six superior boats† (two of them private property) were built expressly for us, and so contrived and stowed that they could all be carried in any weather.

Considering the limited disposable space in so very small a ship, we contrived to carry more instruments and books than one would readily suppose could be stowed away in dry and secure places; and in a part of my own cabin twenty-two chronometers were carefully placed.

Anxious that no opportunity of collecting useful information, during the voyage, should be lost; I proposed to the Hydrographer that some well-educated and scientific person should be sought for who would willingly share such accommodations as I had to offer, in order to profit by the opportunity of visiting distant countries yet little known. Captain Beaufort approved of the suggestion, and wrote to Professor Peacock, of Cambridge, who consulted with a friend, Professor Henslow, and he named Mr. Charles Darwin, grandson of Dr. Darwin the poet, as a young man of promising ability,

* Eight inches abaft and twelve forward.

† Besides a dinghy carried astern.

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extremely fond of geology, and indeed all branches of natural history. In consequence an offer was made to Mr. Darwin to be my guest on board, which he accepted conditionally; permission was obtained for his embarkation, and an order given by the Admiralty that he should be borne on the ship's books for provisions. The conditions asked by Mr. Darwin were, that he should be at liberty to leave the Beagle and retire from the Expedition when he thought proper, and that he should pay a fair share of the expenses of my table.

Knowing well that no one actively engaged in the surveying duties on which we were going to be employed, would have time—even if he had ability—to make much use of the pencil, I engaged an artist, Mr. Augustus Earle, to go out in a private capacity; though not without the sanction of the Admiralty, who authorized him also to be victualled. And in order to secure the constant, yet to a certain degree mechanical attendance required by a large number of chronometers, and to be enabled to repair our instruments and keep them in order, I engaged the services of Mr. George James Stebbing, eldest son of the mathematical instrument-maker at Portsmouth, as a private assistant.

The established complement of officers and men (including marines and boys) was sixty-five: but, with the supernumeraries I have mentioned, we had on board, when the Beagle sailed from England, seventy-four persons, namely :—

Robert Fitz-Roy	Commander and Surveyor.
John Clements Wickham.....	Lieutenant.
Bartholomew James Sulivan	Lieutenant.
Edward Main Chaffers..,.....	Master.
Robert Mac-Cormick	Surgeon.
George Rowlett	Purser.
Alexander Derbishire	Mate.
Peter Benson Stewart	Mate.
John Lort Stokes.....	Mate and Assistant Surveyor.
Benjamin Bynoe	Assistant Surgeon.
Arthur Mellersh	Midshipman.
Philip Gidley King	Midshipman.

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Alexander Burns Usborne ..... Master's Assistant.
Charles Musters ..... Volunteer 1st Class.
Jonathan May ..... Carpenter.
Edward H. Hellyer ..... Clerk.
Acting boatswain : sergeant of marines and seven privates : thirty-four seamen and six boys.

On the List of supernumeraries were—
Charles Darwin ..... Naturalist.
Augustus Earle ..... Draughtsman.
George James Stebbing ..... Instrument Maker.
Richard Matthews and three Fuegians : my own steward : and Mr. Darwin's servant.

Some changes occurred in the course of the five years' voyage, which it may be well to mention in this place.

In April 1832, Mr. Mac-Cormick and Mr. Derbishire returned to England. Mr. Bynoe was appointed to act as Surgeon. Mr. Mellersh received a Mate's warrant; and Mr. Johnson joined the Beagle as Midshipman. In May Mr. Musters fell a victim to fever, caught in the harbour of Rio de Janeiro:—Mr. Forsyth took his place.

Mr. Earle suffered so much from continual ill health, that he could not remain on board the Beagle after August 1832; but he lived at Monte Video several months previously to his return to England. The disappointment caused by losing his services was diminished by meeting Mr Martens at Monte Video, and engaging him to embark with me as my draughtsman.

In March 1833, Mr. Hellyer was drowned at the Falkland Islands, in attempting to get a bird he had shot. In September 1833, Mr. Kent joined as Assistant Surgeon. In June 1834, Mr. Rowlett died, at sea, of a complaint under which he had laboured for years: and the vacancy caused by his lamented decease was filled by Mr. Dring.

Mr. Martens left me, at Valparasio, in 1834; and Mr. King remained with his father, at Sydney, in Australia, in February 1836. After these changes, and at our return to England in October 1836, the list stood thus—

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Robert Fitz-Roy	Captain and Surveyor.
John Clements Wickham	Lieutenant.
Bartholomew James Sulivan	Lieutenant.
Edward Main Chaffers	Master.
Benjamin Bynoe	Surgeon (Acting.)
John Edward Dring	Purser (Acting.)
Peter Benson Stewart	Mate.
John Lort Stokes	Mate and Assistant Surveyor.
Arthur Mellersh	Mate.
Charles Richardson Johnson	Mate.
William Kent	Assistant Surgeon.
Charles Forsyth	Midshipman.
Alexander Burns Usborne	Master's Assistant.
Thomas Sorrell	Boatswain (Acting.)
Jonathan May	Carpenter.

And on the List of supernumeraries were Mr. Darwin: George J. Stebbing: my steward: and Mr. Darwin's servant.

Our complement of seamen, marines, and boys was complete at our return, and generally during the voyage; because, although many changes happened, we had always a choice of volunteers to fill vacant places.

Many of the crew had sailed with me in the previous voyage of the Beagle; and there were a few officers, as well as some marines and seamen, who had served in the Beagle, or Adventure, during the whole of the former voyage. These determined admirers of Tierra del Fuego were, Lieutenant Wickham, Mr. Bynoe, Mr. Stokes, Mr. Mellersh, and Mr. King; the boatswain, carpenter, and sergeant; four private marines, my coxswain, and some seamen.

I must not omit to mention that among our provisions were various antiscorbutics—such as pickles, dried apples, and lemon juice—of the best quality, and in as great abundance as we could stow away; we had also on board a very large quantity of Kilner and Moorsom's preserved meat, vegetables, and soup: and from the Medical Department we received an ample supply of antiseptics, and articles useful for preserving specimens of natural history.

Not only the heads of departments exerted themselves for

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the sake of our health and safety, but the officers subordinate to them appeared to take a personal interest in the Beagle; for which I and those with me felt, and must always feel, most grateful.

Perhaps no vessel ever quitted her own country with a better or more ample supply (in proportion to her probable necessities) of every kind of useful provision and stores than the little ship of whose wanderings I am now about to give a brief and very imperfect narrative; and, therefore, if she succeeded in effecting any of the objects of her mission, with comparative ease and expedition, let the complete manner in which she was prepared for her voyage, by the Dock-yard at Devonport, be fully remembered.

On the 15th of November I received my instructions from the Lords Commissioners of the Admiralty.

INSTRUCTIONS

By the Commissioners for executing the office of Lord High Admiral of the United Kingdom of Great Britain and Ireland, &c.

"You are hereby required and directed to put to sea, in the vessel you command, so soon as she shall be in every respect ready, and to proceed in her, with all convenient expedition, successively to Madeira or Teneriffe; the Cape de Verde Islands; Fernando Noronha; and the South American station; to perform the operations, and execute the surveys, pointed out in the accompanying memorandum, which has been drawn up under our direction by the Hydrographer of this office; observing and following, in the prosecution of the said surveys, and in your other operations, the directions and suggestions contained in the said memorandum.

"You are to consider yourself under the command of Rear-Admiral Sir Thomas Baker, Commander-in-chief of his Majesty's ships on the South American station, whilst you are within the limits of that station, in execution of the services

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above-mentioned; and in addition to the directions conveyed to you in the memorandum, on the subject of your supplies of provisions, we have signified to the Rear-Admiral our desire that, whenever the occasion offers, you should receive from him and the officers of his squadron, any assistance, in stores and provisions, of which you may stand in need.

"But during the whole time of your continuing on the above duties, you are (notwithstanding the 16th article of the 4th section of the 6th chapter, page 78, of the General Printed Instructions) to send reports, by every opportunity, to our Secretary, of your proceedings, and of the progress you make.

"Having completed the surveys which you are directed to execute on the South American station, you are to proceed to perform the several further operations set forth in the Hydrographer's memorandum, in the course therein pointed out; and having so done, you are to return, in the vessel you command, to Spithead, and report your arrival to our Secretary, for our information and further directions.

"In the event of any unfortunate accident happening to yourself, the officer on whom the command of the Beagle may in consequence devolve, is hereby required and directed to complete, as far as in him lies, that part of the survey on which the vessel may be then engaged, but not to proceed to a new step in the voyage; as, for instance, if at that time carrying on the coast survey on the western side of South America, he is not to cross the Pacific, but to return to England by Rio de Janeiro and the Atlantic.

"Given under our hands, the 11th of November 1831.

(Signed) "T. M. HARDY,

"G. BARRINGTON."

"To Robert Fitz-Roy, Esq.,
Commander of his Majesty's surveying vessel
'Beagle,' at Plymouth."

"By command of their Lordships,

(Signed) "GEO. ELLIOT."

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" Sir ; Admiralty Office, 11th November 1831.

" With reference to the order which my Lords Commissioners of the Admiralty have this day addressed to you, I am commanded by their lordships to transmit to you a memorandum, to be shown by you to any senior officer who may fall in with you, while you are employed on the duties pointed out in the above order.

" I am, Sir, &c.

(Signed) " Geo. Elliot."

" To Commander Fitz-Roy,
' Beagle' surveying vessel, Plymouth."

" Admiralty Office, 11th November 1831.

" Memorandum.

" My Lords Commissioners of the Admiralty having ordered Commander Fitz-Roy, of his Majesty's surveying vessel the ' Beagle,' to make surveys of various parts of the South American station, it is their lordships' direction that no senior officer who may fall in with Commander Fitz-Roy, while he is employed in the above important duties, do divert him therefrom, or in any way interfere with him, or take from him, on any account, any of his instruments or chronometers.

(Signed) " Geo. Elliot."

" Memorandum.

" A considerable difference still exists in the longitude of Rio de Janeiro, as determined by Captains King, Beechey, and Foster, on the one hand, and Captain W. F. Owen, Baron Roussin, and the Portuguese astronomers, on the other; and as all our meridian distances in South America are measured from thence, it becomes a matter of importance to decide between these conflicting authorities. Few vessels will have ever left this country with a better set of chronometers, both public and private, than the Beagle; and if her voyage be made in short stages, in order to detect the changes which take place in all chronometers during a continuous increase of temperature, it will probably enable us to reduce that difference within limits too small to be of much import in our future conclusions.

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"With this view, the run to Rio de Janeiro may be conveniently divided into four parts:—

"1st. Touching at Madeira, the exact position of which has been admitted by all parties. Having obtained a four days' rate there, or, if the weather and the exposed anchorage will not permit, at Teneriffe, the Beagle should, 2dly, proceed with the least possible delay to Port Praya, in the Cape de Verde Islands, not only to establish a fresh four days' rate; but that point being the pivot on which all Captain Owen's longitudes turn, no pains should be spared in verifying the position he has assumed for it. From thence, 3dly, she should make the best of her way across the Line to Fernando Noronha. This island, indeed, lies somewhat to the westward of her track, and may retard her progress a little; yet a series of chronometric observations there is essential to the object in view, because it forms the third nearly equal division of the whole run, and because it was the point of junction of Commander Foster's double line of longitudes. If two or three days' delay at either of these two last stations will enable him to obtain satisfactory occultations, and moon culminating observations, which are likely to be seen in this country, the increased certainty of the results will well atone for that loss of time. The Commander will, of course, be careful to adopt, in all those stations, the precise spot of the former observations, with which his are to be compared. The Governor of Fernando Noronha was peculiarly obliging to Commander Foster, and gave up part of his own house for the pendulum experiments. There will be no occasion now for trespassing so heavily on his kindness; but the difference of longitude between that station and Commander Fitz-Roy's must be well measured.

"However desirable it may be that the Beagle should reach Rio de Janeiro as soon as possible, yet the great importance of knowing the true position of the Abrolhos Banks, and the certainty that they extend much further out than the limits assigned to them by Baron Roussin, will warrant the sacrifice of a few days, if other circumstances should enable her to beat down about the meridian of 36° W. from the latitude of

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16° S. The deep sea-line should be kept in motion; and if soundings be obtained, the bank should be pursued both ways, out to the edge, and in to that part already known.

" Its actual extent to the eastward, and its connection with the shoals being thus ascertained, its further investigation may be left to more convenient opportunities.

" At Rio de Janeiro, the time necessary for watering, &c. will, no doubt, be employed by the commander in every species of observation that can assist in deciding the longitude of Villegagnon Island.

" It is understood that a French Expedition is now engaged in the examination of the coast between St. Catherine's and the Rio de la Plata; it would therefore be a waste of means to interfere with that interval; and Commander Fitz-Roy should be directed to proceed to Monte Video, and to rate his chronometers in the same situation occupied by Captain King.

" To the southward of the Rio de la Plata, the real work of the survey will begin. Of that great extent of coast which reaches from Cape St. Antonio to St. George's bay, we only know that it is inaccurately placed, and that it contains some large rivers, which rise at the other side of the continent, and some good harbours, which are undoubtedly worth a minute examination. Much of it, however, from the casual accounts of the Spaniards, seems to offer but little interest either to navigation or commerce, and will scarcely require more than to have its direction laid down correctly, and its prominent points fixed. It should nevertheless be borne in mind there, and in other places, that the more hopeless and forbidding any long line of coast may be, the more precious becomes the discovery of a port which affords safe anchorage and wholesome refreshments.

" The portions of the coast which seem to require particular examination are—

" 1st. From Monte Hermoso to the Rio Colorado, including the large inlet of Bahia Blanco, of which there are three manuscripts in this office that differ in every thing but in name.

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"2dly. The gulf of Todos los Santos, which is studded in the Spanish charts with innumerable islands and shoals. It is said to have an excellent harbour on its southern side, which should be verified; but a minute survey of such an Archipelago would be a useless consumption of time, and it will therefore be found sufficient to give the outer line of the dangers, and to connect that line with the regular soundings in the offing.

"3dly. The Rio Negro is stated to be a river of large capacity, with settlements fifty miles from its mouth, and ought to be partially reconnoitred as far as it is navigable.

"4thly. The gulf of San Matias should be examined, especially its two harbours, San Antonio and San José, and a narrow inlet on the eastern side of the peninsula, which, if easy of access, appears to be admirably situated: and—

"5thly. From the Bahia Nueva to Cape Blanco, including the Gulf of St. George, the coast is of various degrees of interest, and will accordingly require to have more or less time bestowed on its different parts. The position of Cape Blanco should be determined, as there appears to be an error of some miles in its latitude, as well as much doubt about the places of two shoals which are marked near it in the Spanish charts.

"From Cape Blanco to the Strait of Magalhaens, the coast has been partially corrected by Captain King; and Port Desire, having been carefully placed by him, will afford a good place for rating the chronometers, and an opportunity for exploring the river.

"Port San Julian, with its bar and wide river, should be surveyed, as well as any parts of that interval which were not visited in the last expedition.

"The above are the principal points of research between the Rio de la Plata and the Strait. They have been consecutively mentioned in order to bring them into one point of view; but that part of this service would perhaps be advantageously postponed till after the Beagle's first return from the southward; and, generally speaking, it would be unwise to lay down here a specific route from which no deviation

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would be permitted. Where so many unforeseen circumstances may disturb the best-concerted arrangements, and where so much depends on climates and seasons with which we are not yet intimately acquainted, the most that can be safely done is to state the various objects of the voyage, and to rely on the Commander's known zeal and prudence to effect them in the most convenient order.

"Applying this principle to what is yet to be done in the Strait, and in the intricate group of islands which forms the Tierra del Fuego, the following list will show our chief desiderata.

"Captain King, in his directions, alludes to a reef of half a mile in length, off Cape Virgins, and in his chart he makes a seven fathoms' channel outside that reef; and still further out, five fathoms with overfalls. Sarmiento places fifty fathoms at ten miles E.S.E. from that Cape; thirteen fathoms at nineteen miles; and, at twenty-one miles in the same direction, only four fathoms, besides a very extensive bank projecting from Tierra del Fuego, between which and the above shoals Malaspina passed in thirteen fathoms. In short, there is conclusive evidence of there being more banks than one that obstruct the entrance to the Strait, and undoubtedly their thorough examination ought to be one of the most important objects of the Expedition; inasmuch, as a safe approach to either straits or harbours is of more consequence to determine than the details inside.

"None of the above authors describe the nature of these shoals, whether rock or sand; it will be interesting to note with accuracy the slope, or regularity, of the depths, in their different faces, the quality of their various materials, and the disposition of the coarse or fine parts, as well as of what species of rock in the neighbourhood they seem to be the detritus; for it is probable that the place of their deposition is connected with the very singular tides which seem to circulate in the eastern end of the Strait.

"Beginning at Cape Orange, the whole north-eastern coast of Tierra del Fuego as far as Cape San Diego should be sur-

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veyed, including the outer edge of the extensive shoals that project from its northern extreme, and setting at rest the question of the Sebastian Channel.

"On the southern side of this great collection of islands, the Beagle Channel and Whale-boat Sound should be finished, and any other places which the Commander's local knowledge may point out as being requisite to complete his former survey, and sufficiently interesting in themselves to warrant the time they will cost; such as some apparently useful ports to the westward of Cape False, and the north side of Wakefield Channel, all of which are said to be frequented by the sealers.

"In the north-western part it is possible that other breaks may be found interrupting the continuity of Sta Ines Island, and communicating from the Southern Ocean with the Strait; these should be fully or cursorily examined, according to their appearance and promise; and though it would be a very useless waste of time to pursue in detail the infinite number of bays, openings, and roads, that teem on the western side of that island, yet no good harbour should be omitted. It cannot be repeated too often that the more inhospitable the region, the more valuable is a known port of refuge.

"In the western division of the Strait, from Cape Pillar to Cape Froward, there are a few openings which may perhaps be further explored, on the chance of their leading out to sea; a few positions which may require to be reviewed; and a few ports which were only slightly looked into during Captain King's laborious and excellent survey, and which may now be completed, if likely to augment the resources of ships occupied in those dreary regions.

"In the eastern division of the Strait there is rather more work to be done, as the Fuegian shore from Admiralty Sound to Cape Orange has not been touched. Along with this part of the service, the Islands of Saints Martha and Magdalena, and the channel to the eastward of Elizabeth Island, will come in for examination; and there is no part of the Strait which requires to be more accurately laid down and distinctly described, from the narrowness of the channels and the trans-

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verse direction of the tides. Sweepstakes Foreland may prove to be an Island; if so, there may be found an useful outlet to the long lee-shore that extends from Cape Monmouth; and if not, perhaps some safe ports might be discovered in that interval for vessels caught there in strong westerly gales.

"It is not likely that, for the purposes of either war or commerce, a much more detailed account will be necessary of those two singular inland seas, Otway and Skyring Waters, unless they should be found to communicate with one of the sounds on the western coast, or with the western part of the Strait. The general opinion in the former Expedition was certainly against such a communication, and the phenomena of the tides is also against it; still the thing is possible, and it becomes an interesting geographical question, which a detached boat in fine weather will readily solve.

"These several operations may probably be completed in the summer of 1833-34, including two trips to Monte Video for refreshments; but before we finally quit the eastern coast of South America, it is necessary to advert to our present ignorance of the Falkland Islands, however often they have been visited. The time that would be occupied by a rigorous survey of this group of islands would be very disproportionate to its value; but as they are the frequent resort of whalers, and as it is of immense consequence to a vessel that has lost her masts, anchors, or a large part of her crew, to have a precise knowledge of the port to which she is obliged to fly, it would well deserve some sacrifice of time to have the most advantageous harbours and their approaches well laid down, and connected by a general sketch or running survey. Clear directions for recognizing and entering these ports should accompany these plans; and as most contradictory statements have been made of the refreshments to be obtained at the east and west great islands, an authentic report on that subject by the Commander will be of real utility.

"There is reason to believe that deep soundings may be traced from these islands to the main, and if regular they would be of great service in rectifying a ship's place.

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"Having now stated all that is most urgent to be done on this side of the South American Continent as well as in the circuit of Tierra del Fuego, the next step of the voyage will be Concepçion, or Valparaiso, to one of which places the Beagle will have to proceed for provisions, and where Captain King satisfactorily determined the meridian distances.

"The interval of coast between Valparaiso and the western entrance of the Strait has been partly surveyed, as well as most of the deep and narrow channels formed by the islands of Hanover, Wellington, and Madre de Dios; but of the sea face of that great chain of islands which stretches from Queen Adelaide Archipelago to Campana Island, little has yet been done. It presents a most uninviting appearance, can probably afford but little benefit to the navigator, and the chief object in urging its partial examination, is to remove a blank from this great survey, which was undertaken by Great Britain from such disinterested motives, and which was executed by Captains King and Fitz-Roy with so much skill and zeal.

"The experience gained by the latter in that climate will enable him to accomplish all that is now required in much less time than it would have occupied in the beginning of the former expedition.

"At the Gulf of Peñas the last survey terminated. Of the peninsula de Tres Montes, and of the islands between that and Chiloé, a Spanish manuscript has been procured from Don Felipe Bauzá, which may greatly abridge the examination of that interval.

"From thence to Valdivia, Concepçion, and Valparaiso, the shore is straight, and nearly in the direction of the meridian, so that it will require no great expenditure of time to correct the outline, and to fix the positions of all the salient points. Mocha Island is supposed to be erroneously placed: and the depth, breadth, and safety of its channel are not known.

"To the south of Valparaiso the port of Topocalmo and the large shoal in the offing on which an American ship was wrecked, require special examination; and according to Captain Burgess, of the Alert, the coast and islands near Coquimbo

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are very imperfectly laid down. Indeed of the whole of this coast, the only general knowledge we have is from the Spanish charts, which seem, with the exception of certain ports, to have been merely the result of a running view of the shore. Of this kind of half-knowledge we have had too much: the present state of science, which affords such ample means, seems to demand that whatever is now done should be finally done; and that coasts, which are constantly visited by English vessels, should no longer have the motley appearance of alternate error and accuracy. If, therefore, the local Governments make no objections, the survey should be continued to Coquimbo, and indefinitely to the northward, till that period arrives when the Commander must determine on quitting the shores of South America altogether. That period will depend on the time that has been already consumed, and on the previous management of his resources, reserving sufficient to ensure his obtaining a series of well-selected meridian distances in traversing the Pacific Ocean.

"The track he should pursue in executing this important duty cannot well be prescribed here, without foreseeing to what part of the coast he may have pushed the survey, and at what place he may find it convenient to take in his last supplies. If he should reach Guayaquil, or even Callao, it would be desirable he should run for the Galapagos, and, if the season permits, survey that knot of islands. Felix Island, the London bank seen by the brig Cannon, in 1827, in 27° 6′ S. 92° 16′ W., even with the water's edge, and half a mile in length; some coral islands, supposed to be 5° or 6° south of Pitcairn Island, and other spots, which have crept into the charts on doubtful authority, would all be useful objects of research if the Beagle's route should fall in their vicinity. But whatever route may be adopted, it should conduct her to Tahiti, in order to verify the chronometers at Point Venus, a point which may be considered as indisputably fixed by Captain Cook's and by many concurrent observations. Except in this case, she ought to avoid as much as possible the ground examined by Captain Beechey.

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"From Tahiti the Beagle should proceed to Port Jackson touching at some of the intervening islands, in order to divide the run into judicious chronometer stages; for the observatory at Paramatta (Port Jackson) being absolutely determined in longitude, all those intervening islands will become standard points to which future casual voyagers will be able to refer their discoveries or correct their chronometers.

"From Port Jackson her course will depend on the time of the year. If it be made by the southward, she might touch at Hobart Town, King George Sound, and Swan River, to determine the difference of longitude from thence to the Mauritius, avoiding the hurricane months; to Table or Simon's Bay, according to the season; to St. Helena, Ascension, and home.

"If she should have to quit Port Jackson about the middle of the year, her passage must be made through Torres Strait. In her way thither, if the in-shore route be adopted, there are several places whose positions it will be advantageous to determine:—Moreton Bay, Port Bowen, Cape Flinders, and one of the Prince of Wales Islands; and in pursuing her way towards the Indian Ocean, unless the wind should hang to the southward, Cape Valsche or the south-west extreme of New Guinea, one of the Serwatty Chain, Coupang, or the extreme of Timor, Rotte Island, and one of the extremes of Sandalwood Island, may be easily determined without much loss of time. And, perhaps, in crossing the ocean, if circumstances are favourable, she might look at the Keeling Islands, and settle their position.

"Having now enumerated the principal places at which the Beagle should be directed to touch in her circuit of the globe, and described the leading operations which it would be desirable to effect, it remains to make some general remarks on the conduct of the whole survey.

"In such multiplied employments as must fall to the share of each officer, there will be no time to waste on elaborate drawings. Plain, distinct roughs, every where accompanied by explanatory notes, and on a sufficiently large scale to show the

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minutiæ of whatever knowledge has been acquired, will be documents of far greater value in this office, to be reduced or referred to, than highly finished plans, where accuracy is often sacrificed to beauty.

" This applies particularly to the hills, which in general cost so much labour, and are so often put in from fancy or from memory after the lapse of months, if not of years, instead of being projected while fresh in the mind, or while any inconsistencies or errors may be rectified on the spot. A few strokes of a pen will denote the extent and direction of the several slopes much more distinctly than the brush, and if not worked up to make a picture, will really cost as little or less time. The in-shore sides of the hills, which cannot be seen from any of the stations, must always be mere guess-work, and should not be shown at all.

" It should be considered an essential branch of a nautical survey, to give the perpendicular height of all remarkable hills and headlands. It requires but a single angle at each station, adds much to our geographical knowledge, materially assists the draftsman, and by tables which are now printing it will afford to the seaman a ready and exact means of knowing his distance.

" All charts and plans should be accompanied by views of the land ; those which are to be attached to the former should be taken at such a distance as will enable a stranger to recognize the land, or to steer for a certain point ; and those best suited for the plan of a port should show the marks for avoiding dangers, for taking a leading course, or choosing an advantageous berth. In all cases the angular distances and the angular altitudes of the principal objects should be inserted in degrees and minutes on each of the views, by which means they can be projected by scale, so as to correct any want of precision in the eye of the draftsman. Such views cannot be too numerous; they cost but a few moments, and are extremely satisfactory to all navigators.

" Trifling as it may appear, the love of giving a multiplicity of new and unmeaning names tends to confuse our geogra-

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phical knowledge. The name stamped upon a place by the first discoverer should be held sacred by the common consent of all nations; and in new discoveries it would be far more beneficial to make the name convey some idea of the nature of the place; or if it be inhabited, to adopt the native appellation, than to exhaust the catalogue of public characters or private friends at home. The officers and crews, indeed, have some claim on such distinction, which, slight as it is, helps to excite an interest in the voyage.

"Constant observations on the tides, including their set, force, and duration, the distance to which they carry salt water up the rivers, their rise at the different periods of the lunation, and the extent to which they are influenced by the periodic winds, by the sea currents, or by the river freshes, form so prominent a part of every surveyor's duty, that no specific directions on this subject can be necessary. Nor is there any occasion to insist here on the equally important subject of currents; for it is only by a great accumulation of data that we can ever hope to reduce them to regular systems, or that we can detect the mode in which they are affected by change of seasons, or influenced by distant winds.

"The periods and limits of the monsoons and trade-winds will naturally be a continual object of the Commander's observation and study. It is true that he can only witness what occurs during his voyage; but besides collecting facts on this and the last subject, on which others can hereafter reason, it will be of immense advantage that he should endeavour to digest them with the remarks of former voyagers when on the spot.

"On the western coast of South America, for instance, some skill is required in making passages at different periods, and much scattered experience has been gained by seamen who have been long occupied there; but this information has not yet been presented to the public in an intelligible form; and it seems to be the peculiar province of an officer expressly employed on a scientific mission like this, to combine that information with his own, and to render it accessible to every navigator.

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"The local attraction of the Beagle will of course have been ascertained before she leaves England; but when favourable opportunities occur, it will be satisfactory to swing her again in different latitudes, and under large differences of variation.

"No day should pass at sea without a series of azimuths, and no port should be quitted without having ascertained not only the magnetic angle, but the dip, intensity, and diurnal variation. If these observations should have been well made in the same places before, we shall at once obtain the annual change; and by multiplying them in new places, we shall have the means of inferring the magnetic curves.

"The Commander has been so accustomed to the management of chronometers, that there is no doubt, with proper precautions and with proper formulæ for determining their rates, that he will succeed in obtaining good results in reasonably short intervals of time and in gradual changes of temperature; but after long periods, and sudden changes of heat and cold, it will be absolutely necessary to check them by astronomical means.

"Eclipses, occultations, lunar distances, and moon-culminating stars, will furnish those means in abundance: of all these, the last can be obtained with the greatest regularity and certainty; they have become part of the current business at the establishments of the Cape of Good Hope, Paramatta, and St. Helena, in the southern hemisphere; probably at Madras, and in many of the European observatories, and it will therefore be scarcely possible that there should not be corresponding observations for all such as he may have made.

"The eclipses of Jupiter's third and fourth satellites should also be sedulously observed whenever both immersion and emersion can be seen, as the different powers of the telescopes employed by the observers do not in that case affect the results.

"There are also some remarkable phenomena, which will be announced in the Nautical Almanacks, and which will occur during the Beagle's voyage. Some of these will be highly

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interesting to astronomers, and if it would not much derange her operations, she should be taken to some convenient anchorage for the purpose of landing the instruments.

"If a comet should be discovered while the Beagle is in port, its position should be determined every night by observing its transit over the meridian, always accompanied by the transits of the nearest known stars, and by circum-meridional altitudes, or by measuring its angular distance from three well-situated stars by a sextant. This latter process can be effected even at sea, and the mean of several observations may give very near approximations to its real position.

"Meteorological Registers may be of use in a variety of ways; but then they must be steadily and accurately kept. The barometer should be read off to the third place of decimals, and recorded at regular periods of the day; nine o'clock and four o'clock may be recommended as the best, as being the usual hours of its maximum and minimum. The temperature should be marked at the same time, and the extremes of the self-registering thermometer should be daily recorded; care being taken that no reflected heat should act on any of these instruments. The temperature of the sea at the surface ought to be frequently observed and compared with that of the air. An officer cruizing on the east coast of South America, between the parallels of 20° and 35°, was enabled by these means to predict with singular precision the direction and strength of the current.

"In this register the state of the wind and weather will, of course, be inserted; but some intelligible scale should be assumed, to indicate the force of the former, instead of the ambiguous terms 'fresh,' 'moderate,' &c., in using which no two people agree; and some concise method should also be employed for expressing the state of the weather. The suggestions contained in the annexed printed paper are recommended for the above purposes, and if adopted, a copy should be pasted on the first page of every volume of the log-book; and the officer of the watch should be directed to use the same terms in the columns of the log-board.

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"The circularly-formed Coral Islands in the Pacific occasionally afford excellent land-locked harbours, with a sufficient entrance, and would be well adapted to any nice astronomical observations which might require to be carried on in undisturbed tranquillity. While these are quietly proceeding, and the chronometers rating, a very interesting inquiry might be instituted respecting the formation of these coral reefs.

"An exact geological map of the whole island should be constructed, showing its form, the greatest height to which the solid coral has risen, as well as that to which the fragments appear to have been forced. The slope of its sides should be carefully measured in different places, and particularly on the external face, by a series of soundings, at very short distances from each other, and carried out to the greatest possible depths, at times when no tide or current can affect the perpendicularity of the line. A modern and very plausible theory has been put forward, that these wonderful formations, instead of ascending from the bottom of the sea, have been raised from the summits of extinct volcanoes; and therefore the nature of the bottom at each of these soundings should be noted, and every means exerted that ingenuity can devise of discovering at what depth the coral formation begins, and of what materials the substratum on which it rests is composed. The shape, slope, and elevation of the coral knolls in the lagoon would also help the investigation; and no circumstances should be neglected which can render an account of the general structure clear and perspicuous.

"A set of observations connected with the theory of the tides might likewise be carried on with peculiar propriety in one of these coral basins, provided the openings should be sufficiently wide and deep to admit the flux and reflux without material impediment. The island selected for such a purpose should be nearly midway in the ocean, and not very far from the equator. There the tidal wave, uninfluenced by the interrupting barrier of one continent, and equally far from the reaction of the other, might be measured with very beneficial results. Delicate tide-gauges should be prepared beforehand,

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and immediately fixed in some snug nook, where the undulation of the sea could not reach. The rise and fall of the tide should be registered every hour, during the stay of the Beagle, as well as the moments (stated whether in apparent or mean time) of high and low water, as nearly as they can be obtained; and the periods at which the sea and land breezes spring up and fail should likewise be noted, with their effects on the tide, if they can be detected. A boat should be detached, on each tide, to some distance from the island, in order to ascertain the strength and direction of the stream; and all these operations should be continued, if possible, through a whole lunation.

"Compiling general and particular instructions, for the navigation of all the places which he may visit, will of course be an essential part of the Commander's duty; but he will also have innumerable opportunities of collecting a variety of auxiliary information, which, when judiciously combined with the above instructions, of a purely nautical character, will much enhance their utility to all classes of vessels. Such as the general resources on which ships may depend in different places: the chief productions that can be obtained, and the objects most anxiously desired in return: the effect of seasons, of climate, and of peculiar articles of food on the health of the crew, and many others which will readily occur to his mind, and which become of great value to a stranger.

"On all the subjects touched on in these memoranda, Commander Fitz-Roy should be directed to draw up specific reports, and to transmit them from time to time, through their Lordship's Secretary, to the Hydrographic Office, so that if any disaster should happen to the Beagle, the fruits of the expedition may not be altogether lost. Besides such reports, and with the same object in view, he should keep up a detailed correspondence by every opportunity with the Hydrographer.

"The narrative of every voyage in the Pacific Ocean abounds with proofs of the necessity of being unremittingly on guard against the petty treacheries or more daring attacks of the natives. It should be recollected that they are no longer the timid and unarmed creatures of former times, but that many of

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them now possess fire-arms and ammunition, and are skilful in the use of them. Temper and vigilance will be the best preservatives against trivial offences and misunderstandings, which too often end in fatal quarrels; and true firmness will abandon objects of small importance, where perseverance must entail the necessity of violence; for it would be a subject of deep regret that an expedition devoted to the noblest purpose, the acquisition of knowledge, should be stained by a single act of hostility.

(Signed) "F. BEAUFORT."

"Hydrographical Office, 11th November 1831."

FIGURES

TO DENOTE THE FORCE OF THE WIND.

0	Calm.		
1	Light Air.....	Or just sufficient to give steerage way.	
2	Light Breeze	Or that in which a man-of-war, with all sail set, and clean full, would go in smooth water from	1 to 2 knots.
3	Gentle Breeze ..		3 to 4 knots.
4	Moderate Breeze		5 to 6 knots.
5	Fresh Breeze	Or that to which a well-conditioned man-of-war could just carry in chase, full and by	Royals, &c.
6	Strong Breeze....		Single-reefed topsails and top-gall. sails.
7	Moderate Gale ..		Double-reefed topsails, jib, &c.
8	Fresh Gale		Treble-reefed topsails, &c.
9	Strong Gale.....		Close-reefed topsails and courses.
10	Whole Gale	Or that with which she could scarcely bear close-reefed main-topsail and reefed fore-sail.	
11	Storm	Or that which would reduce her to storm stay-sails.	
12	Hurricane	Or that which no canvass could withstand.	

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LETTERS

TO DENOTE THE STATE OF THE WEATHER.

b Blue Sky; (whether clear, or hazy, atmosphere).
c Clouds; (detached passing clouds).
d Drizzling Rain.
f Foggy——f Thick fog.
g Gloomy (dark weather).
h Hail.
l Lightning.
m Misty (hazy atmosphere).
o Overcast (or the whole sky covered with thick clouds).
p Passing (temporary showers).
q Squally.
r Rain (continued rain).
s Snow.
t Thunder.
u Ugly (threatening appearances).
v Visible (clear atmosphere).
w Wet Dew.
. Under any letter, indicates an extraordinary degree.

By the combination of these letters, all the ordinary phenomena of the weather may be expressed with facility and brevity.

Examples :—Bcm, Blue sky, with passing clouds, and a hazy atmosphere.

Gv, Gloomy dark weather, but distant objects remarkably visible.

Qpdlt, Very hard squalls, with passing showers of drizzle, and accompanied by lightning with very heavy thunder.

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CHAPTER III.

Ready for sea—Detained—Sail from England—Well provided—Bay of Biscay — Compasses — Local attraction — Eight Stones—Madeira—Deception—Squall—Teneriffe — Santa Cruz—Quarantine—Squalls—Cape Verd Islands—Port Praya—Produce—Archilla—Bad season—St. Paul Rocks — Cross Equator — Fernando Noronha — Bahia — Slavery—Abrolhos—Cape Frio.

In November, the Beagle was ready for sea, but a succession of hard gales from the westward prevented her leaving England until the end of December. Twice she sailed, and went a few leagues; yet was obliged to return in order to avoid the risk of being damaged, or losing a boat, at the very beginning of her voyage. At last the westerly gales seemed exhausted, a dead calm succeeded, and, warned by the appearances so peculiar to easterly winds, we unmoored at daylight on the 27th, and, as soon as the tide would allow, for there was still no breeze, we warped from our sheltered and picturesque retreat in Barn-pool, under that beautiful place Mount Edgecumbe.

Vessels in the offing, and distant land 'looming' much; a few mottled, hard-edged clouds appearing in the east; streaks (mare's tails) across the sky, spreading from the same quarter; a high barometer (30.3); and the smoke from chimneys rising high into the air, and then going westward; were the signs which assured us of a favourable wind. A light 'cat's paw' rippled the water, we made all sail, the breeze increased, and at noon our little vessel was outside the Breakwater, with a fresh easterly wind.

Of the bitter feelings experienced by most of us when every sail was trimmed, and the land sinking fast from our view, I will say nothing: yet there were enlivening hopes, and all were glad to be freed from the tiresome uncertainty of the past month, all were anxious to enter upon a voyage which, though

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likely to be very long, promised much that would interest, and excite, and perhaps reward.

To the executive officers of a ship it is always a most satisfactory feeling, independent of other thoughts, to be fairly at sea, and away from the scenes of irregularity which so often take place in ports. Those scenes, however, are now much less offensive, and the sailor is far less heedless than he was formerly, if we may take Fielding's description as authority. That humorous sensible author says, in one of the most entertaining accounts of a voyage ever written, "To say the truth, from what I observed in the behaviour of the sailors in this voyage, and comparing it with what I have formerly seen of them, at sea, and on shore, I am convinced that on land there is nothing more idle and dissolute; but, in their own element, there are no persons, near the level of their degree, who live in the constant practice of half so many good qualities."

Never, I believe, did a vessel leave England better provided, or fitted for the service she was destined to perform, and for the health and comfort of her crew, than the Beagle. If we did want any thing which could have been carried, it was our own fault; for all that was asked for, from the Dockyard, Victualling Department, Navy Board, or Admiralty, was granted.

To mention the names of those to whom my shipmates and myself felt most grateful for attention to requests, and for a kind foresight of our future wants, may be unnecessary, some may think improper; yet, at the risk of offending, I must try to express the gratitude that I, and those who sailed with me in the Beagle, owe to Sir James Graham, Sir Thomas Hardy, Captain Beaufort, Commissioner (now Admiral) Ross, Sir Robert Seppings, Sir James Gordon, the late Sir Manley Dixon, and Sir William Burnett: less I cannot say, more might be displeasing.

The wind increased, and drove us onwards into the Atlantic as fast as a heavily laden small vessel, with her 'scuppers' in the water, could be forced. We steered as southerly a course as was safe, in hopes of keeping the east wind longer, and the

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result proved that we were right; for although the Beagle had a fair wind all the way to the Canary Islands, vessels which sailed from England only one day after her, and steered more westerly, lost the east wind very soon, and were retarded by another succession of strong and contrary gales, similar to those which had detained us a whole month.

Individual misconduct, arising out of harbour irregularities, obliged me to have recourse to harsh measures before we had been two days at sea; but every naval officer knows the absolute necessity of a certain degree of what inexperienced persons might think unnecessary coercion, when a ship is recently commissioned. Hating, abhorring corporal punishment, I am nevertheless fully aware that there are too many coarse natures which cannot be restrained without it, (to the degree required on board a ship,) not to have a thorough conviction that it could only be dispensed with, by sacrificing a great deal of discipline and consequent efficiency. "Certainty of punishment, without severity," was a maxim of the humane and wise Beccaria; which, with our own adage about a timely 'stitch,' is extremely applicable to the conduct of affairs on board a ship, where so much often depends upon immediate decision, upon instant and implicit obedience.

We crossed the Bay of Biscay without a gale; though the heavy rolling of a vessel so deep in the water, running before a strong wind, was almost as disagreeable as the effects of one would have been. After witnessing high seas and storms in various parts of the world, I can call to mind only two or three that exceeded what I have myself experienced, or what I have heard described, as having been sometimes encountered in this famed bay.

Why should the sea be higher, or more dangerous, in the bay of Biscay, than it is in the middle of the Atlantic, or elsewhere?—Is it really so?—are questions often asked.

I believe that there is a shorter, higher, and consequently worse sea, in and near the Bay of Biscay, than is often found in other places, and attribute it to the effect of immense Atlantic waves, rolling into a deep bight, or bay, where

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they close upon each other and receive vibratory undulations from each shore; augmented perhaps by the peculiar formation of the bottom of that bay, the variation in depth, and the effects of currents, which, when running over uneven ground, or against the wind, alone cause a heavy swell; a striking exemplification of which may be seen on the bank of Lagullas, near the Cape of Good Hope.

Though so deep in the water, our little vessel's movements were uncommonly easy, and all our best timekeepers being hung in particularly good jimbals, I had no fear of their rates being altered, except by the effect of a change of temperature. This was a point about which I was especially anxious, as so much would depend upon the going of our chronometers, and I did not then think that the motions of a ship affected those instruments so little: as I have since proved to be the case by trying them frequently in boats, or small craft of only a few tons burthen. In her previous voyage the Beagle was as easy a sea-boat as could be desired; but, having raised her upper deck, altered her stowage and trim, loaded her more heavily, and sheathed her with two-inch plank, preparatory to this second expedition, I had abundant cause to feel anxious until the practical effects of such material changes were ascertained.

A little alteration was required near the compasses, for owing to some ill-placed iron-work they did not quite agree; but, after this change was made, we were gratified by finding four first-rate compasses, three fixed for steering, and one for bearings, agree precisely. Another source of satisfaction, connected with the compasses, was the knowledge that they were not affected, unless in a very trifling degree, by local attraction: for while lying in Barn-pool we swung the vessel in order to ascertain its quantity, but were agreeably surprised to find that none could be detected amounting even to one degree. This was attributed to her having only brass guns; and to some very large iron davits for the quarter boats, which were placed rather closely abaft and above the compasses, and perhaps counteracted the effect of iron in the hold, which was so much more distant.

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On the 3d of January we were occupied in looking for the "Eight Stones;" but nothing was seen to indicate either rocks, or shoals, or even shallow water. The sun was shining brightly on a deep blue sea, of one uniform colour: no soundings could be obtained; and had there been a shoal or rock within seven miles of us at any hour of that day, it could not have been passed unnoticed. So many vessels have searched, in vain, for this alleged group of rocks, that their existence can now hardly be thought possible.

At day-light, on the 4th, the rocky high islet of Porto Santo was seen looming through haze and clouds which hung around it. We steered between Porto Santo and the Desertas, intending to anchor in Funchal Roads; but the wind drew round to south-west, with such strong squalls, that I abandoned my intention, and at once steered for Teneriffe. The roadstead I have just mentioned is well known to be unsafe in south-west gales; and there can be no doubt that the most prudent plan is to keep at sea while they last: but I have been told by old traders to Madeira, that ships sometimes remain at anchor, about half a mile from the Loo rock, and ride out south-west gales without difficulty: the 'under-tow' being so considerable that their cables are little strained.

In fine weather, and it is fine at Madeira nine months in the year, the view of this steep and lofty island,* covered with bright verdure, and enlivened by numerous scattered houses, as white as snow, is very striking to a stranger who arrives from the low, and tame-looking shores of the south coast of England.

Seamen are often deceived, when about to anchor in Funchal Roads, in consequence of the sudden transition which they have probably made from a low shelving coast to an abrupt and high mountain-side: for the bottom of the anchorage slopes away as suddenly as the heights overlooking it, and the anchor must indeed be let go upon the side of a mountain. Hence ships seldom go close enough, unless guided by a person who knows the place; and many a chain cable ran out to the clinch, when chains were first used, owing to an incorrect estimate of

* About five thousand feet high.

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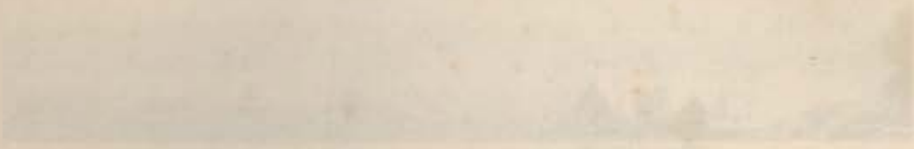

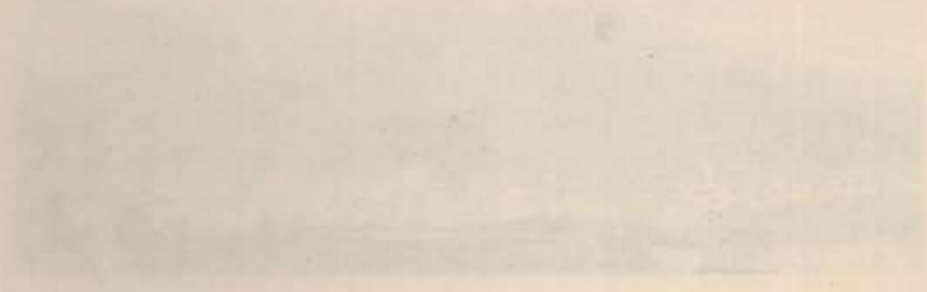

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PANORAMIC VIEW OF MADEIRA.

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the vessel's distance from the shore, and not taking time to sound accurately.

Closing the land quickly after passing some time at sea—approaching high cliffs, or hilly shores, after being, for a time, accustomed to low coasts—or nearing a flat shore, after the eye has been used to precipices and mountains—almost always is a cause of error in estimating distance, however experienced a seaman may be.

While passing at a few leagues from the land, a violent squall came from the west, which was near doing damage: after one puff there was a short calm, with heavy rain, and then a sudden blast struck the ship so violently that we were obliged to take in all sail and run before it during the few minutes it lasted. This squall was one of very many which have reminded me of the old doggrel lines—

> When rain comes before the wind,
> Halyards, sheets, and braces mind:
> But if wind comes before rain,
> Set and trim your sails again.

At daylight the next morning we saw the Salvages, and at sunset thought we could distinguish the Peak of Teneriffe.

Early on the 6th we saw part of the island, and soon afterwards the upper clouds dispersed, and we enjoyed a magnificent view of the monarch of the Atlantic: the snow-covered peak glittering in the rays of the morning sun. Yet as our ideas are very dependent upon comparison, I suppose that persons who have seen the Himalaya Mountains, or the Andes, in all their grandeur, would not dwell much upon the view of Teneriffe, had it not become classical by its historical associations, and by the descriptions of Humboldt and many distinguished travellers.

Although some geographers adopted the Peak of Teneriffe as a zero point from which to reckon longitude, I am free to say, that a less satisfactory one could hardly have been selected; because there are no means of connecting the position of the peak with that of the observer, whether on the shore of the

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island, or on board a ship in the offing, except by a trigonometrical process, always open to errors. Indeed the summit of the peak is not visible from the east, on account of intervening land, until the observer is at some distance from the shore. Hence all meridian distances measured from Teneriffe must depend upon the degree of accuracy with which the position of the actual starting-point, with respect to the Peak, was determined.

How many errors have been caused in ascertaining the longitudes of distant places, by a mistake in the longitude of the position from which a ship, or an observer, actually departed! How many discrepancies between the measurements of different nations would vanish, if the precise points from which each observer set out were known; and if the positions of those points, with respect to one another, were accurately verified!

About noon we approached the sun-burned, uninviting town of Santa Cruz. Lying upon a level, arid space, at the foot of hills, that rise slowly to a considerable height, so as to shut out the more elevated part of the island; hardly a tree to be seen, and no appearance of cultivation; guarded by a rocky shore, on which there is always a disagreeable—often a dangerous surf; it offers indeed little to tempt delay. But notwithstanding this unpromising exterior, and a port so exposed that Spanish ships of war were ordered by their Government to moor there with four anchors, there is much to be found in the higher and interior parts of Teneriffe which amply repays the labour of ascending to and exploring those regions. In one of the churches in Santa Cruz is still hanging the remains of a flag, taken from the English, or left behind, when Nelson lost his arm.

Our anchor had just touched the ground, when a boat from the Health Office approached nearly along-side, conveying the British vice-consul and some quarantine officers, who told us, after hearing whence we came, that it would be impossible to grant permission for any person to land; and that until we should have performed a strict quarantine of twelve days' duration, no personal communication could be expected. This

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regulation was adopted on account of the reports which had reached them respecting the cholera in England.

Observations on shore being indispensable for our purpose, and finding, after some discussion, that there was no chance of attaining our object in a manner that would at all compensate for the delay caused by anchoring and performing quarantine, we weighed without further loss of time, and made sail for the Cape Verd Islands.

This was a great disappointment to Mr. Darwin, who had cherished a hope of visiting the Peak. To see it—to anchor and be on the point of landing, yet be obliged to turn away without the slightest prospect of beholding Teneriffe again—was indeed to him a real calamity.

During the whole of the 7th, the Peak was visible; but on the following day no land was in sight, and we made rapid progress. A very long swell from the north-west, which we felt until the 10th, was probably caused by a gale in the northern Atlantic; and, judging from its size and velocity, I should think that it could not have subsided before traversing many, perhaps ten more, degrees of latitude; which would be to about 10° north. It is interesting to notice how far the undulatory movement of water reaches: in this case it extended through at least ten degrees of latitude where the wind was from different quarters, and probably much farther.

An unusual appearance was observed on the 12th. A cloud like a dense fog-bank approached; and as it drew near, the lower and darker part became arched, and rose rapidly, while under it was a white glare, which looked very suspicious. Sail was immediately reduced—we expected a violent squall; but the cloud dispersed suddenly, and only a common fresh breeze came from the foreboding quarter. Neither the sympiesometer nor the barometer had altered at all; but the cloud was so threatening that I put no trust in their indications, not being then so firm a believer in their prophetic movements as I am at present. Nevertheless, I would by no means advocate the neglect of any precaution suggested by appearances of the

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weather, although no change should be foretold by the glasses. A mistake may be made by the observer, or a variation in the height of the column may have passed unheeded; while it is seldom that a practised eye can be deceived by the visible signs of an approaching squall or gale of wind.

Undoubtedly the worst wind, next to a hurricane, which a vessel can encounter, is a violent 'white squall,' so called because it is accompanied by no cloud or peculiar appearance in the sky, and because of its tearing up the surface of the sea, and sweeping it along so as to make a wide sheet of foam. By squalls of this description, frequent in the West-Indies, and occasionally felt in other parts of the world, no notice will be given much above the horizon; but by consulting a good barometer or sympiesometer, and frequently watching the surface of the sea itself, even a white squall may be guarded against in sufficient time.

Squalls accompanied by clouds are so common, and at sea every one is so much accustomed to look out for them, that I may cause a smile by these notices; yet as there is often much doubt in a young officer's mind, whether an approaching cloud will be accompanied by wind or rain, or by both, and many persons are unable to distinguish, by the mere appearance of a cloud, what is likely to come with or from it, I will venture to mention that when they look hard, or hard-edged (like Indian ink rubbed upon an oily plate), they indicate wind, and perhaps rain; but before the rain falls, those clouds will assume a softer appearance. When they are undefined, and look soft, rain will follow, but probably not much wind.

Dark clouds, hard mixed with soft, and inky fragments in rapid motion beneath them, accompanied perhaps by lightning and distant thunder, are the fore-runners of a heavy squall. Soft, shapeless clouds, in which it is impossible to point out a definite edge, usually bring rain, but not wind: and, generally speaking, the more distinctly defined the edges of clouds are, the more wind they foretell. A little attention

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to these simple observations, so familar to persons who have been some time at sea, may save young officers unnecessary anxiety in one case, and prompt them to shorten sail at a proper time in the other.*

In again trying for soundings with three hundred fathoms of line, near the Island of St. Jago, we became fully convinced of the utility of a reel, which Captain Beaufort had advised me to procure, and of which Captain Vidal had spoken to him in very favourable terms. Two men were able to take in the deep sea line, by this machine, without interfering with any part of the deck, except the place near the stern, where the reel was firmly secured. Throughout our voyage this simple contrivance answered its object extremely well, and saved the crew a great deal of harassing work.

15th. In consequence of a thick haze, very prevalent about the Cape Verd Islands, land was not distinctly seen until we were within three miles of it, and we then found ourselves rather too far westward, owing to a current setting towards the west, at the rate of two knots an hour; this was close to the north point of St. Jago. Next day we anchored in Port Praya.

The wind being always from the north or east during this season of the year (from December to June), a ship can moor as close to the weather shore as may be convenient; but during July, August, September and October, no vessel should deem the bay secure, or anchor near the shore, because southerly gales sometimes blow with much strength, and the rollers, or heavy swell sent in by them, are dangerous to ships which have bad ground tackle, or are lying near the land. As I have myself experienced the force of these gales in the vicinity of the Cape Verd Islands, and witnessed the sea raised by them, I can confidently warn those who are inclined to be incredulous about a gale of wind being found in fifteen degrees of north latitude, beyond the limits of the hurricane regions.

* In the Appendix are a few remarks on clouds.

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Strong gusts come over the land into the bay during the fine season, when the breeze is fresh; therefore a ship entering, with intent to anchor, ought to have a reef in her top-sails, and be ready to clew up the top-gallant sails at a moment's warning.

The vicinity of Port Praya offers little that is agreeable to the eye of an ordinary visitor, though interesting enough to a geologist. A desolate and hilly country, sun-burned and stony, with but few trees even in the vallies, and those only the withering, spectre-like trunks of old palms, surrounds the harbour. The distant and higher parts of the island, however, present a striking outline; and in the interior there is more to be seen, as the following extract from a few notes made by Mr. Rowlett will show.

"We procured some indifferent horses and rode to Ribeira Grande, the remains of an old town, about nine miles west of Port Praya, which was formerly the residence of the Portuguese governor of the Cape Verd Islands; but in consequence of the anchorage becoming blocked up,* the seat of government was shifted to the small straggling town, or rather village, which stands upon a height overlooking the port of Praya. We passed through the fertile and beautiful vallies of Achao and San Martin, and enjoyed drinking some of the finest water we had ever tasted. On a commanding height stood the ruins of a very large fortress, and within the limits of the old town were remains of a cathedral, a bishop's palace, and a college; besides a modern church, in tolerable repair, an inhabited convent, and a hospital supported by charity. In the convent we saw some good paintings from scriptural subjects; and there were some curious old tombs, on one of which, said to be that of a bishop, was the date 1571, and on another we thought the almost obliterated figures were 1497.

"No person who has only visited the port of Praya can form the slightest idea of the beauty of the interior country; it exceeded any thing I had seen, either in Brazil or in the West Indies.

* Perhaps by an earthquake?

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"Fruit was abundant; there were oranges, grapes, plantains, bananas, sour-sops, mammee apples, pomegranates, guavas, quinces, sapodillas, papaw apples, pines, citrons, medlars, figs, and occasionally apples."

Notwithstanding its unfavourable exterior, its small and dirty town, and its black or brown population, I am inclined to think Port Praya of more consequence to shipping than is usually supposed. Water may be procured by rafting the casks, placing a pump in the well, and hiring a few of the natives to do the more laborious work of filling and rolling. The local authorities are attentive and obliging: it is indeed their interest to be so, because much of their trade, and even many of the necessaries of life, depend upon the visits of shipping. Fowls, turkeys, and pigs, are very plentiful, but it is better to procure them by barter than with money. Clothes, new or old, are eagerly sought for, and their full value may be obtained in the produce of the island.

The population is said to be about thirty thousand, a few of whom are Portuguese by birth, and many are descended from Portuguese parents, but the greater number are negroes.

I could hear no decided account of any earthquake having happened; but being so near Fogo, now an active volcano, one may suppose that St. Jago is not exempted from an occasional shock.

The exports of the Cape Verd Islands are small quantities of sugar, cotton, and coffee. Hides of small bullocks, sheep and goat-skins, are likewise exported; and horses, mules, and asses, of an inferior description, are sometimes sent to the West-Indies. The Archilla weed, so much used in dyeing, is however the staple commodity, and, under proper management, might be made highly profitable. At the time of our visit, the yearly revenue arising out of the government monopoly of this article amounted to fifty thousand dollars; and in some years it has been as much as three hundred thousand dollars. This weed grows like a kind of moss upon the cliffs, and is collected by men who climb up or are let down by ropes, like the samphire gatherers.

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The natural dye is blue, approaching to purple; but by using metallic and other solutions, it may be turned to purple, crimson, or scarlet.

Money having been slowly remitted of late years from the mother-country, a great part of the archilla has been applied to the payment of the authorities, the clergy, and the troops (such as they are). A story is told of the last governor having caused a sham mutiny, in order that he might have a good reason for selling the archilla gathered that year, and with the produce paying the troops—and himself. He was brought out with a rope round his neck into the street, and there obliged to promise that he would sell the archilla, then in the government storehouse, to the best bidder.

A kind of castor-oil plant is found, from which a small quantity of oil is obtained, and a sort of soap. Yams are very scarce, being grown only at one part of the island. Mandioca is common, but it degenerates rapidly, and will not produce even a second crop. Vegetables of various kinds are abundant in their seasons.

From August to October is the rainy and sickly season. In September, a south-west gale is usually experienced; but from five to ten hours before its commencement, a dark bank of clouds is seen in the southern horizon, which is a sure forerunner of the gale. Should a vessel be at anchor in the port at such a time, she ought to weigh and put to sea, until the storm has ceased and the swell subsided. In the month of September preceding our visit, an American merchant-brig and a Portuguese slaver were at anchor in Port Praya. A bank of clouds was seen during the day in the S.W., and the American went to sea; but the slaver remained at anchor. A storm arose at night, drove the slave-vessel ashore, and dashed her to pieces in less than half an hour, yet did the American no damage whatever, and the next day she anchored again in the port.

In a valley near the town is a very remarkable tree, of the Baobab kind, supposed to be more than a thousand years old; but I am not aware of the grounds upon which this

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assertion is made. Wild guinea-fowls are found in flocks, and there are wild-cats in the unfrequented parts of the island; but if induced to take a gun in pursuit of the guinea-fowls, I would advise a stranger not to overheat himself, or sleep on shore at night; for fatal fevers have been contracted by Europeans, who were unguarded as to their health, while passing a few days in this hot climate, after being for some time accustomed to the cold weather of a high northern latitude.

Except during the rainy season, the wind is always north-easterly, and then the sky is clear and the sun very powerful; but a dry haze hangs over the island in a peculiar manner, and a quantity of fine dust, quite an impalpable powder, frequently settles on every exposed surface, even on the sails and rigging of a vessel, when passing near the islands.

On the 8th of February our instruments were re-embarked, and, after swinging the ship to ascertain the amount of local attraction, we weighed anchor and sailed. By the compass fixed upon a stanchion in front of the poop, not twenty minutes difference of bearing could be detected, in any position of the vessel: the object observed being the highest point of a sharp peak, distant eleven miles.

On the 10th we spoke the Lyra packet, going from England to Rio de Janeiro, and received a box from her, containing six of Massey's sounding-leads, those excellent contrivances which we frequently found so useful. These machines, as formerly made, did not answer for a much greater depth than one hundred fathoms; because their hollow cylinder yielded to the pressure of the water: but Mr. Massey has since remedied that defect in their construction.

On the 13th a very confused swell seemed to presage a change of weather. Hitherto the wind had been steady from the north-east, and the sky clear; but on this day large soft clouds, light variable breezes, rain, and sometimes a short calm, showed us that we had passed the limits of the north-east trade wind. 14th. Similar weather, with a good deal of rain, but still breeze enough to keep us moving on our course.

On the 15th, the wind was steady from east south-east,

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and the sky free from heavy threatening clouds. We had then entered the south-east trade wind, without having had two hours calm.

St. Paul Rocks, or Peñedo de San Pedro, were seen on the horizon at sunset of the 15th. They appeared extremely small, being about eight miles distant; and had we not been looking out for them, I doubt whether they would have attracted attention. Excepting "Las Hormigas," on the coast of Peru, I never saw such mere rocks at so great a distance from any land.

At daylight next morning, two boats were sent to land upon, and examine them; while the Beagle sailed round this "sunk mountain top," sounding, and taking angles. Good observations were made during the day, as the sky was clear, and the water smooth.

When our party had effected a landing through the surf, and had a moment's leisure to look about them, they were astonished at the multitudes of birds which covered the rocks, and absolutely darkened the sky. Mr. Darwin afterwards said, that till then he had never believed the stories of men knocking down birds with sticks; but there they might be kicked, before they would move out of the way.

The first impulse of our invaders of this bird-covered rock, was to lay about them like schoolboys; even the geological hammer at last became a missile. "Lend me the hammer?" asked one. "No, no," replied the owner, "you'll break the handle;" but hardly had he said so, when, overcome by the novelty of the scene, and the example of those around him, away went the hammer, with all the force of his own right-arm.

While our party were scrambling over the rock, a determined struggle was going on in the water, between the boats' crews and sharks. Numbers of fine fish, like the groupars (or garoupas) of the Bermuda Islands, bit eagerly at baited hooks put overboard by the men; but as soon as a fish was caught, a rush of voracious sharks was made at him, and notwithstanding blows of oars and boat hooks, the ravenous monsters could not be deterred from seizing and taking away more than half the fish that were hooked.

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At short intervals the men beat the water with their oars all round the boats, in order to drive away the sharks; and for a few minutes afterwards the groupars swarmed about the baited hooks, and were caught as fast as the lines could be hauled up—then another rush of sharks drove them away—those just caught were snatched off the hooks; and again the men were obliged to beat the water. When the boats returned they were deeply laden with birds and fish, both welcome to those who had been living on salt provisions.

From the highest point of the rock,* no discoloured water, nor any breaking of the sea, could be discerned, apart from the place itself; and from the soundings taken in the boats, as well as on board the ship, I conclude that it is unconnected with any shoal, being merely the summit of a steep-sided mountain rising from the bottom of the ocean.

There was a slight current setting to the westward, not amounting to a mile an hour.

At sunset that day we were out of sight of St. Paul (or St. Peter), and soon after dark were hailed by the gruff voice of a pseudo-Neptune. A few credulous novices ran upon the forecastle to see Neptune and his car, and were received with the watery honours which it is customary to bestow, on such occasions.

Next morning we crossed the Equator, and the usual ceremonies were performed.

> Deep was the bath, to wash away all ill;
> Notched was the razor—of bitter taste the pill.
> Most ruffianly the barber looked—his comb was trebly nailed—
> And water, dashed from every side, the neophyte assailed.

The disagreeable practice alluded to has been permitted in most ships, because sanctioned by time; and though many condemn it as an absurd and dangerous piece of folly, it has also many advocates. Perhaps it is one of those amusements, of which the omission might be regretted. Its effects on the minds of those engaged in preparing for its mummeries, who enjoy it

* Sixty-four feet above the sea.

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at the time, and talk of it long afterwards, cannot easily be judged of without being an eye-witness.

During the early ages of navigation, before the invention of the compass, somewhat similar, though really ceremonious rites were observed in Spanish, Portuguese, and Italian vessels, when they passed the more remarkable promontories then known. A modern voyager, Kotzebue, notices this subject in a manner which appears to me so sensible, that I shall quote his words without affecting to add another remark.

"On the 11th of October we crossed the Equator, at twenty-five degrees west longitude, reckoning from Greenwich. Having saluted the southern hemisphere by the firing of guns, our crew proceeded to enact the usual ceremonies. A sailor, who took pride in having frequently passed the line, directed the performance with much solemnity and decorum. He appeared as Neptune, attired in a manner that was meant to be terribly imposing, accompanied by his consort, seated on a gun-carriage instead of a shell, drawn by negroes, as substitutes for tritons. In the evening the sailors represented, amidst general applause, a comedy of their own composition.

"These sports, while they serve to keep up the spirits of the men, and make them forget the difficulties they have to go through, produce also the most beneficial influence upon their health; a cheerful man being much more capable of resisting a fit of sickness than a melancholy one. It is the duty of commanders to use every innocent means of maintaining this temper in their crews; for, in long voyages, when they are several months together wandering on an element not destined by nature for the residence of man, without enjoying even occasionally the recreations of the land, the mind naturally tends to melancholy, which of itself lays the foundation of many diseases, and sometimes even of insanity. Diversion is often the best medicine, and used as a preservative, seldom fails of its effect."—(Kotzebue's Voyage, 1823-26.)

Before sunset on the 19th we saw the island of Fernando Noronha, with its singular peak towering aloft, and at midnight anchored in the roadstead.

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Next morning I landed with difficulty for observations, the surf being so high that any common boat would have been swamped. By taking great care, our broad and well-built whale-boats landed the instruments and a small party, and re-embarked them afterwards, without accident.

We landed in a small bay under the (so called) citadel, but there is a safer and in every way preferable landing-place about a mile to the northward. My object being chiefly to take sights of the sun, for time, and compare the chronometers used on shore as soon as possible with those on board, I preferred landing as near as I could to the place where the lamented Captain Foster observed:—but it was difficult to ascertain the house in which his pendulum observations were made. Not even the governor could tell me, for he had arrived since Captain Foster's departure; and most of the inhabitants of the island had changed their dwellings frequently, being all exiles from Brazil.

The governor was a major in the Brazilian service, born at Pernambuco, and under his command were two hundred black troops, and about eight hundred human beings, only thirty of whom were women, and a very few children.

We obtained some fire-wood from one of the islets northward of the principal island; but it was full of centipedes and other noxious insects, from which it was not easy to free it even by charring and washing. Water we did not try to get, because of the heavy surf, but there is no scarcity of it on the island. Neither live-stock nor vegetables could be procured from the apathetic inhabitants.

This place is rather picturesque; and the lofty barren peak, already mentioned, is conspicuous from every point of view. Near the summit is a station from which a look-out is kept, not only over all the island, but over many leagues of the surrounding sea; so that neither ship nor boat can approach or depart, during daylight, without being noticed.

No boats are allowed to be kept on the island, and no intercourse is held with shipping without permission and the strictest inspection.

We sailed from Fernando Noronha the same evening, passed

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round the north-east extremity of the island, and steered for Bahia de Todos Santos. Having remained only one day at anchor, in consequence of information that no better landing could be expected for many days; and wishing to ascertain the rates of the chronometers, as well as to procure a supply of water, I decided to go to Bahia, as the nearest port convenient for both purposes. From the 23d to the 27th we found a current setting us southward, between twenty and thirty miles each day. This was quite unexpected by me, for I thought that we should have been set westward. At daylight on the 28th we made the land about Bahia, and before noon were at anchor in the port.

As we sailed in rapidly from the monotonous sea, and passed close along the steep but luxuriantly wooded north shore, we were much struck by the pleasing view. After the light-house was passed, those by whom the scene was unexpected were agreeably surprised by a mass of wood, clinging to a steep bank, which rose abruptly from the dark-blue sea, showing every tint of green, enlivened by bright sunshine, and contrasted by deep shadow: and the general charm was heightened by turretted churches and convents, whose white walls appeared above the waving palm trees; by numerous shipping at anchor or under sail; by the delicate airy sails of innumerable canoes; and by the city itself, rising like an amphitheatre from the water-side to the crest of the heights.

We found ourselves in the middle of the rainy season, and although favoured by a fine day at arriving, cloudy weather and frequent rain succeeded it, and during the short stay we made, much embarrassed our observations.

Bahia has declined ever since its separation from Portugal: unsettled, weak governments, occupied too constantly by party strife to be able to attend to the real improvement of their country, have successively misruled it. Revolutions, and risings of the negro population, interrupting trade, have repeatedly harassed that rich and beautiful country, and are still impending.

Were property secure, and industry encouraged, the trade from Bahia might be very extensive, particularly in sugar and

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cotton: but who will embark much capital upon so insecure a foundation as is there offered?

The immense extent and increase of the slave population is an evil long foreseen and now severely felt. Humanely as the Brazilians in general treat their slaves, no one can suppose that any benevolence will eradicate feelings excited by the situation of those human beings. Hitherto the obstacles to combinations and general revolt among the negroes, have been ignorance, mutual distrust, and the fact of their being natives of various countries, speaking different languages, and in many cases hostile to each other, to a degree that hardly their hatred of white men can cause them to conquer, even for their immediate advantage.

The slave trade has already entailed some of its lamentable consequences upon the Brazilians, in demoralizing them by extreme indolence, and its sure accompaniment, gross sensuality; but there are in store afflictions hitherto unfelt, occasioned by the growing hordes of enemies who are yearly causing more perplexity and dread in the territories of Brazil.

Could the Brazilians see clearly their own position, unanimously condemn and prevent the selfish conduct of individuals, emancipate the slaves now in their country, and decidedly prevent the introduction of more, Brazil would commence a career of prosperity, and her population would increase in an unlimited degree. In that immense and most fertile country, distress cannot be caused by numerous inhabitants; food is abundant, and the slight clothing required in so warm a climate is easily procured.

The chief, if not the only cause of the slave trade in Brazil, is want of population—want of an industrious population, able as well as willing to clear away primeval forests, and render the soil fit for culture—able to work in the open fields under a hot sun, to cultivate the sugar cane, cotton plants, mandioca, and other productions of tropical climates.

While this extensive and most powerful cause exists, selfish, unprincipled owners of immense territories in Brazil, and elsewhere, will not refrain from importing hundreds, even thou-

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sands of unhappy wretches, who, once landed, become the helpless instruments of immense gain to their owners: neither can any reasonable number of shipping efficiently blockade the coasts of two great continents.

If I am right in these assertions, it appears that there is no method by which the slave trade can be totally suppressed, except by destroying the cause of so abominable a traffic: and that, to this end, a native population should be encouraged in hot climates, who, being gradually inured to work on their native soil, for remuneration from their employers, and a prospect of future comfort for themselves and their offspring, would totally supersede the demand for constrained labour. Of course, the only way by which such a result could be obtained—I should say, perhaps, the first step towards so satisfactory a result, would be, that the government of a slave-importing country should declare that trade piratical: and proclaim every human being free; bound to no man, free to do any thing not contrary to religion, or law, from the moment he or she embarked on board a vessel belonging to that country, or placed a foot upon its soil; which might then indeed be termed, in common with our happy land, a sacred soil. By such a plan as this, individuals would suffer for a time, but the mass of society would be gainers incalculably.

Well-known authors have already said so much of Bahia, its spacious harbour, and delightful environs, that it would be impertinent in the writer of a mere narrative to add his hasty remarks to the calmly considered information which their works contain. But I will venture to notice that however pleased a stranger to Bahia may be at the sensations conveyed through his eyes, previous to landing, he will be miserably disappointed when he finds himself in the dirty, narrow, crowded, and hot 'lower town;' and that the sooner he gets into a sedan* chair, and desires the almost naked bearers to make the best of their way to the 'upper town,' where he will enjoy

* An arm-chair, with a high back, a foot-board, and curtains to draw round, hung to a pole which rests on the shoulders of two men.

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SAN SALVADOR, BAHIA.

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fresh air, a pleasing view, and freedom from annoyances, the less his organs will be offended, and his temper tried.

We sailed from Bahia on the 18th. The bank which projects from the light-house point had been minutely examined by us, during the Beagle's stay in port; on one day, indeed, she went out and anchored at the outer end of the shoal, in order to determine its extent, and assist the boats in sounding; therefore I did not hesitate to stand across it; but there is not water enough over the shallower parts for any ship drawing more than fourteen feet, especially if there is a swell. The shoalest spot is near the outer end; ships of any size may pass between the inner extremity and the point of land adjacent to it.

There are rocks and dangerous shallows southward of the port, which it is extremely necessary to guard against in approaching it from sea, because the current generally sets towards the south, and ships have got ashore on those shoals in consequence. The land northward of Bahia should be made, and some white sandy patches, looking like linen hung out to dry, should be seen before a ship steers more southerly.

After losing sight of the land, our course was shaped to the south-east, towards the eastern limit of the great bank of soundings which extends so far to seaward of the Abrolhos islets. Having reached the parallel of the islands, and being to the eastward of the easternmost soundings laid down in any chart, without finding any ground with three hundred fathoms of line, I began to steer westward—sounding continually, and keeping a sharp look-out at the mast-head. At two in the afternoon of the 26th, we had no bottom, with three hundred fathoms of line; and at the next cast, about an hour afterwards, found only thirty fathoms, without there being the slightest change in the colour of the water, or in its temperature, or any other indication of so sudden a change in the depth. We hauled to the wind directly, worked to the eastward in order to ascertain the precise limit of the bank, and lost soundings as suddenly as we had previously struck them. A grapnel was then put overboard, with two hundred fathoms of line, and we

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again steered westward, till a heavy pull upon the line, and a sudden jerk, showed that we had hooked the bank.

The ship was hove-to, and the necessary observations made on the spot. The grapnel, when hauled up, was found to be straightened, a proof, in addition to that afforded by the lead, that the bottom was rocky. Our soundings at this time were thirty-eight fathoms, and thence to the Abrolhos islets we carried a line of soundings, no where exceeding that depth, but extremely irregular, between thirty-six and four fathoms.

As far as we had time to examine, the chart of these islands, by the Baron Roussin, appeared to be satisfactory; but the soundings are so very irregular in the vicinity of the Abrolhos, that little dependence could be placed on the lead. More than once we had four or five fathoms under one side of the vessel, and from fifteen to twenty under the other. These sudden and startling changes, called by the French, 'Sauts de sonde,' are very unpleasant and perplexing.

The tide, or rather current, which we found when lying at anchor near the islets, set continually to the southward, varying in strength from half a mile to a mile and a half an hour; but we had only three days' experience.

I had imagined, from what I had heard, that the rock of which these islets were chiefly composed was coral; but was surprized to find only coralline growing upon gneiss or sandstone.

While sounding near the Abrolhos we made a great number of experiments with Massey's lead, in order to verify its qualities; and found it agree remarkably well with the common lead, while in less than forty fathoms, but differ from it frequently when the depth of water exceeded seventy fathoms; and wholly fail when used in upwards of one hundred and twenty fathoms. The failure, in great depths, was in consequence of the small hollow cylinder, to which the vanes were attached, bursting, or rather, being compressed by the weight of water. Some more remarks upon this instrument will be found in the Appendix.

We anchored near the islets, at dusk, on the 28th, after being in frequent anxiety, owing to sudden changes in the

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depth of water; and next morning, moved to a better berth at the west side, very near them. They are rather low, but covered with grass, and there is a little scattered brushwood. The highest point rises to about a hundred feet above the sea. Their geological formation, Mr. Darwin told me, is of gneiss and sandstone, in horizontal strata. When our boats landed, immense flights of birds rose simultaneously, and darkened the air. It was the breeding and moulting season; nests full of eggs, or young unfledged birds, absolutely covered the ground, and in a very short time our boats were laden with their contents.

A large black bird, with a pouch like that of a pelican, but of a bright red colour, was very remarkable, as it hovered, or darted among the bright verdure, and at a distance looked handsome; but when seen close, it at once descended to the level of a carrion-eating cormorant or buzzard.

Turtle are to be found at times: we observed the shell and skeleton of an extremely large one lying on a sandy spot at the north side of the northern islet. Some very fine fish, of the cod kind, were caught; one was so large, that, until hauled on board, it was supposed to be a shark. The anchorage is good, and easy of access: all swell is stopped by the shallow places, and by the islets themselves. There is no fresh water.

If a general reader should honour these pages by his perusal, and find such details about wood, water, fish, birds, &c., at places about which few know, and still fewer care—extremely tiresome, he will of course pass them over; but, in my own exculpation, I must beg to be permitted to remind him that the Beagle was employed by Government, to obtain practical information likely to be useful to shipping; and that I might neglect my duty by omitting to mention such matters, when speaking of places which are seldom visited, and hitherto but slightly known.

By those employed in the coasting trade, the Abrolhos are said to be particularly subject to squalls. If this be true, what is the reason? Have the extensive shallows in their

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vicinity any connection with the fact? Thinking myself that they have, I would beg the reader to bear this idea in mind, when, at another part of this narrative, the squalls so frequent in the dangerous archipelago of the low islands are mentioned.*

March 30th. We sailed and sounded in various directions, but such irregular depths I never found elsewhere. Sudden jumps, from thirty to ten, sometimes even to four fathoms, in successive casts of the hand-lead, gave us frequent alarm; but by keeping a boat a-head, and two leads going briskly, we avoided danger, and giving up exploring, regained before dark the safe channel which runs north and south between the Abrolhos and the main land, and steered to pass near Cape San Tomè, or St. Thomas. Next day we were off that cape, but saw none of the breakers which have been so frequently reported to lie at a dangerous distance from the neighbouring shore; although we looked out for them, and steered so as to pass the places where I was informed they would be seen.

On the 3d of April, we passed Cape Frio. I wished to visit the cove in which the Lightning and Algerine lay, while recovering the treasure sunk in the unfortunate Thetis, but circumstances were unfavourable.

* The Bermuda Islands ("still vexed Bermoothes") may also be thought of, as being similarly circumstanced.

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CHAPTER IV.

Loss of the Thetis—Causes of her wreck—Approach to Rio de Janeiro—Owen Glendower—Disturbance in Rio Harbour—Observations—Chronometers—Return to Bahia—Deaths—Macacu—Malaria—Return to Rio de Janeiro—Meridian Distances—Regatta—Fuegians—Lightning—Leave Rio—Equipment—Santa Martha—Weather—Santa Catharina—Santos—River Plata—Pamperoes—Gales off Buenos Ayres—Monte Video—Point Piedras—Cape San Antonio—River Plata—Currents—Tides—Barometer—Absence of trees—Cattle.

Among the shipwrecks which have taken place during late years, perhaps none excited so much astonishment, or caused so much trouble and discussion, as the loss of that fine frigate the Thetis.

Had any seaman been asked, on what frequented shore there was least probability of a wreck, I almost think he would have answered on that of Cape Frio. Yet, against the high cliffs of that bold and well-known coast did she run 'stem on,' going nine knots. One may conceive the shock and general consternation as she crashed against the rocky cliff, and all her masts fell inboard.

As some who turn over these pages may not have read the proceedings of the Court-martial held after the return of her officers to England, I will insert a short account, derived chiefly from those of old friends and shipmates, who were on board her at the awful time of her wreck.

The Thetis sailed from Rio de Janeiro on the 4th of December 1830, and worked to the southward all day, against a southerly wind and thick foggy weather. At 1h. 30m. A.M. on the 5th, she saw Raza Island for the last time, bearing N.W. by W., and distant eight or nine miles. The weather was still hazy, indeed at times very thick, and the wind south-east. She stood off on the larboard tack until seven A.M., and then the wind having increased, and a cross sea getting up, she wore to the eastward. Soon afterwards the wind drew to SS.E., and the ship was kept by the wind on the

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starboard tack until 1h. 30m. P.M., when it was considered that Cape Frio bore about N. 40° E., distant thirty-eight miles. The position at noon, by dead reckoning, gave the Cape bearing N. 43. E., distant forty-one miles; all the calculations giving results between that and N. 51. E., fifty-three miles; but by dead reckoning only, as neither sun, moon, or stars had been seen. At 1h. 30m. the wind being scant, the ship was steered E. by N., and at two, a cross sea checking her way through the water, the course was altered to E.N. E. At two, when the course was thus changed, she had run nineteen miles since noon, and at four, twenty more miles had been made on the E.N.E. course; at which time, four P.M. (under the idea that she was almost abreast of Cape Frio, supposed to be then distant about twenty-four miles), seeing a large ship, 'courses down,' in-shore of her, steering west or W. by N., with all sail set; and the weather clearing, for an interval, without any land being seen; it was concluded that the Thetis was still further from the shore than had been estimated, and her course was altered to N.E. by E. At five, the crew was mustered at quarters, after which the reefs were mended, and the fore top-gallant sail, jibs, spanker, and reefed fore top-mast studding-sail were set. From four o'clock to six she ran, by log, twenty-one miles; after six the weather became very thick and rainy: and when the look-out men were relieved at eight o'clock, it was so dark, and rained so fast, that nothing could be distinguished half a ship's length distant. Soon after eight one of the look-out men, named Robinson, said to another man on the forecastle,* "Look how fast that squall is coming" (this was the cliff looming indistinctly through the rain and darkness), and next moment, "Land a-head," "Hard a-port," rung in the ears of the startled crew, and were echoed terribly by the crashing bowsprit, and thundering fall of the ponderous masts.

The hull did not then strike the rocks, having answered the helm so fast as to be turning off shore when the bowsprit

* Borsworthick. Both these men afterwards sailed with me in the Beagle.

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broke; but the lee yard-arm irons (boom-irons) actually struck fire from the rocky precipice as they grated harshly against it, the boom ends snapping off like icicles.

All three masts fell aft and inward, strewing the deck with killed and wounded men. An immense black barrier impended horribly, against which heavy breakers were dashing with an ominous sound; but the ship's hull was still uninjured. Sentries were placed over the spirit-room; a sail was hoisted upon the stump of the main-mast; the winches were manned; guns fired; rockets sent up, and blue-lights burned; the quarter-boats were cleared away to be ready for lowering; and an anchor was let go; but the water was so deep, that before she brought up, her stern drifted upon a more shelving part of the rock. Several men then tried to land; but, in jumping ashore, many slipped, and were drowned in the surf, or crushed against the rocks. The stern and lee quarter boats were dashed to pieces, as the surf hove the ship against the cliff, and no boat was then available; for the others were either stove, or so covered with wreck, that they could not be used. Finding that the anchor, which had been let go, did no good, but seemed to keep her tailing upon the rocks, the cable was slipped, after which her head fell off to the westward. It was then found that the water was gaining, and the winches were worked. Successive waves threw her starboard quarter upon the rocks; and the effects of repeatedly striking were soon but too apparent, as the water burst open the spirit-room hatches.

At this moment a small opening appeared, into which the ship providentially drove. It was at first thought that this was the opening into Cape Frio Harbour; but it proved to be only a very small cove, or indentation of the rocky cliffs. While drifting close along the rocks into this cove, a hawser was passed ashore, by which afterwards several persons landed. The ship struck heavily in the cove, gave some tremendous yawns, and sunk. As she then lay upon the rocky bottom, each succeeding wave broke over and just covered her. By a violent surge, the rock to which the hawser above-mentioned had been made fast, was torn away; and, for a short time, all

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hope of further communication with the land was suspended. Every effort that could be made to convey a rope to the shore was attempted in vain, until Mr. Geach, the boatswain, went out on the stump of the bowsprit, and by the help of two belaying-pins, succeeded in throwing the end of a small rope to the rocks, by which a large one was immediately hauled ashore, and then kept as much stretched as the strength of the men who had landed would allow. On this larger rope each man was slung, in his turn, and hauled by the small one through the surf to a rough craggy rock. Mr. Geach and John Langley, the captain of the forecastle, were among the last to leave the ship, having almost exhausted themselves in slinging their shipmates.

As day-light broke, the last man was hauled ashore. Many were terribly bruised and lacerated by the fall of the masts, or during these struggles for life, and twenty-five persons perished. Some of the officers made their way to a small village near Cape Frio, and obtained horses, and a guide who conducted them to Rio de Janeiro, where the melancholy news was communicated to the commander-in-chief. The captain, the other officers, and the crew, remained near the place of the wreck, waiting for assistance.

An adequate cause for so great an error in the reckoning of only nineteen hours as that which occasioned the loss of this fine ship and twenty-five souls, besides the personal property of those on board, and a large freight of treasure, is not difficult to find, even without supposing the compasses to have been in error, or affected by local attraction, which, by the way, would in this case have operated in the ship's favour.

The vicinity of Cape Frio, one of the most salient promontories on the coast of Brazil, cannot be supposed exempt from currents; set in motion either by temporary causes, such as strong or lasting winds; or by the varying pressure of the atmosphere upon different portions of the ocean:—or from tidal streams, more or less strong.

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Presuming that the Thetis was carried out of her supposed position, by the former cause, about twenty-four miles; surely rather more than a mile an hour is no surprising current during nineteen hours. But if a stream of tide also affected her, in that time she would have had one whole tide either in her favour or against her.

There was no reason to suspect the existence of much current near Cape Frio, when the Thetis was lost, except on such general grounds as those just mentioned, because no pilot, as far as I know, was aware of such a fact. With strong southerly winds ships of large size do not often leave Rio de Janeiro—coasting vessels never—therefore few persons could have experienced its effect when sailing from the port; and when approaching Rio in similar weather, vessels sail before a fair wind, steer by sight of the land, and take little notice of the log: besides which, they then employ but three or four hours in passing through that space of sea where the Thetis was detained nineteen.

In all probability, such a current as that which drove the Thetis on the rocks is only to be found during southerly winds, and in the summer season of that climate, when the general set of the current is along the coast, towards the south and west.

If a man of war is accidentally lost, a degree of astonishment is expressed at the unexpected fate of a fine ship, well found, well manned, and well officered; and blame is imputed to some one: but before admitting a hastily-formed opinion as fact, much inquiry is necessary. As in the case of the Thetis, an English man-of-war may incur risk in consequence of a praiseworthy zeal to avoid delaying in port, as a merchant-ship would probably be obliged to do, from her being unable to beat out against an adverse wind, and, like that frigate, may be the first to prove the existence of an unsuspected danger.

Those who never run any risk; who sail only when the wind is fair; who heave to when approaching land, though perhaps a day's sail distant; and who even delay the performance of urgent duties until they can be done easily and quite safely; are,

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doubtless, extremely prudent persons: — but rather unlike those officers whose names will never be forgotten while England has a navy.

Of the measures taken for recovering the treasure sunk in the Thetis, much has appeared in print; therefore I will not add a word to that subject of controversy.

Weather such as that which caused the loss of the Thetis, is only at times met with off Capé Frio; a clear sky, with a hot sun, and but little wind, is more usual; and as my first approach to Rio de Janeiro, on board H.M.S. Owen Glendower, in 1819, made much impression upon me, I will endeavour to describe it's circumstances.

High blue mountains were seen in the west, just after the sun had set, and with a fair wind we approached the land rapidly. The sea was quite smooth, but a freshening breeze upon our quarter carried us on, nearly thirteen knots an hour. Though dark as any cloudy tropical night, when neither moon nor star relieves the intense blackness—astern of us was a long and perfectly straight line of sparkling light, caused by the ship's rapid way through the water; and around the bows, as far forward as the bowsprit end, was dazzling foam, by whose light I read a page of common print. Sheet lightning played incessantly near the western horizon: and sometimes the whole surface of the sea seemed to be illuminated. As the moon rose, and the breeze decreased, the contrasts of light and darkness, of swift change of place and apparent tranquillity, lost their effect. Next morning we had a dead calm: high land towered over the fog-banks, which were slowly drawn upwards and dispersed by the heat of a powerful sun; and the sea was smooth as a lake. Numbers of that beautiful fish, the dorado, often called a dolphin, were caught; and the vivid, various colours displayed, as they lay upon our deck, exceeded description. Well I remember too the trouble we middies had with the sun at noon on that day; not with the sun above our heads, but with its image reflected by our quadrants. As he was almost vertical over us, we were dispersed round the ship, each thinking he had brought the reflected image down

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to the proper point of the horizon, until, startled by hearing 'twelve o'clock,' reported by the master, we found too late, and much to our annoyance, that it would have been wiser to have looked at the compass before observing the altitude.

Soon after mid-day black curling ripples stole along the hitherto glassy surface; sail was made, the sea-breeze freshened, and we steered towards the entrance of that magnificent harbour, Rio de Janeiro.

Often as it has been visited and described, I cannot expect any one to require another sketch, but will merely remark that I know no port equal to it in situation, security, capacity, convenience, and abundant supply of every necessary, as well as in picturesque beauty. A day or two after the Owen Glendower anchored, a party of her midshipmen were allowed to take a boat and enjoy a day's excursion in the beautiful harbour, or rather gulf. We landed on an island, which seemed to me like an immense hot-bed, so luxuriant and aromatic were the shrubs, and so exotical the appearance of every tree and flower. Years since elapsed have not in the least diminished my recollection of the novelty and charm of that first view of tropical vegetation.

To return to the Beagle. On the 3d we were near Raza Island, but detained by calms. The light-house lately erected there showed a bright revolving, or rather intermitting light. On the following day, when the sea-breeze set in, we steered for the harbour. The sun shone brightly, and there were enough passing clouds to throw frequent shadows over the wooded heights and across vallies, where, at other times, the brightest tints of varied green were conspicuous: yet I did not think the place half so beautiful as formerly. The charm of novelty being gone, and having anticipated too much, were perhaps the causes; and it is possible that so much wood has been cleared away in late years, as to have diminished sensibly the rich and picturesque appearance which it certainly once possessed.

As we shortened sail under the stern of our flag-ship, I was surprised by finding Sir Thomas Baker, the Commander-in-

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chief, giving directions for the positions to be taken forthwith by the ships of his squadron then present, and orders for the boats to be prepared for landing marines. This was in consequence of one of those disturbances almost usual in South America, especially in Brazil. Some outrages had been committed in the town, and a mutiny had broken out among the troops. Under old and established governments, revolt and mutiny are events which so seldom occur that their shock is not only felt at the time, but transmits vibrations through succeeding ages. In these unsettled states, however, they recur so frequently, that even on the spot they cause little sensation, and excepting by those personally concerned, are scarcely remembered afterwards.

Few strangers visit the metropolis of Brazil without being disappointed, if not disgusted. Numbers of almost naked negroes, hastening along narrow streets—offensive sights and smells, an uncivil and ill-looking native population — indispose one to be pleased, even with novelty; but impressions such as these soon wear off. In the environs of the city are many good houses, in beautiful situations; and while enjoying delightful rides amidst the richest and most varied scenery, or resting in the shade of a veranda, refreshed by the sea-breeze, and overlooking a prospect hardly to be surpassed in the world, the annoyances and the nuisances of the town are forgotten.

With respect to astronomical observations, I was extremely unfortunate at Rio de Janeiro, except in those simple ones for time and latitude, which depend upon sextants and artificial horizons. Being the rainy season, but few nights were favourable for observing the transits of stars with the moon, and those few were too near the full moon to be available. But had the weather been otherwise, I doubt whether I should have obtained satisfactory results, because the transit instrument employed was of an inferior construction, and still more, because I was unaccustomed to its use. So much time was employed, to the prejudice of other duties, in adjusting and re-adjusting this imperfect instrument, and ineffectually watching for intervals of clear sky, that I resolved to set up the transit

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no more, until I had an interval of leisure, and a prospect of some cloudless nights.

Having so many good chronometers on board; being practised in observations such as they require; and placing great confidence in their results; I felt inclined to give attention and time to them rather than to perplex myself, and cause much delay in moving from place to place, by attempting series of observations which would give occupation to an astronomer, and could not be undertaken by me, while actively engaged in coast-survey, without interfering with other duties.

In the Appendix it may be seen how far results obtained by the chronometers agree with those of a higher class, especially with the recent ones of Captain Beechey, to whose determinations, resulting from moon-culminating observations, I conclude that a high value will be attached, because he is a well-practised and able observer.

As I found that a difference, exceeding four miles of longitude, existed between the meridian distance from Bahia to Rio, determined by the French expedition under Baron Roussin, and that measured by the Beagle; yet was unable to detect any mistake or oversight on my part; I resolved to return to Bahia, and ascertain whether the Beagle's measurement was incorrect. Such a step was not warranted by my instructions; but I trusted to the Hydrographer for appreciating my motives, and explaining them to the Lords of the Admiralty. In a letter to Captain Beaufort, I said, "I have not the least doubt of our measurement from Bahia; but do not think that any other person would rely on this one measure only, differing widely, as it does, from that of a high authority—the Baron Roussin. By repeating it, if it should be verified, more weight will be given to other measures made by the same instruments and observers."

We sailed with the ebb-tide and sea-breeze, cleared the port before the land-wind rose, and when it sprung up steered along the coast towards Cape Frio. Most persons prefer sailing from Rio early in the morning, with the land-wind; but to any well-manned vessel, there is no difficulty whatever in working

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out of the port during a fresh sea-breeze, unless the flood-tide should be running in strongly.

On this passage one of our seamen died of a fever, contracted when absent from the Beagle with several of her officers, on an excursion to the interior part of the extensive harbour of Rio de Janeiro. One of the ship's boys, who was in the same party, lay dangerously ill, and young Musters seemed destined to be another victim to this deadly fever.

It was while the interior of the Beagle was being painted, and no duty going on except at the little observatory on Villegagnon Island, that those officers who could be spared made this excursion to various parts of the harbour. Among other places they were in the river Macacu, and passed a night there. No effect was visible at the time; the party returned in apparent health, and in high spirits; but two days had not elapsed when the seaman, named Morgan, complained of headach and fever.

The boy Jones and Mr. Musters were taken ill, soon afterwards, in a similar manner; but no serious consequences were then apprehended, and it was thought that a change of air would restore them to health. Vain idea! they gradually became worse; the boy died the day after our arrival in Bahia; and, on the 19th of May, my poor little friend Charles Musters, who had been entrusted by his father to my care, and was a favourite with every one, ended his short career.

My chief object in now mentioning these melancholy facts is to warn the few who are not more experienced than I was at that time, how very dangerous the vicinity of rivers may be in hot climates. Upon making more inquiry respecting those streams which run into the great basin of Rio de Janeiro, I found that the Macacu was notorious among the natives as being often the site of pestilential malaria, fatal even to themselves. How the rest of our party escaped, I know not; for they were eleven or twelve in number, and occupied a day and night in the river. When they left the ship it was not intended that they should go up any river; the object of their excursion being to visit some of the beautiful islets which stud the harbour. None of us were aware, however, that there was so

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dangerous a place as the fatal Macacu within reach. I questioned every one of the party, especially the second lieutenant and master, as to what the three who perished had done different from the rest; and discovered that it was believed they had bathed during the heat of the day, against positive orders, and unseen by their companions; and that Morgan had slept in the open air, outside the tent, the night they passed on the bank of the Macacu.

As far as I am aware, the risk, in cases such as these, is chiefly encountered by sleeping on shore, exposed to the air on or near the low banks of rivers, in woody or marshy places subject to great solar heat. Those who sleep in boats, or under tents, suffer less than persons sleeping on shore and exposed; but they are not always exempt, as the murderous mortalities on the coast of Africa prove. Whether the cause of disease is a vapour, or gas, formed at night in such situations, or only a check to perspiration when the body is peculiarly affected by the heat of the climate, are questions not easy to answer, if I may judge from the difficulty I have found in obtaining any satisfactory information on the subject. One or two remarks may be made here, perhaps.—The danger appears to be incurred while sleeping; or when over-heated; not while awake and moderately cool; therefore we may infer that a check to the perspiration which takes place at those times is to be guarded against, rather than the breathing of any peculiar gas, or air, rising from the rivers or hanging over the land, which might have as much effect upon a person awake, as upon a sleeper. Also, to prevent being chilled by night damp, and cold, as well as to purify the air, if vapour or gas should indeed be the cause of fever, it is advisable to keep a large fire burning while the sun is below the horizon. But the subject of malaria has been so fully discussed by medical men, that even this short digression is unnecessary.

To return to the narrative. Mr. Bynoe consulted with the best medical advisers at Bahia, and afterwards at Rio de Janeiro, and he and I had the melancholy satisfaction of knowing that the best had been done for his patients.

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The affectionate kindness of Mr. Bynoe on this, and indeed every occasion where his skill and attention were required, will never be forgotten by any of his shipmates.

In our passage from Rio de Janeiro to Bahia, we passed between the Abrolhos Islands and the main land, having a fresh southerly wind, and cloudy weather, with frequent rain. Of course there was some anxiety until we saw the islands, and it was necessary to keep the lead constantly going; but we got into no difficulty, and, assisted by Massey's log, as well as Massey's lead, we made a short passage, without an hour's delay or scant wind. This was favourable for the chronometer measurement, and I was deeply gratified by finding, soon after our arrival, that the measure from Rio to Bahia confirmed that previously made, even to a second of time.

On the 23d of May, we sailed the second time from Bahia, and steered to pass as near as possible to the eastern side of the Abrolhos; but, owing to unfavourable winds, could not approach nearer to them than in fourteen fathoms water.

When examining many of the cases of preserved meat* with which the Admiralty had ordered us to be provided, we found that several had burst and caused a most disagreeable smell. This was not the fault of the tin cases, but an unavoidable accident consequent upon their being stowed where salt water had occasional access, and corroded the tin. In so small and so crammed a hold as ours, it was not easy to make stowage for every thing that ought to be kept dry, particularly with a hatch-deck, while rolling about in the Bay of Biscay; but being warned by this first appearance of decay, our internal arrangement was partly changed, and some of the hatches on the lower deck temporarily caulked down.

Delayed by southerly winds and a long heavy swell from the southward, we made rather a tedious passage back to Rio, and did not anchor until the night of the 3d of June.

Next day (4th) the usual sets of equal altitudes were observed; and after the chronometer rates were ascertained, I

* Prepared by Kilner and Moorsom.

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had the satisfaction of finding that this third meridian distance agreed exactly with the first and second. Upon further examination, it was seen that the Abrolhos Islands were laid down correctly in the French chart, with respect to Bahia; but that the meridian distance between those islands and Rio de Janeiro differed more than four miles from that resulting from three measures made by our twenty chronometers.

A few weeks afterwards all the data and results of these measurements were given to the French Commander-in-chief on the station, who promised to forward them to the Baron Roussin; but I have heard nothing of their having been received. Even those who are disposed to place little reliance on the performance of chronometers, and who doubt the accuracy of distances measured by the transport of time, might be interested by a glance at the particulars of these meridian distances, which are given in the Appendix. They much increased my own confidence in that simple method of ascertaining differences of longitude, and tended to determine my dependence upon a connected chain of meridian distances, in preference to any other mode of finding the precise longitude.

While watering, and rating the chronometers, a few comparatively leisure days afforded a seasonable opportunity for trying the qualities of boats, and exciting fair emulation among their crews. With the Commander-in-chief's permission, and the encouragement of the officers of his squadron, then in the port, some good boat-races were arranged; and knowing how much might afterwards depend upon the qualities of the Beagle's boats, it was very gratifying to find them excellent. Four of the set were built by Mr. Johns, the well-known boat-builder in Plymouth Dock-yard, and the other two by Mr. May, our carpenter. Captain Talbot, of the Warspite, and Captain Waldegrave, of the Seringapatam, tried their best boats and best men on two successive days, to the encouragement of the boats' crews and boat-sailers of the squadron, and much to the surprise of the Brazilians, who had never witnessed any thing like a regatta.

From our first arrival at Rio de Janeiro, until we were

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ready to leave, finally, in July, little Fuegia was staying on shore, at the house of an Englishwoman, near Botafogo bay; and it is worth noticing, that while there, she was supposed by strangers to be one of the aboriginal natives of Brazil: and that I went with York and Jemmy to see a person (who had been many years resident in the interior of Brazil) who remarked, directly he saw them, "they are extremely like the Brazilian aborigines!"

At this time of year (July) the climate of Rio is comparatively cool and pleasant. Cloudy skies, southerly winds, and rain, are frequent; but there is less thunder and lightning than in summer, when not only thunder-storms occur often, but every night there is a continual flashing or reflection of lightning over the distant Organ mountains.

Many ships and buildings have been struck, during late years, still there are but a very few protected by lightning conductors. I was a lieutenant on board the Thetis, when her foremast was shattered by lightning, in Rio Harbour, and shall not easily forget the sensation. Some of the officers were sitting in the gun-room, one very dark evening, while the heavens were absolutely black, and the air hot and close, to an oppressive degree, but not a drop of rain falling, when a rattling crash shook the ship. Some thought several guns had been fired together—others, that an explosion of powder had taken place; but one said—"The ship is struck by lightning!" and that was the case. The top-gallant masts were not aloft; but the fore-topmast was shivered into a mere collection of splinters; the hoops on the foremast were burst, and the interior, as well as outside of the mast, irreparably injured. From the foremast the electric fluid seemed to have escaped by some conductor, without doing further damage; yet it filled the fore part of the ship with a sulphureous smell, and the men who were there thought something full of gunpowder was blown up.

No person received injury: the foremast was taken out afterwards, and replaced by another, purchased from the Brazilian government at a great expense, and made by the carpen-

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ters of the Thetis. I should say that the electric fluid shook rather than shattered the fore-topmast, for it did not fall, but resembled a bundle of long splinters, almost like reeds. It twisted round the head of the foremast, instead of descending by the shortest line, went into the centre of the spar, and then out again to the hoops, every one of which, above the deck, was burst asunder. The Thetis was to have sailed in a few days, but was detained by this accident almost two months. She had no conductor in use.

Only two or three flashes of lightning were seen afterwards; they were accompanied by loud peals of thunder, and then heavy rain poured down. Just before the rain began, St. Elmo's fire was seen at each yard-arm, and at the mast-head. Those who have not seen this light, always a favourite with sailors, because they say it only appears when the worst part of the storm is over, may excuse my saying that it resembles the light of a piece of phosphorus—not being so bright, or so small, as that of a glow-worm, nor yet so large as the flame of a small candle. I was curious enough to go out to a yard-arm and put my hand on a luminous spot; but, of course, could feel nothing, and when I moved my hand the spot re-appeared. About the same time of the year in which this happened, the Heron corvette was struck by lightning, and damaged, while lying at anchor off Buenos Ayres, in the river Plata, a locality extremely subject to vivid lightning, yet different in every respect from that of Rio de Janeiro: one being a flat, open country, near a fresh water river, and in latitude 34°; the other a mountainous and woody region, near the sea, and within the tropic of Capricorn.

On the 5th of July we sailed from Rio de Janeiro, honoured by a salute, not of guns, but of hearty cheers from H.M.S. Warspite. Strict etiquette might have been offended at such a compliment to a little ten-gun brig, or, indeed, to any vessel unless she were going out to meet an enemy, or were returning into port victorious: but although not about to encounter a foe, our lonely vessel was going to undertake a task laborious, and often dangerous, to the zealous execution

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of which the encouragement of our brother-seamen was no trifling inducement.

While in harbour, a few alterations had been made in the disposition of our guns and stores, as well as some slight changes in the sails and rigging; and as the Beagle's equipment afterwards remained unaltered, I will here briefly describe it. She was rigged as a bark; her masts were strongly supported by squarer cross-trees and tops, and by larger rigging than usual in vessels of her tonnage.* Chains were used where found to answer, and in no place was a block or a sheave allowed which did not admit the proper rope or chain freely. There were large trysails between the masts, made of stout canvas, with several reefs, and very useful we found them. On the forecastle was a six-pound boat-carronade: before the chestree were two brass six-pound guns: close to the bulwark on each side of the waist were the 'booms;' and amidships two boats, on the diagonal principle, one stowed inside the other, and as close to the deck as possible; being secured by iron cranks, or supports. Abaft the main-mast were four brass guns, two nine-pound, and two six-pound: the skylights were large; there was no capstan; over the wheel the poop-deck projected, and under it were cabins, extremely small, certainly, though filled in inverse proportion to their size. Below the upper deck her accommodations were similar to, though rather better than those of vessels of her class. Over the quarter-deck, upon skids, two whale-boats, eight-and-twenty feet long, were carried; upon each quarter was a whale-boat twenty-five feet in length, and astern was a dinghy.

A few leagues southward of the port is a good situation for enjoying a general view of the picturesque mountains in its vicinity. When near the shore one only sees those of an inferior order; and it is not until an offing is gained that the bold and varied outlines of the distant Organ Mountains,† the sharp

* Two hundred and forty-two tons.

† So called because they have a number of pinnacles, somewhat like the pipes of an organ.

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peak of the Corcovado, and the singular heights over Tijuca, can be seen at once. Whimsical allusion has been made to the first Lord Hood in the name by which one of these heights is called by English sailors; and in their general outline is a fancied resemblance to a huge giant lying on his back.

Off Santa Martha, a sort of Cape Spartivento, near which one rarely passes without having a change of wind, if not a storm, we were detained by strong southerly gales, which raised a high sea. This extreme movement and delay I regretted much at the time, on account of the chronometers; but the sequel shewed that such motion did not affect them materially, and that alterations of their rates were caused chiefly, if not entirely, by changes of temperature.

Gales in the latitude of Santa Martha generally commence with north-westerly winds, thick cloudy weather, rain, and lightning. When at their height, the barometer begins to rise (having previously fallen considerably), soon after which the wind flies round, by the west, to south-west, and from that quarter usually blows very hard for several hours. But these, which are the ordinary gales, blow from, or along the land, and do not often raise such a sea as is sometimes found off this coast during a south-east storm.

After a tiresome continuance of south-west winds, I became anxious to make Santa Catharina, but before we could reach it the wind changed, and enabled us to steer along the coast towards the south. Having mentioned Santa Catharina, I may as well add a few words to the many lavished in its praise by voyagers of all nations; for it is, excepting Rio de Janeiro, and perhaps Bahia, the best trading port on the east coast of South America; and, considering its situation, capabilities, and productions, is a place in which seamen must always have an interest. It enjoys the advantages of a temperate climate; an extensive and accessible harbour; a most fertile country, abounding in the necessaries of life; and a mercantile position of much importance. The people are more inclined to exert themselves than those in northern Brazil; a difference arising partly, no doubt, from effect of climate;

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but chiefly from their having descended from active and enterprising, though lawless settlers, who were ejected from other places; and from a few respectable colonists induced to emigrate from the Azores. Before I quit the neighbourhood of frequented ports on this coast, one possessing peculiar interest, Santos, ought to be mentioned; to remind seamen that they may there also obtain any refreshments, and secure their ships in a sheltered creek, quite easy of access. For several leagues round Santos there is an extensive flat, covered with thick woods, but intersected by rivers and salt water inlets, whose banks are lined with thickets of mangrove trees. Inland a mountain range abruptly rises to the height of two or three thousand feet, every where clothed with almost impenetrable forests. The climate is, however, unhealthy in December, January, and February; and during the whole year there is a great deal of rain.

Returning to the coast southward of Santa Catharina, I may mention that Cape Santa Martha, and the shores extending northward of it, are high and woody, like the greater part of the coast of Brazil; but that on the south side of the promontory there is a complete change of character: lofty ranges of mountains sinking into low treeless shores, whose outline is as tame and unvarying as that of the former is bold and picturesque.

While sailing along the level uninteresting coast just mentioned, with a fresh breeze off the land, we found it bitterly cold, though the thermometer never was below 40°. Faht: so much does our perception of heat or cold depend upon comparison. Some of our exaggerated opinions as to the coldness of the southern hemisphere may have arisen from the circumstances under which voyagers usually visit high southern latitudes, immediately after enduring the heat of the tropics, and without staying long enough to ascertain the real average temperature during a whole year.

On the 22d of July we were near the river Plata, and as the weather, after sunset, became very dark, with thunder and lightning, though with but little wind, we anchored in the

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vicinity of Cape Sta Maria to avoid being drifted about by irregular currents. For upwards of an hour St. Elmo fires were seen at each mast-head, and at some of the yard-arms: the mast-head vane also, fixed horizontally, and framed with copper, had an illuminated border round it. Heavy rain, much thunder, and a fresh southerly wind followed; but as we were prepared for bad weather, and the sea did not rise much, we maintained our position till daylight next morning, notwithstanding an officer of the watch startling me by reporting that we must be very near the land, because he heard bullocks bellowing.*

On the 23d we entered the great estuary of this shallow though wide river, a hundred and twenty miles across at this part, yet averaging less than ten fathoms in depth; and above fifty miles wide between Monte Video and the opposite point, called Piedras, where the average depth is not more than three fathoms. Very great care is required by vessels navigating the Plata, because of its exceedingly dangerous shoals, its strong and irregular currents, and the sudden tempests to which it is subject. The shoals and currents may be guarded against by a very careful attention to the lead, and a ground-log; but the fury of a violent pampero† must be endured. The land on each side of the Plata is so low, and those extraordinary plains called pampas, hundreds of miles in extent, are so perfectly free from a single obstacle which might offer any check to the storm, that a pampero sweeps over land and water with the weight of a rushing hurricane. Captain King has already described one, by which the Beagle suffered severely, in 1829;‡ but having, to my sorrow, been more immediately concerned, I will endeavour to give a brief account of that disastrous affair, as a warning to others.

On the 30th of January 1829, the Beagle was standing in,

* These noises must have been the discordant 'braying' of the bird called by seamen 'jack-ass penguin.'

† So called because it appears to come from the vast plains called 'pampas.'

‡ Vol. i. pp. 189, 190, 191.

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from sea, towards the harbour of Maldonado. Before mid-day the breeze was fresh from N.N.W., but after noon it became moderate, and there was a gloominess, and a close sultry feeling, which seemed to presage thunder and rain. I should mention that during three preceding nights banks of clouds had been noticed near the south-west horizon, over which there was a frequent reflection of very distant lightning.

The barometer had been falling since the 25th, slowly, but steadily, and on the 30th, at noon, it was at 29.4, and the thermometer 78°. I, and those with me, thought little about the fall of the mercury, and still less about the threatening aspect of the south-west horizon. "Heavy rain," I thought, "at night, will not signify when we are moored in Maldonado:" and there was then every prospect of our reaching that port before night.

Having been often in the river Plata, and once for eight months successively, I had acquired a familiarity with the place, and a disregard for pamperoes, which was not surprising in a young man who had witnessed many, but certainly, as it happened, not one of so serious a nature as to cause any particular impression on his mind. I had not then learned never to despise an enemy.

At about three o'clock the wind was light, and veering about from north-west to north-east. There was a heavy bank of clouds in the south-west, and occasionally lightning was visible even in daylight. Myriads of insects, such as butterflies, dragon-flies, and moths, came off from the land; driven, as it appeared, by gusts of heated wind. At four the breeze freshened up from N.N.W., and obliged us to take in all light sails. Maldonado Tower then bore west, and Lobos Island (centre) S.W.b.S. The weather became more unsettled and threatening, though still we had no expectation of any material change before night: but soon after five it became so dark towards the south-west, and the lightning increased so much, that we shortened sail to the reefed topsails and foresail; still hoping to reach our destination before the pampero began. Shortly before six the upper clouds in the south-west quarter

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assumed a singularly hard, and rolled or tufted appearance, like great bales of black cotton, and altered their forms so rapidly, that I ordered sail to be shortened, and the topsails to be furled, leaving set only a small new foresail. The water was smooth, and, not being deep, there was none of that agitated swell usually noticed before a storm in the great ocean.

Gusts of hot wind came off the nearest land, at intervals of about a minute. The fore-topsail was just furled, and the men down from aloft, the main-topsail in the gaskets, but the men still on the yard, when a furious blast from the north-west struck the ship. The helm was put up, and she paid off fast; yet the wind changed still more quickly, and blew so heavily from south-west, that the foresail split to ribands, and the ship was thrown almost on her beam-ends, and no longer answered her helm. The main-topsail was instantly blown loose out of the men's hands, whose lives were in imminent danger; the fore-topsail blew adrift out of the gaskets; the mainsail blew away out of the gear; the lee hammock-netting was under water; and the vessel apparently capsizing, when topmasts and jib-boom went, close to the caps, and she righted considerably. Both anchors were cut away (for the land was under our lee), and a cable veered upon each, which brought her head to wind, and upright. The heaviest rush of wind had then passed, but it was still blowing a hard gale, and the Beagle was pitching her forecastle into the short high waves which had risen. As the depth of water was small, and the ground tenacious clay, both anchors held firmly, and our utmost exertions were immediately directed towards clearing the wreck, and saving the remains of our broken spars and tattered sails. Had we suffered in no other way, I should have felt joy at having escaped so well, instead of the deep regret occasioned by the loss of two seamen, whose lives, it seemed, might have been spared to this day had I anchored and struck topmasts, instead of keeping under sail in hopes of entering Maldonado before the pampero began.

When the main-topsail blew away from the men, who strug-

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gled hard to keep it fast, they could scarcely hold on, or get off the yard, and one young man fell from the lee yard-arm into the sea. Poor fellow, he swam well, but in vain: the ship was unmanageable, almost overset, the weather quarter boat stove, and the lee one under water: a grating was thrown to him, and the life-buoy let go, but he was seen no more. Another man was supposed to have been carried overboard with the main-topmast, as he was last seen on the cap.

The starboard quarter boat was stove by the force of the wind; and the other was washed away: and so loud was the sound of the tempest, that I did not hear the masts break, though standing, or rather holding, by the mizen rigging. Never before or since that time have I witnessed such strength, or, I may say, weight of wind: thunder, lightning, hail, and rain, came with it, but they were hardly noticed in the presence of so formidable an accompaniment.

After seven the clouds had almost all passed away; the wind settled into a steady south-west gale, with a clear sky; the barometer rose to 29.8, and the thermometer fell to 46°. Lobos Island was set S.E., bearing distant two miles.

In this pampero the masts of a vessel, at anchor off Monte Video, were carried away; and the upper cabin bulkhead of a Brazilian corvette was blown in while lying at anchor, head to wind, with her masts struck. But Maldonado seemed to feel its utmost violence; and there it certainly commenced like a whirlwind. A small boat, belonging to a poor man who carried fruit and vegetables to ships in the bay, was hauled ashore, just above high-water mark, and fastened, by a strong rope, to a large stone. After the storm it was found far from the beach, shattered to pieces, but still fast to the stone, which it had dragged along. Not many days after our disaster, while lying in Maldonado bay, repairing damages, another pampero assailed the Beagle; but though it did her no injury, it blew the boat, stove by its predecessor, away from the place on shore where she was being repaired, and left no trace of her behind.

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Singular fluctuations occur in the river Plata before and after these pamperoes.* For some days previously the river rises, and it is always higher than usual when the south-west wind begins: but, after a few hours, the water falls rapidly, and vessels are left aground: indeed instances have been known of the upper parts of the river, near Buenos Ayres, being so much emptied by strong south-westerly, or westerly winds, that men have rode several miles into its bed, to places where ships usually anchor. I have myself known the water fall, in the outer road, off Buenos Ayres, from six to two fathoms, in less than twelve hours, in a place where the usual depth was four fathoms. Such a change as this would not be thought remarkable where tides usually rise several fathoms; but in the river Plata, where there is very little, if any, tide, where the width of the channel is so great in proportion to its depth, and the confining boundaries are so low, and in many places easily overflowed, a variation of four fathoms cannot take place without causing great difficulties and destruction. In this particular instance,† a heavy gale from the eastward dammed up the river for some days; and then changing, by the south, to the westward, emptied it again proportionably. Small craft were left literally scattered about the low country bordering on the river near Buenos Ayres, and many vessels never floated again. By that gale, which blew directly up the river, and raised a heavy sea, every vessel was driven ashore from the inner road of Buenos Ayres, except a schooner. Fourteen English merchant vessels lay high and dry upon the shore next day, most of them totally lost. The Owen Glendower, bearing the broad pendant of Sir Thomas Hardy, the Icarus brig, and two or three merchant vessels, anchored in the outer road, weathered it out with topmasts struck; but all drove considerably, except the frigate, and she brought both anchors ahead, backed by

* Although generally considered by strangers to refer solely to a squall, or storm, the term pampero is applied by the natives of the country to every south-westerly wind, whether moderate or a hurricane.

† In the year 1820.

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stream anchors with half a cable on each, and riding with a whole cable on each bower, in four fathoms water, over very soft tenacious ground. Part of her forecastle netting was washed away by the sea, though she was an excellent roadster, and at that time drawing a foot less water than usual. She also lost a boat in a manner so likely to be of future occurrence, that I will yet digress, in hopes of being useful, by relating the incident.

Her barge, ably managed by an experienced seaman,* had tried to beat off from the town to the ship, during the commencement of the gale, but could get no farther than the leewardmost merchantman in the outer road. Astern of that vessel she was made fast by a strong hawser, and there rode out the gale admirably until the current began to set out of the river: when the boat was carried against the vessel, and knocked to pieces before any thing could be done to save her, as the sea was running high, and the wind still blowing a gale. The Druid frigate, when lying there,† would have lost a boat in the same way, had it not been one of those excellent diagonal boats, built by Mr. Johns; for it was taken, by the strong weather current, under the ship's bottom, and kept striking there long enough to have broken any ordinary boat into a thousand pieces; but nevertheless she appeared again with only her gunwales injured, the bottom being still perfectly sound.

The Plata has been called by the Spaniards 'El Infierno de los marineros;' sufficient stress has not however been laid on the redeeming qualities which it possesses in having anchoring ground every where, and in soundings, whose nature tells whether you are approaching danger; as on and near the banks the bottom is hard; while in the deeper water it is very soft.

I have remarked that before a continuance of southerly winds the water rises considerably in this river; and I may

* The first who took a steam-vessel to the West-Indies.

† In 1832.

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add, that the reverse takes place under opposite circumstances. Some persons attribute this change of level to the horizontal action of wind; but I am inclined to think it occasioned chiefly by vertical pressure of the atmosphere, increased, doubtless, during strong winds by their driving force.

Before a pampero, the barometer continues to fall during several days, and invariably the water then rises. The gale commences, the barometer ceases falling and begins to rise, and very soon afterwards the level of the river is found to be sinking. For many following days the glass remains high, but the water continues to fall, and, generally speaking, the river is low while the mercury is steady and above the average height, which I should consider to be 29·9 inches. In the Plata I never saw the barometer higher than 30·3, nor lower than 29·4.* I will not delay here to speak of corresponding elevations or depressions of the ocean at other parts of the South American coast, and attempt to trace out the effects of gales in high latitudes, the space through which those winds extend, and whether they reach or affect places in a low or even middle latitude; but leaving such inquiries for another place, take a few more glances at the vicinity of the Plata, and then continue the narrative.

Having already noticed the width and average shallowness of this immense river, and the lowness of its adjacent shores, I need only add, that on the northern side there is a sprinkling of hills, of a granitic structure, scattered amidst extensive plains, while on the south, or right bank, there is neither a hill, a rock, or even a stone.† So low is the land between Point Piedras and Cape San Antonio, that around the great bay, called Sanborombon, it is extremely difficult to say where the water ends, or the coast line begins. Each difference, of

* In estimating weather, or force of wind, by the height of the mercurial column, due regard should be had to the goodness of the instrument, as some barometers, used in ships, differ from others even tenths of an inch.

† Which has not been carried there by man, or by running water.

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even a foot, in the height of the water, makes a change of cables' lengths, if not of miles, in the position of the limiting line between water and land. In consequence it is very dangerous for ships to approach that shore; and, although the bottom is in many places soft, often extremely deep mud, there are other spaces in which hard lumps of tosca* are found, almost as injurious to a ship's bottom as actual rock. I am not aware that there is any granite on the south side of the river Plata, near the shore; and although the name 'Piedras' would incline one to suppose there are rocks or stones near it, I could only find tosca. But towards the northern shore rocks are found, and the dangerous shoal called 'Banco Yngles,' is said to have a granitic foundation. The ridge, of which the English Bank is the north-west extremity, extends eastward, inclining to the south, considerably beyond a line drawn from Cape Santa Maria to Cape San Antonio, and less than ten fathoms water may be found upon it out of sight of land. Northward of the ridge the depth of water varies from ten to thirty fathoms over a very soft bottom of bluish mud; and to the southward of it there are from twelve to three fathoms (diminishing as you approach San Antonio) over a softish bottom of brown or yellow muddy sand.† When it is considered that three very large rivers, besides a host of smaller streams, enter the ocean by the estuary whose more remarkable features we are noticing, that two of those rivers are flooded periodically by tropical rains,‡ and that very heavy gales assist in emptying or filling the shallow wide gulf, in which floods of fresh water contend against the volume of a powerful ocean; not only will frequent

* Tosca is a kind of hardened earth, rather than soft stone, about the consistence of slightly baked clay: it is of a dark brown colour, and varies in hardness from that which is almost stony, to the texture of a sound old cheese.

† Near Cape San Antonio and Point Tuyu there is very soft mud.

‡ The Paraguay rises so far northward, that (excepting a portage of three miles) a canoe may go from Monte Video to the mouth of the Amazon.

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variations in depth be expected, as a natural consequence, but also strong and varying currents. Little or no tide has been hitherto noticed with any degree of accuracy in the estuary of the Plata; but this anomaly may be more apparent than real: for where the depth of water is so fluctuating, and the currents are so variable, it is difficult to distinguish the precise effects of tides, except by a series of observations far longer than has yet been made.

To say much of Maldonado village, the town of Monte Video, or the city of Buenos Ayres, would be to repeat an 'oft-told tale.' The views attached to this volume will give a tolerably clear idea of a few striking peculiarities which are immediately noticed by the eye of a stranger; and of the inhabitants themselves I will only venture to say, upon my slight acquaintance with them, that although prejudiced by their erroneous ideas of freedom, and deficient in high principles, they are courteous and agreeable as mere acquaintances, kind to strangers, and extremely hospitable.

It is well known that there are very few trees* on either bank of the Plata near its mouth, or on those immense plains, called pampas, excepting here and there an 'ombu,'† or some which have been planted near houses; or a few copses of small trees (mostly peach) planted for fuel: but I have not heard any sufficient reason given for this scarcity of wood, in a country covered with a great depth of alluvial soil, and adjoining districts in which trees are abundant. The only second causes for such a peculiarity, which I can imagine, are the following: the nature of the soil, which may be unsuited to most trees, although very productive of grass and gigantic thistles: the furious storms which sweep along the level expanse, and would demolish tender, unprotected young trees: the general want of water, which in some years is so great as to become a severe drought: and the numerous herds of wild cattle which range

* The exceptions are so few, that one might almost say there are no trees which have not been planted.

† A kind of elder.

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over the plains, and eat up every leaf which retains any moisture during the dry heats of summer. Before there were herds of cattle, guanacoes ranged over the country, in great numbers, as they now do to the southward of the river Negro, where I have seen them grazing in large companies, like flocks of sheep. During the droughts above-mentioned vast numbers of cattle die for want of water, and perhaps this may be the principal reason why so few trees grow there naturally; but it cannot be the only one, because they grow where planted, and partially sheltered, though not watered.

Most people are aware of the scale upon which the cattle farms of the 'Banda Oriental' and 'Republica Argentina' were carried on: but the civil wars which have succeeded the steady government of Spain have broken up and ruined many of the largest establishments, where from one hundred to two hundred thousand head of cattle were owned by one man—where the annual increase was about thirty per cent—and where the animals were, generally speaking, slaughtered for their hides alone. What must be the natural fertility of a country, which, without the slightest assistance from man, can nourish such enormous multitudes of cattle, besides immense droves of horses and flocks of sheep, and yet, except near its few towns, appear almost destitute of inhabitants.

To return to our little vessel—entering the Plata in 1832. Unfavourable winds, and currents setting out of the river, delayed our progress, and obliged us to anchor frequently. We arrived at Monte Video on the 26th, and lost no time in making observations for our chronometers, and preparing for surveying the coasts southward of Cape San Antonio: but as I found that it would be advisable to visit Buenos Ayres, in order to communicate with the Government, and obtain information, we sailed from Monte Video on the 31st, and two days afterwards anchored off Buenos Ayres. There, however, we did not remain an hour; for the misconduct of a Buenos Ayrean officer on board a vessel under their colours, and a vexatious regulation with respect to quarantine, decided my

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returning forthwith to Monte Video; and commissioning a capable person to procure for me copies of some original charts, which I thought would be exceedingly useful, and which could only be obtained from the remains of hydrographical information, collected by Spain, but kept in the archives of Buenos Ayres. The Beagle anchored again off Monte Video, on the 3d of August, and as soon as the circumstances which occasioned her return were made known to Captain G. W. Hamilton, commanding the Druid frigate, that ship sailed for Buenos Ayres.

Scarcely had the Druid disappeared beneath the horizon, when the chief of the Monte Video police and the captain of the port came on board the Beagle to request assistance in preserving order in the town, and in preventing the aggressions of some mutinous negro soldiers. I was also requested by the Consul-general to afford the British residents any protection in my power; and understanding that their lives, as well as property, were endangered by the turbulent mutineers, who were more than a match for the few well-disposed soldiers left in the town, I landed with fifty well-armed men, and remained on shore, garrisoning the principal fort, and thus holding the mutineers in check, until more troops were brought in from the neighbouring country, by whom they were surrounded and reduced to subordination. The Beagle's crew were not on shore more than twenty-four hours, and were not called upon to act in any way; but I was told by the principal persons whose lives and property were threatened, that the presence of those seamen certainly prevented bloodshed.

Some days after this little interruption to our usual avocations, we sailed across the river to Point Piedras, anchored there for some hours to determine its position, then went to Cape San Antonio, and from that point (rather than cape) began our survey of the outer coast. To relate many details of so slow and monotonous an occupation as examining any shore, of which the more interesting features have long been known, could answer no good purpose, and would be very tiresome to

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a general reader; therefore I shall hasten from one place to another, dwelling only, in my way, upon the few incidents, or reflections, which may have interest enough to warrant their being noticed in this abridged narrative, or are absolutely necessary for carrying on the thread of the story.

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CHAPTER V.

Eastern Pampa Coast—Point Medanos—Mar-chiquito—Ranges of Hills—Direction of Inlets, Shoals, and Rivers—Cape Corrientes—Tosca Coast—Blanco Bay—Mount Hermoso—Port Belgrano—Mr. Harris—Ventana Mountain—View—Argentina—Commandant—Major—Situation—Toriano—Indians—Fossils—Animals—Fish—Climate—Pumice—Ashes—Conway—Deliberations—Consequent Decision—Responsibility incurred—Paz—Liebre—Gale—Hunger—Fossils at Hermoso—Fossils at Point Alta—Express sent to Buenos Ayres—Suspicions and absurd alarm—Rodriguez.

Aug. 22. From Cape San Antonio (which, though so called, is only a low point) to rather more than half-way towards Cape Corrientes, the sea-coast is sandy and low. Behind the beach are sand-hills, and farther inshore are thickets affording shelter to numbers of jaguars. In sailing along, even with both leads going, we were, for a few minutes, in imminent danger of grounding upon a bank, or ledge, which extends six miles E.S.E. from Point Medanos. The water shoaled so suddenly, and so irregularly, that I could not tell which way to steer; and as we had been running directly before the wind, it was impossible to retreat by the safest track (that which we had made in approaching): however, by persevering in pushing eastward, away from the land, steering one way or another as the water deepened, we at last got clear. We then stood out to gain an offing, rounded the bank, and hauled close inshore again nearly opposite to a large salt lagoon, called Mar-chiquito, which approaches the sea so closely as to have occasioned an idea that, by cutting through the narrow strip of land which separates them, a fine port might be formed.

Some persons assert that there is always a communication between the lagoon and the sea; that cattle cannot pass along the isthmus on account of that opening; and that a boat might swim from one to the other. If this is the case, we were much deceived on board the Beagle; for when she passed so near the spot that the lagoon was overlooked by the officers at her mast-

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heads, nothing like an opening could be detected, though the beach was scrutinized with good glasses, as well from the deck as by those who looked down upon it from aloft as we sailed by. I suspect that there has been some confusion of ideas respecting the little river San Pablo, and a supposed entrance to the lagoon: but, be this as it may, very great difficulty would be found in attempting to form a large and permanent communication at a spot so exposed to heavy south-east gales.

At Port Valdez (in latitude 42° S.) the entrance is sometimes completely blocked up by shingle and sand, during and after a strong south-east gale; and I think it probable that such an effect would be caused here, at times, whether there were a natural or an artificial opening; and as there is no great rise and fall of tide, I much doubt whether the opening would be again cleared, as at Port Valdez, by the mere ebb and flow of water.

In the vicinity of Mar-chiquito, the country (campo) is very fertile, and well watered. Sheltered to the south by a range of down-like hills, whence numerous small brooks originate, it gives abundant pasturage to many thousands of cattle, and is considered by the Buenos Ayreans to be the finest district of their territory. This range of hills extends in a west north-west direction for more than fifty leagues, and varies in name at different places. That part next to Cape Corrientes is called Sierra Vuūlcan;* twenty leagues inland is the ridge named Tandil, and at the western extreme is a height called Cayru. Between Tandil and Cayru there are many hills known by particular names, but they are all part of the range above-mentioned; and it is a remarkable fact, that not only this range, that nearer to Buenos Ayres called Cerrillada, and that of which the Sierra Ventana forms a part, extend nearly in an east-south-east and west-north-west direction; but that most of the ranges of high land, most of the rivers, and the greater number of inlets, between the Plata and Cape Horn, have a similar direction, not varying from it above one point, or at most two points of the compass. After we became aware

* An Indian word, which means 'opening,' or 'having openings.'

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of this peculiarity, it was far easier to avoid shoals, as they all lay in a similar direction.

On a round-topped hill, near Mar-chiquito, we saw an immense herd of cattle, collected together in one dark-coloured mass, which covered many acres of ground. A few men, on horseback, were watching them, who, seeing us anchor, drove the whole multitude away at a gallop, and in a few minutes not one was left behind. Probably they suspected us of marauding inclinations.

Cape Corrientes is a bold, cliffy promontory; off which, notwithstanding the name, I could not distinguish any remarkable current. It is said to be hazardous for a boat to go alongshore, near the high cliffs of that cape, because there are rocks under water which sometimes cause sudden and extremely dangerous 'blind breakers.' More than one boat's crew has been lost there, in pursuit of seals, which are numerous among the rocks and caves at the foot of those cliffs. Hence to Bahia Blanco is a long and dreary line of coast, without an opening fit to receive the smallest sailing vessel, without a remarkable feature, and without a river whose mouth is not fordable. Even the plan of it, on paper, has such a regular figure, that an eye accustomed to charts may doubt its accuracy; so rarely does the outline of an exposed sea-coast extend so far without a break. A heavy swell always sets upon it; there is no safe anchorage near the shore; and, as if to complete its uninviting qualities, in the interior, but verging on this shore, is a desert tract, avoided even by the Indians, and called, in their language, Huecuvu-mapu (country of the Devil). In exploring this exposed coast, southerly winds sometimes obliged us to struggle for an offing; and we lost several anchors in consequence of letting them go upon ground which we thought was hard sand lying over clay, but which turned out to be tosca, slightly covered with sand, and full of holes. The lead indicated a sandy, though hard bottom; but we found it every where so perforated and so tough, that, drop an anchor where we might, it was sure to hook a rock-like lump of tosca, which sometimes was torn away, but at others broke the anchor.

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Finding this to be the case, I had a stout hawser 'bent' to the 'crown' of the anchor, and after shortening in cable, tripped the anchor by the hawser, and then weighed it, uninjured, without much difficulty.

Along this extent of sea-coast, half way between the currents in the vicinity of the Plata, and those occasioned by strong tides near Blanco Bay and the river Negro, we found no current. Whether there was a rise of tide it was not easy to ascertain by the lead-line, when at anchor, from the bottom being so uneven; and to land was impossible, on account of a furious surf.

Several kinds of fish were caught at our temporary anchorages, and noticed carefully by Mr. Darwin. Anchorage is not a word I should use in this case (where the anchor was only let go for a short time while the ship's position could be fixed with accuracy, and our triangulation carried on in a satisfactory manner), as it might deceive a stranger to the coast: stopping-place would be better.

While examining the positions nearest to Blanco Bay, we had occasional alarms—such as the wind shifting and blowing strong directly towards the land; our soundings shoaling suddenly to three, or less than three fathoms; or thick weather coming on while a boat was away sounding;—but these are every-day events in a surveying vessel actively employed.

Near Blanco Bay we found the water greatly discoloured, and the soundings were not such as to tempt us onwards; however, it was necessary to proceed. We steered towards a little hill, which I fancied must be Mount Hermoso,* and soon after sun-set, on the 5th, anchored in what we afterwards found to be the roadstead near that hillock, at the head of Blanco Bay, close to the entrance of Port Belgrano, but divided from it by a bank.

As the bad apologies for charts of this place, which we possessed at our first visit, left us as much at a loss as if we had

* Mount Hermoso is but 140 feet above the sea; yet, on this low coast, it is somewhat remarkable, as being the only peaked hill close to the water; and having under it a low cliffy point, the only one thereabouts.

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none, I set out with the boats next morning to seek for a passage into Port Belgrano.*

Our boats were soon stopped by shoal water, and I found, to my vexation, that the Beagle was anchored at the head of an inlet, between the shore and a large bank extending far towards the south-east, and that before going farther west she must retreat eastward, and look for another passage. This was an unexpected dilemma; but our prospect was improved by the appearance of a small schooner running towards us, from Port Belgrano, with a Buenos Ayrean (or Argentine) flag flying.

Very soon she came near enough for our boat to reach her, and an Englishman came on board, who offered to pilot the Beagle to a safe anchorage within the port. This was Mr. Harris, owner of the little schooner in which he sailed, (a resident at Del Carmen, on the river Negro, and trading thence along the coast), with whom we had much satisfactory intercourse during the next twelvemonth.

By his advice we weighed anchor, stood across the great north bank, in very little more water than we drew, until we got into a channel where there was water enough for any ship, and a soft muddy bottom: there we hauled up west-north-west,† by his direction, and with a fresh wind sailed rapidly into the extensive and excellent, though then little known harbour, called Port Belgrano; and at dusk anchored near the wells under Anchorstock Hill (or Point Johnson).

To give an idea of the general appearance, or almost disappearance, of the very low land around this spacious port, I will mention, that when the Beagle had crossed the north bank, and hauled up in the fair way, Mount Hermoso was nearly beneath the horizon; some bushes on the flat land southward

* Often erroneously called Bahia Blanco; a name originally given to the outer bay, in compliment to General Blanco.

† So constantly did Mr. Harris give this course, on subsequent occasions, that it became quite a joke; but it is nevertheless a strong corroboration of what I stated respecting the general direction of the inlets, and ridges, or ranges of hills.

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of us (Zuraita Island) could be just distinguished; and ahead in the north-west quarter, no land could be made out, except the distant Ventana mountain, which we saw for the first time on that day.

In consequence of this extent of water being intersected by banks, and having so few marks, it is very difficult of access; and no place can offer less that is agreeable to the eye, especially when the tide is out, and much of the banks shows above water. A more disagreeable place to survey, or one that would occupy more time, we were not likely to find, I thought, as I looked around from the mast-head; but upon questioning Mr. Harris, I learned that a succession of similar inlets indented a half-drowned coast, extending hence almost to the Negro; and that, although the dangers were numerous, tides strong, banks muddy, and the shores every where low, the intervening ports were so safe, and so likely to be useful, that it was absolutely necessary to examine them.

Sept. 7. Messrs. Darwin, Rowlett, and Harris set out with me to visit the Buenos Ayrean settlement, called Argentina. Mr. Harris undertook to be our guide, but after two hours' sailing and pulling we found ourselves near the head of a creek, between two soft mud banks, where we could neither row nor turn the boat. We could not land because the mud was too soft to bear our weight, so there we staid till the tide flowed. About two hours after this stoppage there was water enough for us to cross a large bank, and gain the right channel, from which we had deviated, and then, with a flowing tide, we made rapid progress, until the 'Guardia' was announced to us. This was a small hut near the water side, but to reach it we had to wind along a tortuous canal, between banks of soft mud: and when we arrived at the landing-place seven hours had been passed among rushy mud banks, surrounded by which we were often prevented from seeing any solid land. The water was every where salt, the tide running strongly, and the boat often aground.

Waiting to meet us was an assemblage of grotesque figures, which I shall not easily forget—a painter would have been

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charmed with them. A dark visaged Quixotic character, partly in uniform, mounted on a large lean horse, and attended by several wild looking, but gaily dressed gauchos,* was nearest to us. Behind him, a little on one side, were a few irregular soldiers, variously armed, and no two dressed alike, but well mounted, and desperate-looking fellows; while on the other side, a group of almost naked Indian prisoners sat devouring the remains of a half roasted horse; and as they scowled at us savagely, still holding the large bones they had been gnawing, with their rough hair and scanty substitutes for clothing blown about by the wind, I thought I had never beheld a more singular group.

The tall man in uniform was the Commandant of the settlement, or fortress, called Argentina: he and his soldiers had arrived to welcome us, supposing that we were bringing supplies from Buenos Ayres for the needy colony. The Indian prisoners had been brought to work, and assist in carrying the supplies which were expected. Finding that we were neither Buenos Ayreans, nor traders from any other place, it was supposed that we must be spies sent to reconnoitre the place previous to a hostile attack. Neither the explanations nor assertions of Mr. Harris had any weight, for as he was our countryman, they naturally concluded he was in league with us; yet, as the commandant had some idea that we might, by possibility, be what we maintained we were, he disregarded the whispers and suggestions of his people, and offered to carry us to the settlement for a night's lodging.

Leaving the boat's crew to bivouac, as usual, I accepted a horse offered to me, and took the purser up behind; Mr. Darwin and Harris being also mounted behind two gaucho soldiers, away we went across a flat plain to the settlement. Mr. Darwin was carried off before the rest of the party, to be cross-questioned by an old major, who seemed to be considered the wisest man of the detachment, and he, poor old soul,

* Countrymen, employed in keeping and killing cattle, breeding and training horses, hunting, war, &c.

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thought we were very suspicious characters, especially Mr. Darwin, whose objects seemed most mysterious.

In consequence, we were watched, though otherwise most hospitably treated; and when I proposed to return, next morning, to the boat, trifling excuses were made about the want of horses and fear of Indians arriving, by which I saw that the commandant wished to detain us, but was unwilling to do so forcibly; telling him, therefore, I should walk back, and setting out to do so, I elicited an order for horses, maugre the fears and advice of his major, who gave him all sorts of warnings about us. However, he sent an escort with us, and a troop of gaucho soldiers were that very morning posted upon the rising grounds nearest to the Beagle, to keep a watch on our movements.

We afterwards heard, that the old major's suspicions had been very much increased by Harris's explanation of Mr. Darwin's occupation. 'Un naturalista' was a term unheard of by any person in the settlement, and being unluckily explained by Harris as meaning 'a man that knows every thing,' any further attempt to quiet anxiety was useless.

As this small settlement has seldom been visited by strangers, I will describe its primitive state. In the midst of a level country, watered by several brooks, and much of it thickly covered with a kind of trefoil, stands a mud-walled erection, dignified with the sounding appellation of 'La fortaleza protectora Argentina.' It is a polygon, 282 yards in diameter, having about twenty-four sides, and surrounded by a narrow ditch. In some places the walls are almost twenty feet high, but in others I was reminded of the brothers' quarrel at the building of ancient Rome, for there is a mere ditch, over which a man could jump. It is, however, said by the gauchos, that a ditch six feet wide will stop a mounted Indian, and that their houses require no further defence from attacks of the aborigines. How, or why it is that such excellent horsemen do not teach their horses to leap, I cannot understand.

Within, and outside the fort, were huts (ranchos) and a few

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small houses:—more were not required for the inhabitants, who, including the garrison, only amounted to four hundred souls. Some half-dozen brass guns were in a serviceable condition; and two or three other pieces occupied old carriages, but did not seem to be trustworthy.

The fort was commenced in April 1828, by a French engineer, named Parchappe. The first commandant was Estomba: his successor, Morel, was killed, with ninety followers, by a party of Indians under Chenil, in 1829. Valle and Rojas succeeded, and the latter was followed by Rodriguez. Placed in the first instance as an advanced post, at which to watch and check the Indians, rather than as a colony likely to increase rapidly, Argentina has scarcely made any progress since its establishment, though it is the beginning of what may hereafter be a considerable place. Situated favourably for communicating with Concepcion—by way of the pass through the Cordillera, near Tucapel—it is also the only port, between 25° S. and Cape Horn, capable of receiving in security any number of the largest ships.

There is pasture for cattle near the streams which descend from the 'Sierra Ventana:' large salinas (spaces covered with salt) lie within an easy distance of the settlement: of brushwood for fuel there is plenty, though there are no large trees: and report says that there are valuable minerals, including coal and iron,* in the Ventana† mountain.

The most serious objection to the locality, as an agricultural, or even as a mere grazing district, is the want of rain. Two or three years sometimes pass without more than a slight shower; and during summer the heat is great. In winter, there are sharp frosts, sometimes snow; but neither ice nor snow ever lasts through the day.

Good fresh water may be generally obtained, independent of the few running streams, by digging wells between four and

* I believe there is no good foundation for this report. Mr. Darwin's opinion is against the supposition.

† The name 'Ventana' was given because of an opening, at the south side, resembling a window.

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ten feet deep: and in this way we found no difficulty in obtaining an ample supply.

Three months before our visit to Argentina, a number of Indians had been surprised and taken prisoners by Rodriguez; and among them was the famous old cacique, Toriano, whose mere name was a terror to the frontier settlers. The commandant attacked their 'tolderia' (encampment) just before sunrise—when the young men were absent on an expedition—and made prisoners of the old men, women, and children. Toriano was shot in cold blood; with another cacique, and several Indians of inferior note: and his head was afterwards cut off, and preserved for some time at the fort, in order to convince his adherents of his death. Toriano was a noble Araucanian, upwards of seventy years old when surprised asleep and taken prisoner by his merciless enemies. So high was his acknowledged character as a warrior, that his followers supposed him invincible; and until convinced by the melancholy spectacle seen by their spies, they would not believe him gone.

Perhaps it is not generally known, that many of the most desperate incursions upon the Buenos Ayrean colonists have been made by flying troops, or hordes of Indians, whose head-quarters are in the Cordillera of the Andes, or even on the west coast, between Concepcion and Valdivia. Mounted upon excellent horses, and acquainted with every mile of the country, they think lightly of a predatory or hostile excursion against a place many hundred miles distant.

We returned to the Beagle without another delay among the mud-banks, and found the rising grounds (heights they could not be called), nearest the ship, occupied by the troop of gaucho soldiers. As they did not interfere with us, our surveying operations were begun, and carried on as usual. Mr. Darwin, and those who could be spared from duties afloat, roamed about the country; and a brisk trade was opened with the soldiers for ostriches and their eggs, for deer, cavies, and armadilloes.

My friend's attention was soon attracted to some low cliffs near Point Alta, where he found some of those huge fossil

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bones, described in his work; and notwithstanding our smiles at the cargoes of apparent rubbish which he frequently brought on board, he and his servant used their pick-axes in earnest, and brought away what have since proved to be most interesting and valuable remains of extinct animals.

The soldiers appointed to watch our movements soon relaxed so far as to spend nearly all their time in hunting animals for us. Besides those already mentioned, they one day brought a fine living puma, in hopes I should offer a good price, and embark it alive; but having no wish for so troublesome a companion in our crowded little vessel, I only bargained for its skin. The soldiers made a hearty meal of the flesh, and asserted that it was good, though inferior to that of a horse, which I had seen them eating a day or two previously.

Four kinds of armadilloes were described to us by these men, of which we saw but two: the quiriquincha, with nine bands; the mataca-bola, which rolls up into a ball; the peludo, which is large and hairy; and the molito, of which I heard only the name. Mr. Rowlett saw a black fox, and he was told that there are wolves in the neighbourhood. Two small burrowing animals are also found: the zorillo, or skunk; and the tucu-tucu. While speaking of animals, I should say that the commandant (Rodriguez) told me, that he had once seen, in Paraguay, a 'gran bestia,' not many months old, but which then stood about four feet high. It was very fierce, and secured by a chain. Its shape resembled that of a hog, but it had talons on its feet instead of hoofs; the snout was like a hog's, but much longer. When half-grown, he was told that it would be capable of seizing and carrying away a horse or a bullock. I concluded that he must have seen a tapir or anta; yet as he persisted in asserting that the animal he saw was a beast of prey,* and that it was extremely rare,* I here repeat what he said. (See extract from Falkner.—Appendix—No. 11.)

Abundance—I may well say shoals of fish were caught by our men, whenever we hauled the nets at a proper time (the beginning of the flood-tide); and as they were chiefly un-

* Neither of which remarks apply to the Anta.

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known to naturalists, Mr. Earle made careful drawings of them, and Mr. Darwin preserved many in spirits. We procured plenty of good fresh water from wells near the beach, and small wood for fuel in their immediate neighbourhood. The climate is delightful, and healthy to the utmost degree, notwithstanding such extensive flats, half-covered with water, and so many large mud-banks. Perhaps the tides, which rise from eight to twelve feet, and run two or three knots an hour, tend to purify the air; indeed, as the whole inlet is of salt water, there may be no cause for such effects as would be expected in similar situations near fresh water.

In our rambles over the country, near Port Belgrano, we every where found small pieces of pumice-stone; and till Mr. Darwin examined the Ventana, supposed they had been thrown thence: he has, however, ascertained that it is not volcanic; and, I believe, concludes that these fragments came from the Cordillera of the Andes.—(See Vol. III. by Mr. Darwin.)

Falkner, in whose accounts of what he himself saw I have full faith, has a curious passage illustrative of this supposition; and it is not impossible—nor even, I think, improbable—that some of the pumice we saw fell at the time mentioned in the following extract:—" Being in the Vuūlcan, below Cape St. Anthony, I was witness to a vast cloud of ashes being carried by the winds, and darkening the whole sky. It spread over great part of the jurisdiction of Buenos Ayres, passed the river of Plata, and scattered its contents on both sides of the river, insomuch that the grass was covered with ashes. This was caused by the eruption of a volcano near Mendoza, the winds carrying the light ashes to the incredible distance of three hundred leagues or more."—Falkner, p. 51.

As an indisputable, and very recent instance of the distance to which volcanic substances are sometimes carried, I might mention the fact of H.M.S. Conway having passed through quantities of pumice-stone and ashes, in latitude 7° north, and longitude 105° west, being more than seven hundred miles from the nearest land, and eleven hundred from the volcano near Realejo, whence it is supposed that they proceeded; but as it is

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possible that those substances might have been thrown out of a volcano in the Galapagos Islands, and drifted on the surface of the sea by currents, which near there run from twenty to eighty miles in twenty-four hours, towards the north-west, one cannot, with certainty, rely upon that fact as evidence of a distance to which pumice has been carried by wind.

Captain Eden informed me, that the Conway was surrounded by ashes and pumice-stone for a day and a half (on the 5th and 6th of May 1835), and that they were supposed to have been ejected from a volcano near Realejo, at the time of the great earthquake; and an eruption which darkened the air during three days.

The aborigines of these regions attach considerable importance to the Ventana,* chiefly on account of its use as a landmark; for, rising abruptly to the height of 3,340 feet in a flat country, where there is not another hill of consequence, it is of no small use to them in their wanderings. I was told by Mr. Darwin, that he found it to be chiefly of quartz formation; but I need not risk causing a mistake, by repeating here the information which he gave me, when it is given fully in his own words in the accompanying volume.

After a few days' examination of Port Belgrano, and making inquiries of Harris, as well as those persons at Argentina who knew something of the neighbouring waters and shores, I was convinced that the Beagle alone could not explore them, so far as to make her survey of any real use, unless she were to sacrifice a great deal more time than would be admissible, considering the other objects of her expedition. What then was to be done? Open boats could not explore the seaward limits of those numerous shoals which lie between Blanco Bay and the river Negro, because there are dangerous 'races,'† and often heavy seas. The Beagle herself, no doubt, could do so, and her boats might explore the inlets; but, the time that such a proceeding would occupy was

* The Puel Indians called the Ventana Casu-hati (high hill); and the Molu-che, Vuta-calel (great bulk.)—Falkner, p. 74.

† Tide-races, or ripples.

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alarming to contemplate. I might run along the outer line of danger in the Beagle, and connect it with the soundings in the offing; but how could an English ship surveying a frequented coast overlook six large ports,* only because their examination required time, and was dangerous? At last, after much anxious deliberation, I decided to hire two small schooners —or rather decked boats, schooner-rigged—from Mr. Harris, and employ them in assisting the Beagle and her boats. Mr. Harris was to be in the larger, as pilot to Lieutenant Wickham—and his friend Mr. Roberts, also settled at Del Carmen, on the river Negro, was to be Mr. Stokes's pilot in the smaller vessel. These small craft, of fifteen and nine tons respectively, guided by their owners, who had for years frequented this complication of banks, harbours, and tides, seemed to me capable of fulfilling the desired object—under command of such steady and able heads as the officers mentioned—with this great advantage; that, while the Beagle might be procuring supplies at Monte Video, going with the Fuegians on her first trip to the southward, and visiting the Falkland islands, the survey of all those intricacies between Blanco Bay and San Blas might be carried on steadily during the finest time of year. One serious difficulty, that of my not being authorized to hire or purchase assistance on account of the Government, I did not then dwell upon, for I was anxious and eager, and, it has proved, too sanguine. I made an agreement with Mr. Harris,† on my own individual responsibility, for such payment as seemed to be fair compensation for his stipulated services, and I did hope that if the results of these arrangements should turn out well, I should stand excused for having presumed to act so freely, and should be reimbursed for the sum laid out, which I could so ill spare. However, I foresaw and was willing to run the risk, and now console myself for this, and other subsequent mortifications, by the reflection that the service entrusted to me did not suffer.

* Blanco Bay and Port Belgrano, False Bay, Green Bay, Brightman Inlet, Union Bay, and San Blas Bay.

† See Appendix.

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The formal agreement with Mr. Harris being duly signed, I despatched him forthwith to the river Negro, in search of his vessels, and sent the purser with him to ascertain the state of things at Del Carmen, especially with a view to future supplies.

They went in a small coasting vessel, belonging to another Englishman (H. Elsegood), settled at Del Carmen; for the schooner, from which Mr. Harris came to us near to Mount Hermoso, did not delay, but continued her course towards the river Negro.

Our boats were constantly employed while these arrangements were pending, and directly they were finished, the Beagle got under sail to examine the entrance and outer parts of the port. For several days she was thus engaged, anchoring always at night. In a week the schooners arrived, bringing our purser and their owners. The Paz, of about fifteen tons burthen, was as ugly and ill-built a craft as I ever saw, covered with dirt, and soaked with rancid oil. The Liebre, of about nine tons burthen, was a frigate's barge,* raised and decked—oily like the other; but as both had done their owners good service in procuring seal and sea-elephant oil, I saw no reason to doubt our being able to make them answer our purpose. Yet the prospect for those who had so handsomely volunteered to go in any thing, with or without a deck, could not be otherwise than extremely unpleasant; for they did not then foresee how soon a thorough cleansing and complete outfit would be given to both vessels, and how different they would afterwards appear.

Lieutenant Wickham, with the sailmaker, armourer, cooper, and a small party, were immediately established under tents, on the banks of a small creek (Arroyo Pareja). The little schooners were hauled ashore for examination and a thorough refit; and then, having left them the stores and other necessaries which they would require, I went with the Beagle towards Blanco Bay; completed the examination of a narrow though deep channel, by which any ship may

* She had been the barge of the Brazilian frigate Piranga.

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enter Port Belgrano, passed round the great north bank, and again anchored under Mount Hermoso. While some officers and men were on shore there, building a sea-mark on the mount, and otherwise employed for the survey, a gale of wind came on from S.E., which soon sent so heavy a sea into the road-stead near the mount, that the Beagle was obliged to strike topmasts and veer a long scope of cable upon two anchors, besides having another under foot. Unluckily, our party on shore had only one day's provisions, so while the gale lasted their situation was sufficiently disagreeable; the keen air and hard exercise sharpening their appetites, while they had nothing to eat after the first day; and having no guns, they had no prospect of procuring anything. Mr. Darwin was also on shore, having been searching for fossils, and he found this trial of hunger quite long enough to satisfy even his love of adventure. Directly it was possible to put a boat on the water, one was sent, with provisions secured in a cask which was thrown overboard at the back of the surf, and soon drifted ashore to the famishing party. This gale lasted several days, and proved to us not only how heavy a sea is thrown into this bight (rincon, Sp.), by a south-east gale; but also, that the holding-ground is sufficiently good to enable a ship to withstand its effects.

One of our party on shore (who is not likely to forget building a mark on Mount Hermoso) discovered many curious fossils in some low cliffs under the mount; and judging from what Mr. Darwin then found, future collectors may reap a rich harvest there, as well as at Point Alta.

We next returned to the Wells, and while some assisted the outfit of Lieutenant Wickham's little vessels, others explored the upper parts of the port, quite to its end, and Mr. Darwin took advantage of the opportunity to make some of those interesting excursions which he describes in his volume. At this time there were no soldiers to watch us, neither was there any longer a suspicion of our character; for it appeared that an express had been sent off to Buenos Ayres, at our first arrival, giving an exaggerated and rather ludicrous account of

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our officers, instruments and guns—to which an answer had been immediately returned, desiring the commandant to afford us every facility in his power, and checking the old major rather sharply for his officious and unnecessary caution. Had we not been hastily treated in the roads of Buenos Ayres, when I went there to communicate with the Government, and obtain information, I should doubtless have carried with me orders, or a letter, to this commandant, which would have prevented a moment's suspicion: but, as it happened, no real delay was occasioned, and no person was much disturbed except the major, who fancied that our brass guns were disguised field-pieces, our instruments lately invented engines of extraordinary power, our numerous boats intended expressly for disembarking troops; and an assertion of mine, that any number of line-of-battle ships might enter the port, a sure indication that the Beagle was sent to find a passage for large ships: which would soon appear, and take possession of the country. Such was the substance of his communication to the Government at Buenos Ayres, and as he acted as secretary—(Rodriguez being a man of action rather than words)—he had free scope for his disturbed imagination. I shall not easily forget his countenance, when I first told him—thinking he would be glad to hear it—that there was a deep channel leading from Blanco Bay to the Guardia near Argentina, and that a line-of-battle ship could approach within gunshot of the place where I first met the commandant. He certainly thought himself almost taken prisoner; and I really believe that if he had been commanding officer, we should have been sent in chains to Buenos Ayres, or perhaps still worse treated. Fortunately, Rodriguez the commandant, being a brave man, and a gentleman, contemplated no such measures.

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CHAPTER VI.

Beagle sails with Paz and Liebre—Part company—Beagle visits Buenos Ayres—Nautical remarks on the Plata—Sail from Monte Video for San Blas—Lieut. Wickham and tenders—Butterflies—Sail for Tierra del Fuego—White-water—Icebergs—Rocks—Cape San Sebastian—Oens-men—Cape San Diego—Good Success Bay—Natives—Guanacoes—Cape Horn—St. Martin Cove—Gales—Heavy Seas—Nassau Bay—Goree Road—Prepare to land Matthews and the Fuegians.

18th October. No person who had only seen the Paz and Liebre in their former wretched condition, would easily have recognised them after being refitted, and having indeed almost a new equipment. Spars altered, and improved rigging, well-cut sails, fresh paint,* and thorough cleanliness, had transformed the dirty sealing craft into smart little cock-boats: and as they sailed out of Port Belgrano with the Beagle, their appearance and behaviour were by no means discouraging.

At dusk, Lieutenant Wickham and his small party of venturous associates separated from us, and steered into False Bay.† The Beagle anchored for the night, and next day pursued her route towards Monte Video, where she arrived on the 26th.

Desirous of communicating with the Government at Buenos Ayres, and measuring the difference of meridians between that city and Monte Video, we weighed anchor on the 31st, proceeded up the river, and remained in the outer roadstead, off Buenos Ayres, until the 10th of November. We then employed three days in verifying the positions of some banks,‡ as laid down in Heywood's and other charts, and returned to Monte Video on the 14th.

* Or rather red-ochre, coal-tar, and white-wash.

† See orders to Lieut. Wickham, in the Appendix.

‡ Ortiz, Chico, and Ensenada.

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It is not prudent for any vessel drawing more than ten feet water to remain under sail in this part of the river, while it is dark, unless a good pilot is on board; and even the best practical experience is not always a sure guide, so uncertain and fluctuating are the currents and depths of water. There are a few simple precautions, useful in such circumstances, of which I may be excused for reminding young sailors. A ground-log ought to be hove frequently, and compared with a common log; there should be a leadsman in each chains, one, at least, of whom should sound constantly: the deep-sea lead* ought to be used now and then, even in shallow water, as a check upon the hand-lead: from the vessel's draught of water to two fathoms more than that depth, the hand-line should be marked to feet, by alternate marks of dark-coloured hair and small line: strong lanterns should be suspended under the chain-wales, near the water, but close to the ship's side; while a careful person ought to superintend the leadsman, and occasionally take a line into his own hand, so that by 'plumbing' the bottom himself he may ascertain how far reliance is to be placed upon the leadsman's opinion.

In the Plata, as well as in many other pilot-waters, to feel the ground thus is often more useful than knowing the precise depth of water, or even the colour, or nature, of the bottom.

27th Nov. Our arrangements and observations being satisfactorily completed, a sufficient quantity of provision on board to last eight months, at full allowance, and an extra supply of iron and coals for the forge, in case of any serious accident, the Beagle sailed from Monte Video; and, after filling water near Cape Jesu Maria,† hastened to look after her little assistants, left near Bahia Blanco.

In this trip we benefitted by the assistance of Mr. Robert N. Hamond, an early and much esteemed friend of mine, who was lent to the Beagle from H.M.S. Druid, of which he was then a mate.

* Massey's is preferable.

† Above Monte Video, on the north shore.

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December 3d. Soon after daylight we saw the very low islands, just to the northward of San Blas. I wished to have made Point Rubia, but was set twenty miles northward, during the night, by the flood tide. We stood directly towards the shore, but when eight miles from it found a wide breadth of discoloured water, and the depth shoaled suddenly from ten to three fathoms in a few casts of the lead. Hauling off, we steered southward, with the ebb tide. There was no ripple on the banks, but the water was quite yellow, and at the time we altered our course, in consequence of such shallow water, the nearest land was, at least, eight miles distant.

While tracing the outer edge of this bank we descried our cock-boats coming out to meet us, and soon afterwards Mr. Wickham came on board. He gave us gratifying news with little drawback; but had he been half-roasted his own appearance could hardly have been more changed. Notwithstanding the protection of a huge beard, every part of his face was so scorched and blistered by the sun that he could hardly speak, much less join in the irresistible laugh at his own expense. His companions were similarly sun-burned, though not to such a degree. They had been much occupied in sounding extensive banks and harbours, under a hot sun, and while a fresh wind kept them constantly wet with spray. But this inconvenience was trifling; one of more importance was excessive sea-sickness, in consequence of the short and violent movements of such small craft under sail among the tide-races and eddies so numerous on that coast.

In other respects all had prospered so well, that I determined to give Mr. Wickham fresh orders,* enlarging considerably his share of surveying operations. He was desired to continue exploring the coast, even as far as Port Desire, until the Beagle's return from her visit to Tierra del Fuego and the Falkland Islands.

As the weather promised well, an anchor was dropped where we were, outside the banks, but the schooners sought shelter in the harbour of San Blas. Next day they came out and anchored

* See Appendix.

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close to us, in order to receive stores and various supplies which we had brought for them from Buenos Ayres and Monte Video. I was a little uneasy when I saw that the pilot of the Liebre, Mr. Roberts, was one of the largest of men, and that his little vessel looked, by comparison, no bigger than a coffin; but Mr. Wickham allayed my doubts by assuring me that his moveable weight answered admirably in trimming the craft; and that, when she got a-ground, Mr. Roberts stepped overboard, and heaved her afloat. "Certainly," said Mr. Wickham, "he did harm on one day, by going up to look-out, and breaking the mast."

In the afternoon of this day (4th) we weighed anchor and parted company from the Paz and Liebre. They returned to San Blas, and the Beagle steered southward. Secure and capacious as is the port just mentioned, it is one of the most difficult and dangerous to enter on this coast. The best, indeed only approach to it, is called by those sealers and sea-elephant fishers who have hitherto frequented it,—'Hell-gate.'

At about four the weather was very hot, the sky cloudless, and varying flaws of wind drove quantities of gossamer, and numbers of insects off from the land. The horizon was strangely distorted by refraction, and I anticipated some violent change. Suddenly myriads of white butterflies surrounded the ship, in such multitudes, that the men exclaimed, "it is snowing butterflies." They were driven before a gust from the north-west, which soon increased to a double-reefed topsail breeze, and were as numerous as flakes of snow in the thickest shower. The space they occupied could not have been less than two hundred yards in height, a mile in width, and several miles in length.

Our next object was to visit Tierra del Fuego, examine some portions of that country—yet unexplored—and restore the Fuegians to their native places; but in our passage, strong southerly winds, severe squalls, and cold weather, though it was near midsummer in that hemisphere, caused delay and discomfort, as they must always in a small and deeply-laden vessel, where little can be done except in fine weather.

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We passed through a space of sea,* many miles in extent, where the water was of a very much lighter colour than usual; not of a light-green or muddy hue, such as one sees near land, but of a milky white tint. Being in soundings, one naturally attributed such a change of colour to some peculiarity in the ground; but I have since thought differently, and am now inclined to believe that the light-coloured water came from a distance, in one of those great, though slow-moving currents, which sweep past the Falkland Islands, and thence northwards: but to what cause its unusual whiteness is to be attributed, I know not. The dissolution of a huge iceberg, or of many icebergs, might alter the colour, and certainly would change the temperature of a considerable body of water; but in this case, a thermometer immersed in the sea did not indicate a degree lower than that of the previous or following day. During the three days, our soundings varied only from fifty to sixty fathoms. The lead certainly brought up fine grey sand while the water was light-coloured, and dark sand at other times; but I can hardly think that so decided a change—different from any I noticed elsewhere—could have been caused in fifty fathoms water by so small an alteration in the quality of the bottom.

Icebergs have been seen in latitude 40° S., and near the longitude of 50° W.; perhaps they are sometimes carried nearer the coast, in which case they would ground, and melt away.

I suspect that some of the rocks, so often, yet so fruitlessly, sought for—and instead of which many persons have supposed dead whales, wrecks, or large trees, were seen—may have been icebergs, against and upon which sea-weed, drift-wood, or other substances, may have lodged temporarily, causing a rock-like appearance. In this way, perhaps, arose the report of a rock said to have been seen by Lieutenant Burdwood; of the Aigle and Ariel rocks—and even of those islets sought for ineffectually by Weddell, a few degrees eastward of the Falkland Islands.†

* Lat. 46° S. Long. 63° W.

† On this subject there are a few more remarks, under the head—Currents of the ocean,—in the last chapter but one.

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In the first volume some notice was taken of the supposed Ariel Rocks, and I will avail myself of this opportunity to say that at various times the Beagle passed over and near their asserted position; and that she likewise searched for the reported Aigle shoal or rock, without ever finding the slightest indication of either.

On the 15th, we saw the land off Tierra del Fuego, near Cape San Sebastian, and next day closed the shore about Cape Sunday, ran along it past Cape Peñas, and anchored off Santa Inez. A group of Indians was collected near Cape Peñas, who watched our motions attentively. They were too far off for us to make out more than that they were tall men, on foot, nearly naked, and accompanied by several large dogs. To those who had never seen man in his savage state—one of the most painfully interesting sights to his civilized brother—even this distant glimpse of the aborigines was deeply engaging; but York Minster and Jemmy Button asked me to fire at them, saying that they were "Oens-men—very bad men."

Our Fuegian companions seemed to be much elated at the certainty of being so near their own country; and the boy was never tired of telling us how excellent his land was—how glad his friends would be to see him—and how well they would treat us in return for our kindness to him.

We remained but a few hours at anchor under Cape Santa Inez, for so heavy a swell set in, directly towards the shore, caused probably by a northerly gale at a distance, that our situation was dangerous as well as disagreeable. Our only chance of saving the anchor and chain was by weighing immediately; yet if we did so, there would be a risk of drifting ashore: however, we did weigh, and drifted some distance, rolling our nettings in; but a breeze sprung up, freshened rapidly, and soon carried us out of danger. This happened at three in the morning, so my hopes of observations and angles were frustrated, and I had no choice but to run for the strait of Le Maire.

At noon, very high breakers were reported by the mast-head man, off Cape San Diego; at that time the flood-tide was set-

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ting strongly against a northerly wind and high swell; but when the tide was slack, at one, the breakers disappeared; and when we passed close to the cape, at two, the water was comparatively smooth.

There is a ledge extending from Cape San Diego, over which the flood-tide, coming from the southward, sometimes breaks with such violence, that a small vessel might be swamped by the 'bore' which it occasions.

As we sailed into Good Success Bay, a Fuegian yell echoed among the woody heights, and shout after shout succeeded from a party of natives, posted on a projecting woody eminence, at the north head of the bay, who were seen waving skins, and beckoning to us with extreme eagerness. Finding that we did not notice them, they lighted a fire, which instantly sent up a volume of thick white smoke. I have often been astonished at the rapidity with which the Fuegians produce this effect (meant by them as a signal) in their wet climate, where I have been, at times, more than two hours attempting to kindle a fire.

Scarcely was our ship secured, when the wind shifted to south-west, and blew strongly, bringing much rain with it; and we had indeed reason to rejoice at having attained so secure an anchorage. During the night, heavy squalls (williwaws) disturbed our rest very often, but did no injury, the water being quite smooth.

18th. Mr. Darwin, Mr. Hamond and others, went with me to the natives who had so vociferously greeted our arrival; and deeply indeed was I interested by witnessing the effect caused in their minds by this first meeting with man in such a totally savage state.

There were five or six stout men, half-clothed in guanaco-skins, almost like the Patagonians in aspect and stature, being near six feet high, and confident in demeanour. They scarcely bore resemblance to the Fuegians, except in colour and class of features. I can never forget Mr. Hamond's earnest expression, "What a pity such fine fellows should be left in such a barbarous state!" It told me that a desire to benefit these igno-

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rant, though by no means contemptible human beings, was a natural emotion, and not the effect of individual caprice or erroneous enthusiasm; and that his feelings were exactly in unison with those I had experienced on former occasions, which had led to my undertaking the heavy charge of those Fuegians whom I brought to England.

Disagreeable, indeed painful, as is even the mental contemplation of a savage, and unwilling as we may be to consider ourselves even remotely descended from human beings in such a state, the reflection that Cæsar found the Britons painted and clothed in skins, like these Fuegians, cannot fail to augment an interest excited by their childish ignorance of matters familiar to civilized man, and by their healthy, independent state of existence. One of these men was just six feet high, and stout in proportion; the others were rather shorter: their legs were straight and well formed, not cramped and misshapen, like those of the natives who go about in canoes; and their bodies were rounded and smooth. They expressed satisfaction or good-will by rubbing or patting their own, and then our bodies; and were highly pleased by the antics of a man belonging to the boat's crew, who danced well and was a good mimic. One of the Fuegians was so like York Minster, that he might well have passed for his brother. He asked eagerly for "cuchillo." About his eyes were circles of white paint, and his upper lip was daubed with red ochre and oil. Another man was rubbed over with black. They were (apparently) very good-humoured, talked and played with the younger ones of our party, danced, stood up back to back with our tallest men to compare heights, and began to try their strength in wrestling—but this I stopped. It was amusing and interesting to see their meeting with York and Jemmy, who would not acknowledge them as countrymen, but laughed at and mocked them. It was evident that both of our Fuegians understood much of the language in which the others talked; but they would not try to interpret, alleging that they did not know enough. York betrayed this by bursting into an immoderate fit of laughter at something the oldest man told him, which

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he could not resist telling us was, that the old man said he was dirty, and ought to pull out his beard. Now, if their language differed much from that of York Minster, or was indeed other than a dialect of the same original, it is not probable that York could have understood the old man's meaning so readily when he spoke quietly, without signs.

Richard Matthews was with us, but did not appear to be at all discouraged by a close inspection of these natives. He remarked to me, that "they were no worse than he had supposed them to be."

20th. Soon after day-light this morning, some very large guanacoes were seen near the top of Banks Hill.* They walked slowly and heavily, and their tails hung down to their hocks. To me their size seemed double that of the guanacoes about Port Desire. Mr. Darwin and a party set off to ascend the heights, anxious to get a shot at the guanacoes and obtain an extended view, besides making observations. They reached the summit, and saw several large animals, whose long woolly coats and tails added to their real bulk, and gave them an appearance quite distinct from that of the Patagonian animal; but they could not succeed in shooting one.

21st. Sailed from Good Success Bay. On the 22d we saw Cape Horn, and being favoured with northerly winds, passed close to the southward of it before three o'clock. The wind then shifted to north-west, and began to blow strong. Squalls came over the heights of Hermite Island, and a very violent one, with thick weather, decided my standing out to sea for the night under close-reefed topsails. The weather continued bad and very cold during that night and next day.

On the morning of the 24th, being off Cape Spencer, with threatening weather, a high sea, the barometer low, and great heavy-looking white clouds rising in the south-west, indicative of a gale from that quarter, I determined to seek for an anchorage, and stood into (the so-called†) St. Francis Bay. In

* So named in remembrance of Sir Joseph Banks's excursion.

† In the first volume doubts are expressed (in a note to page 199) respecting the place named by D'Arquistade, St. Francis Bay; or rather, I said'

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passing Cape Spencer we were assailed by such a furious hail-squall, that for many minutes it was quite impossible to look to windward, or even to see what was a-head of us. We could not venture to wear round, or even heave to, for fear of getting so far to leeward as to lose our chance of obtaining an anchorage; however, we stood on at hazard, and the squall passed away soon enough to admit of our anchoring in seventeen-fathoms water, quite close to a steep promontory at the south side of St. Martin Cove.

After being for some time accustomed to the low barren shores and shallow harbours of the Pampa and Patagonian coasts, our position almost under this black precipice was singularly striking. The decided contrast of abrupt, high, and woody mountains, rising from deep water, had been much remarked in Good Success Bay; but here it was so great that I could hardly persuade myself that the ship was in security —sufficiently far from the cliff.*

25th. Notwithstanding violent squalls, and cold damp weather, we kept our Christmas merrily; certainly, not the less so, in consequence of feeling that we were in a secure position, instead of being exposed to the effects of a high sea and heavy gale.

I said, that "I do not think the bay adjacent to Cape Horn is that which was named by D'Arquistade, 'St. Francis,' and, if my supposition is correct, Port Maxwell is not the place which was called 'St. Bernard's Cove.'"

If the modern chart be compared with that issued by the Admiralty a few years ago, published by Faden in 1818, it will be seen that the particular plan of St. Francis Bay, given in Faden's chart, agrees much better with the west side of Nassau Bay than with any other place; and that the "remarkable island, like a castle," noticed in the plan, is evidently "Packsaddle Island," of the modern chart. The rough sketch of land towards the north and east, as far as Cape Horn, on that plan, I take to be the random outline of land seen at a distance by the person who drew the plan, and the name "Cape Horn," affixed to the southernmost land then in sight; which must have been Cape Spencer. But it is now too late to remedy the mistake, which is indeed of no consequence.

* As the shores of Tierra del Fuego are so much spoken of in other places, I say no more of them here.

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At sun-set, there was a reddish appearance all over the sky —clouds shot over the summits of the mountains in ragged detached masses—and there was a lurid haze around, which showed a coming storm as surely as a fall of the barometer. The gale increased, and at midnight such furious squalls came down from the heights, that the water was swept up, and clouds of foam were driven along the sea. Although we were close to a weather shore, with our top-gallant masts down and yards braced sharp up, we hardly thought ourselves in security with three anchors down and plenty of chain cable out.*

Dec. 31. Tired and impatient at the delay caused by bad weather, we put to sea again the first day there was a hope of not being driven eastward; and during a fortnight we tried hard to work our way towards Christmas Sound. My purpose was to land York Minster and Fuegia Basket among their own people, near March Harbour, and return eastward through the Beagle Channel, landing Jemmy Button also with his tribe, the Tekeenica. Part of Whale-boat Sound and the western arms of the Beagle Channel were to be surveyed: and by this scheme I proposed to combine both objects.

Jan. 2d. We were rather too near the Diego Ramirez Islands, during a fresh gale of wind, with much sea; but by carrying a heavy press of sail, our good little ship weathered them cleverly, going from seven and a half to eight knots an hour, under close-reefed topsails and double-reefed courses—the top-gallant-masts being on deck.

On the 5th, the same islands were again under our lee—a sufficient evidence that we did not make westing. In fact, no sooner did we get a few reefs out, than we began taking them

* During such sudden, and at times tremendous squalls as these, it is absolutely necessary to have a long scope of cable out, although the vessel may be in smooth water, in order that the first fury of the blast may be over before the cable is strained tight; for otherwise, the chain or anchor might snap. When the violence of the squall is past, the weight of a chain cable sinking down, draws the ship a-head, so far as to admit of her recoiling again at the next williwaw; thus, a kind of elasticity may be given to a chain, in some degree equivalent to that always possessed by a hemp cable.

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in again; and although every change of wind was turned to account, as far as possible, but little ground was gained.

On the 11th we saw that wild-looking height, called York Minster, 'looming' among driving clouds, and I flattered myself we should reach an anchorage; but after tearing through heavy seas, under all the sail we could carry, darkness and a succession of violent squalls, accompanied by hail and rain, obliged me to stand to seaward, after being within a mile of our port. All the next day we were lying-to in a heavy gale—wearing occasionally.

At three in the morning of the 13th, the vessel lurched so deeply, and the main-mast bent and quivered so much, that I reluctantly took in the main-topsail (small as it was when close-reefed), leaving set only the storm-trysails (close-reefed) and fore-staysail.* At ten, there was so continued and heavy a rush of wind, that even the diminutive trysails oppressed the vessel too much, and they were still farther reduced. Soon after one, the sea had risen to a great height, and I was anxiously watching the successive waves, when three huge rollers approached, whose size and steepness at once told me that our sea-boat, good as she was, would be sorely tried. Having steerage way, the vessel met and rose over the first unharmed, but, of course, her way was checked; the second deadened her way completely, throwing her off the wind; and the third great sea, taking her right a-beam, turned her so far over, that all the lee bulwark, from the cat-head to the stern davit, was two or three feet under water.

For a moment, our position was critical; but, like a cask, she rolled back again, though with some feet of water over the whole deck. Had another sea then struck her, the little ship might have been numbered among the many of her class which have disappeared: but the crisis was past—she shook the sea off her through the ports, and was none the worse—excepting

* I have always succeeded in carrying a close-reefed main-topsail (five reefs) in the Beagle, excepting on this and two other occasions; but were I again under similar circumstances, I think I should try to carry it—even then—for some time longer.

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the loss of a lee-quarter boat, which, although carried three feet higher than in the former voyage (1826-1830), was dipped under water, and torn away.*

From that time the wind abated, and the sea became less high.† The main-topsail was again set, though with difficulty, and at four o'clock the fore-topsail and double-reefed foresail were helping us towards False Cape Horn, my intention being to anchor in Nassau Bay. When the quarter-boat was torn away, we were between the Ildefonsos and Diego Ramirez: the wind varying from W.S.W. to S.W.

This gale was severely felt on all parts of the coast, south of 48°, as I afterwards ascertained from sealing-vessels: and at the Falkland Islands, a French whaler, called Le Magellan, was driven from her anchors and totally wrecked in that land-locked and excellent port, Berkeley Sound.

Some persons are disposed to form a very premature opinion of the wind or weather to be met with in particular regions, judging only from what they may themselves have experienced. Happily, extreme cases are not often met with; but one cannot help regretting the haste with which some men (who have sailed round Cape Horn with royals set) incline to cavil at and doubt the description of Anson and other navigators, who were not only far less fortunate as to weather, but had to deal with crazy ships, inefficient crews, and unknown shores; besides hunger, thirst, and disease.

Before midnight we anchored under shelter of the land

* It was well that all our hatchways were thoroughly secured, and that nothing heavy could break a-drift. But little water found its way to the lower deck, though Mr. Darwin's collections, in the poop and forecastle cabins on deck, were much injured. Next to keeping a sharp look-out upon the sky, the water, and the barometer, we were always anxious to batten down our hatches in time—especially at night, during a gale, or in very squally weather.

† The roller which hove us almost on our beam ends, was the highest and most hollow that I have seen, excepting one in the Bay of Biscay, and one in the Southern Atlantic; yet so easy was our little vessel that nothing was injured besides the boat, the netting (washed away), and one chronometer.

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near False Cape Horn; and next morning (14th) crossed Nassau Bay in search of a convenient harbour near the Beagle Channel. Having found so much difficulty in getting to the westward by the open sea, I decided to employ boats in the interior passages, and leave the Beagle at a secure anchorage.

Furious squalls prevented our effecting this purpose; and we anchored for the night in Windhond Bay.* The following day (15th) we again tried to get to the head or north-west corner of Nassau Bay, but ineffectually, for repeated squalls opposed us, and at last obliged me to bear up for Goree Road; one of the most spacious, accessible, and safe anchorages in these regions. Here, to my surprise, York Minster told me that he would rather live with Jemmy Button in the Tekeenica country than go to his own people. This was a complete change in his ideas, and I was very glad of it; because it might be far better that the three, York, Jemmy, and Fuegia, should settle together. I little thought how deep a scheme master York had in contemplation.

18th. Having moored the Beagle in security, and made arrangements for the occupation of those who were to remain on board, I set out with four boats (yawl and three whale-boats), carrying Matthews and the Fuegians, with all the stock of useful things which had been given to them in England.† A temporary deck having been put upon the yawl, she carried a large cargo, and was towed by the other boats when the wind was adverse. Matthews showed no sign of hesitation or reluctance; on the contrary, he was eager to begin the trial to which he had been so long looking forward. Messrs. Darwin, Bynoe, Hamond, Stewart, and Johnson, with twenty-four seamen and marines, completed the party.

My intention was to go round the north-east part of Navarin Island, along the eastern arm of the Beagle Channel, through Murray Narrow, to the spot which Jemmy called his country:

* So named by the Dutch in 1624, after one of their ships, the Windhond.

† By far the larger part of their property, including Matthews's outfit, was sent by Mr. Coates, Secretary of the Church Missionary Society.

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there establish the Fuegians, with Matthews:—leave them for a time, while I continued my route westward to explore the western arms of the channel, and part of Whaleboat Sound: and at my return thence decide whether Matthews should be left among the natives for a longer period, or return with me to the Beagle.

But before I briefly relate this attempt to form a temporary settlement among the Fuegians, it may be advisable to give a general sketch of the aborigines who thinly people the southernmost regions of South America: including not only the various tribes of Fuegians (as far as we know them), but the Patagonians, and those natives of Western Patagonia who are supposed to be a remnant of the tribe called Chonos.

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CHAPTER VII.

SOUTHERN ABORIGINES OF SOUTH AMERICA.

Of the tribes which scantily people Patagonia and Tierra del Fuego, far less is yet known than might generally be expected. Although frequently seen by white men, and often holding intercourse with them, probably no person even moderately educated, excepting Falkner, has staid among them long enough to become acquainted with, and describe their peculiarities.

His description of the aboriginal natives who, in his time (1740–80), roamed over the fertile 'Pampas' of Buenos Ayres, or the sterile plains of Patagonia; of the western mountaineers; and of those unconquerable tribes which repulsed the Peruvian Yncas, opposed Spanish conquerors, and are still independent, is so decidedly corroborated by Molina, by many Spanish authors, and by modern testimony, that in attempting to describe the Patagonians, I shall try to unite his account (bearing in mind the time elapsed, and consequent changes) to the information which has been obtained during late years.

Of the Fuegians, a few notices are to be found in narratives of various voyagers; but the imperfect description here given is principally derived from the natives who went to England in the Beagle; and from Mr. Low, who has seen more of them in their own country than any other person.

About the middle of the last century, the aboriginal inhabitants of that portion of South America which lies between the parallels of thirty and forty, formed two principal divisions, more or less separated by the only real barrier existing in that extent of country, the Cordillera of the Andes. Those who lived eastward of the Andes were called 'Puel-che,' signifying

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east people; and those on the other side were known by the term 'Molu-che,' which signifies war people, or warriors: and these terms are still in habitual use.

Numerous subdivisions have perplexed all whose attention has been attracted to the aboriginal population of Southern America. Falkner's account is the least confused, in every way the most probable, and agrees the best with what is now found to be the condition of that portion of uncivilized man. For our present purpose, I believe, it will be sufficient to remark, that the Puel-che and Molu-che called the tribes who lived towards the south, 'Tehuel-het'* and 'Huilli-che,' both of which terms signify people of the south. The Huilliche were again divided into Pichi Huilli-che and Vuta Huilliche; 'pichi,' meaning little; and 'vuta,' great. Both the Tehuel-het and the Vuta Huilli-che lived to the southward of forty degrees of latitude. A branch or tribe of the Tehuel-het who lived farthest towards the south, on the eastern side, had no horses, and that tribe was called 'Yacana-kunny,'† (foot people). Westward of those people, separated from them by a ridge of mountains, was a tribe called Key-uhue, Key-yus, or Key-es; and northward, the Sehuau-kunny‡.

Falkner, in his account, rather confuses the habits of the Yacana-kunny with those of the Key-uhue, which is not to be wondered at, as he described those tribes solely from the accounts of others. The Key-uhue have neither 'bowls,' or balls (bolas), nor 'ostriches,' (see Falkner, p. 111), in their rugged tempestuous islands: neither do the Yacana-kunny 'live chiefly on fish.' The former live on fish, while the latter kill guanacoes, birds, and seals.

Between the Key-uhue and the Chonos tribe were the Poy-yus, or Pey-es, living on the sea-coast. The Chonos inhabited the Archipelago so called, and part of Chilóe.

These three last-mentioned tribes—Key-uhue, Poy-yus, and Chonos—were called 'Vuta Huilli-che.'

* Called by themselves 'Tehuel-kunny.'

† 'Che,' 'het,' and 'kunny,' signify people, in different dialects.

‡ The Sehuau-kunny are a part of the Tehuel-het.

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Rather than occupy time in attempting to give an account of the past state of these ever-varying tribes,—whose numbers have been so much altered, and whose locations may be now changed,—I will endeavour to give some idea of the present condition, distribution, and probable numbers of the people called Patagonians; of the natives of Tierra del Fuego, or Fuegians, and of the western tribe called Chonos. By those who have frequented the Strait of Magalhaens or its vicinity, the latter are often called 'Canoe Indians;' and the Patagonians, 'Horse Indians.'

The Patagonians (Tehuel-het) travel on horseback over the country between the River Negro and the Strait of Magalhaens; from the Atlantic to the Cordillera of the Andes. They have no boats or canoes of any kind; and their disposition, habits, and language are very different from those of the Fuegians (Yacana-kunny, Key-uhue, and Poy-yus). Those who live in the north-eastern part of Tierra del Fuego have neither canoes nor horses. The natives of the southern and western islands, and of the shores of Otway and Skyring waters, also the people who live upon the western islands and coast of Patagonia, have canoes, but no horses.

The Patagonians are now divided into four parties, each of which has a separate though ill-defined territory. Each of these parties has a leader, or cacique; but they speak one language, and are evidently subdivisions of one tribe. When mutually convenient, they all assemble in one place: but if food becomes scarce, or quarrels happen, each party withdraws to its own territory. At such times one body will encroach upon the hunting grounds of another, and a battle is the consequence. About four hundred adults, and a rather large proportion of children, are in each of these parties: the number of women being to that of the men as three to one. Near the Strait of Magalhaens about fourteen hundred Patagonians have been lately seen encamped together for a short time; but usually there is only one horde, of about four hundred grown people, in that neighbourhood.

Less is known of the Yacana-kunny than of any other tribe,

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or portion of a tribe. It may consist of about six hundred men and women, besides children.

Beyond a range of high mountains to the southward of the Yacana, is the tribe formerly called Key-uhue, now probably the Tekeenica. These are the smallest, and apparently the most wretched of the Fuegians. They inhabit the shores and neighbourhood of the Beagle Channel. The number of adults in this tribe may be about five hundred. (Note 1.)

To the westward, between the western part of the Beagle Channel and the Strait of Magalhaens, is a tribe now called Alikhoolip (which may be the Poy-yus), whose numbers amount perhaps to four hundred.

About the central parts of Magalhaens Strait is a small and very miserable horde, whose name I do not know. Their usual exclamation is 'Pecheray!' 'Pecheray!' whence Bougainville and others called them the Pecherais. For want of a more correct term I shall here use the same word. The number of adults among them is about two hundred.

Near Otway and Skyring waters is a tribe, or fraction of a tribe, whose name I could not learn; for the present I shall call them 'Huemul'—because they have many skins of a kind of roebuck, which is said to be the animal described by Molina as the 'Huemul' *. Their number may be one hundred, or thereabouts. I am inclined to think that these Huemul Indians are a branch of the Yacana people, whom Falkner describes as living on both sides of the Strait.

On the western coast of Patagonia, between the Strait of Magalhaens and the Chonos Archipelago, there is now but one tribe, in which there are not above four hundred grown people.

Each of the tribes here specified speaks a language differing from that of any other, though, as I believe, not radically different from the aboriginal Chilian. Some words are common to two or more tribes; as may be seen by reference to the fragment of a vocabulary in the Appendix; and differences must increase because neighbouring tribes are seldom at peace.

The numbers above stated are mere estimations. The diffi-

* See Note 2, at the end of this chapter.

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culty of obtaining either language or information from the Fuegians can only be well appreciated by those who have had intercourse with them, or with the New Hollanders; whose mimickry of what one says is as perplexing as the same trick is when speaking to the Fuegians.

Allowing that the Tehuel-het or Patagonians amount to	1,600
Yacana	600
Tekeenica	500
Alikhoolip	400
Pecheray	200
Huemul	100, and
Chonos	400
the total will be	3,800,

which I do not think is five hundred in error: and I should say, in round numbers, that there are about four thousand adults south of the latitude of forty degrees, exclusive of Chiloé.

By Patagonia is meant that part of South America which lies between the River Negro and the Strait of Magalhaens.

Eastern Patagonia is the portion of this district which lies eastward of the Cordillera; and Western Patagonia, the part lying between the summits of the Andes and the Pacific Ocean.

Tierra del Fuego takes in all the islands southward of the Strait of Magalhaens (including Staten Land), as far as the Diego Ramirez islets.

Before entering into a more detailed account of these aborigines, I will try to give a slight general idea of their personal appearance; of their horses and canoes; of their houses and country; in short, an outline sketch of that which is observed at the first glance of a stranger's eye. The minuter details, which will follow, may be tedious to many readers.

Magalhaens first gave the name of Patagones to the natives whom he saw at Port San Julian in 1520. They were of very large (gigantic) stature, and their feet, being wrapped in rough guanaco skin, by way of shoes, were remarked particularly. Probably their footsteps in the sand were noticed, and excited

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some such exclamation as 'que patagones!' (what great feet!) patagon meaning a very large foot.—(See note 3.)

Tierra del Fuego was also named by Magalhaens, because many fires were seen, in the night, upon that land.

The aboriginal natives of Eastern Patagonia are a tall and extremely stout race of men. Their bodies are bulky, their heads and features large, yet their hands and feet are comparatively small. Their limbs are neither so muscular nor so large boned as their height and apparent bulk would induce one to suppose: they are also rounder and smoother than those of white men. Their colour is a rich reddish-brown, between that of rusty iron and clean copper, rather darker than copper, yet not so dark as good old mahogany.* But every shade of colour between that just mentioned and the lighter hue of a copper kettle, may be seen among individuals of various ages. Excepting among old or sickly people, I did not notice a tinge of yellow: some of the women are lighter coloured—about the tint of pale copper—but none are fair, according to our ideas.

Nothing is worn upon the head except their rough, lank, and coarse black hair, which is tied above the temples with a fillet of platted or twisted sinews. A large mantle, made of skins sewed together, loosely gathered about them, hanging from the shoulders to their ankles, adds so much to the bulkiness of their appearance, that one ought not to wonder at their having been called 'gigantic.' I am not aware that a Patagonian has appeared, during late years, exceeding in height six feet and some inches; but I see no reason to disbelieve Falkner's account of the Cacique Cangapol, whose height, he says, was seven feet and some inches. When Falkner stood on tiptoe he could not reach the top of Cangapol's head. It is rather curious, that Byron could only just touch the top of the tallest man's head

* The colour of these aborigines is extremely like that of the Devonshire breed of cattle. From the window of a room in which I am sitting, I see some oxen of that breed passing through the outskirts of a wood, and the partial glimpses caught of them remind me strongly of the South American red men.

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whom he saw. Ever restless and wandering, as were the Tehuel-het, of which tribes that cacique was chief, might not Byron have measured Cangapol?* Who disbelieves that the Roman Emperor, Maximinus, by birth a Thracian, was more than eight feet in height? yet who, in consequence, expects all Thracians to be giants? At present, among two or three hundred natives of Patagonia, scarcely half-a-dozen men are seen whose height is under five feet nine or ten; and the women are tall in proportion.

I have nowhere met an assemblage of men and women whose average height and apparent bulk approached to that of the Patagonians. Tall and athletic as are many of the natives of Otaheite, and other islands in the Pacific Ocean, there are also many among them who are slight, and of low stature. The Patagonians seem high-shouldered—owing perhaps to the habit of folding their arms in their mantles across the chest, and thus increasing their apparent height and bulk, as the mantles hang loosely, and almost touch the ground. Until actually measured, I could not believe that they were not much taller than was found to be the fact.

But little hair shews itself on their faces or bodies. From the former it is studiously removed by two shells, or some kind of pincers. Although they do not augment the coarseness of their features by piercing either nose or lips, they disfigure themselves not a little by red,† black,‡ or white§ paint, with which they make grotesque ornaments, such as circles around their eyes, or great daubs across their faces. Upon particular occasions, all the upper part of their body, from the waist upwards, is strangely decorated (or disfigured) by paint, awkwardly laid on with very little design. On their feet and legs are boots made out of the skins of horses' legs. Wooden spurs, if they cannot get iron; sets of balls (bolas), and a long tapering lance of bamboo, pointed with iron, complete their equipment. These lances are seldom seen near the Strait of Magalhaens, but the natives are not always without them.

The women are dressed and booted like the men, with the

* Byron's voyage, 1765.—Falkner, 1740-80.

† Ochre. ‡ Charcoal and oil. § Felspathic earth and oil.

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addition of a half petticoat, made of skins, if they cannot procure foreign coarse cloth. They clean their hair, and divide it into two tails, which are platted, and hang down, one on each side. Ornaments of beads, bits of brass, or silver, or any similar trifles, are much prized, and worn in necklaces, or as bracelets; sometimes also as ear-rings, or round their ankles. Mounted upon horses of an inferior size, averaging only about fourteen hands and a half in height, though rather well-bred, the Patagonians seem to be carried no better than the full-accoutred dragoons, who rode eighteen stone upon horses equal to twelve; yet those horses, so slight in comparison with their masters, carry them at full speed in chase of ostriches or guanacoes; and we all know what our dragoon horses have done under their heavily-weighted, but determined riders. With bridles of hide tied to the lower jaw, when there is not a Spanish bit, and a light saddle of wood, covered with some skins and placed upon others, a Patagonian rides hard when there is occasion—but frequently changes his horse. Many large dogs, of a rough, lurcher-like breed, assist them in hunting, and keep an excellent watch at night. (Note at end of Chapter VIII.)

The toldos (huts) of these wanderers are in shape not unlike gipsy tents. Poles are stuck in the ground, to which others are fastened, and skins of animals, sewed together, form the covering, so that an irregular tilt-shaped hut is thus made. Three sides and the top are covered; but the front, turned towards the east, is open. These toldos are about seven feet high, and ten or twelve feet square; they are lower at the back, or western side, than in front, by several feet. These are their ordinary dwellings; of other rather larger constructions a description will be given hereafter.

The country inhabited by these Patagonians is open and, generally speaking, rather level, but with occasional hills and some extensive ranges of level-topped heights (steppes). There are very few trees, and water is scarce. The eye wanders over an apparently boundless extent of parched, yellow-looking semi-desert, where rain* seldom falls, and the sky is almost

* Except during a few days in each year, or perhaps at intervals of two or three years, when it pours down in torrents.

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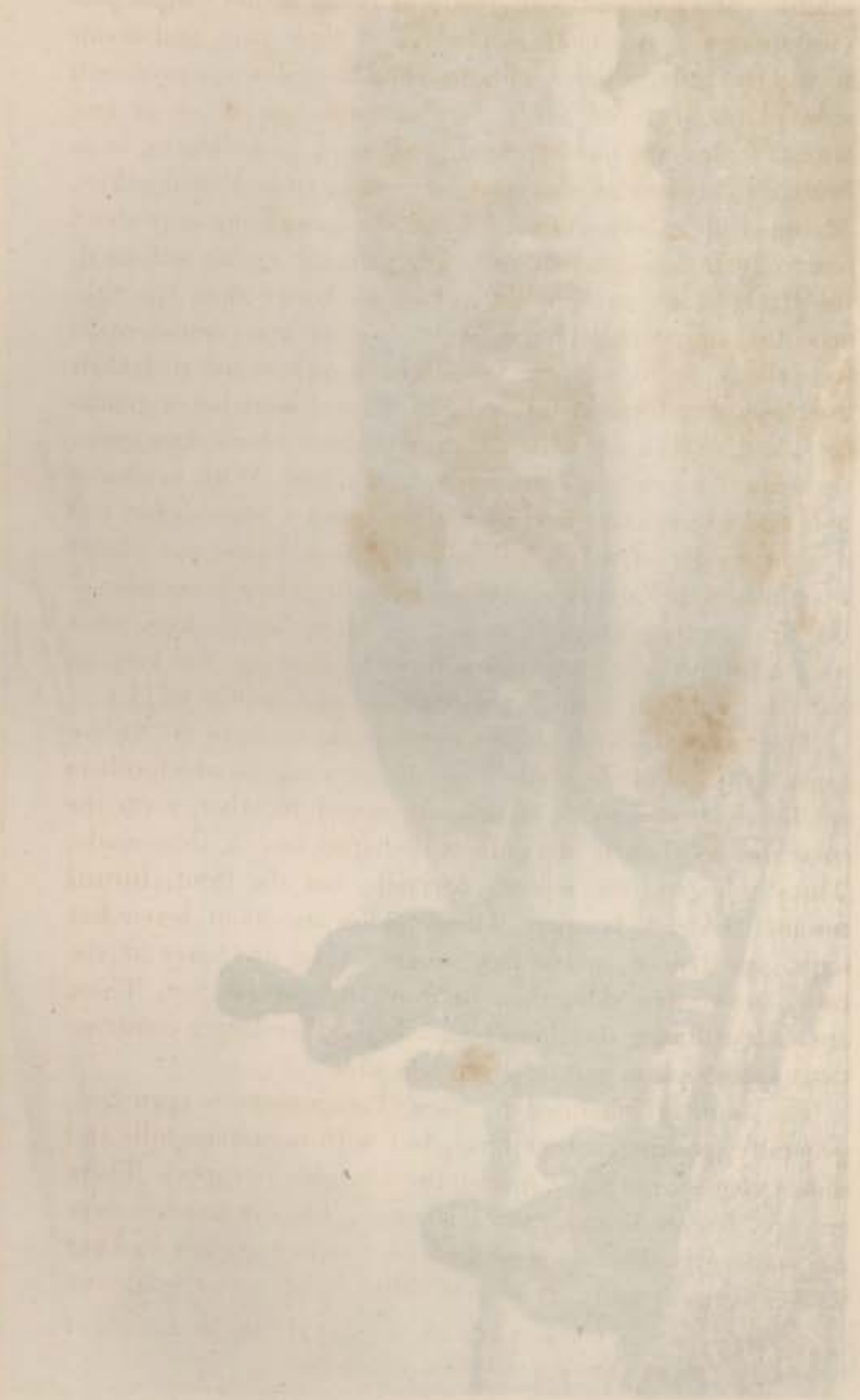

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PATAGONIANS.

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always clear. The heats of summer are very great; but in winter, though the days are not cold, the frosts at night are severe; and at all times of the year, in the day-time, strong winds sweep over the plains.

The Yacana-kunny, natives of the north-eastern part of Tierra del Fuego, resemble the Patagonians in colour, stature, and clothing.* They seem to be now much in the condition in which the Patagonians must have been before they had horses.† With their dogs, with bows and arrows, balls (bolas), slings, lances, and clubs, they kill guanacoes, ostriches, birds, and seals.

The north-eastern portion of Tierra del Fuego is a better country than Patagonia. The woody mountains of the south-western islands are succeeded, towards this north-east district, by hills of moderate height, partially wooded; northward of which are level expanses, almost free from wood, but covered with herbage adapted to the pasturage of cattle.

The climate is a mean between the extremes of wetness and drought, which are so much felt by the neighbouring regions; and when a settlement is made, at some future day, in that part of the world, San Sebastian Bay, in the Yacana country, called by Narborough, King Charles South Land, would be an advantageous position for its site.‡

The Tekeenica, natives of the south-eastern portion of Tierra del Fuego, are low in stature, ill-looking, and badly proportioned. Their colour is that of very old mahogany, or rather between dark copper, and bronze. The trunk of the body is large, in proportion to their cramped and rather crooked limbs. Their rough, coarse, and extremely dirty black hair half hides yet heightens a villanous expression of the worst description of savage features.

Passing so much time in low wigwams, or cramped in small

* Excepting boots.

† See Magalhaens' first interview. Burney, vol. i. p. 34.

‡ Falkner says (p. 93, speaking of this country), "It is evident that this place has the conveniences of wood, water, and soil; and, if there could be found a tolerable harbour, it would be much more convenient for a colony, and have a better command of the passage to the South Sea than Falkland's Islands."

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canoes, injures the shape and size of their legs, and causes them to move about in a stooping manner, with the knees much bent; yet they are very nimble, and rather strong.

They suffer very little hair to grow, excepting on their heads. Even their eyebrows are almost eradicated—two muscle-shells serving for pincers. This aversion to the smaller tufts of hair does not extend to the thatch-like covering of their ugly heads, which is lank, covered with dirt, hanging about their ears, and almost over their faces. Just above their eyes it is jagged away by a broken shell, if they have not a piece of iron hoop for a knife, the pieces cut off being scrupulously burned. In height varying from four feet ten to five feet six, yet in the size of their bodies equalling men of six feet, of course they look clumsy and ill-proportioned; but their hands and feet are rather small with respect to the size of their bodies, though not so in proportion to their limbs and joints, which, excepting the knees, are small. Their knees are all strained, and their legs injured in shape, by the habit of squatting upon their heels. Awkward and difficult as such a posture appears to us, it is to them a position of easy rest.

Sometimes these satires upon mankind wear a part of the skin of a guanaco or a seal-skin upon their backs, and perhaps the skin of a penguin or a bit of hide hangs in front; but often there is nothing, either to hide their nakedness or to preserve warmth, excepting a scrap of hide, which is tied to the side or back of the body, by a string round the waist. Even this is only for a pocket, in which they may carry stones for their slings, and hide what they pick up or pilfer. A man always carries his sling around his neck or waist, wherever he goes.

Women wear rather more clothing, that is, they have nearly a whole skin of a guanaco, or seal, wrapped about them, and usually a diminutive apron. The upper part of the wrapper, above a string which is tied around the waist, serves to carry an infant. Neither men nor women have any substitute for shoes.

No ornaments are worn in the nose, ears, or lips, nor on the fingers; but of necklaces, and bracelets, such as they are, the women are very fond. With small shells, or pieces of the bones

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of birds, strung upon lines made of sinews, these necklaces and bracelets are made, when nothing preferable is to be found; but beads, buttons, pieces of broken glass, or bits of fractured crockery-ware are most highly esteemed.

The hair of the women is longer, less coarse, and certainly cleaner than that of the men. It is combed with the jaw of a porpoise, but neither platted nor tied; and none is cut away, excepting from over their eyes. They are short, with bodies largely out of proportion to their height; their features, especially those of the old, are scarcely less disagreeable than the repulsive ones of the men. About four feet and some inches is the stature of these she-Fuegians—by courtesy called women. They never walk upright: a stooping posture, and awkward movement, is their natural gait. They may be fit mates for such uncouth men; but to civilized people their appearance is disgusting. Very few exceptions were noticed.

The colour of the women is similar to that of the men. As they are just as much exposed, and do harder work, this is a natural consequence: besides, while children, they run about quite naked, picking up shell-fish, carrying wood, or bringing water. In the colour of the older people there is a tinge of yellow, which is not noticed in the middle-aged or young.

Both sexes oil themselves, or rub their bodies with grease; and daub their faces and bodies with red, black, or white. A fillet is often worn round the head, which upon ordinary occasions is simply a string, made of sinews; but if going to war, or dressed for show, the fillet is ornamented with white down, white feathers, or pieces of cloth, if they have obtained any from shipping. Small lances, headed with wood; others, pointed with bone; bows, and arrows headed with obsidian, agate, or jasper; clubs; and slings; are the weapons used by the Tekeenica.

The smoke of wood fires, confined in small wigwams, hurts their eyes so much, that they are red and watery; the effects of their oiling, or greasing themselves, and then rubbing ochre, clay, or charcoal, over their bodies; of their often feeding upon the most offensive substances, sometimes in a

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state of putridity; and of other vile habits, may readily be imagined.

As a Tekeenica is seldom out of sight of his canoe or a wigwam, a slight idea of these—his only constructions—should be given with this sketch.

The canoe is made of several large pieces of bark, sewed together; its shape is nearly that which would be taken by the strong bark of the trunk of a tree (twelve to twenty feet in length, and a foot, or two feet, in diameter), separated from the solid wood, in one piece. If this piece of bark were drawn together at the ends, and kept open by sticks in the middle, it would look rather like a Fuegian canoe.

A Tekeenica wigwam is of a conical form, made of a number of large poles, or young trees, placed touching one another in a circle, with the small ends meeting. Sometimes, bunches of grass or pieces of bark are thrown upon the side which is exposed to the prevailing winds. No Fuegians, except the Tekeenica, make their huts in this manner.

The country of this people may be briefly described by saying that deep but narrow arms of the sea intersect high mountainous islands, many of whose summits are covered with snow, while the lee or eastern sides of their steep and rocky shores are more than partially covered with evergreen woods.

Between projecting rocky points are sandy or stony beaches, fronting very small spaces of level land, on which the huts of the natives are generally placed. Almost throughout the year, cloudy weather, rain, and much wind prevail; indeed, really fine days are very rare. Being so near the level of that great climate agent, the ocean, frost and snow are far less frequent than might be expected in a high latitude, among snow-covered mountains, of which the sight alone inclines one to shiver.

The men of the Alikhoolip tribe are the stoutest and hardiest, and the women the least ill-looking of the Fuegians. Though not very dissimilar, they are superior to the Tekeenica; but they are inferior to the Yacana, and far below the natives of Patagonia. Their canoes are rather better than those of the Tekeenica, made, however, in the same manner.

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CAPALLO MAN.

HUEMUL WOMAN.

HUEMUL BOY.

YAPOO MAN.

YACANA MAN.

PECHERAY MAN.

FUEGIANS.

Published by Henry Colburn, Great Marlborough Street, 1839.

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The wigwams of the Alikhoolip, and indeed of all the Fuegians, except the Tekeenica (and perhaps some of the Yacana, whom we have not seen), are shaped like bee-hives. Their height is not above four or five feet above the ground; but an excavation is usually made within, which gives another foot, making about five feet and a-half of height, inside, and they are two, three, or four yards in diameter. Branches of trees stuck in the ground, bent together towards the top, form the structure, upon which skins, pieces of bark, and bunches of coarse grass are roughly fastened. Of course, neither these nor the Tekeenica wigwams are wind or water tight, neither does the smoke need a chimney.

The country and climate of the Alikhoolip are similar to the Tekeenica, though wetter, more windy, and more disagreeable. Both men and women are better covered with seal or otter skins than the Tekeenica and Pecheray tribes. When surprised, or sure that they would not be plundered, the women of this tribe were always seen wrapped in large otter or seal skins.

The natives of the central parts of Magalhaens Strait appear to be almost as miserable a race as the Tekeenica. As in nothing but language, and the construction of their wigwams, is there any difference which has yet been found out (though probably existing), I shall say no more of them in this place.

Their climate is nearly the same as that of the Alikhoolip; and the country is similar, though more wooded in many places, because more sheltered.

Those whom I have hitherto called Huemul, who live near the Otway and Skyring Waters, seem to be a mixed breed, rather resembling the Yacana, of which tribe they are probably a branch. In habits, as well as in appearance, they partake of some of the peculiarities of Patagonians as well as Fuegians. Their country is like the Yacana—Tierra del Fuego blending or sinking into Patagonia, sharing the qualities of each region, and therefore preferable to either. They have very few canoes; and no horses: but large dogs are used by them in hunting the huemul and guanaco.

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The tribe mentioned in a following page, which was met by Mr. Low at the north side of Fitz-Roy Passage, must have been chiefly composed of slaves (zapallos). The Huemul tribe is not numerous, and having plenty of land, with abundance of food, would hardly quit their own territory to submit to a Patagonian Cacique. These natives are neither inclined to serve a master, nor to learn new habits: besides, being separated from the Horse Indians by a little channel, they could not easily be caught, and obliged to remain with the Patagonians, as some persons have supposed.

The Chonos, who live on the western shores and islands of Patagonia, are rather like the Alikhoolip, but not quite so stout or so daring. In general they are less savage than the Fuegians; and though their habits of life are similar, traces are visible of former intercourse with the Spaniards, which doubtless has tended to improve their character.

Prior to the Spanish conquest, the Chonos Indians inhabited Chiloé and the Chonos Archipelago; but that now they are all south of Cape Tres Montes, there is good reason to suppose, though certainly no positive proof. The canoes of these Chonos Indians are made of planks, sewed together; and they are rowed with oars. Generally there is a cross at one end of the canoe, or rather boat. Their wigwams are like those already mentioned of the bee-hive form.

The climate of Western Patagonia is so disagreeable that the country is almost uninhabitable. Clouds, wind, and rain are continual in their annoyance. Perhaps there are not ten days in the year on which rain does not fall; and not thirty on which the wind does not blow strongly; yet the air is mild, and the temperature surprisingly uniform throughout the year. The country is like the worst part of Tierra del Fuego—a range of mountains, half sunk in ocean; barren to seaward, impenetrably wooded towards the mainland, and always drenched with the waters of frequent rain, which are never dried up by evaporation before fresh showers fall.

Having thus endeavoured to give a slight general idea of the more obvious peculiarities of these, the most southern abori-

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gines on the globe, I will enter into rather more detail, even at the risk of being prolix. As there is much similarity in the habits of all the tribes above-mentioned who use canoes, and we know little of the Yacana, I shall speak of the Horse Indians, generally, in the first place; and of the Canoe Indians, as one body, in the second.

NOTE 1.—There is so much difficulty in deciding upon the orthography of words whose sounds are variously given by individuals even of the same tribe, and which, caught by ears of varying acuteness, are written down according to the pronunciation of different languages, that one may trace some connexion between the names Key-es, Key-yus; Keyuhues, or Keyuhue; Kekenica, or Tekeenica, and Kenneka. This last term is taken from Van Noort. (Burney, vol ii. p. 215.) Perhaps the country there called 'Coin' may be that inhabited by Jemmy Button's Oens-men.

2. Molina's description of the Huemul is said by naturalists to be unsatisfactory and inconclusive; therefore, whether it is an animal hitherto unnoticed (except by him), or the 'kind of roebuck,' mentioned in page 132, remains to be decided. See Molina, vol. i. p. 364.

3. Pennant, in his 'Literary Life,' quotes Cavendish's as well as Brouwer's measurement of footsteps eighteen inches long! As Pennant was personally acquainted with Falkner, and collected much information respecting the Patagonians from other sources likewise, I have inserted a short extract from his work in the Appendix to this volume. The original book is now becoming scarce, and some of the notices contained in it are very interesting in connexion with this subject.

While I was revising my manuscript journal, Sir Woodbine Parish had the kindness to lend me 'Viedma's Diary,' with permission to make use of it: and, finding some interesting notices of the Patagonians which were quite new to me, I have added to the appendix of this volume a verbatim extract from Viedma, which I think will repay the curious reader, especially where their ideas of the transmigration of souls are mentioned.

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CHAPTER VIII.

HORSE INDIANS OF PATAGONIA.

Head — Physiognomy — Stature — Wanderings — Clothing — Armour — Arms — Food — Chase — Property — Huts — Wizards — Marriage — Children — Health — Illness — Death — Burial — War — Horsemanship — Gambling — Caciques — Superstitions — Warfare — Morality — Disposition — Chups — Zapallos.

The head of a Patagonian is rather broad, but not high; and, except in a few instances, the forehead is small and low. His hair hangs loosely: it is black, coarse, and very dirty. A fillet which is worn around the top of the head may be intended as an ornament, for it is certainly of no use. The brow is prominent: the eyes are rather small, black, and ever restless. Deficiency of eyebrow adds to the peculiar expression of their eyes; and a mixture of simplicity and shrewdness, daring and timidity, with that singular wild look which is never seen in civilized man, is very conspicuous in the Patagonians. Its immediate effect is to remind one of the necessity of being always on guard while within reach: yet of all savage nations, perhaps the Patagonians are least inclined to attack or deceive strangers.

In general, the women's stature, physiognomy, and dress, so much resemble those of the men, that, except by their hair, it is difficult for a stranger to distinguish them.

By nature they have but little hair on either face or body, and that little they try to eradicate. Their faces are roundish, and the width or projection of the cheek-bones makes them look unusually wide. The nose is a little depressed, narrow between the eyes, but broad and fleshy about the nostrils, which are rather large. The mouth is large and coarsely formed, with thick lips. Their teeth are often very good, though rather large; and those in front have the peculiarity, which will be discussed when speaking of the Fuegians, of being flattened, solid, and shewing an inner substance. The chin is

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usually broad and prominent: all the features, indeed, are large, excepting the eyes. The expression of their countenances is open and honest (compared with other savages), and their intrepid, contented look is rather prepossessing. The unhesitating manner in which, unarmed, they trust themselves among strangers whom they never before saw, or venture on board ship, even under sail in the offing (if they can obtain a passage in the boat), and go voluntarily from place to place with their white acquaintances, is very remarkable.

Of the stature and bulk of these Indians I have already spoken. It appears to me that those who now live on the northern side of Magalhaens' Strait are descendants of the Patagonians whose size excited so much surprise and discussion; and that, occasionally, individuals have exceeded the common height. Speaking of Cangapol, whose chief resort was the vicinity of the river Negro, though he and his tribe were restless wanderers, Falkner says—"This chief, who was called by the Spaniards the 'Cacique bravo,' was very tall and well proportioned. He must have been seven feet and some inches in height, because, on tiptoe, I could not reach to the top of his head. I was very well acquainted with him, and went some journeys in his company. I do not recollect ever to have seen an Indian that was above an inch or two taller than Cangapol. His brother, Sausimian, was but about six feet high. The Patagonians are a large-bodied people; but I never heard of that gigantic race which others have mentioned, though I have seen persons of all the different tribes of southern Indians." In another place he says, "there is not a part of all this extremity of the continent that some of these wandering nations do not travel over frequently." Of their wanderings, many persons besides myself and those with me can bear witness. Patagonians, who were personally known by officers of the Beagle, were seen by them at the Spanish (now the Buenos Ayrean) settlement, Del Carmen, near the mouth of the river Negro, in September 1832; and by Mr. Low, at their usual abode, near the Strait of Magalhaens, in February 1833. The individual who was then most noticed, a half-breed Indian woman, named

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Maria,* once persuaded some of her companions to go with her to the Falkland islands, in a vessel commanded by Mr. Matthew Brisbane. They went, staid there some weeks, and returned in the same vessel, highly delighted by all the novelties, excepting sea-sickness. The chief wizard of the tribe was one of the party. Maria was then a person of much consequence, being almost their only interpreter, and the wife of a principal person. Her own history must be curious: she was born at Asuncion, in Paraguay; and has a son who is a cacique.

The mantles are curiously painted, usually on one side only, but some have had the hair rubbed off and are painted on both sides. They are very neatly sewed together with thread made out of the split sinews of ostriches, which is the strongest and most durable material they can procure. Making mantles is one of the occupations of the women. The paint used is found on the hills: it is an earthy substance, of various colours. Moistened with water, and made into the shape of crayons, pieces of this substance are dried in the sun; and when used, one end of the crayon is dipped in water and rubbed on the part to be coloured. These mantles are tied about the neck, and usually round the middle, by sinew cords. Often the upper part is dropped, and the body left quite exposed above the waist, and while in active exercise on horseback, this is usually the case, if the mantle is not then entirely discarded. This substantial substitute for clothing is made with skins of the animals of their country; and among those of guanaco, puma, fox, skunk (a kind of weasel or polecat), cavy, dog, otter, seal, and colt, the most esteemed are the small grey fox skins. A kind of 'maro' is sometimes worn by the men; and their boots, I have already said, are made out of the hock part of the skins of mares' and colts' legs. After being cleaned from fat, or membranous substances, dried, and then made pliable with grease, these ready-shaped boots require neither sewing nor soles. Wooden substitutes for spurs are worn, if iron cannot be procured.

For warlike purposes the men clothe themselves in three of

* Frequently mentioned by Captain King in vol. i.

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their thickest mantles: the two outer ones have no hair, but are gaily painted: all three are worn like ponchos. On their heads they then wear conical caps, made of hide; and surmounted by a tuft of ostrich feathers. Another kind of armour, worn by those who can get it, is a broad-brimmed hat, or helmet, made of a doubled bull's hide: and a tunic, or frock, with a high collar, and short sleeves, made of several hides sewed together; sometimes of anta skins, but always of the thickest and most solid they can procure. It is very heavy, strong enough to resist arrows or lances, and to deaden the blow of a stone ball (bola perdida); but it will not turn the bullet fired from a musket. Some say that it will do so, but that which I saw had been pierced through, in the thickest part, by the musket-ball which killed the wearer. When obliged to fight on foot, they use a shield made of hides sewed together (clypeus septemplex).

Their arms are balls (bolas), lances, bows and arrows, clubs, and swords when they can get them. But in hasty, unforeseen skirmishes, they engage in as light order as the more northern Indians, without head-cover or mantle, stripped to their spurs, and armed only with lances and balls; which latter they are never without.

The balls, bowls, or bolas, called by themselves 'sōmai,' are two or three round stones, lumps of earth hardened, iron or copper ore, or lead. If made of earth or clay, the material is enclosed in small bags of green (fresh) hide, which, placed in the sun, contract so much, that they become like stones in hardness; but these clay balls are not used by the Patagonians so much as by the Pampa Indians, in whose country stones or metals are so scarce that there probably the last-mentioned balls were invented. Two balls, connected by a thong of hide, two, three, or four yards in length, are called 'sōmai.' Three such balls, connected by thongs, equal to one another in length, with their inner ends united, are called 'achico.' Taking one ball in the right hand, the other two are whirled around several times, and the whole then thrown at the object to be entangled. There are also balls of less weight and size, made of marble,

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lead, or metallic ore, with shorter cords or thongs, which are for small animals.

Sometimes two small balls, each of which has a cord about a yard in length, are fastened to the thong of the larger set. This is to entangle the victim more effectually. They do not try to strike objects with these balls, but endeavour to throw them so that the thong shall hit a prominent part; and then, of course, the balls swing around in different directions, and the thongs become so 'laid up' (or twisted), that struggling only makes the captive more secure. They can throw them so dexterously, as to fasten a man to his horse, or catch a horse without bruising him. If an animal is to be caught without being thrown down suddenly—an inevitable consequence of these balls swinging round his legs while at full speed—a sōmai is thrown at his neck. The two balls hang down, and perplex him so much by dangling about his fore-legs, that his speed is much checked; and another set of balls, or a lasso, may be used, to secure, without throwing him down. The lasso is not much used, so adroit are they with the balls. A formidable missile weapon is the single ball, called by the Spaniards 'bola perdida.' This is similar to the other in size and substance, but attached to a slighter rope, about a yard long. Whirling this ball, about a pound in weight, with the utmost swiftness around their heads, they dash it at their adversary with almost the force of a shot. At close quarters, it is used, with a shorter scope of cord, as an efficient head-breaker.

Several of these original, and not trifling offensive weapons, are kept in readiness by each individual; and many a Spaniard, armed with steel and gunpowder, has acknowledged their effect.

The lance (chuza) is a long bamboo cane, from twelve to twenty-four feet long, headed with iron or steel. The great length and tapering slightness of these spears makes them formidable to any adversaries, but often fatal to those who are unskilful or timorous, because their vibration, artfully increased to the utmost by the holders, makes it extremely difficult to parry the advance of their point; but, once parried they are

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useless—perhaps become encumbrances to their owners, who, if they do not turn and dash off at full speed, have recourse to their balls or to swords. Some have swords obtained from white men; others fasten long blades (knife-blades, perhaps, or pieces of iron hoop, straightened and sharpened) to handles three or four feet in length. Their bows are three or four feet long; and the arrows, about two feet in length, are headed with small triangular pieces of agate, jasper, obsidian, or even bone. But bows, arrows, shields, clubs, and heavy armour are daily less used; and may we not infer, that arms and armour, suited to foot encounters—such as arrows, heavy clubs or maces, shields, and many-fold tunics—have been laid aside by degrees, as horses have multiplied in the country? Fighting on foot is now seldom practised, except in personal quarrels. Falkner says, they used to envenom the points of their arrows with a species of poison, which destroyed so slowly, that the wounded person lingered for two or three months, till, reduced to a skeleton, he at last expired; but I have not heard of such a practice among the southern aborigines in these days.

Those Indians who have felt the effects of fire-arms, and own abundance of horses, the men of Araucania, who are the terror of the Pampa tribes, have long abolished armour and the arms of former wars—wars so well sung by Ercilla, in which they gained unfading honour in maintaining the freedom of their country. Naked on their horses, armed with lances, swords, and balls, those men now rush like the whirlwind—destroy—and are gone!

The women of Patagonia wear nothing on their heads; their hair, parted before and behind, is gathered into two large tresses, one on each side. Ear-ornaments, necklaces, bracelets, and anklets, made of beads, pieces of brass, silver, or gold, are much esteemed. Their mantles are similar to those of the men; but they are pinned across the breast by a wooden skewer, or a metal pin, and are gathered about the waist, hanging loosely almost to their ankles. A short apron, or half-petticoat, made with skins of small animals, or coarse cloth, is tied about their waist, under the mantle. It only covers them in front, and reaches to the knee. Boots, similar to those

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of the men, and additional clothes, are worn when they ride distances; sitting astride, upon a heap of skins, which serve at night for bedding.

The principal subsistence of these Indians is the flesh of mares, ostriches, cavies, or guanacoes; but though they are not particular, and eat almost anything that they catch, the flesh of young mares is preferred to any other. They broil their meat, and eat it with a lump of fat, and salt. The fat of mares and that of ostriches are boiled together and put into bladders; but the fat of guanacoes is eaten raw, being preferred in that state. There are two roots which they eat, one called tus, the other chālăs. The tus is a bulbous root, growing wild, which when cleaned and baked, or rather roasted, becomes mealy, like a yam. They use it sometimes with their meat, but not often. The chālăs is a long, white root, about the size of a goose-quill. It is either roasted in the embers or put into broth, which they make for women and sick people. When on the sea-coast, limpets and muscles are gathered by the women and children; but fish or seals are seldom obtained. Dogs are not eaten, neither are horses, unless disabled by an accident.

Cattle are yet scarce in the southern regions, because pasture-land is rather deficient; but about the lately-discovered river, Chupat, (lat. 43.21. S.) which, though small, is supposed to cross the continent, they are rather numerous, but their flesh is not thought equal to that of mares.

The only prepared drink which they use, besides the decoction of chālăs, is the juice of barberries, mixed with water, and drank in its natural state. They have no fermented liquor.

Hunting is both amusing and necessary to the men. They go out to the chase in parties, more or less numerous, according to the strength of the tribe, the scarcity of food, and the supply of horses. An extent of country is enclosed by the horsemen; then drawing together, they drive before them all the animals; till, when tolerably collected together, the cacique, or leading man of the party rides at an animal and throws it down with his balls. All then set to work, and ball away in every direction. They do not stop because one animal falls,

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since not one in a hundred escapes by his own exertions when once entangled; but another and another become the victims of a good hunter, before the collection escapes out of his reach. All their sets of balls being employed, and the game dispersed, they begin to kill and divide. Each animal is knocked on the head with a ball, skinned, and cut into pieces, where it fell, and the pieces are then carried on horseback to their huts.

After reaching their settlement, the produce of the chase is brought together, and divided among the different families, in proportion to their respective numbers. If one family has eaten its share sooner than others, some one of that hungry house goes to any party which has meat left, and cuts off what is wanted, without a question.

A number of large dogs assist in the hunt: whether they scent the game I know not, but probably they run by eye, as so many animals are a-foot at once. Each regular hunter has a spare horse at hand; the best horses being carefully reserved for war and the chase. Upon others they travel, place the women and children, and their property.

The method of hunting abovementioned is that employed on set occasions; but if only a few men are together, they surprise and chase, as they can. Sometimes they ride together, and chase whatever they see, whether ostrich, skunk, guanaco, fox, or puma.

The wealth of these Indians consists chiefly in horses and dogs, the richer individuals having forty or fifty horses, and a large number of dogs; the poorer, only one or two horses, and but one dog.

The tents or huts called by themselves 'cow,' and by the Spaniards and their descendants, toldos (tolderia is the place of toldos, or Indian village, in Spanish), have already been partly described. Made of skins, sewed together and supported by poles, a tilt-like construction, open towards the east, is their hastily-formed dwelling. The top slopes towards the west side, which is not above two feet in height. The front is about six or seven feet high; and the inside space about twelve feet by nine. Both poles and skins are carried with them when

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they migrate from place to place. Water does not lodge on the hide covering, neither does wind penetrate; and as east winds are very rare in Patagonia, a temporary screen, such as a few skins, suffices for protection against them.

Two or three families sleep in one hut, unless it is the dwelling of a cacique, or person who has many wives. Poor people have but one wife. Those who are rich, and able to maintain them, have several wives—three, four, five, or even more.

In places where some of the tribe stay constantly, and which are considered the head-quarters, or central rendezvous of a tribe, there are larger huts, almost deserving the name of houses. Some of these are for the cacique and his wives; others are for the wizards, who, in their three-fold capacity of priests, magicians and doctors, have great influence over the superstitious minds of their countrymen. These larger dwellings are made with poles and skins, put together so as to form an oblong shed, with a sloping roof, shaped like a small cottage. The substitutes for walls are about five feet in height, and the roof is in the middle about eight feet from the ground. Some of these houses are four or five yards in width, and eight, ten, or twelve in length. I have never seen one myself; but those who gave me other information, which I found true, said that there were such houses in the interior, and described them minutely to me.

At night, skins are spread upon the ground to sleep on; two or three rolled up, along the length of the back part of the tent or hut, form a pillow for the whole party, on which each family has its place, and the dogs lie at their feet.

The children have a little square place to themselves, in one corner. Infants in the cradle (a piece of hide with a thong fast to its four corners, by which it is suspended from the roof of the dwelling), are placed near their mother.

Marriages are made by sale more frequently than by mutual agreement. Instead of receiving a dowry with his wife, a man pays a large price to her nearest relations. Sometimes girls are betrothed while very young, and a part of the stipulated price paid to the relations. Mutual inclination may sometimes determine the choice; but payment must in every case be

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made, in proportion to the supposed value of the damsel, and the property of her purchaser. If a girl dislikes a match made for her, she resists, and although dragged forcibly to the hut of her lawful owner, plagues him so much by her contumacy, that he at last turns her away, or sells her to the person on whom she has fixed her affections; but he seldom beats her, or treats her ill. Perhaps she does not wait to be so disposed of, but elopes and takes her choice of a protector; who, if more powerful than the husband, obliges him to submit to the double loss, unless a cacique, or a powerful friend of the losing party, forces the gallant to restore her, or compromise the matter, and these affairs are in general easy to settle. It has been already mentioned that each man who possesses any property has usually more than one wife; and that some few men, who have forty or fifty horses, and other riches in proportion, maintain four or five wives.

"Women who have accepted their husbands with good-will are in general very faithful and laborious," says Falkner; "their lives are but one continued scene of labour; for, besides nursing and bringing up children, they are obliged to do much drudgery." Except hunting, providing food, and fighting, all work is done by the women. Indeed they sometimes aid in battle. Some families have slaves who do household work; but if they should have no slaves, not even the wives of a cacique are exempt from every-day labour.

Men do not marry before they are about twenty years of age. Girls are married earlier: from fourteen or fifteen they are considered to be marketable commodities. Falkner says, "When once the parties are agreed, and have children, they seldom forsake each other, even in extreme old age. The husband protects his wife from all injuries, and always takes her part, even if she is in the wrong, which occasions frequent quarrels and bloodshed; but this partiality does not prevent him from reprimanding her, in private, for engaging him in these disputes.

"He very seldom beats her; if she is found unfaithful he lays blame on the gallant, and, if able, punishes him severely;

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unless the delinquent atones by some valuable gift. Sometimes, at the command of a wizard, a man orders his wife to go to an appointed place, usually a wood, and abandon herself to the first person she meets. Yet there are women who refuse to comply with such orders."

When it does happen that a man and his wife quarrel, the woman is sometimes punished by having her two tails rather savagely pulled. I have been told that the husband scarcely ever beats her, except in the height of passion.

Children are left to take care of themselves soon after they can walk. With sets of little balls (bolas) they annoy the dogs not a little, practising their future occupation. While very young they climb upon old, or quiet, horses' backs. If a young guanaco is caught and tamed, or a bird with its wings clipped hops about the tolderia, the little ones have fine sport. While infants are suckling, the mothers use frames or cradles in which their charges are carried about: they are made of flat pieces of wood, with a few semi-circular guards of lath, or thin branches, whose ends are fixed into holes in the wood. In such frames, between pieces of guanaco skin, the babies are placed; and while travelling, these cradles are hung at the mothers' saddle-bows. The children are much indulged. Falkner says, "The old people frequently change their habitations to humour the caprices of their children. If an Indian, even a cacique, wish to change his abode, and the tribe with whom he is living do not choose to part with him, it is customary to take one of his children, and pretend such a fondness for it, that they cannot part with the little favourite. The father, fond of his child, and pleased that it is so much liked, is induced to remain."

Yet with all this apparent goodness of disposition, in moments of passion, these Indians have been seen to be like other savages, disgraced by the worst barbarity. Neither man, woman, wife, nor even a smiling innocent child, is safe from that tiger in human shape—a savage in a rage. "Nunca, nunca fiarse de los Indios," is a Spanish maxim, as well founded as it is common.

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Education, and the beneficial effects of the opinions of others, an influence fully felt only in civilized society, have so tamed and diminished the naturally strong passion of anger, with its sequel, immediate violence, or hatred and revenge, that imagination must be called to the assistance of those who, happily, have never seen a furious savage.

Who can read that instance of child murder, related so well by Byron, in his narrative of the Wager's wreck, without a shudder? yet the man who, in a moment of passion, dashed his own child against the rocks, would, at any other time, have been the most daring, the most enduring, and the most self-devoted in its support and defence! (Appendix No. 14.)

Generally speaking, the Patagonians are extremely healthy. Their constitutions are so good that wounds heal rapidly: but they are not ignorant of the healing properties of some herbs; nor of the purgative qualities of others. They know the effect of bleeding, and can adroitly open a vein with a sharp piece of shell or flinty stone.

When sick, the chālăs root, pounded and mixed with water, is a favourite specific. Should this, or the few other remedies which they think they know, fail, the wizard (who is also doctor) performs some absurd ceremonies, and then rattles together two pieces of dry bladder, in which are some loose stones, in order to frighten away the 'Valichu,' or evil spirits, who are opposing their art, and tormenting the unlucky patient. The diabolical noise caused by rattling these dried bladders, is continued until the disease takes a favourable turn, or the sufferer dies. If death ends the scene, the body is wrapped in the best mantle of the deceased, placed on his favourite horse, and carried to the burying-place of the tribe. The wizard rattles, and the other people howl over the corpse as it is carried to the sepulchre. In a square pit, about six feet deep, and two or three feet wide, where many others have been deposited, the corpse is placed in a sitting posture, adorned with mantles, plumes of feathers, and beads. The spurs, sword, balls, and other such property belonging to the deceased, are laid beside him; and the pit is then covered over with branches of

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trees, upon which earth is laid. His favourite horse is afterwards killed. It is held at the grave while a man knocks it on the head with one of the balls of the deceased. When dead, it is skinned and stuffed, then, supported by sticks (or set up) upon its legs, with the head propped up, as if looking at the grave. Sometimes more horses than one are killed. At the funeral of a cacique four horses are sacrificed, and one is set up at each corner of the burial place. The clothes and other effects belonging to the deceased are burned: and to finish all, a feast is made of the horses' flesh.

But there are also other modes of disposing of dead bodies: and as I am certain that at least two of them are practised by the Patagonians of the present day, and we are assured by Falkner that other methods, one of which was carrying them into the desert by the sea-coast, were customary in his time, I shall here repeat what he says on the subject (p. 118).

"The burial of the dead and the superstitious reverence paid to their memory, are attended with great ceremony. When an Indian dies, one of the most distinguished women among them is immediately chosen to make a skeleton of his body; which is done by cutting out the entrails, which they burn to ashes, dissecting the flesh from the bones as clean as possible, and then burying them under ground till the remaining flesh is entirely rotted off, or till they are removed (which must be within a year after the interment, but is sometimes within two months) to the proper burial-place of their ancestors.

"This custom is strictly observed by the Molu-che, Taluhet, and Diuihet,* but the Chechehet and Tehuelhet, or Patagonians, place the bones on high, upon canes or twigs woven together, to dry and whiten with the sun and rain.

"During the time that the ceremony of making the skeleton lasts, the Indians, covered with long mantles of skins, and their faces blackened with soot, walk round the tent, with long poles or lances in their hands, singing in a mournful tone of voice, and striking the ground, to frighten away the Valichus,

* The Taluhet, Chechehet, and Diuihet, were tribes of Puel-che.

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or evil spirits. Some go to visit and console the widow, or widows, and other relations of the dead, that is, if there is any thing to be got; for nothing is done but with a view of interest. During this visit of condolence they cry, howl, and sing in the most dismal manner; straining out tears, and pricking their arms and thighs with sharp thorns, to make them bleed. For this shew of grief they are paid with glass beads, brass cascabels and such like baubles, which are in high estimation among them. The horses of the dead are also immediately killed, that he may have wherewithal to ride upon in the 'alhue mapu,' or country of the dead, reserving only a few to grace the last funeral pomp, and to carry the relics to their proper sepulchres.

"When they remove the bones of their dead, they pack them up together in a hide, and place them upon one of the deceased's favourite horses, kept alive for that purpose, which they adorn after their best fashion, with mantles, feathers, &c., and travel in this manner, though it be to the distance of three hundred leagues, till they arrive at the proper burial-place, where they perform the last ceremony.

"The Molu-che, Taluhet, and Diuihet, bury their dead in large square pits, about a fathom deep. The bones are put together, and secured by tying each in its proper place, then clothed with all the best robes they can get, adorned with beads, plumes, &c., all of which they cleanse or change once a year. They are placed in a row, sitting, with the sword, lance, bow and arrows, bowls, and whatever else the deceased had while alive. These pits are covered over with trees, canes, or branches woven together, upon which they put earth. An old matron is chosen out of each tribe, to take care of these graves, and on account of her employment is held in great veneration. Her office is to open every year these dreary habitations, and to clothe and clean the skeletons. Besides all this they every year pour upon these graves some bowls of their first-made chicha, and drink some of it themselves to the good health of the dead. (N. B. Not the Tehuelhet.)

"These burying places are, in general, not far distant from

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their ordinary habitations; and they place, all around, the bodies of their dead horses, raised upon their feet and supported with sticks.

"The Tehuelhet, or more southern Patagonians, differ in some respects from the other Indians. After having dried the bones of their dead, they carry them to a great distance from their habitations, into the desert by the sea-coast; and after placing them in their proper form, and adorning them in the manner before described, they set them in order above ground, under a hut or tent erected for that purpose, with the skeletons of their dead horses placed around them.

"In the expedition of the year 1746, some Spanish soldiers, with one of the missionaries, travelling about thirty leagues within land, to the west of Port San Julian, found one of these Indian sepulchres, containing three skeletons, and having as many dead horses propped up around it."

In the expeditions of the Adventure and Beagle, between 1826 and 1834, a few burial places of another kind were examined. These were piles of stones, upon the summits of the highest hills, on the eastern sea-coast. Some had been thrown down and ransacked; probably by the crews of sealing vessels: others there was no opportunity of visiting: only one untouched pile was found: and that one was examined by Lieutenant Wickham. It was on a height, near Cape Dos Bahias, in latitude forty-five south. Only bones were found, in a much decayed state, under a pile of stones about four feet high; and from the remains of the bones Mr. Bynoe ascertained that they had belonged to a woman of the ordinary stature. A pile of stones on a neighbouring height had been pulled down by the crew of a sealing vessel: under it were fragments of decayed bones, which were thought too much injured by time and weather to be worth removing; indeed they crumbled to the touch. Under similar heaps of stones the 'gigantic skeletons' which some voyagers have described, were said to have been found.

Doubtless these several methods of disposing of the dead are not those of one horde only, but of various tribes. But I prefer mentioning all that is yet known of the subject, as

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far as I am aware,* and leaving it for better-informed persons to decide upon the particular habits of each subdivision. Would any one tribe bury each of the five following persons in a similar manner, and in the same place? A powerful cacique—a wizard—a woman—an ordinary man—a child?

"The widow or widows of the dead are obliged to mourn and fast for a whole year after the death of their husband. This consists in keeping themselves close shut up in their huts, without having communication with any one, or stirring out, except for the common necessaries of life; in not washing their faces or hands, but being blackened with soot, and having their garments of a mournful appearance; in abstaining from horse's and cow's flesh, and, within land where they are plenty, from the flesh of ostriches and guanacoes; but they may eat any thing else. During the year of mourning, they are forbidden to marry, and if, within this time, a widow is discovered to have had any communication with a man, the relations of her dead husband will kill them both, unless it appears that there has been violence. But I did not discover that the men were obliged to any such kind of mourning on the death of their wives." (Falkner, p. 119.)

Manslaughter is not infrequent. When quarrels arise, the parties draw their knives, or take such weapons as are at hand, and fight, if not parted, till one is killed. War often occurs between the smaller tribes, but does not last long. When the small tribes unite against another nation, such as the Molu-che, or the Puel-che of the north, their preparations are more serious, and their hostilities of far longer duration.

When at war, or expecting an attack, the Patagonians exercise on horseback, in their armour, every other evening. Frequently the occasion of hostility is an encroachment upon the territories of a neighbouring tribe, either for hunting or plunder. War is, in such case, instantly declared by the insulted

* Except about the tomb which is described by Captain King in the first volume.

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party. In armour, and upon their best horses, they sally forth to meet the intruders. Having met, they ask why their land has been invaded, and desire the strangers to return to the place whence they came. The non-compliance of the intruders is a signal for action; they close—fight—and one party, being vanquished, loses all its property. The manner of fighting has already been mentioned.

The horsemanship of the Patagonians is not equal to that of the northern Indians: yet it is not indifferent. From their weight, and the openness of their country, they do not habitually ride so hard, or practise so many manœuvres as the Araucanian,* who can hang at the side of his horse while at speed, directing him by voice and rein; or even while going through a wood can cling quite beneath his belly for a short time, still urging on and directing him; but such feats, performed by naked men, who are almost centaurs, surpass the powers, or rather the dexterity, of the bulky, well-fed, and heavily-clothed Patagonian.

The Patagonians are very fond of racing. At almost every leisure hour either horses or play engage their attention, for they are also great gamblers. Race-courses are regularly marked out, but they are very short, not a quarter of a mile in length. These short bursts at the utmost speed seem absurd, till one considers that in hunting wild animals, attacking or escaping from the sudden attack of an adversary, such short starts are of the utmost importance. They bet upon the horses, and sometimes stake even their wives and their children. Payment is faithfully made, even to the uttermost. The cards with which they play are pieces of skin, with figures

* The Araucanian hangs at one side of his horse to shelter himself from the lances, balls, or shot of his adversaries, or to avoid trees. At a distance, a troop of these Indians advancing irregularly, might seem to an inexperienced eye merely loose horses, of which so many are seen in the Pampas; but to another Indian, or to a trained gaucho, the attempt to conceal themselves would avail them nothing, because the horses' action, and manner of going, would, at a glance, show him that they were guided by riders.

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painted upon them: perhaps rough imitations of the cards used by the Spaniards; but this may be doubted.

According to Falkner, the native of Patagonia is a superstitious polytheist. I cannot add to, nor have I reason to doubt his account; and shall therefore repeat what he says on this subject, abridging it slightly.

"The Indians imagine that there is a multiplicity of deities, some good, others evil. At the head of the good deities is Guayara-kunny, or the lord of the dead. The chief evil agent is called Atskannakanatz, or Valichu. This latter name is applied to every evil demon.*

"They think that the good deities have habitations in vast caverns under the earth, and that when an Indian dies his soul goes to live with the deity who presides over his particular family.

"They believe that their good deities made the world, and that they first created the Indians in the subterranean caverns above mentioned; gave them the lance, the bow and arrows, and the balls, to fight and hunt with, and then turned them out to shift for themselves. They imagine that the deities of the Spaniards created them in a similar manner, but that, instead of lances, bows, &c., they gave them guns and swords. They say that when the beasts, birds, and lesser animals were created, those of the more nimble kind came immediately out of the caverns; but that the bulls and cows being the last, the Indians were so frightened at the sight of their horns, that they stopped the entrances of their caves with great stones. This is the grave reason they give why they had no black cattle in their country, till the Spaniards brought them over; who, more wisely, had let them out of their caves.

* The Patagonians call the good deity the Creator of all things, but consider him as one who afterwards has no concern about them. He is styled by some Soucha, or chief in the land of strong drink; by others, Guayara-kunny, or lord of the dead. The evil principle is called Huecovoe, or the wanderer without. Other spirits are supposed to take care of particular people—protect their own and injure others: they are called Valichu.—Pennant, p. 61.

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"Some say that the stars are old Indians; that the milky way is the field where the old Indians hunt ostriches, and that the Magellan clouds are the feathers of the ostriches which they kill. They have an opinion that the creation is not yet exhausted; nor all of it yet come out to the daylight of this upper world. The wizards, beating their drums, and rattling their hide-bags full of shells, or stones, pretend to see into other regions under the earth. Each wizard is supposed to have familiar spirits in attendance, who give supernatural information, and execute the conjuror's will. They believe that the souls of their wizards, after death, are of the number of these demons, called Valichu, to whom every evil, or unpleasant event is attributed.

"Their religious worship is entirely directed to the powers of evil; except in some particular ceremonies made use of in reverence to the dead.

"To perform their worship they assemble together in the tent of the wizard, who is shut up from the sight of the rest in a corner. In this seclusion he has a small drum, one or two round calabashes or bags of dry hide, with small sea shells in them, and some square bags of painted hide in which he keeps his spells. He begins the ceremony by making a strange noise with his drum and rattle-bags; after which he feigns a fit, or struggle with the evil spirit, who it is then supposed has entered into him; keeps his eyes turned up, distorts his face, foams at the mouth, screws up his joints, and, after many violent and distorting motions, remains stiff and motionless, resembling a man seized with an epilepsy. After some time he comes to himself, as having overcome the demon's influence; next he feigns, behind his screen, a faint, shrill, mournful voice, as of the evil spirit, who, by this dismal cry, is supposed to acknowledge himself subdued; and then the wizard, from a kind of tripod, answers all questions that are put to him.

"Whether his answers are true or false, is of very little consequence; because, if his intelligence should prove false, it is the fault of the demon, or Valichu. On all these occasions the wizard is well paid.

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"The profession of the wizards is very dangerous, notwithstanding the respect that is sometimes paid to them; for it often happens, when an Indian chief dies, that some of the wizards are killed; especially if they had any dispute with the deceased just before his death; the Indians, in this case, attributing the loss of their cacique to the wizards and their demons. In cases also of pestilence and epidemic disorders, when great numbers are carried off, the wizards often suffer.

"On account of the small-pox, which almost destroyed the Chechehet tribe, Cangapol ordered all the wizards to be killed, to see, if by such means, the distemper would cease.

"There are wizards and witches. The former are obliged to dress in female apparel, and are not allowed to marry. The latter are not restricted. Wizards are generally chosen when children; and a preference is always shewn to those who, at that time of life, discover an effeminate disposition. They are clothed very early in female attire, and presented with the drum and rattles belonging to the profession which they are to follow. Those who are seized with fits of the falling sickness, or the 'Chorea Sancti Viti' (St. Vitus's dance), are immediately chosen for this employment, as selected by the demons themselves; whom they suppose to possess them, and to cause all those convulsions and distortions common in epileptic paroxysms."

The Patagonians, and indeed all the South-American aborigines, have faith in witchcraft. They all believe that the wizards or witches can injure whom they choose, even to deprivation of life, if they can possess themselves of some part of their intended victim's body, or that which has proceeded thence—such as hair, pieces of nails, &c.; and this superstition is the more curious from its exact accordance with that so prevalent in Polynesia.

The tribe, or subdivision of the Tehuelhet who generally live near Magalhaens' Strait, have learned to pay a sort of homage (perhaps it may be termed worship) to an image of wood, cut into the figure of a man's head and body, and called Cristo; this image they rarely produce to strangers, or even amongst

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themselves, except at deaths, or on very particular occasions. This attempt at an outward demonstration of faith in customs of the Romish church, appears to have been caused by a Captain Pelippa, who visited the Strait of Magalhaens some time before the Adventure and Beagle. Who or what he was, I could not discover.

There is a particular kind of tree, which is esteemed sacred, and never burned. It is like a thorn; a resinous gum issues from the knotty, close-grained stem, which has a pleăsant aromatic smell, if put into the fire.

Regular government, or any forms and rules approaching to what may be called a civil constitution, no one would expect to find among tribes of wandering savages; but amongst the Araucanian tribes of Moluche, who do not wander, and have advanced towards civilization, there are regular laws, supporting a settled form of government; and their ideas have been communicated to the southern tribes, and have slightly influenced them. Thus, in many cases, offenders are tried by an assembly of the older people, and their sentence pronounced, after mature deliberation, instead of being at once dealt with as the cacique may, at first thought, deem expedient.

The caciques or chiefs are hereditary. Those who possess much property and have many followers are highly respected; but their authority, though absolute in some instances, is little exerted in the common occurrences of life. When meetings are held for the purpose of deciding upon any question, the cacique presides—that is, he is considered the principal person present; certainly he looks the most solemn, and is the least active. He gives orders to hunting parties, or to those who exercise for war: and if men quarrel, he sometimes causes them to be parted. In time of war he leads his tribe, and in proportion to his enterprise and success is his actual authority while the war lasts. Each person has a particular name, implying a quality or some peculiarity; sometimes a particular place.

"All the sons of a cacique," says Falkner, "have a right to assume the dignity, if they can get any persons to follow them;

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but, on account of the small utility of the rank of cacique, it is often resigned."

Falkner's account of the caciques ought to be, and is, no doubt, one of the best; it is as follows:—

"The cacique has the power of protecting as many as apply to him; of composing or silencing any difference; or delivering over the offending party to be punished with death, without being accountable for it. In these respects, his will is the law. He is generally too apt to take bribes, delivering up his vassals, and even his relations, when well paid for it. According to his orders, the Indians encamp, march, or travel from one place to another, to hunt or make war. He frequently summons them to his tent, and harangues them upon their behaviour; the exigencies of the time; the injuries they have received; the measures to be taken, &c. In these harangues, he always extols his own prowess and personal merit. When eloquent, he is greatly esteemed; and when a cacique is not endowed with that accomplishment, he generally has an orator, who supplies his place" (as in Polynesia).

"In cases of importance he calls a council of the principal Indians and wizards, with whom he consults about the measures to be taken, to defend himself or attack his enemies. In a general war, when many nations unite against a common enemy, as in the great alliances against the Spaniards, they choose a commander-in-chief, called Apo (or Toqui), from among the oldest or most celebrated caciques; but this honour though properly elective, has for many years been hereditary in the family of Cangapol. (Written in 1780.)

"The caciques have not the power to raise taxes, or to take away any thing from their vassals; nor can they oblige them to serve in the least employment, without paying them. They are obliged to treat their vassals with great humanity and mildness, and oftentimes to relieve their wants, or they will seek the protection of some other chief. For this reason, many of those who are born caciques refuse to have any vassals, as they cost them dear, and yield but little profit. No Indian, or body of Indians, can live without the protection of

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some cacique, according to their law of nations; and if any of them attempted to do so, they would undoubtedly be killed, or carried away as slaves, as soon as they were discovered.

"In case of any injury, notwithstanding the authority of the cacique, the party aggrieved often endeavours to do himself justice to the best of his power. They know of no punishment or satisfaction, but that of paying or redeeming the injury or damage done with something of value. If the offence is not very great, and the offender is poor, the injured party perhaps beats him with his balls on the back and ribs; but, in general, they do not chastise, except by death. When the offender is too powerful, they let him alone; unless the cacique interferes, and obliges him to make satisfaction."

A curious plant is found in Patagonia (and at the Falkland Islands), somewhat like a very large and very solid cauliflower. It is greenish, or yellowish-green, tough, and very abundant. It grows upon and close to the ground, forming a lump like a large ant-hill overgrown with moss and grass. From the succulent stalks of this plant a balsamic juice or sap exudes, which is particularly good for healing wounds.

Battles between tribes are carried on similarly to their wars against a nation; but, of course, on a smaller scale. The attacking party halts at a great distance from the enemy, and sends out scouts to reconnoitre. These emissaries hide during the day, but at night examine every detail most minutely, and return to the camp with a full account of their opponent's strength and position. When the moon is near, or a little past the full, showing good light for their work, they advance to the attack. A few hours after midnight they make the assault, kill all the men who resist, and carry away the women and children for slaves.

Sometimes the Indian women follow their husbands, and share in the booty. Laden with plunder, they all retreat as hastily as possible, resting neither night nor day, till they are at a great distance, and out of the reach of their enemies. Sometimes they ride more than a hundred leagues from the place of attack before stopping to rest, and divide the booty.

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On such occasions, if fearful of pursuit, or hard pressed by pursuers, they stop very little by the way—light no fire—eat but little food, and that raw—and some are even able to change horses without checking their speed, or touching the ground. A troop of loose horses is always driven along before the party: and when an Indian, at such a time, wants to change, he rides along-side of a loose horse, jumps on his back, bridle in hand, and in an instant, the bit is transferred from one to the other. Saddle they care not for, when thus pressed.

In guiding and managing their horses, the Indians use the voice with very good effect. The best of those animals are exceedingly well trained; and the owners are as reluctant to part with them as Arabs are to sell their steeds.

The natives of Patagonia breed their own horses as well as dogs: but their constant practice of killing the horses of men who die tends to prevent their being numerous. Upon such occasions, all, excepting the few which had been assigned to his children (generally one or two to each child at its birth), are killed. Dogs have a similar fate. With such laws, a man need not fear being put out of the way for the sake of his property; nor, while the women are enjoined to go through such a mourning ordeal, is it likely they would enter into or favour any combination made against their husbands, however harshly they might be treated by them.

Excepting that of the caciques, I believe there is no superiority of one person over another among the Patagonians. Those who have more property than others, or who are related to the chief, have influence over the rest, but are not considered by them to be their superiors.

The moral restraints of these people seem to be very slight. Each man is at liberty to do very much as he feels inclined; and, if he does not injure or offend his neighbour, is not interfered with by others. Their social habits are those handed down by their ancestors, and adapted to the life they are compelled to lead. Ideas of improvement do not trouble them. Contented with their fine climate—plenty of wholesome food, and an extensive range of country—they rather pity white

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people, who seem to them always in want of provisions, and tossed about at sea. These natives have a great dislike to the motion of a ship; yet, for novelty, they will go afloat when opportunity offers.

In landing at Gregory Bay, Mr. Low has had much trouble in preventing the natives from crowding into his boat, all being anxious to see the vessel. Once, when many strange Indians (of another tribe) were present, he was obliged to affect to quarrel with them; and afterwards they behaved better and were quite civil, but he never allowed his boat to be grounded. Having left a Dutchman as boat-keeper, the natives teased him into a quarrel, and then dragged him out of the water, boat and all, with their lassoes, leaving him among the bushes, frightened and spluttering, while they galloped off, laughing heartily. The Dutchman hastened to Mr. Low; but while he was gone, the boat was put into the water by the authors of the trick, who then dashed off at full speed, highly amused at their feat. Mr. Low gave one of the women a gay gown: it was the first she had seen; and wishing to suckle her infant, she put it under the skirt of the gown, and, with some difficulty, forced the little thing upwards to her breast.

When the Patagonians meet white men, their inclinations are almost always friendly; but if they find themselves able to dictate to the strangers, a tribute of tobacco, bread, muskets, powder, ball, or such articles as they see and fancy, is often imposed.

A trading schooner called at Gregory Bay (in the Strait of Magalhaens) in 1834. Her mate landed, and was asked for various things which he could not or did not wish to give. The natives detained him as a prisoner; sent his boat away; and kept him till his ransom (tobacco and bread) was sent ashore.

Considerable traffic for knives, swords, muskets, ammunition, tobacco, bread, and, latterly, spirits, has been kept up between the southern Patagonians and the vessels which have touched on their shores (especially at Gregory Bay) in going through the Strait. Their returns have been mantles, skins, and fresh guanaco meat.

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During late years, several persons, run-away seamen and others, have passed many months—some, indeed, have passed years—in their company,—living as they live.

In 1833-34, one of the most influential individuals among them was a Chilian, named San Leon, who had been carried to Patagonia by Mr. Brisbane, for the purpose of trading with the Indians for horses. He ran away from the vessel (1830-32), and has since lived with the tribe who are generally found near Gregory Bay. His wife is the daughter of an old native who possesses much property (according to their ideas); she speaks a little Spanish, and interprets for strangers better than her husband, whose knowledge of the Indian language is very slight. Bred in Chile, San Leon is a good horseman, and considered by the Indians to be an excellent hunter.

Mr. Low thinks that the natives would encourage and be friendly to a settlement of white people, made in Patagonia. They profess to like white men, and to wish some to live with them: when old Maria (the woman previously mentioned) was at the Falkland Islands, Mr. Low told her that he intended to build a house at Gregory Bay, and carry white people with him to live there, at which she and her party (including the wizard) seemed to be much pleased.

Mr. Low considers that those natives who live eastward and northward of the First Narrow are not of the same tribe as those who are generally about Gregory Bay, with whom, he says, they are frequently at war. He also thinks that those who live farther westward, near Otway and Skyring Waters, form another subdivision. The following notices, written from his dictation, will show that what I have already stated respecting these minor tribes, considered as subdivisions of one large body or nation, cannot be very far wrong:—

During the stay of the Unicorn (Mr. Low's vessel) in the channel between Otway and Skyring Waters, a fire was made, as a signal to the Indians. They soon began to arrive in small detached parties, some of whom were known to Mr. Low, whose acquaintance with them had been formed at Gregory Bay. They travelled in small parties, therefore were not,

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in all probability, on bad terms with their neighbours at that time.

Those who first arrived were invited on board; but declined going, because their chief was expected: and with the last party came a boy, about nine years' old, fantastically decked with ornaments of copper and brass, with beads, and with a new mantle. A tall, fine-looking man, of the Gregory Bay tribe, accompanied this young cacique, and made him known to Mr. Low, by the name of 'Capitan Chups.'

These natives have adopted the word 'capitan,' and now always use it when addressing white men who they suppose have authority. When some Patagonians of the Gregory Bay party came on board the Beagle, in 1834, seeing a larger number of officers than is usual in small vessels, one of the first questions asked, in broken Spanish, was, "Quanto capitanes abordo?"

Little Capitan Chups seemed to have no small idea of his own consequence, and tried to affect much dignity. He willingly went on board the Unicorn; but not a native would enter the boat until the young chief was seated, when there was a most inconsistent scramble, which nearly swamped it. However, after pushing out a few of the intruders, the party reached the vessel in safety. On board her was a Patagonian boy, who had been four months with Mr. Low, and had been clothed at Monte Video. He had recognized Capitan Chups at a distance, said who he was, and showed by his manner that he considered him a person of high distinction. The little cacique called this boy, asked him many questions, and examined every part of his dress. Afterwards the boy joined some of his own family, who were present. He had before refused to go to the party at Gregory Bay, while there in the vessel, alleging that they were not his people.

Mr. Low said, that the tribe on the banks of this channel were mixed, being partly horse and partly canoe Indians. They were entirely under the dominion of the Gregory Bay party, who appointed their chiefs. Maria's son, called 'Capitan Chico,' was their ruler, until the arrival of Capitan Chups.

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FUEGIANS GOING TO TRADE IN ZAPALLOS WITH THE PATAGONIANS.

Published by Henry Colburn, Great Marlborough Street, 1839.

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Yet Mr. Low did not think that the little capitan belonged to any of the families residing near Gregory Bay, but to some part of the same tribe who live far inland. Maria's son, Chico, was subsequently cacique, or acting as cacique of the Gregory Bay party. Had this western tribe been under the dominion of the Gregory Bay party, would the successor to Chico have been taken from a tribe who live far inland?

The apparent mixture of horse and canoe Indians appears to me to have been an accidental consequence of the fire made as a signal, which called to the spot horsemen from the north and canoes from the south. The novelty of a vessel anchoring in a place never before disturbed by such a visitor, might well suspend hostilities between neighbouring tribes, even had they been at war; but there is every reason to conclude that the canoe men of the south side of those waters have frequent and even amicable intercourse with the horsemen of Patagonia. A part though of that amicable intercourse consists in selling their children to the Patagonians for slaves. The following incident led to the discovery of this slave-trade: Mr. Low heard Maria talking of 'zapallos,'* and asked her if she could get some for him—and how many? He thought she meant pumpkins (for which zapallos is Spanish); Maria replied, "two boat loads," and to show of what, pointed to a young slave, lately purchased from the Fuegians. When there are more zapallos among them than are wanted for slaves, or than suits their convenience, what becomes of them? While young, they may be more useful than when they grow old; and a wandering people, subsisting by hunting, would not in all probability take the trouble of providing for useless slaves, who might maintain themselves. The Patagonians are not so barbarous as to kill them; then what becomes of those zapallos? If they are not sent to the borders of the Skyring and Otway Waters, there to shift for themselves, with perhaps a few old horses, and even some young men who help them to hunt, the employment of their later years is unexplained.

* 'Zapallos,' or some word of similar sound.

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The canoe Indians are in reality despised by the Patagonians; but, for the sake of trade, are generally kept upon half-friendly terms. For dogs, old horses, guanaco meat, and old mantles, the former give pieces of iron pyrites (used for striking fire), their captives, or their children.

Patagonians have a great antipathy to negroes. As soon as they see a black man, they shout, hoot, hiss, and make faces at him.

No signs of hieroglyphics or writing have been noticed among the Patagonians. They can reckon as far as thousands. Time is counted by years and moons, days and nights. There are particular words denoting the various phases of the moon, the seasons of the year, and the times of day and night. In counting, the fingers and toes are used, as well as words expressing numbers, especially when trying to make their meaning clear to strangers. Once, when Mr. Low was leaving Gregory Bay, he gave Maria to understand that he would return again in four moons, and asked her to have some guanaco meat ready for him when he should arrive. He returned a fortnight before his time. No meat was ready. Maria said he was too soon, explaining herself by holding three fingers up, and the fourth bent half down. The few words of their language which have been collected by me are mentioned in the Appendix.

The Patagonians pay respect to old people, taking great care of them; they seldom move about on ordinary occasions, but remain near the tolderia (village or encampment) with the herds of mares.

It has been mentioned that the Patagonians have lately taken a liking to spirits. When intoxicated, they are very noisy, but not quarrelsome. They are very fond of tobacco; and use some sort of pipe, frequently ornamented with brass and tassels: it is passed round from one to the other. They neither work, nor use any metal but what is obtained from white men. There is no kind of pottery made by them: wooden vessels, or bladders, being used for containing water. Many of them now have iron kettles, in which meat is sometimes boiled, but their usual mode of cookery is roasting; a

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piece of meat being put upon a wooden skewer, which is stuck into the ground near their fire.

The conduct of the women does not correspond to their character drawn by Falkner; but their ideas of propriety may have been altered by the visits of licentious strangers. Both at Gregory Bay (on the north shore of Magalhaens Strait), and at the River Negro, the Patagonian women are now thought to be unfaithful to their husbands, and to care little about chastity. The men appear to give themselves no anxiety on the subject. Spirits, provisions, and (to them) valuable articles of hardware, or clothing which they receive, occupy much more of their attention.

These Indians do not appear very sensible of heat or cold, if one may judge from their habits of life, and from their clothing; in the latter, the only difference made during the coldest part of winter is wearing horse-hide boots more constantly. In summer, their feet and legs are generally naked. Both men and women wash themselves occasionally, neither regularly nor often; but the women are rather less uncleanly than the men. I have elsewhere mentioned that they comb their hair with the jawbone of a porpoise (obtained from the zapallos). They have also a small brush, made of coarse grass, twigs, or rushes, with which their toilet is assisted.

When Mr. Low was returning from Monte Video, with the boy on board who has been spoken of as recognizing Capitan Chups, some natives were seen on Elizabeth Island (Strait of Magalhaens). A boat was sent, with the boy in her, to trade with them for skins. When near enough to distinguish persons, he seemed extremely frightened—clung to the thwarts of the boat—and begged not to be landed. These were canoe Indians, but of what tribe was not ascertained: he said they would certainly kill him. Some time after this boy had rejoined his family, Mr. Low was informed, by the Gregory Bay people, that he had collected seal-skins for 'Capitan Low,' which he would not part with to any other person, as he knew they were the object of his friend's trading voyages. This instance of gratitude for kind treatment speaks well for both

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parties: but, indeed, every white man who has passed any time among the Patagonian Indians agrees in giving a favourable account of the treatment experienced. The 'Basket-maker,' however, would fare better than the 'Scholar,' I fancy, with these, as well as with most other tribes of savages, until ideas could be communicated clearly.*

The dogs now found in the southern part of Patagonia have a wolfish appearance—their size, colour, hair, ears, nose, tail, and form being in general much like those of a wolf; though some black or spotted dogs are also seen. The roof of the mouth is black: the ears are always erect, and the nose sharp-pointed. I should say that their usual height is about that of a large fox-hound. Generally the coat is harsh or wiry, and rather short; but there are some dogs among them which have thick woolly coats, like those of Newfoundland or large shepherd's dogs, which some resemble; others being more like lurchers; but all have a wild wolf-like look, not at all prepossessing. I had a fine dog of this kind, rather like a Newfoundland, except in physiognomy, but his habits were so savage that he came to an untimely end. These dogs hunt by sight, without giving tongue; but they growl or bark loudly at the approach of strangers. As to attachment to their masters, the dogs we had could hardly give fair testimony, having been taken (bought) from them; but to strangers they were always snappish.

* With reference to what has been already mentioned about their migratory inclinations, I will here annex an omitted date:—Maria and her companions were at Gregory Bay in November 1831: at the River Negro in September 1832: and again at Gregory Bay, in the Strait of Magalhaens, in March 1833.

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CHAPTER IX.

Features—Form—Paint—Disposition—Food—Doctor—Religious ideas Superstitions — Marriage — Death—Burial—Cannibalism—Weapons —Women's occupation—Training—Obtaining food—Fire—Language —Sagacity and local knowledge—Battles — Ceremony — Natives in Trinidad Gulf—Obstruction Sound—Potatoes—Dogs.

The most remarkable traits in the countenance of a Fuegian are his extremely small, low forehead; his prominent brow; small eyes (suffering from smoke); wide cheek-bones; wide and open nostrils; large mouth, and thick lips. Their eyes are small, sunken, black, and as restless as those of savages in general. Their eyelids are made red and watery by the wood smoke in their wigwams. The chin varies much; that of a Tekeenica is smaller and less prominent than that of an Alikhoolip, in whom it is large and rather projecting, but there is much variety. The nose is always narrow between the eyes, and, except in a few curious instances, is hollow, in profile outline, or almost flat. The mouth is coarsely formed (I speak of them in their savage state, and not of those who were in England, whose features were much improved by altered habits, and by education); their teeth are very peculiar: no canine, or eye-teeth, project beyond the rest, or appear more pointed than those; the front teeth are solid, and often flat-topped like those of a horse eight years old, and enamelled only at the sides: the interior substance of each tooth is then seen as plainly, in proportion to its size, as in that of a horse. Their hair is black, coarse, and lank, excepting the few instances mentioned in the next page. It grows by single hairs, not by piles, or by little bunches like very small camel-hair pencils. It does not fall off, nor does it turn gray until they are very old. Little, if any, hair is seen on the eye-brow. They would have a straggling beard, but scrupulously pull out every hair with tweezers made of muscle-shells.

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As exceptions to the general appearance of these people, it ought to be said that, among the Fuegians, I have seen several individuals, both men and women, with curly or frizzled hair (like that of some of the Polynesians or Malays), with rather high foreheads, straight or aquiline noses; and in other features allied to the natives of New Zealand rather than to their countrymen of Tierra del Fuego. I was much struck by those exceptions, and, at the time, conjectured that they might be descendants of the Spanish colonists at Port Famine: but since then, having seen the Polynesians, I have been led to think otherwise; as will be mentioned in a future page relating to New Zealand.

Phrenological remarks on the forms of their heads are added in the Appendix: some were made on the spot by Mr. Wilson, the former surgeon of the Beagle, and others by a person in London. Mr. Wilson's paper also contains anatomical remarks and measurements. In this place it will be sufficient to remark that their heads are remarkably low, but wide; and full from the ears backward. The neck of a Fuegian is short and strong. His shoulders are square, but high; his chest and body are very large. The trunk is long, compared to the limbs and head. His arms and legs are rounder, and less sinewy, than those of Europeans; his joints are smaller, and his extremities are likewise comparatively less. The hands are shaped like those of Europeans, but the feet, from always going barefooted, are square at the toes, and would, by some persons, be considered of the Papua form. Most of them are rather bow-legged, and they turn their feet a little inwards in walking. The knee is strained by the custom of sitting so long on their heels, so that, when straightened, there are considerable folds or wrinkles of loose skin above and below the joint. The muscles of their thighs are large, but those of the legs, small. Little children are nearly of the same hue as their parents' skin is when cleaned; but infants are, for a few days, rather lighter coloured.

As I have already said, a small fillet is all that is worn around the head. Usually this is a mere string, made of the

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sinews of birds or animals; but, to make a show, they sometimes stick feathers, bits of cloth, or any trash given to them, into these head-bands. White feathers, or white down, on the fillet, is a sign of hostility, or of being prepared for war. Red is the favourite colour, denoting peace, or friendly intentions, and much admired as ornamental. Red paint, made with ochre, is profusely used. Their white* paint is added to the red when preparing for war; but the marks made are mere daubs, of the rudest, if of any design. Black is the mourning colour. After the death of a friend, or near relation, they blacken themselves with charcoal, and oil or grease. Any sort of clay is used, if their paint is scarce, to preserve warmth rather than as an improvement to their appearance.

When discovered by strangers, the instant impulse of a Fuegian family is to run off into the wood with their children, and such things as they can carry with them. After a short time, if nothing hostile is attempted by the intruders, and if they are not too numerous, the men return cautiously, making friendly signs, waving pieces of skins, rubbing and patting their bellies, and shouting. If all goes on quietly, the women frequently return, bringing with them the children; but they always leave the most valuable skins hidden in the bushes. This hasty concealment of seal or otter skins is the result of visits from sealers, who frequently robbed Fuegian families of every skin in their possession, before the natives understood the motives of their expeditions in boats into the interior waters of Tierra del Fuego. Sometimes nothing will induce a single individual of the family to appear; men, women, and children hide in the thick woods, where it would be almost impossible to find them, and do not show themselves again until the strangers are gone: but during the whole time of their concealment a watchful look-out is kept by them upon the motions of their unwelcome visitors.

Scarcity of food, and the facility with which they move from one place to another in their canoes, are, no doubt, the reasons

* Aluminous earth, indurated pipe clay, or decomposed feldspar.

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why the Fuegians are always so dispersed among the islands in small family parties, why they never remain long in one place, and why a large number are not seen many days in society. They never attempt to make use of the soil by any kind of culture; seals, birds, fish, and particularly shell-fish, being their principal subsistence; any one place, therefore, soon ceases to supply the wants of even one family; hence they are always migratory.

In a few places, where the meeting of tides causes a constant supply of fish, especially porpoises, and where the land is broken into multitudes of irregular islets and rocks, whose shores afford an almost inexhaustible quantity of shell-fish, a few families may be found at one time, numbering altogether among them from twenty to forty souls; but even those approaches towards association are rare, and those very families are so migratory by nature, that they do not remain many months in such a spot, however productive it may be, but go wandering away among the numerous secluded inlets or sounds of their country, or repair to the outer sea-coast in search of seals, a dead whale, or fragments of some wrecked ship. During the summer they prefer the coast, as they then obtain a great quantity of eggs and young birds, besides seal, which come ashore to breed at that season; and in the winter they retire more into the interior waters in search of shell-fish, and the small but numerous and excellent fish which they catch among the sea-weed (kelp).

The substitutes for clothing, the arms, canoes, and dwellings of the Fuegians have been so often described already, that I will not tire the reader by a repetition. Some of their customs, hitherto not related, may be more interesting.

There is no superiority of one over another, among the Fuegians, except that acquired gradually by age, sagacity, and daring conduct; but the 'doctor-wizard' of each party has much influence over his companions. Being one of the most cunning, as well as the most deceitful of his tribe, it was not surprising that we should always have found the 'doctor' concerned in all mischief and every trouble arising out of our intercourse

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with these natives. It became a saying among us, that such a person was as troublesome as a Fuegian doctor.

In each family the word of an old man is accepted as law by the young people; they never dispute his authority. Warfare, though nearly continual, is so desultory, and on so small a scale among them, that the restraint and direction of their elders, advised as they are by the doctors, is sufficient.

Ideas of a spiritual existence—of beneficent and evil powers—they certainly have; but I never witnessed or heard of any act of a decidedly religious nature, neither could I satisfy myself of their having any idea of the immortality of the soul. The fact of their believing that the evil spirit torments them in this world, if they do wrong, by storms, hail, snow, &c., is one reason why I am inclined to think that they have no thought of a future retribution. The only act I have heard of which could be supposed devotional, is the following. When Matthews was left alone with them for several days, he sometimes heard a great howling, or lamentation, about sun-rise in the morning; and upon asking Jemmy Button what occasioned this outcry, he could obtain no satisfactory answer; the boy only saying, "people very sad, cry very much." Upon one occasion, when some canoes were alongside the Beagle, at a subsequent visit to the Beagle Channel (in 1834), a sudden howl from one of the Fuegians aroused several others who were near, and at the opposite side of the vessel, when a general howl of lamentation took place, which was ended by a low growling noise. By this, as well as by pulling their hair, and beating their breasts, while tears streamed down their faces, they evinced their sorrow for the fate of some friends who had perished, some days before the Beagle's arrival, by the upsetting of a loaded canoe.* There was no regular weeping, nor any thing at all like the downright cry of a civilized being; it was a noise which seemed to be peculiar to a savage. This howling was mostly among the men, only one young woman was similarly affected. Now whether the noises heard by

* The bottom of a Fuegian canoe is full of mud, or clay, for the fireplace.

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Matthews were occasioned by similar feelings, or by those of a devotional nature, I cannot pretend to say.

The natives whom I carried to England often amused us by their superstitious ideas, which showed, nevertheless, that their ideas were not limited by the visible world. If any thing was said or done that was wrong, in their opinion it was certain to cause bad weather. Even shooting young birds, before they were able to fly, was thought a heinous offence. I remember York Minster saying one day to Mr. Bynoe, when he had shot some young ducks with the old bird—'Oh, Mr. Bynoe, very bad to shoot little duck—come wind—come rain—blow—very much blow."

A great black man is supposed to be always wandering about the woods and mountains, who is certain of knowing every word and every action; who cannot be escaped, and who influences the weather according to men's conduct. York related a curious story of his own brother, who had committed a murder. "In woods of my country," said he, "some men go about alone; very wild men—have no belly (meaning probably that they were very thin), live by stealing from other men." He then went on to say, that his brother had been getting birds out of a cliff, and, on coming down, hid them among some long rushes, and went away. Soon afterwards he returned, and, seeing feathers blown away by the wind from the spot, suspected what was going on; so taking a large stone in his hand, he crept stealthily towards the place, and there saw one of these wild men plucking a bird which he had got out of the cliff. Without saying a word, he dashed the stone at the wild man's head, and killed him on the spot. Afterwards York's brother was very sorry for what he had done, particularly when it began to blow very hard. York said, in telling the story, "rain come down—snow come down—hail come down—wind blow—blow—very much blow. Very bad to kill man. Big man in woods no like it, he very angry." At the word 'blow,' York imitated the sound of a strong wind; and he told the whole story in a very low tone of voice, and with a mysterious manner; considering it an extremely serious affair.

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Jemmy Button was also very superstitious, and a great believer in omens and dreams. He would not talk of a dead person, saying, with a grave shake of the head, "no good, no good talk; my country never talk of dead man." While at sea, on board the Beagle, about the middle of the year 1832, he said one morning to Mr. Bynoe, that in the night some man came to the side of his hammock, and whispered in his ear that his father was dead. Mr. Bynoe tried to laugh him out of the idea, but ineffectually. He fully believed that such was the case, and maintained his opinion up to the time of finding his relations in the Beagle Channel, when, I regret to say, he found that his father had died some months previously. He did not forget to remind Mr. Bynoe (his most confidential friend) of their former conversation, and, with a significant shake of the head said, it was "bad—very bad." Yet those simple words, as Mr. Bynoe remarked, seemed to express the extent of his sorrow, for after that time he said no more about his father. This subsequent silence, however, might have been caused by the habit already noticed, of never mentioning the dead.

When a person dies, his family wrap the body in skins, and carry it a long way into the woods; there they place it upon broken boughs, or pieces of solid wood, and then pile a great quantity of branches over the corpse. This is the case among the Tekeenica and Alikhoolip tribes, as well as the Pecheray; but how the others dispose of their dead, I know not, excepting that, on the west coast, some large caves have been found, in which were many human bodies in a dried state. One of these caves is mentioned in Byron's narrative of the wreck of the Wager: and another was seen by Mr. Low, which will be spoken of in describing the natives of the western coast of Patagonia (the Chonos Indians), who from their intercourse with the Spaniards may be supposed to have acquired ideas somewhat more enlarged than those of the southernmost regions —the Alikhoolip and Tekeenica. I prefer relating all that I know of these tribes, in consequence of the intercourse carried on with them by the Beagle's officers and myself, and the visit

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of York, Jemmy, and Fuegia to England, before any of Mr. Low's account is given; because, as his intercourse was chiefly with the Chonos tribe, and was quite unconnected with the Beagle's visit, it will be more satisfactory to the reader to be enabled to compare accounts from different sources, which in some points are so strikingly similar, that their agreement gives great weight to the whole.

The Fuegians marry young. As soon as a youth is able to maintain a wife, by his exertions in fishing or bird-catching, he obtains the consent of her relations, and does some piece of work, such as helping to make a canoe, or prepare seal-skins, &c. for her parents. Having built or stolen a canoe for himself, he watches for an opportunity, and carries off his bride. If she is unwilling, she hides herself in the woods until her admirer is heartily tired of looking for her, and gives up the pursuit; but this seldom happens. Although this is undoubtedly the custom among many of them, we had some reason to think there were parties who lived in a promiscuous manner—a few women being with many men. It is, however, hardly fair to judge from what we saw during our short visit, when the ordinary habits of their life were certainly much altered. We observed, while at Woollya, a disproportionately small number of females; but it ought to be remembered, that the people whom we then saw came to look at us from a distance, and that the greater part of their women and children were probably left in security at various places, as were the women and children of those who stole our boat in the former voyage (vol. i. p. 394) whom we found in a retired nook, far out of ordinary observation.

Jemmy Button often talked of his father, mother, brothers, and sisters, also of uncles* and aunts, after he knew enough of our language to understand distinctly the relationship. Now this could not have been the case had not his father and mother lived together permanently as man and wife, according to the clear account which he himself always gave of their custom in this respect.

* It was an uncle who gave him to me for some buttons.

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From the concurring testimony of the three Fuegians above-mentioned, obtained from them at various times and by many different persons, it is proved that they eat human flesh upon particular occasions, namely, when excited by revenge or extremely pressed by hunger. Almost always at war with adjoining tribes, they seldom meet but a hostile encounter is the result; and then those who are vanquished and taken, if not already dead, are killed and eaten by the conquerors. The arms and breast are eaten by the women; the men eat the legs; and the trunk is thrown into the sea. During a severe winter, when hard frost and deep snow prevent their obtaining food as usual, and famine is staring them in the face, extreme hunger impels them to lay violent hands on the oldest woman of their party, hold her head over a thick smoke, made by burning green wood, and pinching her throat, choke her. They then devour every particle of the flesh, not excepting the trunk, as in the former case. Jemmy Button, in telling this horrible story as a great secret, seemed to be much ashamed of his countrymen, and said, he never would do so—he would rather eat his own hands. When asked why the dogs were not eaten, he said "Dog catch iappo" (iappo means otter). York told me that they always eat enemies whom they killed in battle; and I have no doubt that he told me the truth.

When the Dutch fleet were in Nassau Bay (1624), a boat's crew were attacked by the natives, murdered and partly eaten. But previous to this (in 1599), Oliver Van Noort had attacked some Fuegians in a cave near a cape, then called Nassau, where he killed several men, and took four boys and two girls prisoners.

Jemmy Button told me that there are two tribes of Tekeenica, differing only in situation, who go to war sometimes with one another, though usually at peace; they live east and west, respectively, of some islets in the Beagle Channel, a short distance north-eastward of Woollya. With these two tribes or subdivisions of the Tekeenica there is constant war made by the Yacana, called by Jemmy 'Oens-men;' but they (the Tekeenica) are sometimes at peace with the Alikhoolip.

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The food of the Fuegians has been mentioned so often in the preceding pages of this or the former volume, that I will only add here a few remarks which have not hitherto been made. When there is time, the natives roast their shell-fish, and half-roast any other food that is of a solid nature; but when in haste, they eat fish, as well as meat, in a raw state. A seal is considered to be a grand prize; for, besides the flesh, they feast on the oil; and a porpoise is much valued, for a similar reason. Seal are often killed on the rocks, by striking them on the nose with a club, or large stick: and rather than let a seal go, which has been intercepted by getting between it and the water, they will risk having a severe bite by attacking it with a stone in hand. Both seal and porpoises are speared by them from their canoes. When struck, the fish usually run into the kelp, with the spear floating on the water, being attached by a short line to a moveable barb; and there the men follow with their canoe, seize the spear, and tow by it till the fish is dead. To them, the taking of a seal or porpoise is a matter of as much consequence as the capture of a whale is to our countrymen. On moonlight nights, birds are caught when roosting, not only by the men but by their dogs, which are sent out to seize them while asleep upon the rocks or beach; and so well are these dogs trained, that they bring all they catch safely to their masters, without making any noise, and then return for another mouthful. Birds are also frequently killed with arrows,* or by stones slung at them with unerring aim. Eggs are eagerly sought for by the natives; indeed, I may say that they eat any thing and every thing that is eatable, without being particular as to its state of freshness, or as to its having been near the fire. Penguins are much prized; the otter is also valued, excepting the body part, which they seldom

* These arrows are of hard wood, well polished, and quite straight. They are about two feet in length, and in a notch at the point have a sharp triangular piece of agate, obsidian, or broken glass; which is not permanently fixed, and therefore remains in a wound, though the shaft may be drawn out. The bow is from three to four feet long, quite plain, with a string made of twisted sinews.

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eat unless hard pressed by hunger. Sometimes they spear fine fish, like cod-fish—fifteen or twenty pounds in weight. Small fish are caught in abundance by the method formerly described,* and they are the staple article of food among the Tekeenica. The fins of a dead whale are esteemed; but if other food is to be had, they do not eat the blubber.

In the Tekeenica country, near the Beagle Channel, there are many small animals, about the size of a cat, which they sometimes take and eat. These, I think, are nutria; for, on one occasion, a fresh nutria skin was obtained from them, the only sign I ever found of a small animal in that neighbourhood.

Of vegetable food they have very little: a few berries, cranberries, and those which grow on the arbutus, and a kind of fungus, which is found on the birch-tree, being the only sorts used. This fungus is very plentiful in some places: it grows upon the birch-tree much as the oak-apple upon an oak-tree. Mr. Darwin describes it fully in his journal (vol. iii). There is also another much larger kind of fungus, which is sometimes eaten. On what tree it grows, I know not, but it was mentioned to me as being about two feet in circumference. The Fuegians drink only pure water, but often, and in large quantities. The women or children fetch it in small buckets, made of birch-bark; and two or three times in the course of a night they wake to eat and drink. In the day-time also they eat and drink very frequently.

The men procure food of the larger kind, such as seal, otter, porpoises, &c.; they break or cut wood and bark for fuel, as well as for building the wigwams and canoes. They go out at night to get birds; they train the dogs, and of course undertake all hunting or warlike excursions.

The women nurse their children, attend the fire (feeding it with dead wood, rather than green, on account of the smoke), make baskets and water-buckets, fishing-lines and necklaces,† go out to catch small fish in their canoes, gather shell-fish, dive for sea-eggs, take care of the canoes, upon ordinary occasions paddle their masters about while they sit idle;—and do any other drudgery.

* See vol. i. p. 428. † See note at end of chapter.

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Swimming is a favourite amusement of the Fuegians during summer; but the unfortunate women are obliged to go out into rather deep water, and dive for sea-eggs in the depth of winter as often as in summer. Men, women, and children are excellent swimmers; but they all swim like dogs. Directly they come out of the water they run to the fire, and rub their bodies all over with oil or grease and ochreous earth, to keep out the cold. Swinging between branches of trees, as our children do, is also a favourite pastime, the ropes being made of strips of seal-skin. Frequently the men are lowered down by such ropes over the faces of high cliffs in search of eggs and young birds, or to attack the seal which herd in caves washed by the surf, and inaccessible to man from seaward.

When ill, however seriously, they know of no remedies but rubbing the body with oil, drinking cold water, and causing perspiration by lying near the fire, wrapped up in skins.

Both men and women are remarkably fond of the little children, and were always much pleased at any notice taken of them by our parties, when they felt sufficient confidence in us to bring the children forward. Much respect is said to be paid to age; yet we never saw either man or woman who appeared to be very old—certainly no one was decrepit.

It is rather curious that usually each of these natives is trained to a particular pursuit: thus, one becomes an adept with the spear; another with the sling; another with a bow and arrows; but this excellence in one line does not hinder their attaining a considerable proficiency in all the others.*

Hostilities are usually carried on with slings and stones rather than by close encounters; yet occasional surprises happen, especially when the Oens-men make an attack, and then there is savage work with clubs, stones in the hand, and spears.

In the winter, when snow lies deep on the ground, the Tekeenica people assemble to hunt the guanaco, which then comes down from the high lands to seek for pasture near the sea. The long legs of the animal stick deeply into the snow and soft boggy ground, disabling him from escape, while the

* Mr. Low has seen Fuegians with balls (bolas) in the northern part of their country.

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Fuegians and their dogs hem him in on every side, and quickly make him their prey.

Jemmy Button's division of the Tekeenica, living westward of Murray Narrow, never obtain guanacoes; but the other division, who live eastward of that small passage, often kill them in winter; and at other times of the year they sometimes get them by lying in wait, and shooting them with arrows, or by getting into a tree near their track, and spearing them as they pass beneath the branches. An arrow was shewn to Low, which was marked with blood two-thirds of its length in wounding a guanaco, afterwards caught by dogs. Low held out his jacket, making signs that the arrow would not penetrate it: upon which the native pointed to his eye.

Some of the families of this eastern division of the Tekeenica have no canoes, living entirely at a distance from the shore, and subsisting upon berries, birch-fungus, guanacoes, and birds. The bows and arrows of those men are longer and better, and they have some very fine dogs, which are trained to search for and bring home food. These dogs often surprise the larger birds, while feeding on the ground, as well as when they are at roost, so quietly do they steal upon their prey. Byron mentions that the Chonos Indians send their dogs away to fish, and that they assist their owners in fishing, by swimming about, and driving the fish into a corner. This I have not witnessed or heard of among the Fuegians; but their dogs assist in a similar manner when in pursuit of an otter, by swimming and diving after it with the utmost eagerness.

Fire, that essential necessary to man in every state and every climate, is always kept alive by these savages wherever they go, either in their canoes, in their wigwams, or even in their hand, by a piece of burning wood; but they are at no loss to rekindle it, should any accident happen. With two stones (usually iron pyrites) they procure a spark, which received among tinder, and then whisked round in the air, soon kindles into a flame. The tinder used is the inner down of birds, well dried; very fine dry moss; or a dry kind of fungus found on the under side of half-rotten trees. Where the pyrites is

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usually obtained, I do not know; but it cannot be plentiful in the Tekeenica country, since every woman keeps small pieces by her, in the basket which holds their paint and ornaments, and will not easily be prevailed upon to part with them. Some of the sealers have fancied these pieces of pyrites were silver or gold ore, and have eagerly sought for the mines whence they came. One person finding a large quantity in a rock somewhere near the Gulf of Trinidad, employed his crew and himself for many days in loading his ship with it, being quite sure it was gold.

Of the Fuegian language we know but little, although three of the natives were so many months with us. I found great difficulty in obtaining words, excepting names for things which could be shown to them, and which they had in their own country; however, the few which I have collected are given in the Appendix to this volume, and I can assure the reader that the utmost pains were taken to spell each word so as to ensure having the correct sound when pronounced by other persons; and to place the marks of accent, as well as quantity, with precision. All the Fuegian sounds are imitable by using our letters, excepting one, a curious sort of 'cluck,' meaning 'no.' Many of their words are exceedingly guttural in their pronunciation, yet I have twice heard their women sing, and not disagreeably. Weddell, in his narrative (p. 173), gives some Fuegian words, and endeavours to trace a similarity to the Hebrew language. Molina also, in his vocabulary of the Araucanian language, which appears to be related to the Fuegian, traces some singular correspondences.

Mr. Low, who has had more intercourse with the Fuegians than perhaps any other individual, gave me much information about them. He says that, generally speaking, they appear to be friendly when meeting strangers, but that their subsequent conduct depends entirely upon their relative numbers. They ought never to be trusted, however, as they have hasty tempers, and are extremely revengeful. They show much hardiness and daring, being always ready to defend their own property, or resent any ill treatment; and they are enterprising thieves.

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When the intentions of the natives are hostile, the women and children are kept out of the way; the men are quite naked, their bodies painted more than usual, and the leader of the party has a band of white feathers around his head.

Mr. Low had a Fuegian boy on board the Adeona, who learned to speak English very tolerably, during eighteen months that he staid on board as a pilot and interpreter. This boy, whose name, among the sealers, was Bob, was one of the Chonos tribe, and had never been south of Magalhaens Strait before he embarked with Mr. Low. He said, that in cases of extreme distress, caused by hunger, human flesh was eaten, and that when they had recourse to such food, the oldest women invariably suffered. The poor creatures escaped to the woods, if possible, at such a time, but were soon found and brought back by force. They were killed by suffocation, their heads being held over the thick smoke of a fire made of green wood, and their throats squeezed by the merciless hands of their own relations. This boy imitated the piercing cries of the miserable victims whom he had seen sacrificed. He also mentioned that the breasts, belly, hands, and feet, were most liked. When first questioned on this subject, he showed no reluctance in answering any questions about it; but after a time, perceiving how much shocked his English companions were at the story, and how much disgust it excited among the crew of the vessel, he refused to talk of it again.

The different tribes of canoe Indians are generally upon hostile terms with each other, as well as with the horse Indians. This may be more particularly noticed about the western entrance of Magalhaens Strait, where the tribes which inhabit opposite sides* are particularly inveterate in their hostility.

On the west coast of Patagonia, from the Strait of Magalhaens to Cape Tres Montes, Mr. Low found that the natives seemed to be of one tribe, and upon friendly terms with one another. A man, whose native name was Niqueaccas, was taken on board Mr. Low's vessel, near Cape Victory, as a pilot,

* Chonos and Alikhoolip.

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and he afterwards proved to be acquainted with all the natives met with along the coast as far north as the parallel of 47°. He was always glad to see the various parties of Indians whom they met, and was invariably well received by them. Perfectly acquainted with every part of the coast, he was able to point out excellent harbours, as well as the best seal 'rookeries.' Niqueaccas and the boy Bob were of the same tribe; but whenever he was spoken to about eating people, he became sullen, and not a word could be obtained from him. He spoke English very fairly before leaving the vessel in his own country, after being with Mr. Low fourteen months.

The people of this tribe* are by no means without ideas of a superior Being. They have great faith in a good spirit, whom they call Yerri Yuppon, and consider to be the author of all good: him they invoke in time of distress or danger. They also believe in an evil spirit, called Yaccy-ma, who they think is able to do all kinds of mischief, cause bad weather, famine, illness, &c.: he is supposed to be like an immense black man. After being hard pressed for food, and then obtaining a good quantity, much form is observed in distributing the first supplies. Mr. Low witnessed a ceremony of this kind, during which the greatest order prevailed. The whole tribe was seated round a fire, and the oldest man gave each individual a share, repeatedly muttering a short prayer, and looking upwards. Not one of the party, although nearly starved, attempted to touch the food, a large seal, until this ceremony was ended: one share was offered to Mr. Low. At another time, on Madre de Dios Island, after having been detained in port upwards of three months, owing to very bad weather, during which time the natives were almost famished, being unable to reach the outer rocks in quest of food, Mr. Low went with his boats and procured a few seals, taking an Indian in each boat. At his return the carcasses of the seals were sent ashore, but not one of the natives, ravenous as they were, attempted to touch a morsel until all was landed, till the

* Chonos. See page 194.

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ceremony above-mentioned had been duly performed, and till the natives who had been in the boats had chosen what they pleased for their share.

This tribe appears to have regular places for depositing their dead; as on a small out-lying island, a little southward of Madre de Dios, Mr. Low found a cave which had been used for such a purpose: it was strewed with human bones, and the body of a native child was found in a state of putrefaction. The bodies seemed to have been placed in shallow graves, about a foot deep, which had been dug along the sides of the cave, and covered with twigs and leaves. Slips of a peculiar plant, resembling box, had been carefully planted along the outer sides of each grave, and those near the mouth of the cave had taken root and were growing, but all those in the interior had decayed.

One evening, while at sea, Mr. Low called the boy to him, and said, "Bob, look at the sun; it is going to be drowned." The boy shook his head, saying, "No, no drown; to-morrow morning get up again. Sun go round earth; come again to-morrow."

The natives of this tribe* suppose that all white people originally came from the moon; they call them "cubba;" and often make use of an expression with reference to them which means "White men of the Moon." These Indians, in common with those of the other southern tribes, are exceedingly superstitious, implicitly believing omens, signs, and dreams, as well as the 'wise men' among them, who are thought infallible as prophets, doctors, and magicians. Once, when Mr. Low was detained about three weeks by contrary winds and bad weather, his crew became discontented, and attributed their ill-luck to a native who was detained on board against his will. To pacify those who were, in this instance, every bit as superstitious as the aborigines themselves, a fire was made on shore, to invite the Indians to approach; and when they came he delivered their countryman to them, explaining at the same

* Chonos.

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time that he would depart as soon as the wind became fair. An old Indian, then, in a very ceremonious and mysterious manner, gave Low what he understood to be a charm, with strict injunctions not to look at it until next morning; when, at sunrise, there would be a fair wind, and the vessel might sail. Notwithstanding the old man's orders, he was no sooner out of sight than Low opened the mysterious packet, which appeared to contain human hair, mixed with the scrapings of the shaft of an arrow.

Next morning, however, at sunrise, a fair (easterly) wind sprung up, and the vessel sailed. How the old man foreknew the change—whether he judged by the sky, the tides, or other indications, did not transpire; but this was by no means a singular instance of extraordinary accuracy shown by the natives in foretelling changes of weather.

The sagacity and extensive local knowledge of these people is very surprising; Niqueaccas was so well acquainted with all the coast between 47° and the Strait of Magalhaens, that, upon being taken to a high hill, immediately after landing from a cruise, in which they had been far out of sight of land, he pointed out the best harbours and places for seal then visible; and in one direction, a long way off (pointing towards Eyre Sound, then far out of sight), he said there were great numbers of fur seals. The boy Bob also described that same place, when he was with Mr. Low at the Galapagos Islands. On a calm day, while there was nothing going on, he made a chart with chalk upon the vessel's deck, reaching from the windlass to the taff-rail, and Mr. Low has since felt quite certain that the boy meant Eyre Sound, though at that time these interior waters on the west coast of Patagonia had not been explored by any white man.

Niqueaccas was always anxious and timid about taking the Adeona through a passage where he knew danger existed, and proportionably pleased when the dangers were safely passed, and the vessel anchored in a safe position.

The boy Bob, when only ten years old, was on board the Adeona at sea. As the vessel approached land, Low asked

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him where a harbour could be found? As soon as he understood what was meant, which was an affair of some difficulty, for he then could speak but very little English, he got up on the vessel's bulwark, and looked anxiously around. After some hesitation, he pointed to a place where the ship might go, and then went to the lead-line, and made signs to Mr. Low that he must sound as he approached the land. The cove was found to have a shoal and narrow entrance, but was safe and sufficiently spacious within. Such knowledge at so early an age is an extraordinary proof of the degree in which the perceptive and retentive faculties are enjoyed by these savages. Whenever the advice of Niqueaccas or any of his tribe was rejected, much sullenness and displeasure were shown. Upon one occasion his services were refused, and a harbour tried against his advice, which proved to be a bad one; it was left to seek for that which he had previously recommended, and his sullenness suddenly changed into delight; but when his harbour was pronounced excellent, and he was duly praised, his joy knew no bounds.

Generally speaking, both Niqueaccas and the boy Bob were well-behaved and good-tempered; but the boy was sometimes inclined to be mischievous, and would hide the people's clothes, or put salt into their mouths while asleep. When much annoyed, he would use both teeth and nails, and attack any one, however superior to himself in size and strength.

Battles between parties of the same tribe seem to occur occasionally, as this boy showed Mr. Low two spots where quarrels had been decided. Both were open spaces, clear of trees, and near them were the remains of wigwams. One of those battles occurred in consequence of one party wishing to take some seal-skins away from the other; but it did not distinctly appear from the boy's account whether these encounters were between parties of his tribe, or whether an encroachment upon their territory, with a view to plunder, had been made by some other tribe. That parties occasionally cross overland from Skyring Water to Obstruction Sound is evident from Mr. Bynoe's account (page 198), and that people of the

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tribe to which Niqueaccas belonged either make excursions themselves southward of the Strait of Magalhaens, or that the Alikhoolip invade their territory and take away canoes, is evident from the fact of plank canoes* having been seen in and about the Barbara Channel. The arms used are similar to those of the Alikhoolip already described.

A method of declaring war, ascertained by the following circumstance, is rather curious. The boy Bob had been taken on board the Adeona, in consequence of some dispute with the natives, who had stolen things from the vessel. Mr. Low intended to keep him as a hostage until the missing property should be restored; but the tribe decamped, and as Low was obliged to sail, he carried the boy away with him. At the return of the vessel, about eight months afterwards, the boy saw something on shore, at the entrance of the harbour, which he looked at for some time very earnestly, and then gave Mr. Low to understand that the natives had declared war against him and his ship, and intended to attack her at her return. No natives being visible, Low went ashore with the boy, to see what it was that had attracted his attention, and found a number of spears, arrows, and clubs, roughly cut out of wood, painted red, and stuck into the ground, across a point of the island, and having in the middle a large block of wood, roughly carved into a strange figure (said by the boy to be that of their evil spirit) curiously painted, with long red teeth, and having a short halter of hide (seal-skin) round the part intended to represent a neck. Notwithstanding this outward demonstration of anger and intent to revenge, not a native was seen in the neighbourhood during the many months which Low passed there, and in consequence he had no opportunity of restoring the boy to his own tribe; but he was afterwards kindly received, and treated as Low's son, among the Patagonians of Gregory Bay.

The natives of Niqueaccas' tribe (Chonos) are less dishonest and deceitful than those of the southernmost islands. Mr. Low

* Plank canoes are used on the west coast. See page 142.

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has sometimes left his vessel, while he was away sealing, with only two men on board; and although in one instance, at Madre de Dios, there were about a hundred and fifty natives assembled, no hostile or predatory attempt whatever was made by them in his absence: indeed so careful were they to prevent any cause for misunderstanding, that in no instance did more than two of their party go on board the vessel during the absence of the boats; though, after their return with Low, they went to her as usual in great numbers. This tribe was in extreme distress for want of food; the whole party looked thin and miserable. Continual gales had prevented the rocks from being uncovered at low water, and no canoe could be launched on account of the surf, therefore they could get neither shell-fish nor seal. A small party were observed going away, as if on an excursion, and the others who remained explained to Low, by signs, that in four sleeps they would return with food. On the fifth day they were met by Low, returning, but almost dead with fatigue, each man having two or three great pieces of whale-blubber, shaped like a poncho with a hole in the middle, on his shoulders. The blubber was half putrid, and looked as if it had been buried under ground. When they entered the largest wigwam, an old man cut very thin slices off one piece, broiled each successively, and distributed to the party in rotation; but before doing so, he muttered a few words over each piece in a mysterious manner, while strict silence was kept by the by-standers. One slice was offered to Low. The boy Bob once noticed marks where a whale had been cast ashore; taking a sharp stick, he probed the sand in several places, and found many large pieces of blubber, which were taken on board and boiled down for oil. One of the men of this tribe, seeing two long powder-horns on board the Adeona, placed them to his head and made a noise like the bellowing of cattle; but he and his tribe were much frightened by sheep and pigs. They would not land on a small island where some pigs were turned loose, and when talking of them, made signs that they had very big noses which alarmed them. When a pig was killed by the crew

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and part of it cooked, the natives refused even to taste the meat. One day several of these people had gone on board the Adeona with some old axes and pieces of iron, which they wished to have ground at her grindstone (a favour which had often been granted); but in consequence of something having gone wrong in the vessel, which had ruffled Low's temper, he rather roughly refused to let them stay on board. They went away quietly, but left their axes, &c. behind; and while returning were met by the mate of the vessel, who asked if they had ground them; they replied negatively, and gave the mate to understand that the captain's face was too long, but that they would come again when it was shorter. This occurred before either Niqueaccas or the boy had been taken on board the Adeona.

Mr. Low remarked to me that the conduct of these Indians on this occasion of his harshly refusing to comply with a slight request, was quite different from that which the Fuegians would have shown under similar circumstances: they would have been angry, and in all probability have returned his ill-temper with a display of their own, evinced by a shower of stones. Once, when Low was in the Magdalen Channel, he desired some Fuegians who were on board to leave the vessel while his men were below at dinner. They refused to comply, and offered resistance; but being obliged to go, went in their canoes to a short distance a-head, and there remained slinging large stones on board, which broke several windows. To drive them away muskets were used, though without injuring any of their party. Next day the hardy fellows came alongside again, as unconcernedly as ever.

When the Fuegians are inclined to attack an enemy with stones, they generally try to raise a breastwork of boughs or logs; but no such preparation was ever noticed among the natives of the western coast of Patagonia.

While the Adelaide tender was examining the inner passages and sounds of the western shores of Patagonia, under Lieutenant Skyring, some interesting remarks were made by

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Mr. Bynoe, which do not appear in the narrative of that cruise given in the preceding volume. I shall here insert them in his own words :—

"We entered the Gulf of Trinidad, and while surveying thereabouts met two large canoes, which were thought to be whale-boats when first seen at a distance; but as we concluded that some sealing vessel was in the neighbourhood, and that these were her boats, little notice was taken of them until they had approached very near, when, to our astonishment they proved to be large plank canoes, pulled with oars, and full of fine stout Indians. Just within hail they stopped, lay on their oars, halloed to us most vociferously, and waved skins above their heads. One man was very conspicuous, having on his head a tall leathern cap, tapering to a point, which was ornamented with feathers of various gaudy colours; and around the brim of this high conical hat there was also a fringe of feathers. This singular character was painted black all over from head to foot, except a circle of white round each eye, and a few white dots upon his cheeks. By signs we succeeded in tempting them to come alongside the schooner, and were then still more struck by their appearance: they were far superior to any Fuegians I had seen, being a taller race, more upright, and better proportioned; their limbs were better formed, more muscular, rounder, and fuller than those of any canoe Indians of the Strait of Magalhaens or Barbara Channel; and their skins were cleaner as well as clearer, which was probably the reason why we thought them lighter coloured than the others whom we had seen. The length of back, so remarkable in a Fuegian, was not very discernible in these people, neither were they by any means so ugly as the former; indeed a rather pleasing smile was sometimes noticed on the younger faces. None among them were much smoke-dried, nor did their eyes look red and watery. There did not appear to be one of the party above a middle age, and most of them were young. Three of the men had lost each an upper incisor tooth, and one had a long though not deep scar upon the breast. We all pronounced these people to belong to a finer race than we had

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seen on the water, and the size of their canoes was quite beyond anything hitherto noticed: they were near thirty feet in length and seven feet broad, with proportionate depth, being made of planks sewn together with strips of twisted bark and rushes: the bow and stern were flat, and nearly upright. Six round pieces of wood formed the thwarts, which were fastened to the gunwale by ropes of twisted rushes; and there were six short oars on each side. These oars were about seven feet long, the blade being a flat piece of wood about sixteen inches in length, fastened to the handle by rush rope passed through two holes in the blade. Of such burthen were these boats (rather than canoes), that two men standing on one gunwale did not bring it down to the water. Each was steered by an old woman, who sat silently abaft with a paddle. All the party were quite naked excepting the old women.

"From one of the old women a small bag was obtained, in exchange for a shirt and some woollen stuff, which proved to contain white dust, feathers, parrots' heads, hawks' feet, white earth, and red ochre. One of the men had an old hatchet, and made signs that he wanted to sharpen it at our grindstone: of course we complied with his request, and allowed a man and a young lad to come on board for that purpose. The lad turned the stone, while the man held the axe; and extremely well it was sharpened. The spears and slings were similar to those seen in other places.

"Although these natives seemed to be remarkably well disposed, it was not quite pleasant to see thirty of them looking over the schooner's bulwark, while our boats were away and only five or six men left on board: however, they made no attempt to do any thing improper, and before sunset left us peaceably, striking up a song as they paddled away."

Mr. Bynoe remarked, that in the neighbourhood of Easter Bay (Obstruction Sound), the country had much the appearance of English park scenery; large clumps of trees growing straight and tall, with intervening spaces of clear ground covered with long grass. In this place he found great numbers of wigwams and deserted canoes. Some of the former were of

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large dimensions, and various shapes: two were like inverted whale-boats, each of which might hold forty or fifty people; and in the long ones (six feet high), Mr. Bynoe could walk upright. All of them were built of slight materials, such as branches of trees covered with long grass. Five or six large wigwams stood together in each place; and near them canoes had evidently been built, for many trees had been felled and barked close by. The traces of fire were visible, which had been trained around the roots of the trees; and many large pieces of bark were lying about, partly sewed together. Four good canoes were found in one place, one of the four being quite new: and there were many old or broken ones. They also saw on nearly every sandy point a neatly-constructed small wigwam, about two feet high, at the entrance of which was a platted rush noose, intended as a snare to catch swans probably, which were numerous about the adjoining grounds, and generally roost on those sandy points. Many deer, like a kind of roebuck, were seen by Mr. Bynoe, but he did not suceeed in shooting one. Horse tracks were seen near the upper part of Obstruction Sound; showing that the eastern Patagonians occasionally visit this part of the western coast. Mr. Bynoe suggested the possibility of the natives of Skyring Water travelling overland, building canoes, and then going northward along the west coast; but I do not myself think it so likely as that the Chonos Indians should select such a spot, abounding in food, to pass their winter in, or to stay at for a considerable time while building canoes. Probably, when Mr. Bynoe was there (being summer-time) the tribe, whose winter quarters it had been, were dispersed along the sea-coast in search of seal, eggs, and young birds. In support of his idea Mr. Bynoe says, "I only met one canoe, and that of the bark kind, in the Mesier Channel: whence could that one have come? None of the bark canoes have been seen by us on the west coast, excepting in that instance, and in Obstruction Sound. The distance from Skyring Water to the head of Obstruction Sound is small, though sufficiently difficult to traverse to prevent transporting canoes, because of low prickly brushwood.

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How can we account for the numerous canoes stranded in Obstruction Sound, excepting by a supposition that the natives, after using them in a north-westerly excursion, left them behind at their return, as they may have left others on the shores of Skyring Water? These canoes were all of bark, and rather smaller than those usually made by the southern Fuegians." Should this be the case, there can no longer be any doubt of the non-existence of a direct passage between Skyring Water and the Smyth Channel (leading northwards from Magalhaens Strait). Perhaps the horse Indians sometimes stay in the neighbourhood of Obstruction Sound, and oblige their slaves (zapallos) to build canoes and swan-traps, to fish for them, and even make excursions for seal.

Mr. Bynoe saw many nutria among the islands of Western Patagonia, and a great number of otters. Brant-geese, swans, ducks, and rock-geese were also plentiful in particular places, but not generally. Besides the wild potato, found on the Guaianaco islands (mentioned in the first volume), Mr. Bynoe noticed, in the Gulf of Peñas, an abundance of the plant called 'pangue,' which grows also in Chilóe, and is so much liked by the Chilotes.

Mr. Low said that natives whom he met in the Gulf of Trinidad relished potatoes which he gave them, and asked for more. They pointed towards the north and used the word 'aquinas,' which he recognized as being the term used for potatoes by the aborigines at the south of Chilóe.

A native who was on board the Adeona in one of her excursions among the western islands of Patagonia induced Low to take long walks in search of potatoes, which never were found; and afterwards, in the Mesier Channel, he persuaded him to go about in quest of seals, until an opportunity offered for escaping to a small party of his own tribe whom he met there. When taxed by the crew with deceiving Mr. Low about the potatoes, he fell into (or affected) a violent passion, and sprung at the nearest man, grappling him in a most determined and malicious manner.

Having now mentioned all that I know respecting the Canoe

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Indians (excepting some facts related by Capt. King in vol. i.), I will add a few words about their constant and faithful companion, the dog: and then continue the narrative.

The dog of a Fuegian or Chonos Indian is small, active, and wiry, like a terrier with a cross of fox. His hair is usually rough, and dusky, or dark-coloured; but there are many dogs among the Fuegians almost white, or prettily spotted, some of which have fine smooth hair. All that were examined had the roof of their mouth black, the ears erect, large, and pointed; the nose sharp, like that of a fox; the tail drooping, and rather inclined to be bushy. They are exceedingly vigilant and faithful. Their sagacity is shown in many ways, some of which I have already noticed; and not least, in their providing for themselves, each low-water, by cunningly detaching limpets from the rocks, or by breaking muscle and other shells, and then eating the fish.

These dogs bark at strangers with much fury: and they give tongue eagerly when hunting the otter.*

* Byron says they do so likewise when driving fish into corners.

NOTE to page 185.—The Fuegian necklaces show some ingenuity in those who make them, being composed of small shells, perforated very neatly, and fastened together on strings of sinews or gut, so finely divided and platted, that one is, at first, inclined to doubt their being the manufacture of such uncouth savages.

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CHAPTER X.

Set out to land Matthews and the Fuegians—Their meeting with Natives —Supposed Volcano—Dream—Oens-men—Scene—Arrival at Woollya —Encampment—Concourse of Natives—Jemmy's Family—Wigwams —Gardens—Distrust—Experiment—Westward Exploration—Remove Matthews—Revisit Woollya—Gale—Sail for the Falkland Islands.

At the end of Chapter VI., I described our preparations for landing the Fuegians, who had been in England, among their own countrymen; and now, having attempted to give a fuller idea of those people, the narrative of our proceedings shall be continued.

Jan. 19, 1833. The yawl, being heavily laden, was towed by the other three boats, and, while her sails were set, went almost as fast as they did; but after passing Cape Rees, and altering our course to the westward, we were obliged to drag her along by strength of arm against wind and current. The first day no natives were seen, though we passed along thirty miles of coast, and reached Cutfinger Cove. (This name was given because one of our party, Robinson by name, almost deprived himself of two fingers by an axe slipping with which he was cutting wood.) At this place, or rather from a hill above it, the view was striking. Close to us was a mass of very lofty heights, shutting out the cold southerly winds, and collecting a few rays of sunshine which contrived to struggle through the frequent clouds of Tierra del Fuego. Opposite, beyond a deep arm of the sea, five miles wide, appeared an extensive range of mountains, whose extremes the eye could not trace; and to the westward we saw an immense canal, looking like a work of gigantic art, extending between parallel ranges of mountains, of which the summits were capped with snow, though their sides were covered by endless forests. This singular canal-like passage is almost straight and of nearly an

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uniform width (overlooking minute details) for one hundred and twenty miles.

20th. We passed the clay cliffs, spoken of in the former volume, first visited by Mr. Murray. They narrow the channel to less than a mile, but, being low, were beneath the horizon of our eye at Cutfinger Cove:—westward of them the channel widens again to its usual breadth of two miles. Several natives were seen in this day's pull; but as Jemmy told us they were not his friends, and often made war upon his people, we held very little intercourse with them. York laughed heartily at the first we saw, calling them large monkeys; and Jemmy assured us they were not at all like his people, who were very good and very clean. Fuegia was shocked and ashamed; she hid herself, and would not look at them a second time. It was interesting to observe the change which three years only had made in their ideas, and to notice how completely they had forgotten the appearance and habits of their former associates; for it turned out that Jemmy's own tribe was as inferior in every way as the worst of those whom he and York called "monkeys—dirty—fools—not men."

We gave these 'Yapoos,' as York called them, some presents, and crossed over to the north side of the channel to be free from their importunities; but they followed us speedily, and obliged us to go on further westward than was at all agreeable, considering the labour required to make way against a breeze and a tide of a mile an hour. When we at last landed to pass the night, we found that the forests on the sides of the mountains had been burned for many leagues; and as we were not far from the place where a volcano was supposed to exist, in consequence of flames having been seen by a ship passing Cape Horn, it occurred to me that some conflagration, like that of which we found the signs, might have caused appearances resembling the eruption of a distant volcano: and I have since been confirmed in this idea, from having witnessed a volcano in eruption; and, not long afterwards, a conflagration, devouring many miles of mountain forest; both of which, at a distance, shewed lines of fire, fitful flashes, and sudden gleams.

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Persons who have witnessed a forest burning on the side of a mountain, will easily perceive how, when seen from a distance, it may resemble the eruption of a volcano; but to those who have not seen fire on such a scale, I may remark that each gust of wind, or temporary calm; each thick wood, or comparatively barren space; augments or deadens the flames so suddenly, as the fire sweeps along the mountain side, that, at a distance of fifty miles or more, the deception may be complete.

22d. Favoured by beautiful weather, we passed along a tract of country where no natives were seen. Jemmy told us it was "land between bad people and his friends;" (neutral-ground probably). This evening we reached a cove near the Murray Narrow; and from a small party of Tekeenica natives, Jemmy's friends, whom we found there, he heard of his mother and brothers, but found that his father was dead. Poor Jemmy looked very grave and mysterious at the news, but showed no other symptom of sorrow. He reminded Bennett* of the dream (related in the previous chapter), and then went for some green branches, which he burned, watching them with a solemn look: after which he talked and laughed as usual, never once, of his own accord, recurring to the subject of his father's decease. The language of this small party, who were the first of Jemmy's own tribe whom we met, seemed softer and less guttural than those of the "bad men" whom we had passed near the clay cliffs; and the people themselves seemed much better disposed, though as abject and degraded in outward appearance as any Fuegians I had ever seen. There were three men and two women: when first we were seen they all ran away, but upon two of our party landing and advancing quietly, the men returned and were soon at their ease. Jemmy and York then tried to speak to them; but to our surprise, and much to my sorrow, we found that Jemmy had almost forgotten his native language, and that, of the two, York, although belonging to another tribe, was rather the best interpreter. In a few minutes the natives comprehended that we should do them no harm; and they then called back their women, who were hiding in the

* My coxswain.

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woods, and established themselves, very confidently, in a wigwam within a hundred yards of our tents. During this and the preceding day, we found the weather, by comparison, so mild, even warm, that several of our party bathed; yet the thermometer ranged only to 53° in the shade, and at night fell to 40°. The temperature of the sea was 48°.

Being within a few hours' pull (row) of Jemmy's 'own land,' which he called Woollÿa, we all felt eager, though anxious, and I was much gratified by seeing that Matthews still looked at his hazardous undertaking as steadily as ever, betraying no symptom of hesitation. The attentions which York paid to his intended wife, Fuegia, afforded much amusement to our party. He had long shewn himself attached to her, and had gradually become excessively jealous of her good-will. If any one spoke to her, he watched every word; if he was not sitting by her side, he grumbled sulkily; but if he was accidentally separated, and obliged to go in a different boat, his behaviour became sullen and morose. This evening he was quizzed so much about her that he became seriously angry, and I was obliged to interpose to prevent a quarrel between him and one of his steadiest friends.

On this and previous evenings, as we sat round the blazing piles, which our men seemed to think could never be large enough, we heard many long stories from Jemmy about the Oens, or Coin men, who live beyond the mountains at the north side of the Beagle Channel, and almost every year make desperate inroads upon the Tekeenica tribe, carrying off women and children, dogs, arrows, spears, and canoes; and killing the men whom they succeed in making prisoners. He told us that these Oens-men made their annual excursions at the time of 'red leaf;' that is in April or May, when the leaves of deciduous trees are changing colour and beginning to fall; just the time of year also when the mountains are least difficult to pass.

At that period these invaders sometimes come down to the shores of the Beagle Channel in parties of from fifty to a hundred; seize upon canoes belonging to the Yapoo division of

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the Tekeenica tribe, cross over to Navarin Island, and thence sometimes to others, driving the smaller and much inferior Tekeenica people before them in every direction. By Jemmy's own account, however, there are hard battles sometimes, and the Oens tribe lose men; but as they always contrive to carry away their dead, it seems that the advantage of strength is on their side.

These periodical invasions of a tribe whose abode is in the north-eastern quarter of Tierra del Fuego are not to be confounded with the frequent disputes and skirmishes which take place between the two Tekeenica tribes; and it is interesting to compare what we thus heard with the account obtained by Oliver Van Noort in 1589: who learnt that the people lived in caves dug in the earth, * and that there were five tribes—four of ordinary stature and one of gigantic size. These giants, called Tiremenen, lived in 'Coin.' The other tribes were called Enoo, Kemenites, Karaike, and Kenneka.

23d. While embarking our tents and cooking utensils, several natives came running over the hills towards us, breathless with haste, perspiring violently, and bleeding at the nose. Startled at their appearance, we thought they had been fighting; but it appeared in a few moments, that having heard of our arrival, they lost not a moment in hurrying across the hills from a place near Woollȳa, and that the bloody noses which had surprised us were caused by the exertion of running. This effect has been noticed among the New Hollanders, I believe the islanders of the Pacific Ocean, as well as the Esquimaux, and probably others; but to our party it was then a novelty, and rather alarming.

Scarcely had we stowed the boats and embarked, before canoes began to appear in every direction, in each of which was a stentor hailing us at the top of his voice. Faint sounds of deep voices were heard in the distance, and around us echoes to the shouts of our nearer friends began to reverberate, and warned me to hasten away before our movements should be-

* The ground within a wigwam is scooped out considerably.

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come impeded by the number of canoes which I knew would soon throng around us. Although now among natives who seemed to be friendly, and to whom Jemmy and York contrived to explain the motives of our visit, it was still highly necessary to be on our guard. Of those men and boys who ran over the hills to us, all were of Jemmy's tribe excepting one man, whom he called an Oens-man; but it was evident, from his own description, that the man belonged to the Yapoo, or eastern Tekeenica tribe, and was living in safety among his usual enemies, as a hostage for the security of a man belonging to Jemmy's tribe who was staying among the eastern people.

As we steered out of the cove in which our boats had been sheltered, a striking scene opened: beyond a lake-like expanse of deep blue water, mountains rose abruptly to a great height, and on their icy summits the sun's early rays glittered as if on a mirror. Immediately round us were mountainous eminences, and dark cliffy precipices which cast a very deep shadow over the still water beneath them. In the distant west, an opening appeared where no land could be seen; and to the south was a cheerful sunny woodland, sloping gradually down to the Murray Narrow, at that moment almost undistinguishable. As our boats became visible to the natives, who were eagerly paddling towards the cove from every direction, hoarse shouts arose, and, echoed about by the cliffs, seemed to be a continual cheer. In a very short time there were thirty or forty canoes in our train, each full of natives, each with a column of blue smoke rising from the fire amidships, and almost all the men in them shouting at the full power of their deep sonorous voices. As we pursued a winding course around the bases of high rocks or between islets covered with wood, continual additions were made to our attendants; and the day being very fine, without a breeze to ruffle the water, it was a scene which carried one's thoughts to the South Sea Islands, but in Tierra del Fuego almost appeared like a dream. After a few hours (pulling hard to keep a-head of our train) we reached Woollȳa, and selected a clear space favourably situated for our encampment, landed, marked a boundary-line,

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placed sentries, and made the various arrangements necessary for receiving the anticipated visits of some hundred natives. We had time to do all this quietly, as our boats had distanced their pursuers several miles, while running from the Murray Narrow before a favourable breeze which sprung up, and, to our joy, filled every sail.

We were much pleased by the situation of Woollȳa, and Jemmy was very proud of the praises bestowed upon his land. Rising gently from the water-side, there are considerable spaces of clear pasture land, well watered by brooks, and backed by hills of moderate height, where we afterwards found woods of the finest timber trees in the country. Rich grass and some beautiful flowers, which none of us had ever seen, pleased us when we landed, and augured well for the growth of our garden seeds.

At our first approach, only a few natives appeared, who were not of Jemmy's family. The women ran away and hid themselves, but Jemmy and York contrived (with difficulty) to make the men comprehend the reason of our visit; and their awkward explanation, helped by a few presents, gradually put them at ease. They soon understood our meaning when we pointed to the boundary-line which they were not to pass. This line was on the shore between our tents and the grass-land; immediately behind the tents was a good landing-place, always sheltered, where our boats were kept in readiness in case of any sudden necessity.

Soon after our arrangements were made, the canoes which had been following us began to arrive; but, much to my satisfaction, the natives landed in coves at some distance from us, where the women remained with the canoes while the men and boys came overland to our little camp. This was very favourable for us, because it divided their numbers and left our boats undisturbed. We had only to guard our front, instead of being obliged to look out all round, as I had expected; and really it would have been no trifling affair to watch the pilfering hands and feet of some hundred natives, while many of our own party (altogether only thirty in num-

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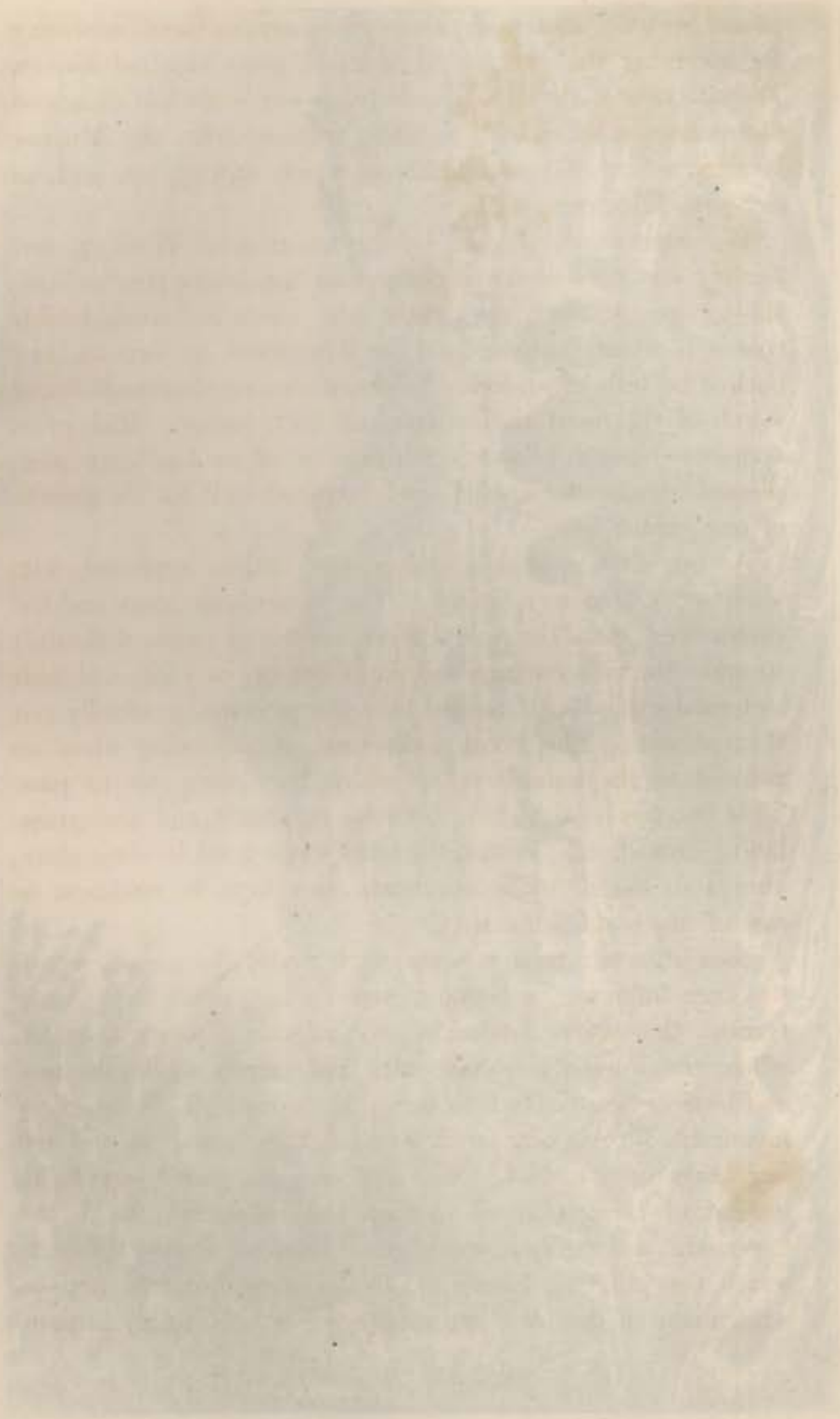

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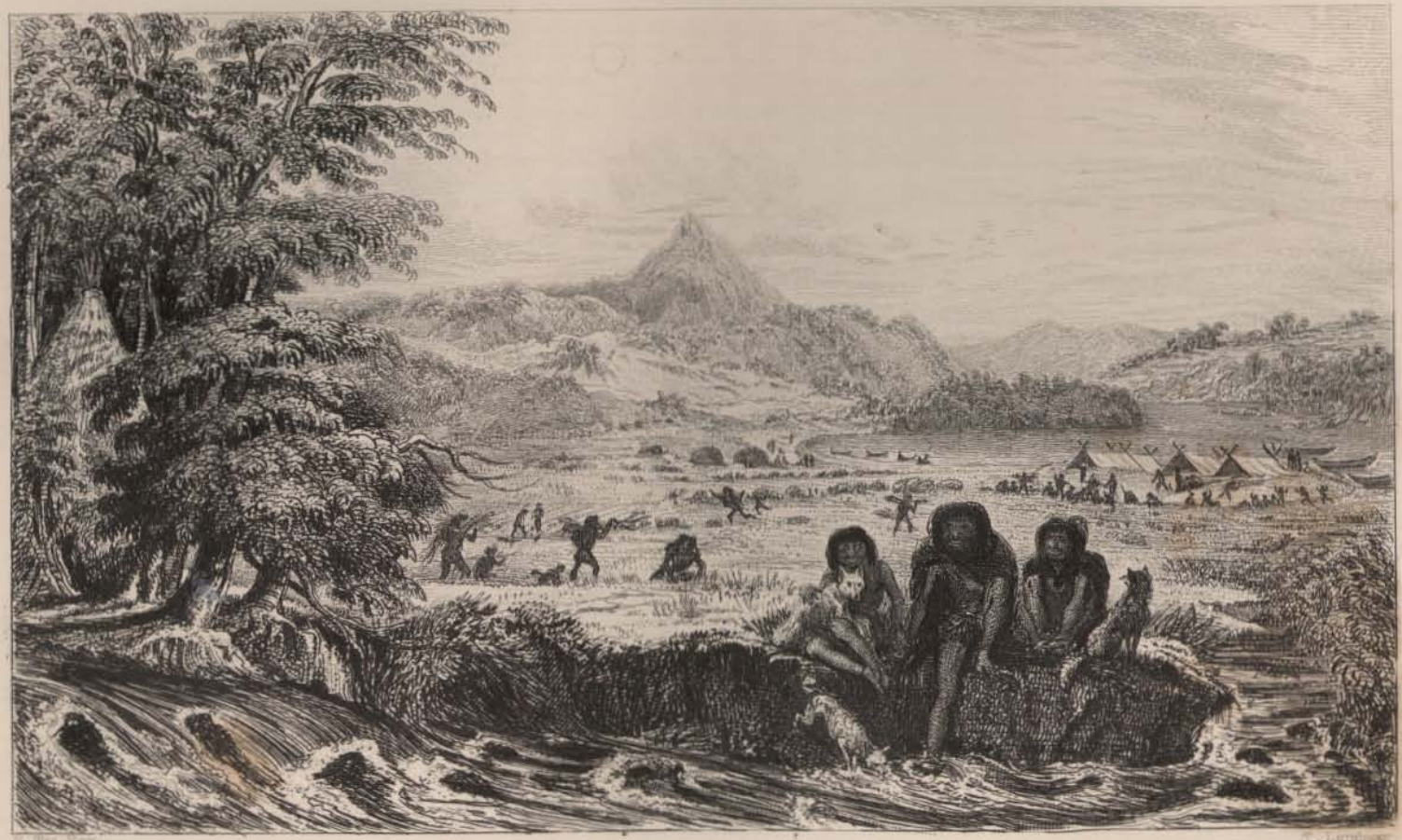

WOOLLYA.

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ber) were occupied at a distance, cutting wood, digging ground for a garden, or making wigwams for Matthews, York, and Jemmy.

As the natives thronged to our boundary-line (a mere mark made with a spade on the ground), it was at first difficult to keep them back without using force; but by good temper on the part of our men, by distributing several presents, and by the broken Fuegian explanations of our dark-coloured shipmates, we succeeded in getting the natives squatted on their hams around the line, and obtaining influence enough over them to prevent their encroaching.

Canoes continued to arrive; their owners hauled them ashore on the beach, sent the women and children to old wigwams at a little distance, and hastened themselves to see the strangers. While I was engaged in watching the proceedings at our encampment, and poor Jemmy was getting out of temper at the quizzing he had to endure on account of his countrymen, whom he had extolled so highly until in sight, a deep voice was heard shouting from a canoe more than a mile distant: up started Jemmy from a bag full of nails and tools which he was distributing, leaving them to be scrambled for by those nearest, and, upon a repetition of the shout, exclaimed "My brother!" He then told me that it was his eldest brother's voice, and perched himself on a large stone to watch the canoe, which approached slowly, being small and loaded with several people. When it arrived, instead of an eager meeting, there was a cautious circumspection which astonished us. Jemmy walked slowly to meet the party, consisting of his mother, two sisters, and four brothers. The old woman hardly looked at him before she hastened away to secure her canoe and hide her property, all she possessed—a basket containing tinder, firestone, paint, &c., and a bundle of fish. The girls ran off with her without even looking at Jemmy; and the brothers (a man and three boys) stood still, stared, walked up to Jemmy, and all round him, without uttering a word. Animals when they meet show far more animation and anxiety than was displayed at this meeting. Jemmy was evidently much morti-

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fied, and to add to his confusion and disappointment, as well as my own, he was unable to talk to his brothers, except by broken sentences, in which English predominated. After a few minutes had elapsed, his elder brother began to talk to him; but although Jemmy understood what was said, he could not reply. York and Fuegia were able to understand some words, but could not or did not choose to speak.

This first evening of our stay at Woollȳa was rather an anxious one; for although the natives seemed inclined to be quite friendly, and they all left us at sunset, according to their invariable practice, it was hard to say what mischief might not be planned by so numerous a party, fancying, as they probably would, that we were inferior to them in strength, because so few in number. Jemmy passed the evening with his mother and brothers, in their wigwam, but returned to us to sleep. York, also, and Fuegia were going about among the natives at their wigwams, and the good effect of their intercourse and explanations, such as they were, was visible next day (24th) in the confident, familiar manner of the throng which surrounded us while we began to dig ground for gardens, as well as cut wood for large wigwams, in which Matthews and his party were to be established. Canoes still arrived, but their owners seemed as well-disposed as the rest of the natives, many of whom assisted us in carrying wood, and bringing bundles of grass or rushes to thatch the wigwams which they saw we were making, in a pleasant sheltered spot, near a brook of excellent water. One wigwam was for Matthews, another for Jemmy, and a third for York and Fuegia. York told me that Jemmy's brother was "very much friend," that the country was "very good land," and that he wished to stay with Jemmy and Matthews.

A small plot of ground was selected near the wigwams, and, during our stay, dug, planted and sowed with potatoes, carrots, turnips, beans, peas, lettuce, onions, leeks, and cabbages. Jemmy soon clothed his mother and brothers, by the assistance of his friends. For a garment which I sent the old woman she returned me a large quantity of fish, all she had to offer;

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and when she was dressed, Jemmy brought her to see me. His brothers speedily became rich in old clothes, nails and tools, and the eldest were soon known among the seamen as Tommy Button and Harry Button, but the younger ones usually staid at their wigwams, which were about a quarter of a mile distant. So quietly did affairs proceed, that the following day (25th) a few of our people went on the hills in search of guanacoes: many were seen, but they were too wild to approach. An old man arrived, who was said to be Jemmy's uncle, his father's brother; and many strangers came, who seemed to belong to the Yapoo Tekeenica tribe. Jemmy did not like their visit; he said they were bad people, 'no friends.'

26th. While some of my party were washing in a stream, stripped to the waist, several natives collected round, and were much amused at the white skins, as well as at the act of washing, so new probably to them. One of them ran to the nearest wigwams, and a troop of curious gazers collected, whose hands, however, were soon so actively employed in abstracting the handkerchiefs, shoes, &c., which had been laid on the bank, that a stop was put to the ablutions.

We discovered that Jemmy's eldest brother was a 'doctor,' and though young for his occupation of conjuring and pretending to cure illness, he was held in high estimation among his own tribe. I never could distinctly ascertain whether the eldest man, or the doctor of a tribe had the most influence; but from what little I could learn, it appeared to me that the elder of a family or tribe had a sort of executive authority, while the doctor gave advice, not only in domestic affairs, but with respect to most transactions. In all savage nations, I believe there is a person of this description—a pretended prophet—conjuror—and, to a certain degree,—doctor.

This evening our party were employed for a short time in firing at a mark, with the three-fold object of keeping our arms in order—exercising the men—and aweing, without frightening, the natives. While this was going on, the Fuegians sat about on their hams, watching our proceedings, and often eagerly talking to each other, as successful shots were made at the target,

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which was intentionally placed so that they could see the effect of the balls. At sunset they went away as usual, but looking very grave, and talking earnestly. About an hour after dark, the sentry saw something moving along the ground near our tents, within the boundary line, which he thought was a wild animal, and had just levelled his musket to fire at it, when he discovered it was a man, who instantly darted off, and was lost in the darkness. Some native had doubtless stolen to the tents, to see what we were doing; perhaps with a view to surprise us, if asleep, perhaps only to steal.

27th. While a few of our party were completing the thatch of the last wigwam, and others were digging in the garden which was made, I was much surprised to see that all the natives were preparing to depart; and very soon afterwards every canoe was set in motion,—not half a dozen natives remaining. Even Jemmy's own family, his mother and brothers, left us; and as he could give no explanation of this sudden departure, I was in much doubt as to the cause. Whether an attack was meditated, and they were removing the women and children, previous to a general assembly of the men, or whether they had been frightened by our display on the preceding evening, and feared that we intended to attack them, I could not ascertain; but deeming the latter by far the most probable, I decided to take the opportunity of their departure to give Matthews his first trial of passing a night at the new wigwams.

Some among us thought that the natives intended to make a secret attack, on account of the great temptation our property offered; and in consequence of serious offence which had been taken by two or three old men, who tried to force themselves into our encampment, while I was at a little distance; one of whom, when resisted by the sentry, spit in his face; and went off in a violent passion, muttering to himself, and every now and then turning round to make faces and angry gestures at the man who had very quietly, though firmly, prevented his encroachment.

In consequence of this incident, and other symptoms of a

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disposition to try their strength, having more than three hundred men, while we were but thirty, I had thought it advisable, as I mentioned, to give them some idea of the weapons we had at command, if obliged to use them, by firing at a mark. Probably two-thirds of the natives around us at that time had never seen a gun fired, being strangers, coming from the Beagle Channel and its neighbourhood, where no vessel had been; and although our exercise might have frightened them more than I wished, so much, indeed, as to have induced them to leave the place, it is not improbable that, without some such demonstration, they might have obliged us to fire at them instead of the target. So many strangers had arrived during the few days we remained, I mean strangers to Jemmy's family —men of the eastern tribe, which he called Yapoo—that his brothers and mother had no longer any influence over the majority, who cared for them as little as they did for us, and were intent only upon plunder. Finding this the case, I conclude that Jemmy's friends thought it wise to retreat to a neighbouring island before any attack commenced; but why they did not tell Jemmy their reasons for going, I know not, neither could he tell me more than that they said they were going to fish, and would return at night. This, however, they did not do.

In the evening, Matthews and his party—Jemmy, York, and Fuegia—went to their abode in the three new wigwams. In that made for Matthews, Jemmy also took up his quarters at first: it was high and roomy for such a construction; the space overhead was divided by a floor of boards, brought from the ship, and there most of Matthews' stores were placed; but the most valuable articles were deposited in a box, which was hid in the ground underneath the wigwam, where fire could not reach.

Matthews was steady, and as willing as ever; neither York nor Jemmy had the slightest doubt of their being all well-treated; so trusting that Matthews, in his honest intention to do good, would obtain that assistance in which he confided, I decided to leave him for a few days. The absence of the

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natives, every one of whom had decamped at this time, gave a good opportunity for landing the larger tools belonging to Matthews and our Fuegians, and placing them within or beneath his wigwam, unseen by any one except ourselves; and at dusk, all that we could do for them being completed, we left the place and sailed some miles to the southward.

During the four days in which we had so many natives about us, of course some thefts were committed, but nothing of consequence was stolen. I saw one man talking to Jemmy Button, while another picked his pocket of a knife, and even the wary York lost something, but from Fuegia they did not take a single article; on the contrary, their kindness to her was remarkable, and among the women she was quite a pet.

Our people lost a few trifles, in consequence of their own carelessness. Had they themselves been left among gold and diamonds, would they all have refrained from indulging their acquisitive inclinations?

Notwithstanding the decision into which I had reasoned myself respecting the natives, I could not help being exceedingly anxious about Matthews, and early next morning our boats were again steered towards Woollÿa. My own anxiety was increased by hearing the remarks made from time to time by the rest of the party, some of whom thought we should not again see him alive; and it was with no slight joy that I caught sight of him, as my boat rounded a point of land, carrying a kettle to the fire near his wigwam. We landed and ascertained that nothing had occurred to damp his spirits, or in any way check his inclination to make a fair trial. Some natives had returned to the place, among them one of Jemmy's brothers; but so far were they from showing the slightest ill-will, that nothing could be more friendly than their behaviour.

Jemmy told us that these people, who arrived at daylight that morning were his friends, that his own family would come in the course of the day, and that the 'bad men,' the strangers, were all gone away to their own country.

A further trial was now determined upon. The yawl, with one whale-boat, was sent back to the Beagle, and I set out on

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a westward excursion, accompanied by Messrs. Darwin and Hamond, in the other two boats: my intention being to complete the exploration of Whale-boat Sound, and the north-west arm of the Beagle Channel; then revisit Woollȳa, either leave or remove Matthews, as might appear advisable, and repair to our ship in Goree Road. With a fair and fresh wind my boat and Mr. Hamond's passed the Murray Narrow, and sailed far along the channel towards the west, favoured, unusually, by an easterly breeze. Just as we had landed, and set up our tent for the night, some canoes were seen approaching; so rather than be obliged to watch their movements all night, we at once embarked our tent and half-cooked supper, and pulled along the shore some miles further, knowing that they would not willingly follow us in the dark. About midnight we landed and slept undisturbed. Next day we made little progress, the wind having changed, and landed, earlier than usual, on the north side of the channel, at Shingle Point. Some natives soon appeared, and though few in number, were inclined to give trouble. It was evident they did not know the effect of fire-arms; for if a musket were pointed at them, and threatening gestures used, they only made faces at us, and mocked whatever we did. Finding them more and more insolent and troublesome, I preferred leaving them to risking a struggle, in which it might become necessary to fire, at the hazard of destroying life. Twelve armed men, therefore, gave way to six unarmed, naked savages, and went on to another cove, where these annoying, because ignorant natives could not see us.

On the 29th we reached Devil Island, and found the large wigwam still standing, which in 1830 my boat's crew called the 'Parliament House.' Never, in any part of Tierra del Fuego, have I noticed the remains of a wigwam which seemed to have been burned or pulled down; probably there is some feeling on the subject, and in consequence the natives allow them to decay naturally, but never wilfully destroy them. We enjoyed a grand view of the lofty mountain, now called Darwin, with its immense glaciers extending far and wide. Whether

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this mountain is equal to Sarmiento in height, I am not certain, as the measurements obtained did not rest upon satisfactory data; but the result of those measures gave 6,800 feet for its elevation above the sea. This, as an abstract height, is small, but taking into consideration that it rises abruptly from the sea, which washes its base, and that only a short space intervenes between the salt water and the lofty frozen summit, the effect upon an observer's eye is extremely grand, and equal, probably, to that of far higher mountains which are situated at a distance inland, and generally rise from an elevated district.

We stopped to cook and eat our hasty meal upon a low point of land, immediately in front of a noble precipice of solid ice; the cliffy face of a huge glacier, which seemed to cover the side of a mountain, and completely filled a valley several leagues in extent.

Wherever these enormous glaciers were seen, we remarked the most beautiful light blue or sea green tints in portions of the solid ice, caused by varied transmission, or reflection of light. Blue was the prevailing colour, and the contrast which its extremely delicate hue, with the dazzling white of other ice, afforded to the dark green foliage, the almost black precipices, and the deep, indigo blue water, was very remarkable.

Miniature icebergs surrounded us; fragments of the cliff, which from time to time fall into a deep and gloomy basin beneath the precipice, and are floated out into the channel by a slow tidal stream. In the first volume the frequent falling of these masses of ice is noticed by Captain King in the Strait of Magalhaens, and in the narrative of my first exploring visit to this arm of the Beagle Channel; therefore I will add no further remark upon the subject.

Our boats were hauled up out of the water upon the sandy point, and we were sitting round a fire about two hundred yards from them, when a thundering crash shook us—down came the whole front of the icy cliff—and the sea surged up in a vast heap of foam. Reverberating echoes sounded in every direction, from the lofty mountains which hemmed us in; but our whole attention was immediately called to great rolling waves

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which came so rapidly that there was scarcely time for the most active of our party to run and seize the boats before they were tossed along the beach like empty calabashes. By the exertions of those who grappled them or seized their ropes, they were hauled up again out of reach of a second and third roller; and indeed we had good reason to rejoice that they were just saved in time; for had not Mr. Darwin, and two or three of the men, run to them instantly, they would have been swept away from us irrecoverably. Wind and tide would soon have drifted them beyond the distance a man could swim; and then, what prizes they would have been for the Fuegians, even if we had escaped by possessing ourselves of canoes. At the extremity of the sandy point on which we stood, there were many large blocks of stone, which seemed to have been transported from the adjacent mountains, either upon masses of ice, or by the force of waves such as those which we witnessed. Had our boats struck those blocks, instead of soft sand, our dilemma would not have been much less than if they had been at once swept away.

Embarking, we proceeded along a narrow passage, more like a river than an arm of the sea, till the setting sun warned us to seek a resting-place for the night; when, selecting a beach very far from any glacier, we again hauled our boats on shore. Long after the sun had disappeared from our view, his setting rays shone so brightly upon the gilded icy sides of the summits above us, that twilight lasted an unusual time, and a fine clear evening enabled us to watch every varying tint till even the highest peak became like a dark shadow, whose outline only could be distinguished. No doubt such scenes are familiar to many, but to us, surrounded even as we so often were by their materials, they were rare; because clouds continually hang over the heights, or obscure the little sunshine which falls to the lot of Tierra del Fuego.

The following day (30th) we passed into a large expanse of water, which I named Darwin Sound—after my messmate, who so willingly encountered the discomfort and risk of a long cruise in a small loaded boat. Desirous of finding an opening

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northwards, I traced the northern shore of this sound, mile by mile, leaving all islands to the southward until we entered Whale-boat Sound, and I recognized Cape Desolation in the distance, as well as a number of minor points which had become familiar to me during the search after our lost boat in the former voyage (1830).

Feb. 2. Having done what was necessary and attainable for the purposes of the survey, we traversed Whale-boat Sound, and stopped for a time at an old bivouac, used by me twice before, on an islet near the east extremity of the largest Stewart Island. While the boat's crew were occupied in preparing our meal, I went to Stewart Island, and from a small eminence saw Mount Sarmiento quite distinctly. We next steered eastward, along the north side of the Londonderry Islands, and passed the night in a narrow passage. On the 3d we got to the open sea at the south side of Darwin Sound, and entered the south-west arm of the Beagle Channel rather too late, for it had become so dark we could distinguish no place fit to receive us; however, after much scrutiny and anxious sounding, to ascertain if our boats could approach without danger of being stove, we were guided by the sound of a cascade to a sheltered cove, where the beach was smooth. Excepting for the novelty and excitement of exploring unknown places, however uninteresting they may be, there was little in this trip worthy of general notice, considering how much has already been said of these unprofitable regions. Even to a professed naturalist, there was scarcely anything to repay the time and trouble, as it was impossible to delay long enough in any one place to give time for more than a most cursory examination.

I need hardly say that the survey of such places as were visited in this hasty manner is little more than an eye-sketch, corrected by frequent bearings, occasional latitudes by sun, moon, or stars, and meridian distances, measured by two chronometers, which were always kept in a large box and treated very carefully. To have attempted more, to have hoped for such an accurate delineation of these shores, at present almost useless to civilized man, as is absolutely necessary where ship-

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ping may resort, would have been wrong, while so many other objects demanded immediate attention.

4th. We sailed along the passage very rapidly, a fresh wind and strong tide favouring us. The flood-tide stream set two or three knots an hour through this south-west arm of the Beagle Channel, but the ebb was scarcely noticed: certainly its strength did not, even in the narrowest places, exceed one knot an hour. A few Alikhoolip Fuegians were seen in a cove on the south shore, ten miles west of Point Divide; the only natives, except a very small party in Darwin Sound, that had been met in the excursion since we left the Tekeenica people.

Near Point Divide we saw a large fire, and approached the spot guardedly, supposing that a number of Fuegians must be there. No one appeared; but still the fire burned brightly, and we began to think there might be an ambush, or that the natives who had been there had fled, but were still in the neighbourhood. Approaching nearer, we found that the fire was in a large tree, whose trunk it had almost consumed. Judging from the slow rate at which the tree burned while we were present, I should say it had been on fire two or three days, and that the frequent heavy rain had prevented the flames from making head. Had the weather been some time dry, the adjoining woodland would have blazed, and, as the mountain side is steep and covered with trees, the conflagration would have been immense. At Point Divide the slate rock seemed to be of excellent quality, fit for roofing; but when will roofing slates be required in Tierra del Fuego? Perhaps though sooner than we suppose; for the accidental discovery of a valuable mine might effect great changes.

On the south shore, nearly opposite to Shingle Point, we met a large party of natives, among whom those who disturbed us at that place as we passed westward were recognized. All of them appeared in full dress, being bedaubed with red and white paint, and ornamented, after their fashion, with feathers and the down of geese. One of their women was noticed by several among us as being far from ill-looking: her features were regular, and, excepting a deficiency of hair on the eyebrow,

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and rather thick lips, the contour of her face was sufficiently good to have been mistaken for that of a handsome gipsy. What her figure might be, a loose linen garment, evidently one that had belonged to Fuegia Basket, prevented our noticing. The sight of this piece of linen, several bits of ribbon, and some scraps of red cloth, apparently quite recently obtained, made me feel very anxious about Matthews and his party: there was also an air of almost defiance among these people, which looked as if they knew that harm had been done, and that they were ready to stand on the defensive if any such attack as they expected were put into execution. Passing therefore hastily on, we went as far as the light admitted, and at daybreak next morning (6th) were again hastening towards Woollÿa. As we shot through the Murray Narrow several parties of natives were seen, who were ornamented with strips of tartan cloth or white linen, which we well knew were obtained from our poor friends. No questions were asked; we thought our progress slow, though wind and tide favoured us: but, hurrying on, at noon reached Woollÿa. Several canoes were on the beach, and as many natives seemed to be assembled as were there two days before we left the place. All were much painted, and ornamented with rags of English clothing, which we concluded to be the last remnants of our friends' stock. Our boats touched the shore; the natives came hallooing and jumping about us, and then, to my extreme relief, Matthews appeared, dressed and looking as usual. After him came Jemmy and York, also dressed and looking well: Fuegia, they said, was in a wigwam.

Taking Matthews into my boat, we pushed out a short distance to be free from interruption, and remained till I had heard the principal parts of his story: the other boat took Jemmy on board, and York waited on the beach. Nearly all the Fuegians squatted down on their hams to watch our proceedings, reminding me of a pack of hounds waiting for a fox to be unearthed.

Matthews gave a bad account of the prospect which he saw before him, and told me, that he did not think himself

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safe among such a set of utter savages as he found them to be, notwithstanding Jemmy's assurances to the contrary. No violence had been committed beyond holding down his head by force, as if in contempt of his strength; but he had been harshly threatened by several men, and from the signs used by them, he felt convinced they would take his life. During the last few days, his time had been altogether occupied in watching his property. At first there were only a few quiet natives about him, who were inoffensive; but three days after our departure several canoes full of strangers to Jemmy's family arrived, and from that time Matthews had had no peace by day, and very little rest at night. Some of them were always on the look-out for an opportunity to snatch up and run off with some tool or article of clothing, and others spent the greater part of each day in his wigwam, asking for every thing they saw, and often threatening him when he refused to comply with their wishes. More than one man went out in a rage, and returned immediately with a large stone in his hand, making signs that he would kill Matthews if he did not give him what was demanded. Sometimes a party of them gathered round Matthews, and, if he had nothing to give them, teased him by pulling the hair of his face, pushing him about, and making mouths at him. His only partizans were the women; now and then he left Jemmy to guard the hut, and went to the natives' wigwams, where the women always received him kindly, making room for him by their fire, and giving him a share of whatever food they had, without asking for any thing in return. The men never took the trouble of going with him on these visits (which, however, ceased when so many strangers arrived), their attention being engrossed by the tools, clothes, and crockeryware at our shipmate's quarters. Fortunately, the most valuable part of Matthews' own things were underground, in a cave unsuspected by the natives, and other large tools were hidden overhead in the roof of his hut. York and Fuegia fared very well; they lost nothing; but Jemmy was sadly plundered, even by his own family. Our garden, upon which much labour had been bestowed, had been trampled

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over repeatedly, although Jemmy had done his best to explain its object and prevent people from walking there. When questioned about it, he looked very sorrowful, and, with a slow shake of the head, said, "My people very bad; great fool; know nothing at all; very great fool." It was soon decided that Matthews should not remain. I considered that he had already undergone a severe trial, and ought not to be again exposed to such savages, however willing he might be to try them farther if I thought it right. The next difficulty was how to get Matthews' chest and the remainder of his property safely into our boats, in the face of a hundred Fuegians, who would of course understand our object, and be much more than a match for us on land; but the less hesitation shown, the less time they would have to think of what we were about; so, dividing our party, and spreading about a little to create confidence—at a favourable moment the wigwam was quickly cleared, the cave emptied, and the contents safely placed in our boats. As I stood watching the proceedings, a few anxious moments passed, for any kind of skirmish would have been so detrimental to the three who were still to remain. When the last man was embarked, I distributed several useful articles, such as axes, saws, gimblets, knives and nails, among the natives, then bade Jemmy and York farewell, promising to see them again in a few days, and departed from the wondering throng assembled on the beach.

When fairly out of sight of Woollȳa, sailing with a fair wind towards the Beagle, Matthews must have felt almost like a man reprieved, excepting that he enjoyed the feelings always sure to reward those who try to do their duty, in addition to those excited by a sudden certainty of his life being out of jeopardy. We slept that night in a cove under Webley Head; sailed early the following morning (7th) along the north side of Nassau Bay, and about an hour after dark reached the Beagle—found all well, the surveying work about Goree Road done, the ship refitted, and quite ready for her next trip.

A day or two was required for observations and arrangements, after which (10th) we beat to windward across Nassau

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Bay, and on the 11th anchored in Scotchwell Bay. A rough night was passed under sail between Wollaston and Navarin Islands, in which we pretty well proved the clearness of that passage, as it blew fresh and we made a great many boards.

Next day I set out to examine the western part of Ponsonby Sound and revisit Woollÿa. In my absence one party was to go westward, overland, to look at the outer coast between False Cape and Cape Weddell, and another was to examine and make a plan of the bay or harbour in which the Beagle lay. In 1830, Mr. Stokes had laid down its shores with accuracy on a small scale, but there was not then time to take many soundings; and as I conceived that Orange Bay and this harbour were likely to be useful ports, it was worth making a particular plan of each.

12th. With one boat I crossed Tekeenica Sound, and explored the western part of Ponsonby Sound. Natives were seen here and there, but we had little intercourse with them. Some curious effects of volcanic action were obsevred, besides masses of conglomerate, such as I had not noticed in any other part of Tierra del Fuego. On one islet I was placed in an awkward predicament for half an hour; it was a very steep, precipitous hill, which I had ascended by climbing or creeping through ravines and among trees; but, wishing to return to the boat's crew, after taking a few angles and bearings from its summit, I could find no place by which it appeared possible to descend. The ravine up which I crawled was hidden by wood, and night was at hand. I went to and fro, like a dog on a wall, unable to descend, till one of the boat's crew who was wandering about heard me call, and, ascending at the only accessible place, showed me where to plunge into the wood with a prospect of emerging again in a proper direction. This night we had dry beautiful weather, the leaves and sticks on the ground crackling under our feet as we walked, while at the ship, only sixty miles distant, rain poured down incessantly.

The night of the 13th was passed on Button Island. This

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also was quite fine, without a drop of rain, while at the ship, in Packsaddle Bay, it rained frequently. I mention these instances to show how different the climate may be even in places so near one another as Packsaddle Bay and Woollȳa.

14th. With considerable anxiety I crossed over from Button Island to Woollȳa. Several canoes were out fishing, women only being in them, who did not cease their occupation as we passed: this augured well; and in a few minutes after we saw Jemmy, York, and Fuegia, in their usual dress. But few natives were about them, and those few seemed quiet and well disposed. Jemmy complained that the people had stolen many of his things, but York and Fuegia had contrived to take better care of theirs. I went to their wigwams and found very little change. Fuegia looked clean and tidily dressed, and by her wigwam was a canoe, which York was building out of planks left for him by our party. The garden was uninjured, and some of the vegetables already sprouting.

Jemmy told us that strangers had been there, with whom he and his people had 'very much jaw,' that they fought, threw 'great many stone,' and stole two women (in exchange for whom Jemmy's party stole one), but were obliged to retreat. Jemmy's mother came down to the boat to see us; she was decently clothed, by her son's care. He said that his brothers were all friendly, and that he should get on very well now that the 'strange men' were driven away. I advised Jemmy to take his mother and younger brother to his own wigwam, which he promised to do, and then, finding that they were all quite contented and apparently very happy, I left the place, with rather sanguine hopes of their effecting among their countrymen some change for the better. Jemmy's occupation was hollowing out the trunk of a large tree, in order to make such a canoe as he had seen at Rio de Janeiro.

I hoped that through their means our motives in taking them to England would become understood and appreciated among their associates, and that a future visit might find them so favourably disposed towards us, that Matthews might then

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undertake, with a far better prospect of success, that enterprise which circumstances had obliged him to defer, though not to abandon altogether.

Having completed our work in Packsaddle Bay on the 18th, the Beagle went to the inlet originally called Windhond Bay, a deep place full of islets: thence, on the 19th, she moved to Gretton Bay, on the north side of Wollaston Island, and to Middle Cove. On the 20th, it was blowing a gale of wind from the south-west, but we pushed across before it to Goree Road, knowing that we should there find secure anchorage, and be unmolested by the furious williwaws which whirled over the high peaks of Wollaston Island.

We weighed from Goree Road on the 21st, and ran under close-reefed topsails to Good Success Bay, where our anchors were dropped in the evening. The night of the 22d was one of the most stormy I ever witnessed. Although close to a weather shore in a snug cove, upon good holding ground, with masts struck and yards braced as sharp as possible, the wind was so furious that both bowers were brought a-head with a cable on each, and the sheet anchor (having been let go early) had half a cable on it, the depth of water being only ten fathoms. During some of the blasts, our fore-yard bent so much that I watched it with anxiety, thinking it would be sprung. The storm being from the westward, threw no sea into the cove, but I several times expected to be driven out of our place of refuge, if not shelter. During part of the time we waited in Good Success Bay for an interval of tolerable weather, in which we might cross to the Falkland Islands without being molested by a gale, there was so much surf on the shore that our boats could not land, even while the wind was moderate in the bay.

While we were prisoners on board, some fish were caught, among which was a skate, four feet in length and three feet wide. Several fine cod-fish, of the same kind as those off Cape Fairweather, were also hooked, and much relished.

On the 26th we sailed, passed through a most disagreeable swell off Cape San Diego, and ran before a fresh gale towards

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the Falkland Islands. Towards evening we rounded to for soundings, but the sea was so high and short, that a man* at the jib-boom-end was pitched more than a fathom under water. He held on manfully, both to the boom and the lead-line, and as he rose above the wave, blowing and dripping, hove the lead forward as steadily as ever.† My own feelings at seeing him disappear may be imagined:—it was some time before we sounded again. This heavy though short sea seemed to be caused by the flood tide, coming from the southward, and meeting waves raised by strong north-west winds. The stream of tide set us a mile each hour north-eastward.

At eight the wind and sea were too much for us to run with; therefore, watching an opportunity, we rounded to ‡ under close-reefed main-topsail, trysails, and fore-staysail. Next morning (27th) we bore up, though the sea was still heavy, and steered to pass south of the Falklands. Our observations at noon showed that since leaving Good Success Bay we had been set more than thirty miles to the north-east. This effect, whether caused by the flood tide-stream, or by a current independent of the tide, would be dangerous to ships endeavouring to pass westward of the Falklands during bad weather, and in all probability caused the embayment of H.M.S. Eden, Captain W. F. W. Owen, when she was saved by his skill: also of a French storeship, the Durance; and of several other vessels. At noon, on the 28th, we found that the current or stream of tide had set us more towards the east than to the northward, during the preceding twenty-four hours, while we were at the south side of the islands.

At daylight on the 1st of March (having passed the preceding night standing off and on under easy sail), we made Cape Pembroke, at the eastern extremity of the Falklands. The weather was very cold and raw, with frequent hail-squalls,

* Nicholas White.

† Two men in the staysail netting were also dipped under water, at a second plunge, from which White escaped.

‡ The barometer was below 29 inches. See Meteorological Journal in Appendix.

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although in the month corresponding to September of our hemisphere; and while working to windward into Berkeley Sound, the gusts of wind were sometimes strong enough to oblige us to shorten all sail. I did not then know of Port William—so close to us, and so easy of access.

The aspect of the Falklands rather surprised me: instead of a low, level, barren country, like Patagonia, or a high woody region, like Tierra del Fuego, we saw ridges of rocky hills, about a thousand feet in height, traversing extensive tracts of sombre-looking moorland, unenlivened by a tree. A black, low, and rocky coast, on which the surf raged violently, and the strong wind against which we were contending, did not tend to improve our first impressions of those unfortunate islands—scene of feud and assassination, and the cause of angry discussion among nations.

In a cove (called Johnson Harbour) at the north side of Berkeley Sound, was a wrecked ship, with her masts standing, and in other places were the remains of two more wrecks. We anchored near the beach on which Freycinet ran the Uranie, after she struck on a rock off Volunteer Point, at the entrance of Berkeley Sound; and from a French boat which came alongside learned that the Magellan, French whaler, had been driven from her anchors during the tremendous storm of January 12-13; that her crew were living on shore under tents, having saved every thing; that tnere were only a few colonists left at the almost ruined settlement of Port Louis; and that the British flag had been re-hoisted on the islands by H.M.S. Tyne and Clio.

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CHAPTER XI.

HISTORICAL SKETCH OF THE FALKLAND ISLANDS.

THE Falkland Islands, lying between the parallels of 51° and 53° S., and extending from near 57° almost to 62° W., are in number about two hundred, but only two are of considerable size. Between these latter, called East, and West Falkland, is the channel to which our countryman, Strong, gave the name of Falkland Sound, he himself calling the adjacent country Hawkins' Land.

Plausible assertions have been made by parties anxious to disprove the claim of Great Britain to these islands, and so few persons, excepting those immediately concerned, have inclination to refer to original documents, that I may be pardoned for recalling to the recollection of those to whom the subject is still interesting, a few well-known facts, which, if fairly considered, place the question above dispute.

It has been asserted, that Americus Vespucius saw these islands in 1502,* but if the account of Americus himself is authentic,† he could not have explored farther south than the right bank of La Plata. In 1501-2 Americus Vespucius, then

* Il me paroît qu'on en peut attribuer la première découverte au célèbre Améric Vespuce, qui, dans son troisième voyage pour la découverte de l'Amérique, en parcourut la côte du nord au mois d'Avril 1502. Il ignoroit à la vérité si elle appartenoit à une île, ou si elle faisoit partie du continent; mais il est facile de conclure de la route qu'il avoit suivie, de la latitude à laquelle il étoit arrivé, de la description même qu'il donne de cette côte, que c'étoit celle des Malouines. J'assurerais, avec non moins de fondement, que Beauchesne Goüin, revenant de la mer du Sud en 1700, a mouillé dans la partie orientale des Malouines, croyant être aux Sebaldes.—Voyage de Bougainville, 2d édit. 1772, tom. i. p. 63.

† Letters of Americus Vespucius, in Ramusio's Collection, vol. i. fol. 128.

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employed by the King of Portugal, sailed 600 leagues south and 150 leagues west from Cape San Agostinho (lat. 8° 20′ S.) along the coast of a country then named Terra Sancte Crucis.* His account of longitude may be very erroneous, but how could his latitude have erred thirteen degrees in this his southernmost voyage?

The south shore of the Plata is low, and appears to be woody, though it is not; the depth of water off it is moderate, and the currents are strong—all which peculiarities have been remarked on the northern coasts of the Falklands; therefore the 'description' alluded to by De Bougainville would apply equally well to the right bank of the Plata. The late Mr. Dalrymple published an extract from a chart printed at Rome, in 1508, in which it is said, that ships of Portugal discovered a continuation of land as far south as fifty degrees,† which did not there terminate. In that chart the name America is not to be found. Brazil is there called Terra‡ Sancte Crucis.

If the Portuguese or any other people actually traced or even discovered portions of coast south of the Plata before 1512, it appears strange that so remarkable an estuary, one hundred and twenty miles across, should have been overlooked; especially as soundings extend two hundred miles seaward of its entrance:—and that the world should have no clear record of its having been discovered prior to the voyage of Juan de Solis, in 1512. Vespucius has already robbed Columbus and his predecessor, Cabot, of the great honour of affixing their names to the New World—shall he also be tacitly permitted to claim

* The name America was not given before the year 1507. (Herrera, Dec. 1, 7, 5.)

† The Falklands are beyond fifty-one degrees of south latitude.

‡ In 1507 (the admiral Christopher Columbus being dead), Americus Vespucius was taken into the service of the King of Spain, with the title of 'Pilote mayor,' and was employed in making charts of the new discoveries, which gave him an opportunity to affix his own name to the land of South America. (Herrera, Dec. 1, 7, 5.)

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even the trifling distinction of discovering the Falklands, when it is evident that he could not have seen them ? *

On the 14th of August 1592, John Davis, who sailed with Cavendish on his second voyage, but separated from him in May 1592, discovered the islands now called Falkland. In Mr. John Jane's relation of Davis's voyage (Hakluyt, vol. iii. p. 846), there is the following simple, but distinct account of this discovery: "Aug. 14, 1592. We were driven in among certain isles, never before discovered by any known relation, lying fifty leagues or better from the shore, east and northerly from the Strait" (of Magalhaens).

At this time Davis was striving to enter the Strait of Magalhaens, but had been long at sea, and driven far by tempests. His bearing is correct, though the distance (by estimation only) is too small.

In 1683-4, Dampier and Cowley saw three islands in lat. 51° to 51° 20′ S., which they (correctly) supposed to be those seen and named by Sebald de Weert. However, the editor of Cowley's narrative, one William Hack, published a different latitude for the land they saw, and called it Pepys Island, in compliment to the then Secretary of the Admiralty, intending that it should be supposed a new discovery. The false latitude given by Hack was 47° S.: in his drawing of the island he did not omit the insertion of an Admiralty Bay and a Secretary Point.

Hawkins sailed along the northern shores of these islands in 1594, and he, ignorant of Davis's discovery, named them Hawkins's Maiden Land. His account appearing first, and prominently, before the public, procured for them the name by which they were known until Strong, in 1690, sailed through and anchored in the channel which he named Falkland Sound. The Welfare's journal, written by Strong, is in the British Museum, together with Observations made during a South Sea Voyage, written by Richard Simson, who sailed in the

* Could the constructor of the chart, published at Rome in 1508, have been misinformed, owing to a mistake of 5 for 3 (50 for 30)? Such errors occur frequently in modern compilations.

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same ship; but a few sentences in each are so relevant to the present subject, that I shall quote them verbatim:—"1690. Monday 27th January. We saw the land; when within three or four leagues, we had thirty-six fathoms. It is a large land, and lieth east and west nearest. There are several quays that lie among the shore. We sent our boat to one, and she brought on board abundance of penguins, and other fowls, and seals. We steered along shore E. by N., and at eight at night we saw the land run eastward as far as we could discern. Lat. 51° 3′ S.

"Tuesday 28th. This morning at four o'clock we saw a rock that lieth from the main island four or five leagues. It maketh like a sail.* At six, we stood into a sound that lies about twenty leagues from the westernmost land we had seen. The sound lieth south and north nearest. There is twenty-four fathoms depth at the entrance, which is four leagues wide. We came to an anchor six or seven leagues within, in fourteen fathoms water. Here are many good harbours. We found fresh water in plenty, and killed abundance of geese and ducks. As for wood, there is none.

"On the 31st we weighed from this harbour, with the wind at W.S.W. We sent our long-boat a-head of the ship, to sound before us. At eight o'clock in the evening, we anchored in nine fathoms. The next morning we weighed, and sent our boat before us. At ten, we were clear out of the sound. At twelve, we set the west cape bearing N.N.E., which we named Cape Farewell. This sound, Falkland Sound as I named it, is about seventeen leagues long; the first entrance lies S. by E., and afterwards S. by W."

How it happened that the name Falkland, originally given to the sound alone, obliterated Hawkins, and has never yielded to Davis, is now a matter of very trifling importance.

I may be permitted to remark particularly, that Hawkins and Strong not only saw both East and West Falkland, but that in 1690 Strong anchored repeatedly between them, and landed: and I do so, because stress has been laid upon the fact

* This rock was seen by Hawkins, and named by him 'White Conduit.' Now it is called Eddystone.

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of Beauchesne Goüin having anchored in 1700 on their eastern coast.

In the year 1600, the islands now called Jasons, Salvages, or Sebaldines, at the north-west extremity of the Falklands, were seen and named by Sebald de Weert; and during the next two centuries many other navigators, sailing to or from the Pacific, saw the Falklands; but it does not appear that any further landing was effected, or even that any vessel anchored there, after Beauchesne, except the Saint Louis, of St. Malo, until M. de Bougainville landed to form his settlement, in February 1764.

Several ships of St. Malo passed near the Eastern Falklands between the years 1706 and 1714, from whose accounts M. Frezier compiled his chart, published in 1717; and in compliment to the owners of one of them (the Saint Louis), her commander, M. Fouquet, named the cluster of islets near which he anchored, the Anican Isles.

In consequence of the visits of these ships of St. Malo, the French named the islands Les Malouines; but this was not till after 1716, when Frezier compiled the chart in which he called them 'Isles Nouvelles,' although in his own narrative (p. 512, Amsterdam edition, 1717), he says, "Ces îsles sont sans doute les mêmes que celles que le Chevalier Richard Hawkins découvrit en 1593."

The Spaniards adopted the French name, slightly altered, by changing Malouines into Malvinas: even now the term 'Maloon,' a corruption of Malouine,* is sometimes used by English or Americans instead of island, in writing as well as in speaking.

During the early part of the last century, France maintained a lucrative commerce with Chile and Peru, by way of Cape Horn, and the advantages which might be derived from a port of refuge and supply at the eastern extremity of the Falklands did not escape her active discernment.

De Bougainville says, "Cependant leur position heureuse

* "Fortunately, it is on this maloon, or island, that bullocks and horses are found running wild."—(Weddell, p. 97.)

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pour servir de relâche aux vaisseaux qui vont dans la mer du sud, et d'échelle pour la découverte des terres Australes, avoit frappé les navigateurs de toutes les nations. Au commencement de l'année 1763, la cour de France résolut de former un établissement dans ces îles. Je proposai au ministere de le commencer à mes frais, et secondé par MM. de Nerville et d'Arboulin, l'un mon cousin-germain et l'autre mon oncle, je fis sur le champ construire et armer à Saint Malo, par les soins de M. Duclos Guyot, aujourd'hui mon second, l'Aigle de vingt canons, et le Sphinx de douze, que je munis de tout ce qui étoit propre pour une pareille expédition. J'embarquai plusieurs familles Acadiennes, espèce d'hommes laborieuse, intelligente, et qui doit être chère à la France par l'inviolable attachement que lui ont prouvé ces honnêtes et infortunés citoyens.

" A' Monte Video nous prîmes beaucoup de chevaux, et de bêtes à corne,—nous atterrâmes sur les îles Sébaldes le 31 Janvier 1764.

" La même illusion qui avoit fait croire à Hawkins, à Woodes Rogers, et aux autres, que ces îles étoient couvertes de bois, agit aussi sur mes compagnons de voyage, et sur moi. Nous vîmes avec surprise, en débarquant, que ce que nous avions pris pour du bois en cinglant le long de la côte, n'étoit autre chose que des touffes de jonc fort élevées et fort rapprochées les unes des autres. Leur pied, en se desséchant reçoit la couleur d'herbe morte jusqu'à une toise environ de hauteur; et de là sort une touffe de joncs* d'un beau verd qui couronne ce pied; de sorte que, dans l'éloignement, les tiges réunies présentent l'aspect d'un bois de médiocre hauteur. Ces joncs ne croissent qu'au bord de la mer, et sur les petites îles; les montagnes de la grande terre sont, dans quelques endroits, couvertes entièrement de bruyères, qu'on prend aisément de loin pour du taillis."—(Voyage autour du Monde, 1766-69, séconde édition, 1772, tom. i. p. 66-69.)

On the 17th of March De Bougainville decided to place his

* Now called Tussac by the sealers and colonists.

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establishment on the spot where the present settlement stands, and forthwith disembarked to commence the laborious undertaking of founding a colony.

In the year 1764, a squadron was sent to the South Seas by George III., in whose instructions, dated June 17th, 1764, it is said, "And whereas his Majesty's islands, called Pepys Island and Falkland Islands, lying within the said track," (the track between the Cape of Good Hope and the Strait of Magalhaens), "notwithstanding their having been first discovered and visited by British navigators, have never yet been so sufficiently surveyed, as that an accurate judgment may be formed of their coasts and product, his Majesty, taking the premises into consideration, and conceiving no junction so proper for enterprises of this nature as a time of profound peace, which his kingdoms at present happily enjoy, has thought fit that it should now be undertaken."

On the 23d January 1765, Commodore Byron went on shore at these islands, with the captains and principal officers of his squadron, "when the Union Jack being erected on a high staff, and spread, the commodore took possession of the harbour and all the neighbouring islands for his Majesty King George III., his heirs, and successors, by the name of Falkland Islands. When the colours were spread, a salute was fired from the ship."

In consequence of Byron's favourable report, Captain Macbride was sent out in H.M.S. Jason to begin their colonization. He arrived in January 1766.

Spain, hearing of the French settlement, immediately laid claim to the islands, as forming a part of her American possessions; and France, influenced by various considerations, agreed to deliver up to Spain her newly-formed colony, upon condition that the projectors and colonists should be indemnified for their losses: an agreement honourably fulfilled by Spain.

On the 1st of April 1767, De Bougainville gave up possession to the Spanish officer appointed to take charge; the standard of Spain was hoisted, and royal salutes fired by the ves-

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sels present. Some of the French colonists remained, but the greater part preferred returning to France, and passages were given to them on board Spanish ships.

In 1770, a Spanish armament attacked the British colony at Port Egmont, and obliged its small garrison to surrender to an overpowering force, and quit the place. England, indignant at the insult, armed for war, and demanded satisfaction from Spain for the injury inflicted. At first Spain argued and temporized; but finding that Great Britain continued firm, and that the English people were even more disposed for action than their Government, she relinquished her views—disavowed the act of her officer—and restored Port Egmont. England was satisfied—or rather, the court party professed to be satisfied; but the opposers of government angrily declared that Spain had not done enough; and that, though compelled to make restitution, her insult was unatoned for.

In 1774, finding the establishment at the Falklands expensive, and almost useless,* England quietly withdrew it; but the marks and signals of possession and property were left upon the islands, and when the governor departed, the British flag remained flying, and various formalities were observed, intended to indicate the right of possession, as well as to show that the occupation of them might be resumed.

The reports made by officers employed at Port Egmont were of such a discouraging tendency, that no person at that time entertained the least wish to have any further concern with the islands—and for years they were unnoticed—though not forgotten by England. Spain, however, jealous of interference with her colonial possessions, and regarding the Falklands as a vantage-ground, from which those in the south might be suddenly or secretly invaded, maintained a small garrison at the eastern extremity of the Archipelago, where her ships occasionally touched, and from time to time reconnoitred the adjacent ports, in order to ascertain whether any visitors were there. At what precise time the Spaniards with-

* The fact was, it was injudiciously situated, and therefore seldom visited, except by a few fishermen.

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drew this small garrison, and left the Falkland archipelago uninhabited by man, I am not certain; but it must have been early in this century, because from 1810 to 1820 there was no person upon those islands who claimed even a shadow of authority over any of them.

In 1820, a ship of war was sent from Buenos Ayres to Port Louis; her captain, Jewitt, hoisted the Argentine flag, and saluted it with twenty-one guns; notifying, at the same time, to the sealing and whaling vessels present, that he was "commissioned by the Supreme Government of the United Provinces of South America to take possession of these islands in the name of the country to which they naturally appertain."—(Weddell, p. 103.) This act of the Buenos Ayrean Government was scarcely known in Europe for many years; and not until 1829 was it noticed formally by Great Britain.

After reading this short statement of facts, one may pause to consider what nation is at this moment the legitimate owner of the Falklands. Do the discovery, prior occupation, and settlement of new and uninhabited countries give a right to possession? If so, Great Britain is the legal owner of those islands. Davis first discovered them; Hawkins first named them; Strong first landed on them; and (excepting the French), Byron first took formal possession of them; and (again excepting the French), Macbride first colonized them. Respecting the French claim, depending only upon first settlement, not discovering, naming, or landing; whatever validity any one may be disposed to allow it, that value must be destroyed, when it is remembered that Spain asserted her superior claim, and that France actually admitted it, resigning for ever her pretensions to those islands. Whatever France might have been induced to do for political reasons, of which the most apparent now is the continuance of the trade she then carried on with Chile and Peru, England never admitted that the Spanish claim was valid: and France having withdrawn, the question is solely between Spain and Great Britain. Spaniards neither discovered, landed upon, nor settled in the Falklands before Englishmen; and their only claim rests upon

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the unstable foundation of a papal bull, by virtue of which Spain might just as well claim Otaheite, the Sandwich Islands, or New Zealand.

As to the pretensions of Buenos Ayres, I shall only remark, that in a paper transmitted by her government to Mr. Baylies, chargé-d'affaires of the United States of North America, on the 14th August 1832, the advocate of her claims asserts, that "it is a political absurdity to pretend that a colony which emancipates itself, inherits the other territories which the metropolis may possess. If that singular doctrine were to be found in the code of nations, the Low Countries, for example, on their independence being acknowledged, in 1648, would have succeeded to Spain in her rights to America; and in the same manner, the United States would have appropriated to themselves the British possessions in the East-Indies. Inheritance, indeed! the United States did not inherit the rights of England in Newfoundland, notwithstanding its contiguity; and are they to inherit those which she may have to the Malvinas, at the southern extremity of the continent, and in the opposite hemisphere."*

The writer of the preceding sentences, in his haste to attack the United States of America for an assertion made by one of their journalists, to the effect that the United States inherited from Great Britain a claim to fish around the Falklands, must have overlooked the simple fact, that his arguments were even more applicable to Buenos Ayres than they were to the United States of North America.

When Captain Jewitt arrived at the Falklands, he found more than thirty sail of vessels engaged there in the seal fishery, besides others which were recruiting the health of their crews after whaling or sealing voyages in the antarctic regions. By the crews of these ships numbers of cattle and pigs were killed, as well as horses, the wild descendants of those taken there by Bougainville and his successors.

* Papers relative to the origin and present state of the questions pending with the United States of America on the subject of the Malvinas (Falkland Islands). Translated and printed at Buenos Ayres in 1832.

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In 1823, the Buenos Ayrean Government took another step, in the appointment of a 'comandante de las Malvinas;' and in the same year, Lewis Vernet, by birth a German, in concert with his friends at Buenos Ayres, "solicited and obtained from the Government the use of the fishery and of the cattle on the Eastern Malvina, and likewise tracts of land thereon, in order to provide for the subsistence of the settlement.* This undertaking did not prosper; but the next year Mr. Vernet prepared a second expedition, in which he himself sailed. His own words (translated) are: † "After many sacrifices, I was enabled to surmount great obstables; but still that which we expected to effect in one year was not realized before the expiration of five. My partners lost all hope, and sold me their shares. I bought successively three vessels, and lost them; I chartered five, one of which was lost. Each blow produced dismay in the colonists, who several times resolved to leave that ungrateful region, but were restrained by their affection for me, which I had known how to win, and by the example of constancy and patience which my family and myself held out to them."

In 1828, the Government of Buenos Ayres granted to Mr. Vernet (with certain exceptions) the right of property in the Falkland Islands—and in Staten Land! "It also conceded to the colony exemption from taxation for twenty years, and for the same period the exclusive right to the fishery in all the Malvinas, and on the coast of the continent to the southward of the Rio Negro, under the condition that within three years I (Vernet) should have established the colony." ‡

About this time merchant-vessels of all nations visited the Falkland Islands, both in their outward voyage and when returning from the Pacific; but advantageous as their visits were, those of numerous sealers had a very different effect: for, instead of frequenting the settlement, their crews killed the seal indiscriminately at all seasons, and slaughtered great numbers of wild cattle. "For this reason," says Vernet, "I

* See note in preceding page. † Idem. ‡ Idem.

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requested the Government to furnish me with a vessel of war, to enable me to cause the rights of the colony to be respected. The Government was aware of the necessity of the measure; but not being then able to place a vessel at my disposal, it resolved to invest me with a public and official character, and for that purpose issued the two decrees of the 10th of June: the one re-establishing the governorship of the Malvinas and Tierra del Fuego; and the other nominating me to fulfil that office."*

In 1829, Vernet warned off some North American sealers; and in 1831, upon their repeating the sealing excursion of which he had complained, he detained them by force. This act, and various circumstances arising out of it, drew upon him and his unfortunate colony the hasty indignation of Captain Silas Duncan, of the United States corvette Lexington, who, on his own responsibility, without waiting to communicate with his Government, sailed from the Plata to the Falkland Islands, surprised, assaulted, and made prisoners of many unoffending people, and unwarrantably destroyed both property and buildings. Mr. Brisbane and several others were put into confinement, and carried away, on board the Lexington, to Buenos Ayres, where they were delivered up to the Buenos Ayrean Government, in February 1832. The United States supported their officer, and immediately despatched a chargé-d'affaires to Buenos Ayres, with instructions to demand compensation for the injury done to North American trade, and full reparation to all North American citizens for personal wrongs.

While the United States and Buenos Ayres were discussing the questions at issue, Great Britain, following up the solemn warnings she had given Buenos Ayres (especially in the protest addressed to that Government by Mr. Parish, in November 1829), issued orders to her Commander-in-chief on the South American station, to send a vessel of war to re-hoist the British flag upon the Falkland Islands; to assert her right of sovereignty, and to cause every thing belonging to the Buenos Ayrean Government to be embarked and sent away.

* See note, page 236.

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On the 2d of January 1833, H.M.S. Clio anchored in Berkeley Sound, to carry these orders into effect; H.M.S. Tyne, about the same time, anchoring in Port Egmont. In each place the British colours were hoisted and saluted: the small Buenos Ayrean garrison at Port Louis quietly withdrew, and sailed for the Plata in an armed schooner, belonging to Buenos Ayres: and from that time those unhappy islands have been more ostensibly British, though but little has yet been done to draw forth the resources, and demonstrate the advantages which they unquestionably possess. When the Tyne and Clio sailed, after a very short stay at the islands, no authority was left there, but the colours were entrusted to an Irishman, who had been Mr. Vernet's storekeeper.*

In 1834, a lieutenant in the navy, with a boat's crew, was sent to reside at Port Louis, and since that time various small ships of war have succeeded each other in visiting and exploring the numerous islands and harbours of that archipelago.

Those who may wish for more historical information on this subject—for further details of former negociations between Spain and England, or of the late discussions between North America and Buenos Ayres—should refer to Dr. Johnson's "Thoughts respecting the Falkland Islands" (Johnson's Works, vol. viii. p. 96, Murphy's Edition, 1816); to Junius's 42d Letter; and to papers published at Buenos Ayres in 1832; in addition to general history.

* Not long before the Clio arrived, there had been a mutiny in the garrison, and the Buenos Ayrean commanding officer had been barbarously murdered. In the early part of 1834, Mr. Brisbane fell a victim to treachery. These fatal occurrences will be mentioned again in the course of my narrative.

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CHAPTER XII.

First Appearance — Tides — Currents — Winds — Lightning — Seasons — Temperature — Rain — Health — Dangers — Cautions — View — Settlement — Animals — Foxes — Varieties — Seal — Whales — Fish and Fishery — Birds — Brushwood — Peat — Pasture — Potash — Orchilla — Grazing — Corn — Fruit — Vegetables — Trees — Plants — Land — Situation of principal Settlement — Prospective advantages — Suggestions — Vernet's Establishment — Reflections.

In the appearance of the Falkland Islands, there is very little either remarkable or interesting. About the greater part of the archipelago, barren hills, sloping towards low and broken ground, or rocky surf-beat shores, are the only objects which meet the eye. On the West Falkland, and some small islands near it, there are high precipitous cliffs in a few parts exposed to the western seas; but other places, and especially the southern portions of East Falkland, are so low that they cannot be seen from the deck of a vessel five miles distant. The average height of the western island is greater than that of the eastern, although the highest hills seem to be in the latter, where they rise to about thirteen hundred feet above the sea level.

Around the islands, especially toward the south-eastern and north-western extremes, there are numerous islets and rocks, whose distance from shores, where tides run strongly and winds are violent as well as sudden, makes them exceedingly dangerous; more particularly near the north-west extremity of the group: and as seamen require information on these matters before entering a port, I will notice the tides, winds, and climate previous to other subjects.

The tides differ much as to strength and direction in different parts of the archipelago, but the times of syzigial high water only vary from five to eight o'clock; and the rise of tide is almost similar every where, about four feet at neap, and eight

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feet at spring tides. The principal swell of the ocean, which causes the tidal streams about these islands, comes from the south-east. Scarcely any stream is perceptible on the south-east coast of East Falkland; but along the north, south, and west shores it increases in strength, until among the Jason Islands it runs six miles an hour, causing heavy and dangerous races. Off Berkeley Sound, across the entrance, and near Cape Carysfort, the tide runs about two knots, at its greatest strength; and thence westward it increases gradually. Into Falkland Sound the tide flows from both openings, and meets near the Swan Islands; shewing, I apprehend, that the principal wave or swell impinges upon the coast considerably eastward of south.

The tidal currents are stronger along the northern shores of the archipelago than they are along the south coasts; and the stream of flood is stronger than the ebb. At Port William, the easternmost harbour, the time of high water at full moon is five; and thence westward, the times increase gradually to half-past eight, at New Island, which is nearly the westernmost of the group.

Generally speaking, the sea is much deeper near the southern and western shores than it is near those of the north; and to those local differences I attribute the varying velocity of the minor tide streams.

Besides these movements of the surrounding waters, there is a current setting past the islands from south-west to north-east: a current which continually brings drift wood to their southern coasts, and has brought Fuegian canoes. On all parts of the southern shores that are open to the south-west, the beaches or rocks are covered with trees, which have drifted from Staten Land or Tierra del Fuego. Great quantities of this driftwood may be found between Cape Orford and Cape Meredith; upon the Arch, Speedwell, George, and Barren Islands: indeed, there are few places between Cape Orford and Choiseul Bay where a vessel may not find a good supply of fuel. On Long Island, and in the bay behind the Sea-Lion Islands, portions of Fuegian canoes have often been found; one consisted of an entire side (pieces of bark sewed together), which

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could not have been made many years. At sea, when north-eastward of the Falklands, great quantities of drift kelp* are seen, besides water-worn trunks and branches of trees, near which there are generally fish, and numbers of birds. These sure indications of a current from the south-west have been met with upwards of two hundred miles to the northward of Berkeley Sound. There is not, however, reason to think that this current ever runs more than two knots an hour, under any circumstances, and in all probability its usual set is even less than one knot.

Wind is the principal evil at the Falklands: a region more exposed to storms, both in summer and winter, it would be difficult to mention.

The winds are variable; seldom at rest, while the sun is above the horizon, and very violent at times; during the summer a calm day is an extraordinary event. Generally speaking, the nights are less windy than the days, but neither by night nor by day, nor at any season of the year, are these islands exempt from sudden and very severe squalls; or from gales which blow heavily, though they do not usually last many hours.

It has been stated by Bougainville and others that in summer the wind generally freshens as the sun rises, and dies away about sunset: also, that the nights are clear and starlight. The information I have received, with what I have myself witnessed, induces me to agree to the first of these statements in its most general sense, and to a certain degree I can admit the second; but, at the same time, it is true that there are many cloudy and very many windy nights in the course of each year, I might almost say month. The Magellan was driven from her anchors, though close to a weather shore in the narrowest part of Berkeley Sound, and totally wrecked in Johnson Harbour about midnight of the 12th of January† 1833.

The prevalent direction of the wind is westerly. Gales, in general, commence in the north-west, and draw or fly round to the south-west; and it may be remarked, that when rain

* Sea-weed detached from the rocks and drifting with the current.

† The month which, in that hemisphere, corresponds to July in ours.

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accompanies a north-west wind it soon shifts into the south-west quarter, and blows hard.

Northerly winds bring cloudy weather; and when very light, they are often accompanied by a thick fog: it is also worth notice that they almost always occur about the full and change of the moon.

North-east and northerly winds bring gloomy overcast weather, with much rain; sometimes they blow hard and hang in the N.N.E., but it is more common for them to draw round to the westward. South-easterly winds also bring much rain, they are not frequent, but they blow hard, and as the gale increases it hauls southward. During winter the winds are chiefly from the north-west, and in summer they are more frequently south-west. Though fogs occur with light easterly or northerly winds, they do not often last through the day.

Gales of wind, as well as squalls, are more sudden, and blow more furiously from the southern quarter, between south-west and south-east, than from other directions.

Wind from the east is rarely lasting, or strong; it generally brings fine weather, and may be expected in April, May, June, and July, rather than at other times, but intervals of fine weather (short indeed), with light breezes from E.S.E. to E.N.E., occur occasionally throughout the year.

Neither lightning nor thunder are at all common, but when the former occurs easterly wind is expected to follow. If lightning should be seen in the south-east while the barometer is low,* a hard gale from that quarter may be expected. South-east and southerly gales last longer than those from the westward, and they throw a very heavy sea upon the southern shores. In the winter there is not, generally, so much wind as in the summer, and in the former season the weather, though colder, is more settled, and considerably drier.

* A seaman may naturally ask here, and at other passages where reference is made to the barometer, "What is considered low for that place?" and as a reply may be obtained more satisfactorily by consulting the Meteorological Journal, in the appendix, than by receiving an answer in figures (barometers and direction of wind varying so much), I will beg him to look at that Journal.

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In different years seasons vary so much, that those who have been longest about the islands hardly venture to predict what weather will be found during any particular month. All they say is, that January, February, and March, though warmest, are the windiest months, and that May, June, and July, though cold, are much less stormy.*

I must here add one word in favour of the barometer, or sympiesometer. Every material change in the weather is foretold by these invaluable instruments, if their movements are tolerably understood by those who consult them, and if they are frequently observed. Mr. Low said to me, "The barometer is worth any thing in these countries" (alluding to Tierra del Fuego, as well as the Falklands); "some say they dislike it because it is always so low, and foretelling bad weather; but how often do we have any other?" They must, somehow, think the barometer ominous, and overlook the use of the omen.

The temperature may be considered equable; it is never hot, neither is it ever very cold; but the average is low, and in consequence of frequent rain and wind, a really moderate degree of cold is much more noticed than would probably be the case if the weather were dry and serene.

Since 1825 Fahrenheit's thermometer has only once been observed so low as 22° in the shade, at mid-day, and it has been but once above 80° in the shade. Its ordinary range is between 30° and 50° in the winter, and from 40° to 65° in the summer. Ice has not been known to exceed an inch in thickness; snow seldom lies upon the low lands, or at any period exceeds two inches in depth. Although rain is so frequent, it does not continue falling for any considerable time; and as evaporation is rapid, in consequence of so much wind, there are no unwholesome exhalations; indeed, the climate is exceedingly healthy, and no disease whatever has been hitherto contracted, in consequence of its influence, excepting ordinary colds and coughs, or rheumatic affections, brought on by unusual expo-

* Mr. Low scarcely ever found two succeeding years alike, as to wind and weather, during the corresponding seasons.

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sure to weather. It is said by those who have had the most experience there, that the climate of West Falkland is milder than that of the Eastern large island. Probably the west winds are chilled in passing over the heights, and upon reaching Port Louis are several degrees colder than when they first strike upon the western islands. In Tierra del Fuego, and many other places, the case is similar, the western regions having a milder climate than is found about the central or eastern districts. Excellent harbours, easy of access, affording good shelter, with the very best holding ground, abound among these islands, and, with due care, offer ample protection from the frequent gales.

In approaching the land, and especially while entering a harbour, a careful look-out should be kept for 'fixed kelp,' the seaweed growing on every rock in those places, which is covered by the sea, and not very far beneath its surface. Lying upon the water, the upper leaves and stalks show, almost as well as a buoy, where there is a possibility of hidden danger. Long stems, with leaves, lying regularly along the surface of the sea, are generally attached to rocky places, or else to large stones. Occasionally a few straggling stalks of kelp are seen in deep water, even in thirty fathoms: many of which are attached to stones, and so firmly, that their long stems will sometimes weigh the stone adhering to their roots. Such scattered plants as these need not be minded by a ship; but in passing to windward of patches or beds of kelp, or rather in passing on that side from which the stems stream away with the current, care should be taken to give the place a wide berth, because the only part which shows, when the tide is strong, lies on one side of, not over the rocks. Where the stream of tide is very strong this kelp is quite 'run under,' or kept down out of sight, and can no longer be depended on as a warning. When a clear spot is seen in the middle of a thick patch of fixed kelp, one may expect to find there the least water.

Drift kelp, or that which is floating on the surface of the sea, unattached to any rock or stone, of course need not be

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avoided; it may be known at a glance, by the irregular huddled look which it has. Off the south-east shores of the Falklands there are several rocky shallows, on which the sea breaks heavily during south-east gales, though not at other times: all those shallows are marked by kelp, and in one place, thus indicated, not more suspicious in appearance than others, a rock was found, almost 'awash' at low water.

Many wrecks have occurred, even on the land-locked shores of harbours themselves, and in 1833-4, some of their remains served as a warning to strangers to moor their ships securely: but with good ground tackle, properly disposed, and the usual precautions, a vessel will lie in absolute safety, as the holding-ground is excellent: indeed, in many places so tenacious, that it is exceedingly difficult to weigh an anchor which has been some time down. Particular directions for making the land, approaching and entering harbours, and taking advantageous berths, will be found in another place: generally speaking, the local pilotage is very simple.

The country is remarkably easy of access to persons on foot; but half-concealed rivulets and numerous bogs, oblige a mounted traveller to be very cautious. There are no trees any where, but a small bush is plentiful in many vallies. Scarcely any view can be more dismal than that from the heights: moor-land and black bog extend as far as eye can discern, intersected by innumerable streams, and pools of yellowish brown water. But this appearance is deceptive; much of what seems to be a barren moor, is solid sandy clay soil, covered by a thin layer of vegetable mould, on which grow shrubby bushes and a coarse grass, affording ample nourishment to cattle; besides which, one does not see into many of the vallies where there is good soil and pasture. Some tracts of land, especially those at the south of East Falkland, differ in character, being low, level, and abundantly productive of excellent herbage.

Mr. Darwin's volume will doubtless afford information as to the geological formation of the Eastern Falkland. He did not visit the western island, but obtained many notices of it from

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those who were there. The more elevated parts of East Falkland are quartz rock; clay-slate prevails in the intermediate districts. Sandstone, in which are beautifully perfect impressions of shells, occurs in beds within the slate formation: and upon the slate is a layer of clay, fit for making bricks. Near the surface, where this clay is of a lighter quality, and mixed with vegetable remains, it is good soil, fit for cultivation. In some places, a great extent of clay is covered by a layer of very solid peat, varying in depth from two to ten feet. The solidity of this peat is surprising; it burns well, and is an excellent substitute for other fuel. To the clay and to the solid peat may be attributed the numerous bogs and pools of water, rather than to the total amount of rain. Is the peat now growing, or was the whole mass formed ages ago?

The settlement, now consisting only of a few huts, some cottages, and a ruinous house or two, occupies the place originally selected by Bougainville, close to Port Louis, at the head of Berkeley Sound. Standing in an exposed situation, scattered over half a mile of rising ground, without a tree or even a shrub near it, the unfortunate village has a bleak and desolate appearance, ominous of its sad history. Previous, however, to entering upon the affairs of the settlement, I will continue my sketch of the islands and their present produce, independent of the settlers now there.

By the French, and afterwards by the Spanish colonists, a number of black cattle, horses, pigs, and rabbits, were turned loose upon East Falkland; and, by considerate persons, engaged in whale or seal-fishery, both goats and pigs have been left upon smaller islands near West Falkland. These animals have multiplied exceedingly; and, although they have been killed indiscriminately by the crews of vessels, as well as by the settlers, there are still many thousand head of cattle, and some thousand horses, besides droves of pigs, perfectly wild, upon the eastern large island: while upon Carcass Island, Saunders Island, and others, there are numbers of goats and pigs. In 1834, the smallest estimate exceeded twelve thou-

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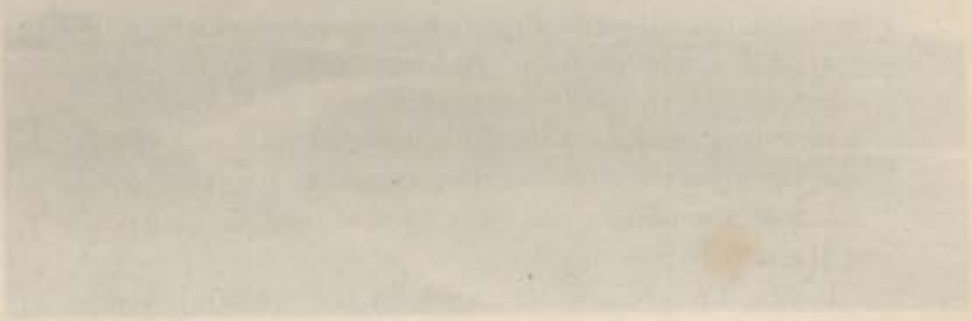

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ENTRANCE TO BERKELEY SOUND.

SETTLEMENT AT PORT LOUIS.

BERKELEY SOUND FALKLAND ISLANDS.

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sand cattle, and four thousand horses; but there were no means of ascertaining their number, except by comparing the accounts of the gaucho colonists, who were accustomed to pursue them, not only for ordinary food or for their hides, but even for their tongues alone, not taking the trouble to carry off more of the animal so wantonly slaughtered.* The wild cattle are very large and very fat, and the bulls are really formidable animals, perhaps among the largest and most savage of their race. At Buenos Ayres, the ordinary weight of a bull's hide is less than fifty pounds, but the weight of such hides in the East Falkland has exceeded eighty pounds. The horses look well while galloping about wild, but the gauchos say they are not of a good breed, and will not bear the fatigue of an ordinary day's work, such as a horse at Buenos Ayres will go through without difficulty. Perhaps their 'softness,' as it is there called, may be owing to the food they get, as well as to the breed. The wild pigs on East Falkland are of a long-legged, ugly kind; but some of those on Saunders Island and other places about West Falkland are derived from short-legged Chinese pigs. The only quadruped apparently indigenous is a large fox, and as about this animal there has been much discussion among naturalists, and the specimens now in the British Museum were deposited there by me, I am induced to make a few remarks upon it.

* "The settlers, when they abandoned the eastern island, left behind them several horses and horned cattle, which have increased so much, that, on going a few miles into the country, droves of both animals may be seen. I have taken several of the bullocks by shooting them. They are generally ferocious, and will attack a single person; and thus, those who hunt them are enabled to get within pistol-shot of them by the following stratagem. Four or five men advance in a line upon the animal, and, by appearing only as one person, it stands ready to attack, till within one hundred yards, when the hunters spread themselves, and fire, endeavouring to shoot the bullock either in the head or in the fore-shoulder. The horses will also attack a single person, and their mode of doing so is by forming a circle round him, and prancing upon him; but by means of a musquet they may be readily dispersed."—Weddell's Voyage, pp. 102, 103.

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It has been said, that there are two varieties of this 'wolf-fox,' as it has been called,* one being rather the smaller, and of a redder brown; but the fact is, that no other difference exists between the two apparent varieties, and as the darker coloured larger animal is found on the East Falkland, while the other is confined to the western island, the darker colour and rather thicker furry coat may be attributed to the influence of a somewhat colder climate. The fox of West Falkland approaches nearer the large fox of Patagonia, both in colour and size, than its companion of East Falkland does; but allowing that there is one shade of difference between the foxes of East and West Falkland, there are but two, or at most three shades between the animal of West Falkland and the large fox of Port Famine. In Strong's voyage (1690), Simson describes these foxes as being twice as large as an English fox, but he does not say upon which island.†

* "Le loup-renard, ainsi nommé parce qu'il se creuse un terrier, et que sa queue est plus longue et plus fournie de poil que celle du loup, habite dans les dunes sur le bord de la mer. Il suit le gibier et se fait des routes avec intelligence, toujours par le plus court chemin d'une baie à l'autre; à notre première descente à terre, nous ne doutâmes point que ce ne fussent des sentiers d'habitans. Il y a apparence que cet animal jeûne une partie de l'année, tant il est maigre et rare. Il est de la taille d'un chien ordinaire dont il a aussi l'aboiement, mais foible. Comment a-t-il été transporté sur les îles?"—Voyage de Bougainville, seconde édition, tome i. p. 113.

† "They saw foxes on this land, which, Simson says, 'were twice as big as those in England. Having brought greyhounds with us, we caught a young fox alive, which we kept on board some months, but on the first firing our great guns in the South Sea, he was frighted overboard, as were also some St. Jago monkies. As to the antiquity of these foxes, as they cannot fly, and it is not likely they should swim so far as from America, nor again is it probable that any would be at the pains of bringing a breed of foxes so far as Hawkins' Island is from any other land, it will follow that there have either been two distinct creations, or that America and this land have been formerly the same continent.' There are means more within the common course of nature than those which occurred to Simson, by which foxes may have become inhabitants of this land. Islands of ice are met at sea in much lower southern latitudes,

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All who have seen these animals alive have been struck by their eager ferocity and disregard of man's power. Byron says, "Four creatures of great fierceness, resembling wolves, ran up to their bellies in the water to attack the boat!" also, "When any of these creatures got sight of our people, though at ever so great a distance, they ran directly at them."—"They were always called wolves by the ship's company; but except in their size and the shape of the tail, I think they bore a greater resemblance to a fox. They are as big as a middle-sized mastiff, and their fangs are remarkably long and sharp." "They burrow in the ground, like a fox." The Beagle's officers, when employed in surveying the Falklands, were often annoyed, as well as amused, by the intrusion of these fearless animals. In size, the larger ones are about twice as bulky as an English fox, and they stand nearly twice as high upon their legs.* Their heads are coarser, and their fur is not only thicker as well as longer, but it is of a woolly nature.

Referring again to a resemblance between the Falkland and Patagonian foxes, I may remark, that there is as much difference in size, in coat, and in tail, between the guanaco of Port Desire and that of Navarin Island (near Cape Horn), as there is between the fox of West Falkland and that of Port Famine. What the Patagonian animal is which the Blanco Bay people called 'wolf,'† or to which Pigafetta alluded in his vocabulary of words used by the Patagonians at Port San Julian, as equivalent to 'ani,'‡ I cannot say: I was inclined to suspect an equivoque arising out of the word 'lobo,' which means seal as well as wolf; but Lieut. Wickham says he saw a wolf near the Colorado River. § The Falkland foxes feed upon birds, rab-

tudes, many of which, no doubt, are formed in the bays and rivers of the continent. Seals and sea-birds repose on the edge of the shore, whether it is ice or land, and foxes, or other animals, in search of prey, will frequently be carried away on the large pieces of ice which break off and are driven out to sea."—Burney, vol. iv, pp. 331-332.

* The country they range over being open, without trees, does not require them to steal along under branches, like the foxes of a woody country.

† Page 107 of this volume.

‡ Burney, vol. i. p. 37.

§ Page 296.

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bits, rats and mice, eggs, seals, &c., and to their habits of attacking king-penguins, if not seal, while alive, I presume that a part of their unhesitating approach to man may be traced.

Naturalists say that these foxes are peculiar to this archipelago, and they find difficulty in accounting for their presence in that quarter only.* That they are now peculiar cannot be doubted; but how long they have been so is a very different question. As I know that three hairy sheep, brought to England from Sierra Leone in Africa, became woolly in a few years, and that woolly sheep soon become hairy in a hot country (besides that their outward form alters considerably after a few generations); and as I have both seen and heard of wild cats, known to have been born in a domestic state, whose size surpassed that of their parents so much as to be remarkable; whose coats had become long and rough; and whose physiognomies were quite different from those of their race who were still domestic; I can see nothing extraordinary in foxes carried from Tierra del Fuego to Falkland Island becoming longer-legged, more bulky, and differently coated. But how were they carried there? In this manner:—In page 242, the current was mentioned which always sets from Staten Land towards the southern shores of the Falklands—icebergs or trees

* Forster, as an exception, saw no difficulty in accounting for their involuntary migration. "M. Forster, Anglais, de la Société Royale, qui a fait à cet ouvrage l'honneur de le traduire, a accompagné sa traduction de plusieurs notes."—"Je dois dire que toutes ses notes ne sont pas également justes; par exemple, dans le chapître de l'Histoire Naturelle des Iles Malouines, il est surpris de ce que je le suis d'avoir trouvé sur ces îles un animal quadrupède, et de mon embarras sur la manière dont il a été transporté. Il ajoute qu'ayant passé comme je l'ai fait plusieurs années en Canada, j'aurois dû savoir que des quadrupèdes terrestres se trouvant sur de grandes glaces au moment où elles sont détachées des terres, sont emportées à la haute mer, et abordent à des côtes fort éloignées de leur pays natal, sur lesquelles ces masses de glace viennent échouer. Je sais ce fait; mais M. Forster ne sait pas que jamais les voyageurs n'ont rencontré de glaces flottantes dans les environs des îles Malouines, et que dans ces contrées il ne s'y en peut pas former, n'y ayant ni grand fleuve ni même aucune rivière un peu considérable.—Voyage de Bougainville, séconde édition, tom. i. pp. xiv. et xv. (note).

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drifted by that current and westerly winds afford the means of transport; and I appeal to the quotations already made from Forster's and Bougainville's works for proof that animals may be so carried.

Because we do not know that there are foxes at this time upon Staten Land, it does not follow that there are none, or that they have never been there; and as guanacoes, pumas, and foxes are now found on Eastern Tierra del Fuego, why might not foxes have been carried to Staten Land and thence to the Falklands, or, which is still more probable, drifted from Eastern Tierra del Fuego direct. I have heard somewhere, though I cannot recollect the authority, that a man in North America hauled a large old tree to the bank of a river in which it was floating towards the sea, and proceeded to secure it on the bank, when to his astonishment, out of a hole in the tree jumped a fine fox. Clusters of trees are often found floating, which have fallen off a cliff, or have been carried out of a river; and once in the ocean, they are drifted along partly by currents and partly by wind acting upon their branches or exposed surfaces.

Rats and mice were probably taken to the Falklands by the earlier navigators who landed there, whose ships were often plagued with their numbers.* That they have varied from the original stock in sharpness of nose, length of tail, colour, or size, is to be expected, because we find that every animal varies more or less in outward form and appearance, in consequence of altered climate, food, or habits; and that when a certain

* In Viedma's Diary of an Expedition to Port San Julian in 1780, he says, "El Bergantin San Francisco de Paula entrò en el riachuelo para descargarlo y dar humazo a las ratas." (The brig San Francisco de Paulo went into the creek to be unloaded and smoked, to kill the rats (or mice, ratas signifying either). In Magalhaens' voyage (1520) "Juan (a Patagonian) seeing the Spaniards throwing mice into the sea, desired he might have them for food; and those that were afterwards taken being given to him, he carried them on shore."—Burney, vol. i. p. 34. Perhaps some of those mice reached land alive, as the ships lay close to the shore. Many other vessels, however, afterwards staid some time in Port San Julian, particularly those of Drake.

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change, whatever it may be, is once effected, the race no longer varies while under similar circumstances; but to fancy that every kind of mouse which differs externally from the mouse of another country is a distinct species, is to me as difficult to believe as that every variety of dog and every variety of the human race constitute a distinct species. I think that naturalists who assert the contrary are bound to examine the comparative anatomy of all these varieties more fully, and to tell us how far they differ. My own opinion is, judging from what I have gathered on the subject from various sources, that their anatomical arrangement is as uniformly similar as that of the dogs and of the varieties of man.

On East Falkland there are numbers of rabbits, whose stock is derived from those carried there by Bougainville or the Spaniards. Among them were some black ones (when I was there), which had been pronounced indigenous, or, at all events, not brought from Europe. A specimen of these pseudo-indigenous animals has been carefully examined by those to whom a new species is a treasure, but it turns out to be a common rabbit.

Sea-elephant and seal (both hair and fur-seal) were abundant along the shores of the archipelago in former years, and by management they might soon be encouraged to frequent them again;* but now they are annually becoming scarcer, and if means are not taken to prevent indiscriminate slaughter, at any time of year, one of the most profitable sources of revenue at the Falklands will be destroyed.

Whales frequent the surrounding waters at particular seasons, and they are still to be found along the coasts of Patagonia and Tierra del Fuego (within easy reach from the Falklands), though their numbers are very much diminished by the annual attacks of so many whale-ships, both large and small, which have made the Falklands their head-quarters during the last twenty years.

A valuable source of daily supply, and by salting, of foreign

* On the little island 'Lobos,' in the river Plata, passed and therefore to a certain degree disturbed daily by shipping, seals are numerous; being preserved like game, and destroyed only at intervals.

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export, is the inexhaustible quantity of fish which swarm in every harbour during the summer. The description which most abounds is a kind of bass, from two to three feet long, and six inches in depth: it takes salt well, and has been exported by cargoes to the river Plata* and to Rio de Janeiro; and there are delicious small fish in such shoals, that our boats' crews were sometimes obliged to let a large portion escape from the net before they could haul it ashore without tearing.†

Mr. Vernet said, "We have a great abundance of fish in all the bays, where they come at the beginning of spring to spawn. In the winter season they retire. They enter regularly twice in the twenty-four hours, at about half-flood. They are caught in such numbers, that ten or twelve men salted about sixty tons in less than a month. Generally, they are caught with a net, but they will also take the hook; they are of a species between the mullet and the salmon, and become very fat towards the end of the summer. They are very good eating, and when salted, some prefer them to the cod-fish."—Vernet, MS. 1831. In the fresh-water ponds, so numerous on the large islands, there is a very delicate fish, somewhat resembling a trout, which may be caught by angling. The shell-fish are chiefly muscles and clams, both of which are very abundant, and easily gathered at low water.

It may here be remarked that the cod-fishery off Patagonia and Tierra del Fuego might be turned to very good account by settlers at the Falklands.

Of the feathered tribe there are numbers, but not much variety has been found—a natural consequence of the absence of trees. Three or four kinds of geese,‡ two kinds of snipe, several varieties of the duck, occasionally wild swans of two

* Where fish, though plentiful, does not take salt well.

† Many tons have been taken at a haul.

‡ One kind of goose, that which has erroneously been called a bustard, arrives in a tame condition, about April or May, with easterly winds. Perhaps these birds come from Sandwich Land, or even Enderby Land. Their tameness may be a consequence of being ignorant of man, or of the half-tired state in which they arrive.

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kinds, a sort of quail (like that of Tierra del Fuego), carrion-hawks or vultures, albatrosses, gulls, petrel, penguins, sea-hens, shags, rooks, curlew, sandpipers, rock-hoppers, and a very few land-birds, are found about most of the islands.*

Although there are no trees, a useful kind of brushwood grows abundantly in vallies, to the height of three or four feet, and thickly set together. Over level plains it is but thinly scattered. The settlers use this brushwood for lighting their peat-fires. There are three kinds of bushes: one grows straight, from two to five feet high, with a stem from half an inch to an inch and half in diameter: this kind is found abundantly in most of the vallies. Another is common about the southern parts of the islands, and has a crooked trunk, as thick as a man's arm, growing to about three feet in height. The third is smaller still, being little better than heather; it grows almost every where, though scantily.

Peat is inexhaustible; and, if properly managed, answers every common purpose of fuel, not only as a substitute, but pleasantly.† It will not, however, in its natural state, answer for a forge; but if dried and subjected to heavy pressure for some time before use, a much greater heat might be derived from it.

There is but little difference in the quality of the grass, either on high or low land; but in sheltered valleys it is longer, softer, and greener, than elsewhere. The whole face of the country is covered with it; and in some places, especially over a peaty soil, its growth becomes hard and rank. In the

* 'Birds' eggs are so numerous at the proper season, that "eight men gathered at one place alone, in four or five days, upwards of sixty thousand eggs, and might have collected twice that number had they remained a few days longer."—Vernet, MS. 1831.

† "The want of wood on these islands would be a great inconvenience, were it not that good peat is very abundant. I have burned many tons, and found it an excellent substitute for coal. In order to get it dry, it is necessary to pull it from the sides of the pit, not very deep; and as there are several peat-holes, by working them alternately, the material may be procured in a state fit for use."—Weddell's Voyage, p. 88.

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southern half of East Falkland, where, as I mentioned, the soil is good, there is abundance of long, but brownish grass over all the country, and at the roots of it there are sweet tender shoots, sheltered from the wind, much liked by cattle. In that district there are several varieties of grass growing on fine dark-coloured earth, mixed with light white sand; and, although, from never being cut, it has a rugged and brown appearance, its nutritive properties must be considerable, as the finest cattle are found feeding there. Mr. Bynoe remarked to me, that wherever the surface of the ground had been broken by cattle, he found a very dark-coloured earth mixed with sand or clay, or else clay mixed with gravel and sand. That the clay is good for bricks has been mentioned; but I have not said that there is stone of two or three kinds suitable for building, and that any quantity of lime may be obtained by burning fossil shells brought from the coast of Patagonia, where the cliffs are full of them, or by collecting the shells scattered upon the Falkland shores. Another natural production, of more value than it has hitherto been considered, is the common sea-weed or kelp;* and I am told by Sir Woodbine Parish that the archil or orchilla weed was obtained there by the Spaniards.

It is to be remarked, that the soil of East Falkland has been very much improved in the neighbourhood of the settlement, as well as around the estancia, or farm, where the tame cattle are kept, in consequence of the treading and manuring it has

* The manner of extracting potash from sea-weed is as follows:—When a sufficient quantity of kelp has been collected, it is spread out in a place where it will be dried by the sun and wind, and when dry enough to burn, a hollow is dug in the ground three or four feet wide; round its margin are laid stones, on which the weed is placed and set on fire. Quantities of this fuel being continually heaped upon the circle, there is in the centre a constant flame, from which a liquid substance, like melted metal, drops into the hollow beneath. This substance is worked, or stirred, with iron rakes, and brought to an uniform consistence while in a state of fusion; and when cool, it consolidates into a heavy, dark-coloured alkaline substance, which undergoes in the glass-houses a second vitrification, and then assumes a perfect transparency.

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received. The grass is there as short and as sweet as horses could desire; and does not this show, that by folding, on a large scale, any extent of pasture land might, by degrees, be brought to a similar condition? Why sheep have not been carried there in greater numbers I am not aware, but judging from the climate, and the fur of the foxes, I should suppose that the long-woolled sheep would do well, and perhaps improve the staple of its wool, as the merino sheep has done in an opposite manner—by transportation to Australia. Pigs have increased in great numbers on the small islands, where their young are safer from the foxes, and where there is abundance of the sedgy grass called tussac, the roots and stalks of which are much liked by them.

The size and fatness of the wild cattle is a clear proof that the country is adapted for grazing. Of twenty wild bulls which were killed during one excursion of the settlers, shortly before the Beagle's arrival, the average weight of each hide was above seventy, and a few weighed eighty pounds. Some of these animals are so fat and heavy, that the gauchos say they cannot drive them across the marshy grounds which are passed by the other cattle, as well as by men on horseback. It has been also ascertained that meat takes salt remarkably well in that climate; and as salt of excellent quality, as well as saltpetre, abounds on the coast of Patagonia, there is no reason why large quantities of salt meat and salt fish should not be prepared there, and exported to the Brazils, to the East, to Chile, and Peru, besides supplying a number of the ships which would touch there.

But there are alleged disadvantages to contend against, which must not be overlooked for a moment. It is very doubtful whether corn will ripen. Fruit, which requires much sun, certainly will not, and culinary vegetables have been said to run to stalk and become watery. Nevertheless, Mr. Brisbane assured me that wheat had been tried in Vernet's garden, and that there it grew well, producing a full ear and large grain. The garden was small, slightly manured, and defended from wind by high turf fences. Potatoes, he said,

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grew large, though watery; but it was easy to see that justice had not been done to them, whole potatoes having been put into holes and left to take their chance, upon a soil by no means so suitable for them as might have been found. Planted even in this rough way, Mr. Bynoe collected three pounds weight of potatoes from one root. By proper management, I think that they, as well as turnips, carrots, cabbage, lettuce, and other esculent plants, might be brought to great perfection, particularly on sheltered banks sloping towards the north-east. The turnips which I saw and tasted were large and well-flavoured: the largest seen there weighed eight pounds and a-half. Flax has been tried in a garden, and succeeded. Mr. Bynoe saw some of it. Hemp has never yet been tried. Currant bushes (*ribes antartica*) have been transported from Tierra del Fuego, and tried near the settlement, but their fruit did not ripen properly. It ought, however, to be remembered that those currants are wild, a bad sort of black currant, and that when ripe in Tierra del Fuego they are scarcely eatable.

We read in Bougainville and Wallis, that thousands of young trees were taken up by the roots in the Strait of Magalhaens, and carried to the Falkland Islands; but no traces of them are now visible either at Port Egmont or Port Louis. Perhaps they were taken out of their native soil at an improper period, exposed to frost or salt water, while their roots were uncovered, and afterwards planted by men who knew more of the main brace than of gardening. Bougainville, however, had industrious 'familles Acadiennes' with him, under whose care the young trees ought to have fared better than under the charge of Wallis's boatswain. Mr. Brisbane told me that he had brought over some young trees from Tierra del Fuego for Mr. Vernet; that some had died, but others (which he showed me) were growing well in his garden. From the opinions I have collected on the subject, and from what has been effected on waste lands, downs, and exposed hills in England and Scotland, by planting thousands at once instead of tens, I have no doubt whatever that trees may be

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grown upon either Falkland, and that the more are planted the better they would grow—assisting and sheltering each other. At first, young plants or trees should have banks of earth raised near them, to break the fury of south-west storms, and the most sheltered situations, with a north-east aspect, should be chosen for a beginning.

Anti-scorbutic plants are plentiful in a wild state, such as celery, scurvy-grass, sorrel, &c.; there are also cranberries,* and what the settlers call strawberries, a small red fruit, growing like the strawberry, but in appearance and taste more like a half-ripe blackberry. I must not omit the 'tea-plant,' made from which I have drank many cups of good tea,† and the settlers use it frequently. It has a peculiar effect at first upon some people, which is of no consequence, and soon goes off.‡ This little plant grows like a heath in many parts of the Falklands as well as in Tierra del Fuego, and has long been known and used by sealers.§ The large round gum plant (*Hydrocelice gummifere*), common in Patagonia and Tierra del Fuego, is abundantly found, and, when dried, is useful for kindling fires, being extremely combustible. The gum which exudes from its stalks when cut or broken, is called by the settlers 'balsam,' and they use it quite fresh for wounds; at the least it answers the purpose of sticking-plaister. In summer it may be collected in considerable quantities, without injuring the plants, as it then oozes out spontaneously; even while green, the whole plant is very inflammable. The gauchos, when in the interior of the islands, tear it asunder, set it on fire, and roast their beef before it. Within the stems of the tall sedgy grass, called tussac, is a white sweetish substance, something like the kernel of an unripe nut; this is often eaten by the set-

* One reason for the arrival of flights of geese during April and May may be, that the cranberries are then ripe, of which they are very fond.

† At my own table I have seen it drank by the officers without their detecting the difference: yet the only tea I used at other times was the best that could be obtained at Rio de Janeiro.

‡ U———m ciens.

§ It produces a small berry, of very pleasant taste, which when ripe is eaten as fruit.

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tlers, and is so much relished by cattle, horses, and pigs, that the plant itself is greatly diminished in quantity, and now can only be found in its former luxuriance upon islands where cattle or hogs have not access. These flags or rushes are more than six feet high; they make good thatch and a soft bed. There is a shrub, or rather creeper, of which the French made a kind of beer, thought to be wholesome and anti-scorbutic; and there are other vegetable productions which are of little consequence, perhaps, except to botanists,* and as most of them were long ago well described by Bougainville, I may beg the reader to refer to his fourth chapter (Détails sur l'histoire naturelle des Iles Malouines) for a very faithful and well-written account, to every statement in which, as far as my own knowledge goes, I can bear testimony.

Having mentioned the principal productions, it remains to say what more may be effected and what improvements may be made by an industrious colony. Land, which is now in a state of nature, might be surprisingly improved by ploughing and manuring with burned peat or with kelp, which is so abundant on every part of the shore. Walls, or rather mounds of turf, a few feet in height, would assist the slopes of the ground in sheltering cultivated soil from south-west winds, and where stones, as well as turf, are so plentiful, it would be worth while to make a number of small enclosures for fields as well as gardens, taking care always to select the sides of hills, or rather sloping grounds which incline towards the north-east. Fresh water being abundant everywhere, and the islands being so much cut into by the sea, that water carriage could be obtained to within a very few miles of any place, there can be no great preference for one locality rather than another, with a view to agriculture alone; but of course the principal settlement must be near the eastern extremity of the archipelago, because that part is most accessible to shipping, and even now frequently visited. A colony planted near Port William, or at Port Louis, with a small establishment to supply the wants of ship-

* "On a spot, twelve feet square, chosen indiscriminately on the rising grounds in the interior, twenty-seven different plants were counted."—(Vernet, MS.)

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ping at Port William, could not fail to prosper, if a free port were offered there to ships of all nations. Homeward-bound ships from our rapidly growing colonies in Australia, as well as those from Mexico, Peru, and Chile, are often in want of a port to which they can resort about the middle of their voyage. The River Plata is out of the way and dangerous; Santa Catharina is almost as much out of reach, and deficient in many articles of supply; Rio de Janeiro and Bahia are also out of the line and very expensive, though they are often resorted to; St. Helena is too far east, scantily supplied, and more expensive than the Brazils. But almost every one of those ships 'sight' the eastern end of the Falklands as they pass by, to correct or verify their longitude, and how very little delay then would they experience, if the course were shaped so as to pass a little nearer Port William, and there heave to under the lee of the land, or let go an anchor, as might be most suitable. Water and fresh provisions might be speedily procured, at a price now moderate, and if a colony were once well organized, in a short time as low as in any part of the world. A few small vessels should be attached to the colony, and two small men of war, one of which should be always about the chief harbour, and the other visiting the various ports of the archipelago. I have alluded more than once to the fact of excellent fresh water being plentiful every where, and I may here add, that if a sailing tank-vessel were kept at Port William in readiness to supply ships without delay, that one convenience only, when generally known, would ensure the visits of almost every Australian and Mexican trader, besides many others. No one making a long voyage hesitates to take in an additional supply of good water during his passage, if he can do so without delay (of consequence) and without danger. It is the natural unwillingness to get in with the land—to be delayed in port—to pay heavy port dues, and to risk losing men—that generally induces seamen in command of vessels to avoid every port excepting that to which they are bound; but if you could ensure to a ship loading at Sydney a safe 'half-way house' at the Falklands, she would hardly prefer carrying a quantity of

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water, no longer necessary, to the proportion of cargo that might be stowed in its place.

Local circumstances, such as the relative position of the land, the set of the tides and currents, the prevailing winds, and the accessibility of Port William or Berkeley Sound, contribute to make the easternmost part of the Falklands safer and more easy to approach than almost any place that I am acquainted with.

With the supply of shipping, and the establishment of a frequented free port in view, as the first source of prosperity, colonists should augment the number of animals, birds, and vegetables, which they see thrive so well there, and take little thought about corn, except for home consumption (unless indeed oats should be found to grow well). They should assiduously increase their stock of cattle, sheep, pigs, and poultry, make butter and cheese, rear calves, and breed horses; they should salt meat and fish; bring wood and lime from Tierra del Fuego and Patagonia, and turn their thoughts to supplying ships with water, fuel (perhaps dried peat), and provisions, in the quickest and cheapest manner. Hides, pig-skins, goat-skins, sheep-skins, wool, foxes' fur, rabbit-skins, bird-skins and down, horns, salt meat, salt butter, cheese, potash, orchilla weed, potatoes, salt-fish, seal-skins, seal-oil, whale-oil, and whale-bone, would form no indifferent return cargo for vessels carrying there implements of husbandry, stores of various kinds, flour and biscuit, clothing, lumber, furniture, crockery-ware, glass, cutlery, and household utensils. North American vessels, laden with flour or lumber, might make very profitable voyages.

I have always thought the Falklands an admirable place for a penal establishment, a thorough convict colony. A healthy, temperate climate, far removed from civilized countries, and (if used for such a purpose only) incapable of being injured by the presence of bad characters, as our mixed settlements have been—fully supplied with necessaries, yet without any luxuries—sufficiently extensive to maintain a large population, though small enough to be kept under the strictest martial law, and inspected every where, by water as well as by land—

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it seems to me the very best situation for locating those bad characters who are unfit to remain at home. But to whomsoever it may happen to colonize these islands, there can be no doubt that industry will be well rewarded, that health, safety, and a frequent communication with the mother country, will be as certain as in any other colony, and that the only drawbacks to be anticipated are those likely to be caused by wind and deficiency of solar heat.

Animals increase rapidly, and the quality of their hides or fur improves. Cows give a large quantity of excellent milk, from which good butter and cheese may be made. Not long since, a letter was received from the Hon. George Grey, Captain of H.M.S. Cleopatra, in which he said that the milk and butter at Howick was not superior to that which he tasted at the Falklands. In the event of steamers engaging in the navigation of those seas,* a port of supply and repair, in short, a maritime depôt would be required, in or near Tierra del Fuego; but no such establishment could easily be formed there without a military force, and occasional hostilities with the natives, whereas, at the Falklands, the only native opponents would be foxes, horses, and bulls.† This immense advantage over most habitable and fertile countries—the having no aboriginal population—should be duly considered by those who may contemplate planting a colony there. Weddell says, "A settlement at this point of the South Atlantic would evidently afford great facilities to navigation. The extensive tracts of ground, well clothed with grass, and the quantity of fine cattle running wild on the island, are sufficient proofs of its being a country that might be settled to advantage. The winters are mild, the temperature being seldom so low as the freezing point. Several of my crew, indeed, went without

* From Concepcion (37° S.) to Elizabeth Island, near the eastern entrance of Magalhaens Strait, there is every where abundance of wood fuel for steamers.

† It is very dangerous for persons on foot to approach the wild horses or cattle, especially the bulls, unless they are armed with rifles or balls (bolas); and even then, no one ought to venture alone.

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stockings during the greater part of the winters we spent there. The south wind, however, is cold and stormy, but it is not frequent; the prevailing winds are between S.W. and N.W., which, blowing from the coast of Patagonia, are comfortably temperate. This climate appears to be in general much more temperate now than it was forty years ago, the cause of which may probably be, that immense bodies of ice were then annually found in the latitude of 50°; this ice, between the Falkland Islands and South Georgia, would necessarily lower the temperature of both air and water, and consequently an unfavourable opinion of the climate was produced."—Weddell's Voyage, pages 94-95.

For much of the produce of the islands, such as salt-meat and fish, potatoes, oil, butter, cheese, tallow, &c. a ready market would always be found on the coasts of South America, while other articles, previously mentioned, would have a free sale in Europe and North America. Should any accident happen to a vessel in doubling Cape Horn, obliging her to make for the nearest port at which she can obtain supplies, where can she now go? To the River Plata on one side, or to Chilóe on the other—either of which is twelve hundred miles from Cape Horn!

A great temptation to shipping would be, the certainty of supplies, and freedom from harbour dues as well as pilotage. Twenty years after the first establishment of a colony would be quite soon enough to think of any port charges, and till that time, every encouragement ought to be given to vessels, by piloting them gratis, and charging for nothing but the supplies which they may choose to purchase, and for those, upon the lowest possible terms. As to pilotage, indeed, I may say that none is required, if a stranger has the chart now published by the Admiralty, for there is no danger in any of the Falkland harbours that is not distinctly buoyed by kelp. A few rocks in the offing are indeed to be guarded against, such as the Uranie Rock, and those near the Jason Isles; but a ship must have passed all those before a pilot could board her, under ordinary circumstances, and afterwards there would be no

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danger, if a vigilant look-out and common skill were exercised.

Berkeley Sound (besides many other ports) would contain a large fleet in security, while around it are coves and basins in which any repairs might be carried on.

Probably some intercourse might be opened with the Patagonians, and, by them, with other roving tribes on the continent, who would exchange guanacoes, horses, cattle, poultry, hides, horns, tallow, and hair, for hardware, clothing, cutlery, ornaments, saddles, spurs, bridles, &c.; and as the guanaco is so warmly clothed in the high southern latitudes, and is capable of being domesticated,* it might be found a valuable animal to encourage among sheep and cattle at the Falklands. Mr. Brisbane told me, that some wool, sent by Mr. Vernet from East Falkland to Liverpool, sold for nearly double the price of Buenos Ayres wool; and this was the produce of sheep which had only been a few years on the island, of the Buenos Ayrean stock, unmixed with any superior breed. To show how well the little colony, established by Mr. Vernet, was succeeding, prior to its harsh and unnecessary ruin by Captain Silas Duncan, I will give an extract of a letter received from a brother officer who visited Port Louis.

"The settlement is situated half round a small cove, which has a narrow entrance from the sound; this entrance, in the time of the Spaniards, was commanded by two forts, both now lying in ruins, the only use made of one being to confine the wild cattle in its circular wall when newly brought in from the interior. The governor, Louis Vernet, received me with cordiality. He possesses much information, and speaks several languages. His house is long and low, of one story, with very thick walls of stone. I found in it a good library, of Spanish, German, and English works. A lively conversation passed at dinner, the party consisting of Mr. Vernet and his wife, Mr.

* "Magalhaens, in his voyage, saw Patagonians who had with them four young guanacoes, led about with a kind of halter."—Burney, vol. i. p.34, anno 1520.—And others on which they placed their wives. Pennant. At Mocha the natives had tame guanacoes, or alpacoes, in 1598. In Peru, the llama has been a domestic animal as long as we have any record.

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Brisbane, and others; in the evening we had music and dancing. In the room was a grand piano-forte; Mrs. Vernet, a Buenos Ayrean lady, gave us some excellent singing, which sounded not a little strange at the Falkland Isles, where we expected to find only a few sealers.

"Mr. Vernet's establishment consisted of about fifteen slaves, bought by him from the Buenos Ayrean Government, on the condition of teaching them some useful employment, and having their services for a certain number of years, after which they were to be freed. They seemed generally to be from fifteen to twenty years of age, and appeared contented and happy.

"The total number of persons on the island consisted of about one hundred, including twenty-five gauchos and five Indians. There were two Dutch families (the women of which milked the cows and made butter); two or three Englishmen; a German family; and the remainder were Spaniards and Portuguese, pretending to follow some trade, but doing little or nothing. The gauchos were chiefly Buenos Ayreans; but their capataz or leader was a Frenchman."

Such was the state of Vernet's settlement a few months before the Lexington's visit; and there was then every reason for the settlers to anticipate success, as they, poor deluded people, never dreamed of having no business there without having obtained the permission of the British Government. They thought, naturally enough, that the Buenos Ayrean Government could not have sold the islands to Mr. Vernet, unless the state of La Plata had a right to them; they believed that the purchase-money had been paid;* but they were not aware that the British Government had protested formally against the pretended claim of Buenos Ayres, so quiet was that fact kept by the Argentine Government, although the solemn protest was made by Mr. Parish, the British consul-general, in November 1829.

* It is said that officers in the Buenos Ayrean army, relations of Mrs. Vernet, had claims upon their Government, which they agreed should be liquidated by receiving certain sums of money from Mr. Vernet; in consideration of which the Government made over to him their pretended right of property in the Falklands and Staten Land.

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However unjustifiably Mr. Vernet may, in fact, have behaved towards vessels belonging to the United States of North America, it must be remembered that he had a commission from the Buenos Ayrean Government, empowering him to act as civil and military governor of the Falklands; that he believed the Buenos Ayrean authority valid; and had no doubt in his own mind that he was doing right. Mr. Vernet, therefore, was no robber—no pirate—as he was termed by Captain Duncan, because he tried to uphold his situation, and prevent his settlement being robbed by people who had no claim whatever upon any of the islands. However wrong Vernet's actions may have been, he was responsible to his Government for them; and those who acted under his order, he having a legal commission, certainly did not deserve to be seized as pirates, put into irons, and so carried to the Plata! Neither was it just (setting mercy quite aside) to destroy the infant colony, break open or tear down doors and windows, search houses, drawers, and chests, trample over gardens, break through fences, and ill-use the helpless, unarmed settlers to such a degree, that for many months afterwards whenever a man-of-war was seen approaching, the frightened inhabitants at once fled to the interior, not knowing how they might be treated. Poor Brisbane (of whom frequent mention has already been made, and of whom I have yet to speak), was taken, with others, in irons to Monte Video, where the British consul obtained his release; he had joined Vernet in a contract to take seal upon the Falklands, and was left in charge of the settlement at the period of Captain Duncan's hostility. At that time Vernet himself was absent, having gone with his family to Buenos Ayres, in order that he might attend at the ensuing trial of those sealing vessels which had been detained by him for repeatedly taking seal upon the Falkland Islands, after he had duly warned them off.

I have heard much of Mr. Vernet and his proceedings, from various quarters—from enemies as well as friends—and although I never met him, and therefore cannot be partial from friendship, I do sincerely pity his misfortunes; and it is my belief that he has been much misrepresented.

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CHAPTER XIII.

Anchor in Berkeley Sound—Le Magellan—British flag hoisted—Ruined Settlement—Mr. Hellyer drowned—Burial—French Whalers—Unicorn—Adventure—Squall—Flashes—Fossils—Killing Wild Cattle—Sail from Falklands—River Negro—Maldonado—Constitucion—Heave down, copper and refit Adventure—Signs of weather—Sound banks—Los Cesares—Settle with Harris and part company—Blanco Bay—Return to Maldonado—Monte Video.

March 1. The Beagle anchored at the south side of Berkeley Sound (near the beach where Freycinet was obliged to run l'Uranie ashore, in 1820, after striking on the detached rock off Volunteer Point), and remained there till I had ascertained the state of affairs on shore: for seeing a French flag flying near some tents behind Johnson Cove or harbour, and knowing that, in 1831, the flag of Buenos Ayres was hoisted at a settlement in the sound, it was evident a change of some kind had occurred. Directly our anchor had dropped, a whale-boat belonging to the wrecked whale-ship, 'Le Magellan,' came alongside; and from her chief mate (who was also whaling-master), we learned that his ship had parted from her anchors during a tremendous squall on the night of the 12th of January, and was totally wrecked. He then informed me that the British colours had been hoisted on these islands by H.M.S. Clio; and that H.M.S. Tyne had since visited the port and saluted the flag; that the white flag was hoisted at the French tents only as a signal to us; and that he was sent by M. le Dilly, his captain, to entreat us to render them assistance. Two of our boats were forthwith manned; one was sent to the settlement at Port Louis, and in the other I went to the Frenchmen at Johnson Cove. I found them very comfortably established in large tents made from the sails of their lost ship; but they manifested extreme impatience to get away from the islands, even at the risk of abandoning the vessel and cargo. After due inquiry, I promised to carry as many of them as I

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could to Monte Video, and to interest myself in procuring a passage for the rest.

Their ship was lying upon a sandy beach, one bilge stove in, and her hold full of sand and water; but as there was no surf, and at high spring-tide the sea rose only to her deck, all the stores and provisions, if not the ship herself, might have been saved by energetic application of proper means soon after she was stranded. When I saw her it was not too late, but I had too many urgent duties to fulfil to admit of my helping those who would not help themselves. Returning on board, I met Mr. Chaffers, who had been to Port Louis, and heard that there was no constituted authority whatever resident on the islands, but that the British flag had been left by Captain Onslow in charge of an Irishman, who had been Mr. Vernet's storekeeper. This man at first declined answering Mr. Chaffers's questions, because his uniform buttons were (as he thought) different from those of the Tyne's officers; however, being a simple character, he soon became more loquacious than was wished. He told Mr. Chaffers that he was ordered to 'hoist the flag up and *down*' when vessels arrived, and every Sunday: that there was 'plenty of beef,' and as for rabbits and geese, only the 'poor people eat them.'

2d. Weighed and shifted our berth to Johnson Cove. 3d. We got on board all the new rope, bread, salt meat, and small stores, which the Frenchmen had saved and wished us to embark for the benefit of their owners. Meanwhile, surveying operations were begun, and an officer despatched to the settlement, who informed me of the arrival of a merchant schooner (Rapid), fourteen days from Buenos Ayres, with Mr. Brisbane on board (as Vernet's agent as well as partner), who was delighted to meet our officer, finding in him one of those who helped to save his life when wrecked in the Saxe Cobourg in 1827.

No sooner had Mr. Brisbane landed than the master and crew of the Rapid hastened to make themselves drunk, as an indemnification for the fatigues of their exceedingly long and hazardous voyage: and in that state they were found by the

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Beagle's officer. Next morning Brisbane came on board with his papers, and I was quite satisfied with their tenor, and the explanation which he gave me of his business. Some misapprehension having since arisen about his being authorized by Vernet to act in his stead, I may here mention again (though no longer of any material consequence), that Brisbane's instructions from Vernet authorized him to act as his private agent only, to look after the remains of his private property, and that they had not the slightest reference to civil or military authority. This settled, I went to Port Louis, but was indeed disappointed. Instead of the cheerful little village I once anticipated finding—a few half-ruined stone cottages; some straggling huts built of turf; two or three stove boats; some broken ground where gardens had been, and where a few cabbages or potatoes still grew; some sheep and goats; a few long-legged pigs; some horses and cows; with here and there a miserable-looking human being,—were scattered over the fore-ground of a view which had dark clouds, ragged-topped hills, and a wild waste of moorland to fill up the distance.

"How is this?" said I, in astonishment, to Mr. Brisbane; "I thought Mr. Vernet's colony was a thriving and happy settlement. Where are the inhabitants? the place seems deserted as well as ruined." "Indeed, Sir, it was flourishing," said he, "but the Lexington ruined it: Captain Duncan's men did such harm to the houses and gardens. I was myself treated as a pirate—rowed stern foremost on board the Lexington—abused on her quarter-deck most violently by Captain Duncan—treated by him more like a wild beast than a human being—and from that time guarded as a felon, until I was released by order of Commodore Rogers." "But," I said, "where are the rest of the settlers? I see but half a dozen, of whom two are old black women; where are the gauchos who kill the cattle?" "Sir, they are all in the country. They have been so much alarmed by what has occurred, and they dread the appearance of a ship of war so much, that they keep out of the way till they know what she is going to do." I afterwards interrogated an old German, while Brisbane was out of sight,

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and after him a young native of Buenos Ayres, who both corroborated Brisbane's account.*

At my return on board, I was shocked by the sad information that Mr. Hellyer was drowned. He had walked about a mile along the shore of a creek near the ship, with one of the Frenchmen, who then left him† (having recollected that he would be wanted for a particular purpose). Mr. Hellyer, anxious to shoot some ducks of a kind he had not before seen, walked on with his gun, saying he would return in half an hour.

About an hour after this, the capataz of the gauchos, Jean Simon by name, riding towards the French tents to learn the news, saw clothes, a gun, and a watch, lying by the water side; but, as no person was in sight, he thought they must have belonged to some one in the boats which were surveying, so rode on quietly; and not until another hour had elapsed, did he even casually mention to the Frenchmen what he had seen. They, of course, were instantly alarmed and hastened to the spot, with those of our party who were within reach. Some rode or ran along the shore, while others pulled in whale-boats to the fatal spot, and there, after much searching, the body was discovered under water, but so entangled by kelp that it could not be extricated without cutting away the weed. Mr. Bynoe was one of those who found it, and every means that he and the French surgeon could devise for restoring animation was tried in vain. A duck was found dead in the kelp not far from the body, and his gun was lying on the beach, discharged, with which the bird had been shot.

To me this was as severe a blow as to his own messmates; for Mr. Hellyer had been much with me, both as my clerk and because I liked his company, being a gentlemanly, sensible young man. I also felt that the motive which urged him to strip and swim after the bird he had shot, was probably a

* The German told me, among other things, that he had collected rabbit-skins at his leisure hours, and had made, at different times, above two hundred dollars by them.

† It was a positive order on board the Beagle, that no one should make any excursion, in such places, alone.

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desire to get it for my collection. Being alone and finding the water cold, he may have become alarmed, then accidentally entangling his legs in the sea-weed, lost his presence of mind, and by struggling hastily was only more confused. The rising tide must have considerably augmented his distress, and hastened the fatal result.

5th. This day we buried the body of our lamented young friend, on a rising ground near Johnson Cove, in sight of our ship. All the French attended the melancholy ceremony, as well as all our own party, excepting the very few who were obliged to stay on board.

6th. An agreement was brought about, and witnessed by me, between M. le Dilly and the master of the Rapid schooner, by which the latter bound himself to convey to Monte Video those of the Magellan's crew whom the Beagle could not carry: and next day another French whaler arrived (the fourth we had lately seen), belonging to the owners of the Magellan, so there was no longer any want of help for M. le Dilly.

A few days afterwards a sealing schooner, the Unicorn, arrived, Mr. William Low being sealing master and part owner; and, although considered to be the most enterprizing and intelligent sealer on those shores, perhaps anywhere, the weather had been so much against him that he returned from his six months' cruise a ruined man, with an empty ship. All his means had been employed to forward the purchase and outfit of the fine vessel in which he sailed; but having had, as he assured me, a continued succession of gales during sixty-seven days, and, taking it altogether, the worst season he had known during twenty years' experience, he had been prevented from taking seal, and was ruined. Passengers with him were the master and crew of a North American sealing schooner, the Transport, which had been wrecked on the south-west coast of Tierra del Fuego, in Hope Harbour; and he told me of two other wrecks, all occasioned by the gale of January 12-13th.

At this time I had become more fully convinced than ever that the Beagle could not execute her allotted task before she, and those in her, would be so much in need of repair and rest,

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that the most interesting part of her voyage—the carrying a chain of meridian distances around the globe—must eventually be sacrificed to the tedious, although not less useful, details of coast surveying.

Our working ground lay so far from ports at which supplies could be obtained, that we were obliged to occupy whole months in making passages merely to get provisions, and then overload our little vessel to a most inconvenient degree, as may be supposed, when I say that eight months' provisions was our usual stock at starting, and that we sailed twice with ten months' supply on board.*

I had often anxiously longed for a consort, adapted for carrying cargoes, rigged so as to be easily worked with few hands, and able to keep company with the Beagle; but when I saw the Unicorn, and heard how well she had behaved as a sea-boat, my wish to purchase her was unconquerable. A fitter vessel I could hardly have met with, one hundred and seventy tons burthen, oak built, and copper fastened throughout, very roomy, a good sailer, extremely handy, and a first-rate sea-boat; her only deficiencies were such as I could supply, namely, a few sheets of copper, and an outfit of canvas and rope. A few days elapsed, in which she was surveyed very carefully by Mr. May, and my mind fully made up, before I decided to buy her, and I then agreed to give six thousand dollars (nearly £1,300) for immediate possession. Being part owner, and authorized by the other owners to do as he thought best with the vessel in case of failure, Mr. Low sold her to me, payment to be made into his partners' hands at Monte Video. Some of his crew being 'upon the lay,' that is, having agreed to be paid for their work by a small proportion of the cargo obtained, preferred remaining at the Falklands to seek for employment in other vessels, others procured a passage in the Rapid, and a few were engaged by me to serve in their own vessel which, to keep up old associations, I named 'Adventure.' Mr. Chaffers and others immediately volunteered to go

* Excepting water, of which we only carried six weeks.

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in her temporarily (for I intended to place Mr. Wickham in her if he should be willing to undertake the responsibility), and no time was lost in cleaning her out thoroughly, loading her with stores purchased by me from M. le Dilly and from Mr. Bray (lately master of the Transport), and despatching her to Maldonado, to be prepared for her future employment.

This schooner was built at Rochester as a yacht for Mr. Perkins, and, as I have reason to believe, cost at least six thousand pounds in building and first outfit. Soon afterwards, she was armed and used by Lord Cochrane in the Mediterranean; then she was fitted out by a merchant to break the blockade of Buenos Ayres; but, taken by a Brazilian man-of-war, and carried into Monte Video, she was condemned as a prize and sold to Mr. Hood, the British Consul, who went to England and back again in her with his family; after which, she was fitted out for the sealing expedition I have mentioned. At the time of my purchase she was in want of a thorough refit, and her internal arrangements required alteration; but it happened that Mr. Bray and M. le Dilly had each saved enough from their respective vessels to enable me to load the Adventure on the spot with all that she would require; from the former I bought anchors, cables, and other stores, amounting to £216: and from M. le Dilly rope, canvas, and small spars, for which £187 were paid. Those who were conversant in such matters, the master, boatswain, and carpenter of the Beagle, as well as others, assured me that these articles were thus obtained for less than a third of their market prices in frequented ports.

While the Beagle lay in Johnson Cove, we witnessed a memorable instance of the strength with which squalls sometimes sweep across the Falklands. Our ship was moored with a cable each way in a land-locked cove, not a mile across, and to the south-westward of her, three cables' length distant, was a point of land which, under ordinary circumstances, would have protected her from sea, if not from wind. Our largest boat, the yawl, was moored near our eastern anchor, with a long scope of small chain. At six in the evening of a stormy

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day (10th March), the wind increased suddenly from the strength of a fresh gale to that of a hurricane, and in a few minutes the Beagle brought both anchors ahead, and was pitching her forecastle into the sea. Topgallant-masts were on deck, and yards braced sharp up all day; but we were obliged to let go a third anchor, and even then had some anxiety for the result. Till this squall came, the water had been smooth, though of course covered with white crests ('horses'); but it was then changed into a short sea, such as I should have been slow to believe wind could have raised in that confined cove. The yawl, an excellent sea-boat, and quite light, was swamped at her moorings; but I think that the chief cause of her filling was a quantity of kelp which drifted athwart hawse and hindered her rising easily to the sea.

During the month we remained in Berkeley Sound, I had much trouble with the crews of whaling or small sealing vessels, as well as with the settlers, who all seemed to fancy that because the British flag was re-hoisted on the Falklands, they were at liberty to do what they pleased with Mr. Vernet's private property, as well as with the wild cattle and horses. The gauchos wished to leave the place, and return to the Plata, but as they were the only useful labourers on the islands, in fact, the only people on whom any dependance could be placed for a regular supply of fresh beef, I interested myself as much as possible to induce them to remain, and with partial success, for seven staid out of twelve.

While walking the deck after dark, I sometimes saw flashes of light on the distant hills, which it was difficult to account for as 'ignes fatui,' because they were seen only on the heights, and momentarily, long intervals intervening between each faint flash. I once remarked similar instantaneous glimpses of feeble light, like the flashing of a distant pistol, near Pecket Harbour, in Magalhaens Strait, during a rainy night, but on the hills, at the south side of Berkeley Sound, I witnessed such lights repeatedly. They were never bright or lasting—merely a faint sudden glimmer—exactly as I have said, like the flash of a pistol, fired at a great distance. It has

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since occurred to me, that the phosphoric light spoken of by Bougainville in the following passage may be of a nature similar to that which I saw, and that those momentary flashes might have been caused by the occasional fall of stones among ravines, near the summits of hills. "Des voyages entrepris jusqu' au sommet des montagnes (pour chercher des calcaires), n'en (de pierre) ont fait voir que d'une nature de quartz et de grès non friable, produisant des étincelles, et même une lumière phosphorique, accompagnée d'une odeur sulphureuse." —(Bougainville, Voyage autour du Monde, 1766-69, tome I., p. 100).

The shattered state of most summits of mountains in these regions* has often struck me, many of them being mere heaps of rocks and stones, over which it is extremely difficult to climb. Mount Skyring may be cited as one remarkable instance; there, the stones gave out a very sulphureous smell when struck together, and were strongly magnetic.† Lightning, electricity, and magnetism being intimately related, one is led to think that, if the above conjecture is incorrect, there may be some connexion between these sudden glimpses of faint light and the transmission of the electric fluid. This much I am certain of, that they were not lights made by man, and that they were different from the will-o'-the-wisp, or ignis fatuus.

My own employment obliged me to remain near the ship, but some of the officers made excursions into the interior, and to them and Mr. Brisbane I am indebted for most of the following notices of these islands.

Some very large bones were seen a long way from the seashore, and some hundred feet above the level of high water, near St. Salvador Bay. How they got there had often puzzled Mr. Vernet, and Brisbane also, who had examined them with attention; Brisbane told me they were whale's bones.‡ The rocky summits of all the hills are amazingly broken up,

* Falklands and Tierra del Fuego. † Vol. I., p. 382.

‡ Bougainville says, "D'autres ossemens enormes, placés bien avant dans les terres, et que la fureur des flots n'a jamais été capable de porter si loin, prouvent que la mer a baissé, ou que les terres se sont elevées."—Vol. I., pp. 112-113.

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like those of far higher elevations in Tierra del Fuego, and the fragments—some very large—have rolled down the nearest ravines, so that they look like the beds of dried-up torrents. The sand-stone, which is abundant, offers beautifully perfect impressions of shells, many of which were brought to England. In these fossils the minutest portions of delicate shells are preserved, as in a plaster of Paris cast, though the stone is now very hard. There are fine stalactites in some large caverns, but they are known only to a few sealers. The large muscles produce pearls of considerable size, though inferior quality, perhaps; Mr. Brisbane had a small bottle full. In one of the cottages I saw a heap of good whalebone, and was informed that some hundred pounds worth had been picked up on the coasts, and sold to whalers for a tenth part of its European value, in exchange for clothes, spirits, ammunition, and biscuit. On West Falkland there are beautiful pebbles, and on the heights fine crystals have been found.

Although the climate is so much colder than that of Buenos Ayres, the gauchos sleep in the open air, when in the interior, under their saddles, just as they do in the latitude of 35°. While idling at the settlement they gamble, quarrel, and fight with long knives, giving each other severe wounds. With their loose ponchos, slouched hats, long hair, dark complexions, and Indian eyes, they are characters fitter for the pencil of an artist than for the quiet hearth of an industrious settler. Besides these gauchos, we saw five Indians (p. 267), who had been taken by the Buenos Ayrean troops, or their allies, and allowed to leave prison on condition of going with Mr. Vernet to the Falklands. Including the crews of some thirty whale-ships, hovering about or at anchor among the islands; the men of several American vessels, all armed with rifles; the English sealers with their clubs, if not also provided with rifles; these cut-throat looking gauchos; the discontented, downcast Indian prisoners, and the crews of several French whalers—who could not or would not see why they had not as good a right to the islands as Englishmen—there was no lack of the elements of discord; and it was with a

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heavy heart and gloomy forebodings that I looked forward to the months which might elapse without the presence of a man-of-war, or the semblance of any regular authority.

Our tender, the Adventure, sailed on the 4th of April, under the charge of Mr. Chaffers, who was desired to call off the River Negro, and thence go to Maldonado, moor his vessel close to Gorriti Island, land every thing, and commence her thorough refit.

About this time one of the officers went to see some wild cattle taken. After riding far beyond the hills seen from Port Louis, a black speck was discerned in the distance—instantly the three gauchos stopped, adjusted their saddle-gear, lassoes, and balls, and then cantered off in different directions. While stopping, my shipmate saw that the black spot moved and doubled its size. Directly afterwards, he perceived five other black things, and taking it for granted they were cattle, asked no questions of his taciturn, though eager, companions, but watched their movements and galloped on with the capataz (Jean Simon), the other two making a détour round some hills. Having got down wind of the herd, Simon slackened his pace, and, lying along his horse's back, gradually ascended a slight eminence, beyond which the cattle were feeding. For a moment he stopped to look round:—there was a monstrous bull within a hundred yards of him; three hundred yards further, were about twenty cows; and in a valley beyond, was a large herd of wild cattle. Just then the heads of the other two men were seen a quarter of a mile on one side, also to leeward of the cattle, which were still feeding unsuspiciously. With a sudden dash onwards, such as those horses are trained to make, Simon was within twenty yards of the overgrown, but far from unwieldy brute, before he could 'get way on.' Whirling the balls around his head, Simon hurled them so truly at the bull's fore-legs, that down he came, with a blow that made the earth tremble, and rolled over and over. Away went Simon at full gallop after a fine cow; and at the same time, each of the other men were in full chase of their animals. The herd galloped off almost as fast as horses; but in a few moments, another bull was bel-

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lowing in impotent rage, and two cows were held tightly by lassoes—one being caught by Simon alone, and the other by his two companions. One of the men jumped off, and fastened his cow's legs together so securely, that she could only limp along a few inches at a time; his horse meanwhile keeping the second lasso tight, as effectually as if his master had been on his back. Both lassoes were then shaken off, and one thrown over Simon's cow, which had been trying in all kinds of ways to escape from or gore her active enemy, who—go which way she would—always kept the lasso tight; and often, by checking her suddenly, half overset and thoroughly frightened her. Leaving his horse as soon as the cow was secure, Simon hamstrung the bulls, and left them where they fell, roaring with pain and rage. He then remounted, and all four cantered back towards the 'estancia' (or farm), where the tame cattle are kept. Simon was asked to kill the poor brutes before he left them; but he shook his head, with a sneer, and remarked, that their hides would come off easier next day! At daybreak, the following morning, half-a-dozen tame cattle were driven out to the place of slaughter, and with them the frightened and already half-tamed cows (which had been left tied in a place where they had nothing to eat), were easily driven in to the farm. The two bulls were at last killed, skinned, cut up, and the best parts of their carcases carried to the settlement. The hides of those two animals weighed seventy-three and eighty-one pounds.

Speaking to Simon myself one day about the indiscriminate slaughter of cattle which I had heard took place occasionally, he told me that the gauchos used sometimes to kill them for their tongues only, and, perhaps, a steak or two, for 'asado' (meat roasted on a stick), without taking the trouble to skin them; being too great epicures in their way to feast twice upon the same animal.

In 1834, while surveying the sea-coast of these islands, in the Adventure, Lieutenant Wickham, Mr. Low, and Mr. Johnson had many a bull hunt; but though there was as much or more risk in their encounters, being on foot, with

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rifles, assisted only by a good dog, their adventures were individually rather than generally interesting. They used to land in unfrequented harbours, very near herds of wild cattle or horses, creep quietly along behind tussac or bushes, till they got within rifle-shot, take good aim at the fattest, and after firing, do their best to kill the animal, in general only wounded by a first shot. They had an excellent dog, who always seized the creatures by the lower lip, and diverted their attention from Mr. Johnson or Low, who otherwise might have lost their lives, on more than two occasions.

The report of a gun usually alarmed the whole herd of cows, and off they went at a gallop; but the lordly bulls were not to be hurried, they would stand and face their enemies, often charge them; when a precipitate retreat behind a rock, or to the boat, or across a boggy place, which the bull would not try, was the only resource, if their hardy dog was not by, to seize the angry animal, and give time for a well-directed shot. In those excursions, also, while ashore at night in small tents, the foxes used to plague them continually, poking their unpleasant heads into the opening of the tent (while the man on watch was by the fire), stealing their provisions, and breaking their rest, after a fatiguing day's work. What with the foxes, the wild bulls, and the wild horses, it is thoroughly unsafe for a person to walk alone about the unfrequented parts of the Falkland Islands—even with the best weapons for self-defence against either man or beast. Several unfortunate people have been missed there, who wandered away from their parties.

April 6.—Having embarked M. le Dilly, with some of his officers and crew, and lumbered our little ship with the spars and stores purchased from him, we sailed from the Falklands. Our passage to within sight of the river Negro was short, though stormy, a south-east gale driving us before it, under a close-reefed fore-topsail. As the sea ran high, it might have been more prudent to have 'hove-to;' but time was precious, and our vessel's qualities as a sea-boat, scudding as well as 'by the wind,' were well known.

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Early on the 12th, we were off the river Negro; but baffling winds and a heavy swell (raised by the late gale), prevented our anchoring near the bar, or sending in a boat.

Soon after noon on the 14th, while standing off and on, waiting for the swell to go down, and allow of a boat crossing the bar, a sail seen in the horizon was made out to be the Adventure. We steered for and spoke her, found all well, sent her on to Maldonado, and again stood towards the bar. Our tender, as I mentioned, sailed from Berkeley Sound on the 4th; but was obliged to heave-to during the gale in which we were able to scud.

Next day (15th), a decked boat, like the Paz, with some difficulty crossed the bar, and brought me letters from Lieutenant Wickham, by which I learned that he and his party had sailed from the river, intending to visit the Gulf of San Matias, only a few days before we arrived, having previously examined all the coast, from Port Desire to Valdes Creek.* I was sorry to hear that Corporal Williams, a very worthy man, in every sense of the words, had been drowned in the river Negro. Williams had been in two polar voyages, and under Captain King, in H.M.S. Adventure, from 1825 to 1830. The rest of the party were well, and making rapid progress with their task. Wind favouring, we made all sail for the Bay of San José, hoping to meet the little vessels under Lieutenant Wickham, but could not find them;† so concluding that they had run further south than was intended at their departure from the Negro, we steered out of the Gulf of San Matias, and made sail for the Plata.

At daylight on the 26th, land was seen near Maldonado, and at two, we anchored off Monte Video. In a few hours the French passengers were landed; next day our anchor was again weighed, and at noon on the 28th we moored the Beagle in Maldonado Bay, close to the little island of Gorriti. Our tender, the Adventure, had arrived on the 23d. My thoughts

* Or port, as it has been called, though improperly, because it is at times almost blocked up by a bar.

† They were in Port San Antonio.

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were at this time occupied by arrangements connected with her, besides the usual routine observations. I was extremely anxious to fit the schooner properly, and to set her to work, but at the same time to keep all our other operations in active progress. A decked boat was lying in Maldonado, just built, which her owner, Don Francisco Aguilar, offered to lend me for two months, if I would rig her for him, and this proposal exactly suited my views, as it would enable me to send for Lieutenant Wickham, and supply his place by Mr. Usborne, leaving Mr. Stokes to continue the survey about San Blas and the Colorado. Accordingly, the Constitucion, as this little craft was named by her owner, was hauled alongside, and Mr. Usborne with a party, set to work in preparing her for a trip to the River Negro. On the 1st May Mr. Usborne sailed, having with him Mr. Forsyth and five men; he was to go to the River Negro, join and assist Mr. Stokes, and inform Lieutenant Wickham that he was wanted at Maldonado, to take charge of the Adventure. The Constitucion was about the size of the Liebre, a craft I should hardly have thought fit for such a voyage had I not heard so much from Mr. Harris and his companion, Roberts, of the capital weather those decked boats make in a gale. With their hatches secured, tiller unshipped, a storm try-sail—or no sail at all set, and nobody on deck, they tumble about like hollow casks, without caring for wind or sea.

Next day (2d) the Beagle returned to Monte Video, to procure carpenters, plank, and copper for the Adventure. I found that she was so fine a vessel, and so sound, that it was well worth while to copper her entirely afresh, with a view to her future operations among islands in the Pacific, where worms would soon eat through places on a vessel's bottom from which sheets of copper had been torn away. At this time the Adventure's copper was complete, but thin, and as the carpenters said it would not last above two years more with certainty, I determined to copper her forthwith, and make one substantial refit do for all. Here, to my great regret, Mr.

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Hamond decided to return to England,* and we consequently lost a valuable member of our small society.

On the 17th, having engaged men and purchased plank, copper, provisions and other necessaries, we sailed from Monte Video, and next morning anchored in Maldonado. As soon as a part of our cargo was landed—all that was then wanted by the working party on Gorriti, under Mr. Chaffers—we proceeded up the river to fill water, anchored again off Monte Video for a short time, and returned to our future consort at Gorriti (24th). Preparations were then commenced for heaving the schooner down to copper her. We hauled her alongside, and on the 28th hove her 'keel out,' for a few hours, and righted her again at dark. While standing on her keel, examining the state of her copper and planking, I saw a sail in the offing, which was soon made out to be the Constitucion, and just after we righted the schooner Lieut. Wickham came alongside. He brought good tidings—without drawback—and those who know what it is to feel anxiety for the safety of friends whose lives are risked by their willingness to follow up the plans of their commanding officer—however critical those plans may be—will understand my sensations that night. The Constitucion anchored off the Negro on the 11th, entered it next day, found the Paz and Liebre there, and on the 17th sailed again. Six knots and a-half an hour was the most she could accomplish under any circumstances, yet her passages were very good, considering the distance. During June we remained in Maldonado, employed about the Adventure, and refitting as well as painting our own ship. Meanwhile Mr. Darwin was living on shore, sometimes at the village of Maldonado, sometimes making excursions into the country to a considerable distance; and my own time was fully occupied by calculations and chart-work, while the officers attended to heaving down the Adventure. This process, in a place partly exposed to south-west winds, was extremely tedious,

* Provided that the Commander-in-Chief approved of his doing so—a sanction which I had no doubt of his receiving.

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and had it not been for the great advantages Maldonado and Gorriti offered in other respects, the situation might have been deemed exceedingly ill-chosen for such a purpose. Only when there was no swell could we haul her alongside and heave her down (an operation under any circumstances difficult, as she was one hundred and seventy tons in burthen, and we were but two hundred and thirty-five) and many days sometimes intervened on which no progress could be made. Every morning, at dawn of day, Lieut. Sulivan and I used to watch the sky most anxiously, in order to know whether it would be worth while unmooring, and warping the vessels together, and as the indications we looked for never deceived us, I will here mention them. Though familiar to all who lead a country or seafaring life, and often rise before the sun, they may be of use to others, whose attention has not been drawn to 'weather wisdom.'

When the first streak of light appeared close to the horizon, and the sun's rising was preceded by a glow of faint red, not extending far, a fine day succeeded, whether the sky were then overcast or clear; but if the first gleam of light appeared high above the horizon, behind clouds, and there was much red, not only near the sun, but visible on clouds even near the zenith, wind, if not rain, was sure to follow. Between the extremes of course there may be many varieties of appearance as well as of succeeding weather; but as I have found such signs followed by similar weather, in most parts of the world, and as I have often profited by them, with reference to making or shortening sail, &c.; I do not like to pass over this occasion for a hint to the inexperienced. I have always found that a high dawn (explained above) and a very red sky, foretold wind—usually a gale; that a low dawn and pale sun-rise indicated fine weather; that the sun setting behind a bank of clouds, with a yellow look, was a sign of wind, if not rain, and that the sun setting in a clear horizon, glowing with red, was an unfailing indication of a coming fine day. I have already said (page 50), that hard-edged, oily-looking clouds, foretell, if they do not accompany wind, and that soft clouds—clouds which have a watery rather than an oily look—are signs of

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rain; and if ragged, or streaky, of wind also. Light foggy clouds, rising early, often called the 'pride of the morning,' are certain forerunners of a fine day.

On the 8th of July the Beagle sailed from Maldonado, and anchored off Monte Video for a few days, waiting for the arrival of a packet from England. Directly the letters were received she returned to Maldonado.

On the 18th, my survey work being finished, and our help no longer required at Gorriti, we sailed to sound eastward in the latitude of the English Bank, and then returned to make a few arrangements with Lieutenant Wickham, and obtain observations for the chronometers, previous to making an excursion towards the south.

On the 24th we sailed to Cape San Antonio, and thence along the coast, close by Cape Corrientes, and skirting the San Blas banks, till we anchored off the river Negro. There we found the Paz and Liebre just returned from their examination of those intricacies which surround the ports between Blanco Bay and San Blas. The Liebre came out to meet us with a satisfactory report of progress, as well as health; and, at her return, Mr. Darwin took the opportunity of going into the river, with the view of crossing overland to Buenos Ayres, by way of Argentina: after which, he proposed to make a long excursion from Buenos Ayres into the interior, while the Beagle would be employed in surveying operations along sea-coasts uninteresting to him. We then got under sail and began our next employment, which was sounding about the outer banks off San Blas and Union Bays, and examining those parts of Ports San Antonio and San José which the Paz and Liebre had been prevented doing by wind and sea; besides which, I wished to see them myself, for many reasons, more closely than hitherto. The accumulation of banks about San Blas, and near, though southward of the river Colorado, is an object of interest when viewed in connection with the present position of the mouth of that long, though not large, river, which traverses the continent from near Mendoza, and which may have contributed to their formation; at least, so think geologists.

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Be this as it may, there is now a mass of banks extending far to seaward, which make the coast from Blanco Bay to San Blas extremely dangerous; more particularly, as the adjoining shore is almost a dead flat, and so low, that in many parts it can only be seen when the observer is among, or upon, the shoals. The space between Union Bay and San Blas was very appropriately named by the Spaniards Bahia Anegada (dried up bay), because it is so shallow, and the inner parts are rather drowned land than actual water, being only covered at half tide. Falkner says (p. 77), that a Spanish vessel was lost in this bay, the crew of which "saved themselves in one of the boats, and sailing up the river arrived at Mendoza." Whether this ship was called 'Los Cesares' I am not aware, but as there is an islet in the 'Bahia Anegada' named in the old Spanish charts, 'Isla de los Cesares,' I suspect that such was the fact, and incline to connect this story with the many rumours of a settlement, 'de los Cesares,' somewhere in the interior of Patagonia. Falkner says, that "the crew saved themselves in one of the boats;"* but there were few Spanish vessels about that coast in the early part of the eighteenth century whose whole crew could have been saved in one of their boats.† If the remainder had formed even a temporary encampment about San Blas, or near the river Negro, it would have been described, with much exaggeration, by Indians of the west, as well as by those of the East country. A few men might have been admitted into a tribe of Indians who improved their habits and dwellings, so far as to have given rise to the curious reports so much circulated in South America, during the last century and even in this—of a colony of white people, with houses and gardens, in the interior of the continent, somewhere about the latitude of forty degrees; according to some

* "In the year 1734, or thereabouts (within how many years after or before that time?), the masts and part of the hulk were seen," (Falkner, p. 77.) The so-called 'Isla de los Cesares' is closely attached to, if not a part of the main land at the west side of Anegada Bay.

† Reports of the Cesares began to be circulated in the early part of the eighteenth century.

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between two ranges of the Cordillera; others said it was in the plains; but all appeared to think there was no doubt of the existence of such a settlement.

In Villarino's Diary of his Exploration of Anegada Bay, I find that he was much assisted by horses and mules, which he carried on board his vessels, and landed as often as he had occasion to make a journey by land. At the river Negro I heard that some of these animals became so tame, and accustomed to landing and embarkation, that they would leap quietly into or out of the boats, when required.*

On the 19th of August, we anchored near the bar of the Negro, to meet the Paz and Liebre, take our officers and men on board, and pay Mr. Harris the money to which he was entitled, not only by contract, but by the uniform attention, activity, and thorough kindness, which he and his partner had shown to their temporary companions; by their knowledge as pilots, and by the useful information which they had readily given, to the full extent of their abilities. The complete success of that enterprize was greatly owing to the conduct of those two worthy men. Before dark all was settled, our party was safely on board; we quitted Harris and Roberts, with their useful little craft, mutually satisfied; and made sail for Blanco Bay, where there was still work to be done; intending to add to our already numerous soundings, while following the seaward edges of the banks.

On the 24th, we moored off the Wells, in Port Belgrano.

Next day, Lieutenant Sulivan went with a party to explore the furthest extreme of the inlet, while others were occupied, as usual, in the various duties always necessary on board a ship, in addition to those of a survey.

Mr. Darwin was at Argentina, and hearing of our arrival, rode to the Wells. He had met General Rosas on the Colorado, who treated him very kindly; and he was enjoying his shore-roving without any annoyance, the old major being no longer afraid of a 'naturalista.'

* Viedma and other Spaniards were similarly assisted in their expeditions.

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On the 7th of September, we finally left Blanco Bay;* but again sounded along the dangerous banks of Anegada Bay, determined to do our utmost to prevent vessels from getting ashore there in future, as many have done already, especially during the blockade of Buenos Ayres, when several prizes, which had been taken from the Brazilians, were wrecked and totally lost.

In these surveying trips along-shore we always anchored when we could, in order to preserve our station and connect triangles; but, of course, we were often obliged to weigh again at short notice, during the night; therefore every preparation was made for any change of wind or weather, and a careful look-out always kept upon the deep-sea lead (invariably attended throughout the night), as well as upon the sympiesometer, the sky, and the water. I mention the deep-sea lead particularly, because however shallow the water may be, mistakes are often made with the hand-lead, especially at night, when a tide or current is running, in consequence of the lead being drifted by the action of the water upon it and the line, and deceiving even a moderate leads-man; who sometimes thinks the water much deeper than it really is—sometimes the reverse; and never can tell exactly, under such circumstances, how a ship is moving over the ground, or whether she is dragging her anchors.

Off Starve Island we were obliged to weigh in a hurry, one night, owing to a gale coming on from the south-east, and during the 10th and 11th, we carried a press of sail, to get off the land; the wind then drew round by the south, and a succession of baffling weather ensued, which prevented our doing any thing on the coast, and also hindered our reaching the Plata until the 16th, on which day we ran up to Monte Video, and anchored.

On the 18th we weighed, hearing that H.M.S. Snake had brought stores and letters for us, and was at Maldonado, but had hardly lost sight of the town, when the Snake hove in

* Mr. Darwin had previously departed on his road to Buenos Ayres.

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sight. Knowing her to be one of the new build, I altered course, to sail a few miles with her, and see how much she would beat us; but, to my surprize, she gained on us but little while running free with a fresh breeze, just carrying top-mast studding-sails; and I was afterwards told by her officers, that though she sailed uncommonly well on a wind, and worked to windward wonderfully, she did nothing remarkable with a flowing sheet. I did not like her upper works; they 'tumbled home' too much (like some old French corvettes); narrowing her upper deck, giving less spread to the rigging, and offering a bad form to the stroke of a heavy sea, whether when plunging her bow into it, or receiving it abeam. However good such a form may be for large ships, which carry two or three tier of guns, I cannot think it advantageous for flush-decked vessels or small frigates, and am quite certain that it is bad for boats. I here allude particularly to that 'tumbling home' of the upper works, which some persons approved of a few years ago. This is not the place, however, for a discussion upon naval architecture (even if I were qualified to deal with the subject, which assuredly I am not); but I cannot pass over an opportunity of adding my mite of praise to the genius and moral courage of Sir William Symonds and Captain Hayes, who, undeterred by opposition, and difficulties of every description, have succeeded in infusing (if the metaphor may be allowed) so large a portion of Arab blood into the somewhat heavy, though stalwart coursers of our native breed. Amidst the natural contention of eager candidates for an honourable position, to which they have been accustomed to aspire, and for which some are doubtless admirably qualified, it is not surprising that due credit has not always been given to that originality and justifiable daring, of which the merits are attested by the Vanguard and Inconstant. Neither has it always been recollected, however men may have differed in their opinions of this or that individual, as a naval architect, that the two best ships built of late years were constructed by naval officers, self-educated chiefly during the practice of their profession. I am quite aware, that some of those eminent architects who have con-

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structed good ships since 1810—Sir Robert Seppings, Professor Inman, Mr. Roberts, and Mr. Fincham, were very much restricted as to dimensions allowed with respect to guns to be carried; and that, therefore, no one can pretend to say what degree of excellence the ships might have attained, had their architects been unshackled; but taking things as they are —not as they might have been—to Symonds and Hayes (if not chiefly to the former) belongs the merit of having improved our navy materially. We are so apt to forget, during the heat of controversy, that even an approach to perfection is unattainable, and the utmost any one can hope for is to have fewer faults than his rivals—that we should not hastily condemn, in any case, only because we can detect deficiencies or errors.

Many persons have remarked, that notwithstanding all the competition, all the trials of sailing, and all the reported improvements, which have taken place since the peace, our fastest ships have not excelled some of those built by France, England, or other countries, during the war. My own knowledge of those ships is only derived from the descriptions of persons who sailed in or chased them: but the conclusion I am led to draw from their accounts is that, with few exceptions,* those ships were very slightly built, often of unseasoned timber, and that their rapid rate of sailing only lasted so long as their frames would yield to the fluid, and were not water-sodden. Recently launched, light, and elastic, confined by few beams, knees, or riders, held together by trunnions more than by metal, and intended only to sail swiftly—for a short existence —those greyhound vessels were as different in their construction from the solid, heavy, durable ships of this day, as a light, active youth is from a well-set man trained to labour.

A man-of-war requires strength, solidity, capacity; great

* The Malta (Guillaume Tell), Norge, and a few others, were splendid exceptions, but even in the construction of those ships far less iron and copper were used than is now customary in vessels of their class. By substituting so much metal in place of wood, for knees, braces, and bolts, solidity, strength, and capacity are acquired in modern ships at the expense, in most instances, of elasticity, and swift sailing.

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buoyancy for supporting her heavy metal, durability, and tenacity; besides easiness as a sea-boat, and superiority of sailing. Vessels may easily be built to excel in any of these qualifications; but to excel in all is the climax, only to be obtained by genius, aided by extraordinary study and experience.

After running a few miles with the Snake, and finding that she steered towards Buenos Ayres, we altered our course to resume our easterly route, and early next morning were anchored alongside the Adventure.

As it was evident that another month must elapse before the schooner would be ready for her work, notwithstanding the zealous exertions of Lieut. Wickham and his crew, I decided to finish myself the survey, which I had intended he should begin with, namely, of the south shore of the Plata and a reported bank off Cape Corrientes—and defer the second visit to Tierra del Fuego until December or January. Accordingly, the Beagle sailed on the 23d, and after a close examination of Cape San Antonio and the great mud-bank, called Tuyu, which lies within it, we went to the neighbourhood of Cape Corrientes, and there looked about and sounded in every direction, but could find no shoal. We then returned to the river, and sounded Sanborombon Bay, laying its shores down on the chart as accurately as we could, considering that the water was every where so shoal, that even a boat could not get within half a mile of the land, except at particular times, for which we could not wait. The distance at which the Beagle was obliged to keep, varied from four miles to three (seldom less), and then she was sailing in about a foot more water than she drew.*

On the 6th of October we returned to Maldonado; to prepare for a long excursion southward, and to hasten the equipment of the Adventure. By the 19th she was almost ready, so we weighed in company, ran up the river to water, and on the 21st moored off Monte Video, to take in our final supplies previous to quitting the River Plata for the last time. Here, to my surprise, I found people talking about the English having

* The Beagle's draught of water was eleven feet and a half forward, and thirteen feet aft, when in ordinary loaded trim.

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taken possession of the island of Gorriti, and built houses upon it. This, I knew, must in some way have arisen out of the temporary encampment of the Adventure's crew; and enquiring further, I found that columns of the Monte Video newspapers had been filled with discussions on the subject.* The local authorities at Maldonado having been told (incorrectly) that the English had hoisted British colours upon the island—had repaired several old buildings—and had erected a house with glass windows, for the commanding officer's residence—became alarmed; and as stories seldom lose by repetition, the good people of Monte Video were soon in commotion. However, the affair was easily explained; but not without many a laugh at the absurdity of my little observatory (made of ninety small pieces of wood, so as to be stowed in a boat), having 'loomed' so large. Had our colours ever been displayed on shore, there might have been some foundation for their alarm; but it so happened that the only flag that was on the

"Monte Video, Octubre 22 de 1833.

*"El infrascripto Ministro Secretario de Estado en el departamento de Relaciones Exteriores, tiene órden del Gobierno para dirigirse al Sr. Cónsul General de S.M.B. y manifestarle, que á consecuencia de varios sucesos que han tenido lugar en la Isla de Gorriti, donde se halla la tripulacion de la Escuna de S.M. Adventure, los cuales constan de los documentos que en copia autorizada se acompañan; y deseoso el Gobierno de satisfacer la ansiedad publica que han producido aquellos sucesos, y quitar todo pretexto de interpretaciones, espera que el Sr. Cónsul tendrá á bien manifestarle los motivos que dieron mérito á que los individuos pertenecientes á aquel Buque pasasen á la Isla, como igualmente las causales de su permanencia en ella.

"El Ministro que subscribe reitera al Sr. Cónsul General de S.M.B. los sentimientos de su mayor consideracion y aprecio.

(Firmado) "Francisco Llambi."

"Monte Video, Octubre 28 de 1803.

"El abajo firmado Cónsul General de S.M.B. cerca de la República Oriental del Uruguay ha tenido el honor de transmitir al Sr. Fitz-Roy, comandante de la barca descubridora de S.M.B. Beagle, la comunicacion y copias

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island, at any time while our party was there, was an old Monte Video (Banda Oriental) ensign, which belonged to the schooner when I bought her from Mr. Low. This incident, trifling as it is, may be worth notice, as showing how necessary it is to be more circumspect and explanatory in every dealing with a small State, than in similar transactions with the Authorities of old established governments.

The month of November was passed at Monte Video: laying down chart-work, computing observations, and writing; procuring and stowing provisions; painting the vessels outside and blacking their rigging; and occasionally giving the crews leave to go ashore. Mr. Darwin returned at the end of the month; and the first week in December both vessels sailed from the river: but before I go on with them to Tierra del Fuego and the Falklands, some pages shall be devoted to the proceedings of our enterprizing and hard-working labourers, who were employed so zealously during twelve months without intermission, in the little vessels Paz and Liebre.

y copias inclusas que S. E. el Sr. D. Francisco Llambi, Ministro Secretario de Negocios Extrangeros le hizó el honor de dirigirle en 22 del corriente; y el infrascripto se halla autorizado para decir que ni el 3 de Octubre, de 1833, ni otro dia alguno del presente año se ha enarbolado o desplegado en la Isla de Gorriti la Bandera de la nacion Britanica. El 3 de Octubre de 1833, y muchos días anteriores, la de este Estado fuè izada como un señal para D. Francisco Aguilar, avisándole que se iva á embiar un bote en busca de carne y comestibles. La casa de madera con vidriera que se dice ser habitada por el comandante, es un observatorio portatil hecho en Inglaterra, que ahora se halla en la Isla de Ratas de este Puerto; y ninguno de los edificios de la Isla de Gorriti, ha sido reparado por persona alguna bajo las órdenes del Comandante Fitz-Roy: lo que el abajo firmado comunica á S.E. saludándole con su particular consideracion y aprecio.

(Firmado) "Tomas Samuel Hood."

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CHAPTER XIV.

Paz and Liebre begin work—Chronometers—Fish—Animals—San Blas—Wrecks—River Negro—Del Carmen—Inhabitants—Indians—Trade—Williams drowned—Port Desire—Gale—Salinas—Lightning—Bones in Tomb—Trees—Dangers—New Bay—Cattle—Seals—Soil—River Chupat—Drift Timber—Fertility—Wild Cattle—Valdes Creek—Imminent danger—Tide Races—Bar of the Negro—Hunting—Attack of Indians—Villarino—Falkner.

The Paz and Liebre parted company with the Beagle on the 18th of October 1832, and commenced their undertaking by a cursory examination of the entrance to False Bay, Green Bay, and Brightman Inlet. Lieut. Wickham and Mr. King, with Roberts and four men, were in the Liebre.* Messrs. Stokes, Mellersh, and Forsyth, with Harris and five men, were on board the Paz.† While they were northward of the Colorado, true bearings of the Ventana Mountain, and observed latitudes, made them independent of their five chronometers; but it was soon found that the rates of those useful machines were not injured even by the continual as well as sudden motions of so small a vessel. They were bedded in sawdust, wool, and sand,‡ within a large tub, which was secured to the deck under the cabin table of the Paz, not far from the centre of least motion.

In Brightman Inlet great quantities of fish were caught, by stopping up the mouths of small creeks with a net at high water, and when the tide ebbed many more were left ashore than were wanted. On Green Island they found good water by digging wells seven or eight feet deep. The island itself was overrun by deer and cavies: and on the main land the wild pig of the country (javali) was seen. On the 23d they entered the river Colorado, but had much trouble in warping to a safe berth, on account of the water being very shoal at the entrance which they had chosen. The principal mouth was a

* Nine tons burthen. † Fifteen tons.

‡ Sawdust alone would have been better.

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quarter of a mile further south, the stream being there "broad and rapid," with two fathoms water when the tide was out; but beset, to seaward, by sandbanks, which shift with every south-east gale. Quantities of drift-wood, a kind of willow (sauci), lay about every where, indicating that the river sometimes overflowed its banks to a great distance, and brought down these trees from the interior country, as none grow within three leagues of the mouth. The river hereabouts is divided into many streams, forming a great number of small islands, which are nearly all of clay covered with rushes. From one of these streams or channels, the Cañada, there are creeks communicating at high-water with Union Bay. Here Lieut. Wickham's party saw a wolf.

On the 27th they met a whale-boat (at Creek Island in Anegada Bay) from the River Negro, in search of sea-elephants. Next day they reached a snug creek in San Blas Bay, where they heard that the Indians had lately driven off all the cattle from the San Blas Estancia, had destroyed the houses, dismounted the guns, and broken the carriages. They were accompanied by a number of desperate criminals who had fled from justice at Buenos Ayres, and idle gauchos, who preferred robbery to work, and were unquestionably the most savage of the troop. On the 29th the Liebre was hauled ashore, to extract a piece of sauci wood that had run through her bottom: and a party was afterwards employed in erecting a conspicuous mark upon Hog Island; a very difficult task, because the loose sand, of which that island wholly consists, flies in clouds at every gust, and nowhere affords a solid foundation. By the help of casks filled with it, and spare anchors, they at length succeeded in securing an old spar upright, which was large enough to be seen ten miles round, in that low half-drowned country.

Deer were very numerous on Javali Island; but on the place called Deer Island, there was not one, though they were so plentiful there a few years before. Some dogs had been left there by a whale-ship, which have increased very much in numbers and are very savage: these dogs have exterminated the deer.

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Any quantity of fresh water may be obtained in San Blas Bay, by digging wells six or eight feet deep; and fish are abundant: but it is no place for a ship to enter unless under favourable circumstances of weather, wind, and tide; and decidedly dangerous with a south-easter, because there is then a sea on the banks outside which confuses the pilot's eye, and prevents his distinguishing the proper channel; besides which, thick weather, if not rain, is the general accompaniment to that wind.

On the 3d of December the Beagle anchored off San Blas (as formerly mentioned). Both schooners went out to her, and in returning at night into San Blas Bay, working to windward with a strong flood tide, they passed close to an unknown rock which would have made an end of their cruise had they touched it. The least water they had, however, was eight feet;* but both vessels were close to it, while the tide was running four or five knots. This rock is in the middle of the entrance to San Blas Bay. At midnight they reached their anchorage, without a dry article in either vessel.

On the 6th, Lieutenant Wickham remarked, while at anchor between San Blas and the River Negro, off Point Rasa, that the stream of tide began to set northward at half flood, and continued to run in that direction until half ebb, by the shore. "It is not at all uncommon on this coast," he says, "to see wrecks of vessels above high-water mark, and spars strewed along the beach where the sea does not touch them." These wrecks took place during south-east gales, when the sea was raised above its usual level in fine weather: and were the vessels spoken of in the previous chapter, as having been entrusted to ignorant or careless prize-masters, who ran for San Blas or the River Negro, not then knowing that so fine a port as Blanco Bay existed. Strong tides, shoals, a low coast, and bad weather would have perplexed professed seamen; but those difficulties were insurmountable to such unpractised craftsmen as those who were in charge of them, and most of the prizes were lost. One large ship of four or five hundred

* The Paz drew five feet and a half, the Liebre four feet.

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tons was taken, by a wiser master, to Port Melo, and there her cargo was discharged into small craft, which landed it safely in the River Negro. Many of these ill-fated vessels were never afterwards heard of; but from the numerous wrecks seen along the coast between the Colorado and the Negro, it may be inferred that they and their unfortunate crews perished in the surf occasioned by south-east gales, or were capsized by sudden pamperoes.

Running up the River Negro (on the 7th December), Lieut. Wickham found the 'freshes'* strongly against him. The banks of the river afforded a pleasing contrast, by their verdure, to the arid desert around Anegada Bay. Most part of these banks was cultivated, and great quantities of fine corn was seen growing. Here and there were country houses (quintas) surrounded by gardens, in which apple, fig, walnut, cherry, quince, and peach trees, vines, and vegetables of most kinds were abundantly plentiful.

Although the banks of the river are so fit for cultivation, it is only in consequence of floods, which take place twice a-year—once during the rainy season of the interior, and once at the time when the snow melts on the Cordillera. These floods swell the river several feet above its banks, bringing a deposit of mud and decayed vegetable matter, which enriches the soil and keeps it moist even during the long droughts of that climate.

The plough used there is wooden, and generally worked by oxen, but it does not cut deeply. Manure is never used, the soil being so fattened by alluvial deposits.

The town of Nuestra Señora del Carmen, is about six leagues up the river, on its northern bank, upon a slightly-rising ground about forty feet above the water. It is irregularly built: the houses are small, one only having two stories; and glass windows are seldom seen: each house has a large oven. A square enclosure of some extent, formed by walls of unbaked bricks (adobes), is called the fort, and within it are the church, the

* Showing that this was the period of one of the two floods to which the Negro is annually subject.

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governor's house, lodgings for the officers, and public stores. This fort commands the neighbourhood, as well as the houses (or cottages) surrounding it; and of the hundred buildings which compose the town of Carmen, exclusive of about thirty huts on the south bank of the river, the fort is the oldest. It was built about 1763. Some houses, forty years old, are as fresh in outward appearance, as if built only a few years ago. In a population of 1,400, there are about 500 negroes. Altogether there may be in the town about two thousand inhabitants, but many of the poorer families and negroes live in caves, which were dug out of cliffs on the river's bank by the first Spanish settlers. It is said that they served the Spaniards as a secure refuge from the Indians, who could only approach them by one path, easily secured. These caves, dug out of earthy clay, are not despicable dwellings, while there is a fire in them to expel damp.

About a league from the entrance of the river are the ruins of a large house, which was the "Estancia del Rey." In former days 100,000 head of cattle were attached to that establishment, now there is not even a calf.

Some of the first settlers were living at Carmen in 1833, staunch royalists, every one looking back with regret to former times. One of them belonged to the crew of the Spanish launch that first entered the river. He said, that the Indians were then living in detached tribes along both banks of the river, and were very friendly to the Spaniards. This same old man afterwards made one of the exploring party, under Villarino, in 1786, when the natives were not only inoffensive, but gave them assistance. How different from the present day! when if a Christian is seen by the natives, he is immediately hunted, and his safety depends upon the fleetness of his horse. It has sometimes happened, that persons riding along near this river, have been surprized by a marauding party of Indians, and obliged, as their only resource, to leap off the banks (barrancas), whether high or low, and swim across to the other side. The Indians have never followed; hence this, though requiring resolution, is a sure mode of escape.

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Prior to the conclusion of the war between Brazil and Buenos Ayres (1828), the settlers at Carmen lived tranquilly—undisturbed by Indian aggression (retaliation?) but since that time, they have been kept in continual alarm. Prisoners are often brought to Carmen to be ransomed, whom the Indians have taken from other places. They are generally women or children; and as the Indians often find out who their prisoners are, the ransoms asked are proportionably exorbitant. Men are usually put to death, if they do not die of their wounds. There is a tribe of friendly Indians living near Carmen, at the outskirts of the town, who do much hard work for the inhabitants for very trifling remuneration; but they are shamefully abused, cheated in every way by shopkeepers and liquor-venders, and harshly treated by other persons, who seem to consider them inferior beings—unworthy of any kind or humane consideration. Should one of these poor creatures fall by the knife of a passionate white man, no notice is taken of it by the authorities; the murderer boasts of his deed, and the poor relations suffer patiently the loss and the insult, which they dare not avenge. Having quitted the free tribes, seduced by promises never fulfilled, they would not be received among them again; and their own numbers, originally small, are reduced daily by disease and abominable drugs, which the publicans sell them in what is said to be spirituous liquor (agua ardiente). Mr. Wickham saw a poor Indian woman, between forty and fifty years of age, almost killed by a blow on the head from an ox's skull (with the horns), given by a wretch, who had drawn his knife upon her husband for preventing his kissing a pretty girl, their daughter, who was walking with her. This scoundrel was seen by Mr. Wickham, a few days afterwards, betting at the race-course with the principal people of the place.

Thanks to the influence of Harris and Roberts, and their connections (both being married to daughters of Spanish settlers), our officers and men were exceedingly well treated. Every door was open to them; and the fruit in every garden was freely, as well as sincerely offered. Letters had been for-

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warded to the commandant or governor, from Buenos Ayres, desiring that we might have every facility and freedom in our operations; but the disposition towards us was such, that those letters were not required.

From the remains of former buildings, and accounts of the old men, Lieutenant Wickham thought that the Spanish settlers must have been far more industrious and ingenious than their creole descendants, who are idle, indolent, and ignorant. The height of their ambition is to make a show at the Sunday races, where they deceive, drink, wrangle, gamble, and quarrel. These Sabbath occupations are always attended by the female part of the population, who take that opportunity of displaying their finery; and though seated upon handkerchiefs on the sandy ground, without any defence from sun, wind, dust, or rain, every damsel displays silk stockings and a gaudy dress upon these occasions. The men do not go near them, notwithstanding their attire: they can beat a poor woman almost to death, upon occasion; but they cannot defer a bet, or risk losing a dollar, for the sake of female society.

The climate is so healthy, that illness of any kind is scarcely known; and the inhabitants, in general, live to a good old age. There is a stirring trade carried on in small vessels, between Buenos Ayres and this place. Salt, of excellent quality, hides, peltry, seal or sea-elephant oil, and skins, are the principal exports, in return for which are received manufactures, sugar, spirits, tobacco, &c.

The Indians, who live at the outskirts of the town in 'toldos,' which are neither wind nor water-tight, load vessels with salt; but the price of their labour is usually spent in some kind of spirituous liquor, which is made and drugged expressly for them—the publicans often saying, "that it is a sin to give an Indian good spirits." When drunk, the howling of these poor wretches is quite frightful. Some of them are almost skeletons—the result, probably, of drinking.

Some leagues up the river coal is obtained, I was informed, but I did not see a specimen myself. Probably Mr. Darwin had an opportunity of examining its quality.

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On the 12th, Lieutenant Wickham sailed for Blanco Bay, to deliver some letters from me (which I had received from Buenos Ayres) to the commandant Rodriguez.

13th. Off the banks in Anegada Bay there was too much sea (during a S.W. gale) for the Liebre to keep on her course any longer, having run as long as was prudent, and already shipped several seas. When hove-to, under a balance-reefed foresail, with the tiller unshipped, she was dry and easy, and lay about five points from the wind.

Mr. Wickham arrived at Argentina on the 16th, and left it on the following day. In sailing out of Blanco Bay, along the south shore, while it was dark, the Liebre grounded frequently; but her crew got overboard, and hauled her over the banks as often as she was stopped by them, and at midnight she was at sea. A south-east gale on the 18th drove her into the Colorado, where Lieutenant Wickham found a strong outset, owing to the 'freshes,' even during the flood-tide.

On the 22d, the Liebre entered the river again, and anchored near Carmen.

At daylight on the 24th, Corporal Williams was missed, supposed to have fallen overboard in the night, while asleep. He slept on deck sometimes, when tormented by musquitoes; and as the Liebre's weather-cloth rail was but a few inches above the deck, he might possibly have rolled overboard into the stream, which would immediately have carried him away. His body was found, about three miles down the river, at sun-set the next evening (Christmas day). The governor (though a Roman catholic) allowed the burial to take place in the consecrated ground of the church, and the curate himself was present.

While the Liebre was absent, Mr. Stokes, in the Paz, surveyed many miles of the river, as well as the bar. No vessel drawing more than eleven feet water can enter without much danger: if at a favourable time any person should be induced to risk crossing the bar with a ship of greater draught, he should bear in mind that it is much more difficult to get to sea than it is to enter, because wind which is fair for approach-

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ing, raises the water; and the reverse. Although ships drawing fourteen feet have passed the bar, at unusually favourable times, others of only ten feet draught have been detained forty days in the river.

29th. Both our little vessels sailed, and on the 4th of January they anchored safely in Port Desire:—this was a bold stroke, but success attended it. They were thus placed at the southernmost point of the coast they were to survey, while the sun was farthest south; and as the days shortened, they would work along the coast northward. Recent traces of Indians were found; and the master of an American sealer told Mr. Wickham that they had been there in considerable numbers, about two months previously. The wells were all full; therefore much rain must have fallen during October, November, or December. I have mentioned elsewhere that although the eastern coast of Patagonia is usually an arid desert, there are periodical times, of short duration, at which rain falls abundantly.

11th. Having rated their chronometers, the little vessels stood out to sea, in company with the North American sealer; but they had not sailed many miles before the wind increased to a gale, and still becoming stronger, bringing clouds of dust and sand off the land, they were reduced to bare poles, and drifted fast off-shore, as well as northward. When the fury of the gale was over, their balance-reefed foresails were set, and with their tillers unshipped they made very good weather, until they were driven near the tide-races off Cape Blanco, where some anxious hours were passed, half-buried in foam, and the wind again almost a hurricane. Towards evening, the storm abated; our water-soaked explorers succeeded in regaining a position under shelter of the land; and anchored next morning under Cape Blanco, to dry themselves and take observations. In this severe gale, the North American schooner split two close-reefed foresails, lost a boat, and was otherwise damaged.

Lieutenant Wickham and Mr. Mellersh walked a long way

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from Cape Blanco, to trace the coast, and look out for shoals in the offing; in doing which, they found numerous 'salinas' (extensive hollow places filled with salt), where the solid mass of very white and good salt was several feet in thickness. Guanacoes were numerous, but shy. On the rocks some fur-seal were seen; too few, however, to be worth a sealer's notice. The following week was passed in examining St. George Bay. Scarcely any stream of tide was found in its western part, though the rise amounted to nearly twenty feet. About Tilly road, where they landed, the mass or principal part of the soil, where visible in cliffs or ravines, is loose sandy clay (diluvium), with immense quantities of large fossil oyster shells imbedded in it. These shells were found every where, even on summits seven or eight hundred feet above the sea, and some of them weighed eight pounds.

A place honoured by the Spaniards with the name of Malaspina, and described as a port, was found to be a wretched cove, full of rocks, hardly safe even for the Liebre. While moored there, our party witnessed lightning set fire to bushes and grass. The flames spread rapidly, and for two days, the face of the country continued to blaze. Near Port Arredondo, Mr. Wickham went to the tops of several hills; he found the country unproductive, except of a few bushes, and yellow wiry grass. There were no traces of natives. Very heavy rain fell during the night of the 28th. I mention it thus particularly, because some persons have said that rain never falls on the east coast of Patagonia, in any quantity.

The cove called 'Oven' is a singular place, being a parting (as it were) in the solid rock, nearly a mile in length, but very narrow, with four fathoms water in it at low tide. Surrounded on all sides by precipitous hills, it is, indeed, an oven; and would injure a ship seriously, even more than other ports on this arid coast, if she were to lie long in it; as her seams would all be opened, and her planks split by the heat and drought. The water found here was so strongly impregnated with salt-petre, that it was not drinkable; but probably better

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might have been procured had they dug fresh wells. On the summit of South Cape an Indian tomb was found. The stones had been displaced, and some bones were lying about, a few of which were taken on board, but none could be got in a perfect state. Mr. Bynoe afterwards examined them, and informed me that they had belonged to a female of small stature.*

Off Ship Island, and thence to Cape Dos Bahias, the tide-stream was again felt strongly, running two, three, or, in some places, four knots an hour. At a little creek, in Camarones Bay, near Cape Dos Bahias, abundance of small wood, fit for fuel, was found; and plenty of fresh water in hollows of the rocks. A guanaco was shot, which weighed upwards of two hundred pounds. Not only is small wood plentiful about Camarones Bay, but the country is sufficiently covered with grass of good quality. Several Indian tombs were seen on the hills, whence it may be inferred that natives at times frequent the neighbourhood, although no recent traces were met with by our party. Unfortunately, not one of these tombs, simply irregular piles of stones, was found in an undisturbed state, neither were any more bones discovered: they are all similarly situated upon the most conspicuous, smooth, and round-topped hills.

At Port Santa Elena many tons of excellent water were procured from hollows in the rocks. (7th Feb.) Approaches to trees were found at this place, which though stunted as to height, much like thorn-trees in exposed situations, were of respectable dimensions. One measured more than three feet round the trunk, but its fellow was not seen.

After dusk, on the 10th, while endeavouring to enter New Bay, with a fresh wind and strong flood-tide, the Liebre got into a 'race,' and was hustled within a fathom of a rock, over which the tide was boiling furiously. Fortunately, the Paz saw the Liebre alter course and make more sail, and by imme-

* I gave them to Sir Francis Chantrey, by whom they were shown to several persons.

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diately following her example, avoided the danger. They then hauled off, and passed the night at sea.

Next day (11th), they stood towards the bay again, the wind increasing fast, till it blew a gale from W.S.W., which being against a flood-tide stream, running at the rate of four knots through the entrance, raised a short hollow sea, dangerous for small craft. Battening down the hatches securely, and close-reefing, the little vessels worked through gallantly, though frequently obliged to lower their sails in squalls, or as they dived into a sea heavier than usual. The tide soon swept them beyond the narrow part, and then they were comparatively in safety.

Part of the west shores of New Bay seemed to be fit for cultivation, being covered with a fine dark soil; and there is abundance of fire-wood. Some small ponds of excellent water were found, over a clayey bed, in which were tracks of cattle. A guanaco shot here was superior to any killed elsewhere, as to condition. Many thousand seals were seen on the rocks, which did not take to the water as soon as disturbed—therefore they could not have been much molested by man.

On the 24th, Lieutenant Wickham discovered the river Chupat, and after waiting for the tide, anchored half a mile within the entrance. Next day he went a few miles up it in a boat, and found that, though free from drift-timber, it was shoal and narrow, few places being deeper than six feet at low-water, or wider than a hundred yards. The stream ran down two or three knots an hour. Many tracks of cattle were seen, but none of natives. As the river seemed to be free from sunken trees, and to have but few banks in it, Mr. Wickham decided to move the Liebre as far up as he could, and then make another excursion in his little two-oared skiff. Between pulling* and sailing, the Liebre was moved twelve miles up in one day, and was moored in the middle of the stream, lest Indians should be near.

Next morning, Mr. Wickham went in his boat, about eight

* Both the vessels had oars.

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miles further; but in a direct line he was then not more than twelve miles from the entrance. Along the banks on each side, as he had advanced, both he and those with him, were much struck by the richness of the alluvial land (caused doubtless by the river overflowing its low banks), and by the quantities of drift-timber, which actually looked like the stores in immense timber-yards. Among the drift-wood there were many large and sound trees left several hundred yards from the banks, therefore the periodical floods must be great.

At Mr. Wickham's westernmost point "the river and the country round had a beautiful appearance, as seen from a rising ground on the south side—an excellent position for a settlement." From this elevation the stream was traced to the westward, running with a very serpentine course, through level meadow land, covered with rich herbage. Several herds of wild cattle were seen, and their traces were observed every where in such numbers as to indicate a great abundance of animals.

Mr. Wickham returned on the 26th to the entrance, and found that a store of fish had been salted by the cook, while Mr. Stokes and others were going about, surveying the neighbourhood. These fish were a kind of bass, nearly as good as salmon.

I have no doubt that this is a river whose existence has been many years known by Spaniards, but of which the situation was intentionally concealed, on account of the lucrative trade some individuals hoped to carry on by means of hides and tallow obtained from the herds of wild cattle. The Spaniards used to anchor their vessels in Port San José, and thence ride in large parties to the Chupat; there they surrounded numbers of cattle, and drove them across the peninsula between San José and New Bay, where they slaughtered them at leisure. Numbers were probably killed nearer the river; but all that could be driven, had doubtless the privilege of conveying their own hides to the neighbourhood of their hunters' ships. There was still living at the River Negro (in 1833) an old man, who was one of the few individuals that escaped

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during a dreadful massacre of Spanish settlers at Port San José. He said that the Indians were jealous of their encroachments, and seized an opportunity, while the Spaniards were attending the performance of mass, to fall upon them, and indiscriminately slay all, except three or four who were taken alive and kept as slaves.

That the Spaniards should have chosen San José for the place of their settlement instead of New Bay, or the Chupat itself, is easily accounted for, by mentioning that small vessels can generally run from the River Negro to Port San José without much risk and in a short time, whereas there are strong tides and dangerous 'races' off the peninsula of San José, and the entrance of the Chupat will not admit a vessel drawing more than seven feet: even this only at high-water. I think that the Chupat is the river alluded to by Falkner, as being in the "country of Chulilaw."* He was told that it traversed the continent as far as the Andes, and judging from the drift-timber, as well as volcanic scoriæ brought down by it, there is ground for thinking that the Chupat† rises in the Cordillera. There is also reason to suppose that the river described and placed variously by different geographers, under the name of Camarones, is this Chupat, chiefly because the Indians who frequent the country bordering upon the south bank of the Negro, say that there is no river of consequence between that and the Santa Cruz, excepting the Chupat.

With this river so near at hand, the west side of New Bay would be an excellent situation for a settlement. There ships of any burthen might anchor in safety, and a communication be carried on with the interior by means of flat-bottomed boats, or barges, so constructed as to admit of being towed, or tracked, in the river, and capable of running up to New Bay before a fair wind. In the River Negro similar boats go a long way up the river for salt; they are towed by horses or oxen; and such vessels, even of thirty tons burthen, might enter the Chupat, if constructed so as to draw but little water. I need not dwell upon the possible advantages to be derived from opening a

* Falkner, p. 87. † Chupat is the Indian name.

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communication across the continent with Chiloé, which might be a means of diffusing Christianity, civilization, and commercial intercourse.

On the 3d, Lieut. Wickham and his party left the Chupat. Early on the 5th they entered Valdes Creek (by the Spaniards styled 'port'), with the flood tide running nearly six knots into the narrow entrance: and on its shores found heaps of horns and bones, besides the wreck of a vessel.* These were indications of one of the temporary settlements maintained on the peninsula of San José for the purpose of obtaining hides. The carcases of the animals were invariably left to decay; a few delicate portions only being selected for food.

Until the 12th our little vessels were unable to quit this singular place, for the ebb tide set so strongly against the swell outside, raised by a S.E. gale, that they could not attempt to cross the bar. Sometimes the very narrow entrance of Valdes Creek is almost stopped up for a time by shingle and sand, after a S.E. gale has been blowing for a few days, therefore at such a time no vessel ought to run for it.

During the war between Brazil and Buenos Ayres (1825-9), Mr. Adams, of Carmen, was master of a merchant vessel hired by Vernet to convey settlers to the Falkland Islands. In returning thence, short of water and provisions, he thought to put into Valdes Creek, knowing that some people were there employed in collecting hides. He ran in for the land, with a fresh S.E. wind, and did not discover, until almost too late, that the bar was not passable. When close in he perceived a heavy sea breaking at the entrance, where he expected smooth water, and directly hauled off; but it was only by carrying a heavy press of sail that he cleared the land; and at the expense of passing through 'races,' which tore off the vessel's bulwarks and otherwise damaged her materially. As our cock-boats crossed this bar, they had ten feet water, but on each side of it there were five fathoms. The Liebre, sharp built, plunged into each short swell; while the Paz, with her bluff bow, did not

* Of about two hundred tons burthen.

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take in a single sea. The bar is a continuation of the long shingle spit, or bank, which forms the seaward side of the harbour; and is about nine miles long, though in some places not a hundred yards broad.

Towards noon the wind fell light, and the vessels were swept by a strong tide-stream towards a 'race,' whose noise might have appalled the crews of much larger and stouter barks. No bottom could be struck with the deep-sea lead, and no efforts of the crews at the oars had much effect in arresting their progress towards apparently inevitable destruction. Even at this awful time, habitual familiarity with danger, and zeal for the service, shewed their effects strongly in Mr. Stokes, who eagerly watched for the sun's meridian altitude, with his sextant to his eye, while every now and then he caught a hasty glimpse of the foaming and roaring race towards which the little craft were fast approaching. At this crisis a breeze sprung up which just enabled them to pass clear; but no one who was in those vessels can ever forget that day, neither do I think they attribute their preservation to blind chance. Sailors see too many of these 'chances' to think of or reflect upon them lightly, and those who have had experience are not wont to forget, that to direct and to preserve are among the least efforts of Omnipotence—so far, at least, as our limited intelligence enables us to discern.

At five that afternoon the Paz and Liebre were about eighteen miles off shore, out of soundings with their lead-lines, and yet were only a mile and half from the eastern part of the race; therefore they still stood to seaward, to get as far as possible from a neighbourhood so dangerous at any time, but especially so at night. For two hours they passed through a rippling, but could strike no soundings with sixty fathoms of line.

In 1830 Mr. Harris (owner of the Paz) sailed from the River Negro in a vessel of about ninety tons, with some horses on board, which he had engaged to convey to a party of gauchoes who were employed on the peninsula of San José, in killing cattle for their hides. Within the Bay of San Matias, about six

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leagues N.W. of the port (San José), he got into one of these races,* and could not extricate his vessel. No soundings could be obtained: the sails were useless in consequence of the violent motion and want of wind, where the water was breaking so furiously, though elsewhere a fresh breeze was blowing; and nothing could be done. The crew took to the rigging, to avoid being washed overboard; and for almost three hours they were tossed about, like an empty bottle in a ripple, before the race abated, with the turn of tide, so as to admit of their sails acting enough to draw them a-head out of the commotion. The vessel, though a strong one, was so much shaken and damaged, the horses so much injured, and all hands so much 'scared,' as Harris honestly told me, that he steered back direct for the Negro, forfeited his agreement, and refused to go again.

On the 14th March the Paz and Liebre again crossed the bar of the River Negro, and next day they anchored a-breast of the town (Carmen). Lieut. Wickham found that an expedition had been sent from Buenos Ayres for the purpose of obliging the Indians to retire beyond (southward of) the Negro; and, if possible, deprive them of their horses. Bad weather and a heavy sea on the bar, caused by south-east gales, prevented the Paz and Liebre from sailing again until the 11th of April, when they went to Port San Antonio, and afterwards into Port San José. Plenty of firewood, and abundance of fish, were found at San Antonio; but no fresh water, except by digging wells. The tide-stream rushes into and out of Port San José in a violent manner, especially when opposed by wind; but after the narrow part of the entrance is passed, all agitation of the water ceases, except what may be caused by wind. It is a barren and desolate place, without wood or fresh water, and too large for a harbour. Our party saw proof of this assertion in the wreck of a small vessel at the north-east part of the port, which had been driven from her anchors and

* The tide-races within the bay are less formidable than those off Point Norte, near which our vessels were.

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totally lost, though she was lying in a land-locked bay, or rather gulf.

On the 6th of May, while returning from San José to the River Negro, our little vessels got into a ripple, which did not break, but had almost the appearance of a whirlpool. There was a hollow short swell, and an irregular motion in every direction, exactly like the boiling of a pot, on a great scale. Here again they could touch no bottom with fifty fathoms of line and a heavy lead. These races and ripplings in such deep water, about the peninsula of San José, are very remarkable; chiefly because there are none such on any other part of the coast. They will be recurred to in a future page of this volume.

May 7th. The Paz and Liebre returned to the Negro, but could not reach an anchorage off Carmen until late the next day, owing to the 'freshes.'* The next occupation for our party was examining and sounding the entrance and bar of the Negro, a task purposely deferred, as being of minor consequence. The mouth of a rapid river like this, subject to floods, and disemboguing at a place exposed to the full force of such a heavy sea as is raised on that coast by a south-east gale, must be frequently changed, as to the detail of its shoals and channels; therefore no plan, however exact at one time, can be depended upon after the lapse of a few years; and no vessel larger than a boat would be justified in attempting to enter without a local pilot, if one can be obtained. In one spot, near Main Point, where a small battery stood in 1826, there were two fathoms water in 1833; and within the same period the deepest water for a few miles within the entrance, changed gradually from the south side to the north. Mr. Darwin was told that the river was called Negro after a cacique of that name; but Falkner asserts that it was so called by the Spaniards, because the aborigines knew it by the name of 'Cusu Leuvu,' which means black river.†

* There are two floods annually: one about December or January, caused by snow melted on the Cordillera; and the other about May or June, occasioned by heavy rains in the interior country. These inundations are very variable.

† Falkner, p. 79.

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In May, June, July, and August, the neighbourhood of this river swarms with wild fowl, which migrate from the south, for the winter, and return there to breed about September. The old people foretell a severe winter when they arrive early, and in greater numbers than usual. In 1833-4 they formed the staple article of food for the inhabitants of Carmen during the winter, as the Indians had deprived them of their cattle; in the summer cavies and ostriches supplied their tables. Hunting is a favourite amusement of the Carmenites. They sally forth in large parties on horseback, attended by a motley crowd of dogs, inclose a large extent of country, contract the circle gradually,* and at last drive a great number of ostriches, wolves, cavies, deer, foxes, and pumas, into a comparatively small space, when the indiscriminate attack commences—balls and lassoes flying in every direction. Many accidents happen to the horses in these hunts, owing to the ground being so undermined, in some places, by the 'tucutucu,'† a little animal like a small rabbit; but the riders are so skilful, that they generally save themselves, however awkwardly their horses may fall. Pumas are an especial object of attack, not only for the risk attached to encountering them, but because they do so much damage to the young animals of all kinds: they have a peculiar method of instantly killing a young colt by breaking its neck with an adroit blow of one paw, while the poor creature is held fast between the other and a most formidably armed mouth. In 1779 there were numerous herds of cattle and horses near the town of Carmen, but incursions of the Indians have diminished them to but few.

During the time of the old Spaniards, after 1783, more than a thousand Indians attacked the settlement at one time. The inhabitants retreated to their caves,‡ where, defended by strong doors, with loop-holes for musketry, they were safe; but their

* As in eastern countries.

† This Indian name, gutturally pronounced, expresses the curious sound made by these creatures while under ground—a noise somewhat like the blow of a distant hammer.

‡ Mentioned in p. 299.

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houses were ransacked and burned, and all their animals driven away. Since that time the frequent predatory excursions of minor parties of Indians have prevented the settlers from again attempting to collect animals in large numbers, seeing that they would assuredly tempt the aborigines to repeat their attacks on a greater scale than ever. The old man, who was one of Villarino's party,* gave Mr. Darwin some information about that expedition, which entirely corroborates the interesting account of Basilio Villarino himself, who made his way, by excellent management, and extreme perseverance, to the foot of the Cordillera, though surrounded by Indians suspicious of his intentions. He managed so dexterously as to make one tribe become his firm friends and assistants; and behaved so well himself, in his own enterprises, as well as in his conduct to those under him, as to have obtained their hearty co-operation during eight long months. But he was soon afterwards savagely murdered by the natives during another exploring expedition.† The old man said that Villarino was much guided by the account of an Englishman,‡ whose description of the river and Indian country was found to be very accurate. Mr. Darwin heard several anecdotes of the Indians, and their attacks upon the Christians (so they term all white men) which interested me very much; but as I suppose they will be found in his volume, it is unnecessary here to do more than allude to them.

On the 12th May Mr. Usborne, in the Constitucion, anchored in the river, and next day put himself under Mr. Stokes's orders; to whom Lieut. Wickham gave up the charge of this branch of the survey, and then went on board the Constitucion to hasten towards Maldonado. On the 17th all three little vessels sailed, Lieut. Wickham steering for the Plata, and Mr. Stokes for San Blas.

From this time till the Paz and Liebre were discharged, in

* Bowman of his boat (lancha).

† Sir Woodbine Parish has given an abridged translation of Villarino's Diary in the Journal of the R. Geogr. Society for 1836, vol. vi, part ii, pp. 136—167.

‡ Falkner evidently.

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August,* Mr. Stokes and his party were most zealously occupied between the Negro and Blanco Bay; but time was too fully occupied in the uninteresting, though useful works, of sounding, measuring, observing, and chart-making, to admit of many notices of the country being obtained in addition to those already mentioned; indeed the nature of the coast, almost flat, uninhabited, without trees, and fronted by extensive sand-banks, precluded the possibility of acquiring much information not of a technical nature.

* Already mentioned, p. 288.

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CHAPTER XV.

Beagle and Adventure sail from Monte Video—Port Desire—Bellaco Rock—Refraction—Port San Julian—Viedma—Drake—Magalhaens—Patagonians—Port Famine—San Sebastian Bay—Woollya—Jemmy—Story—Treachery—Oens-men—Improvement—Gratitude—Falklands—Events—Captain Seymour—Search for Murderers—Lieutenant Smith—Brisbane—Wreck—Sufferings—Lieutenant Clive—Sail from Falklands.

Dec. 6th, 1833. With a supply of provisions and coals,* sufficient for at least nine months, the Beagle and her tender sailed together from Monte Video.

We first touched at Port Desire (23d Dec.), and after passing a very cheerful Christmas-day,† and exploring the inlet to its extremity, the Adventure was left to complete some alterations in her masts and rigging, while the Beagle would survey the coast between Sea Bear Bay and Port San Julian.

The party who went up the inlet were much struck by the wildness and height‡ of the rocky cliffs which they saw on each side of what appeared to have been the bed of a former river; but could go no further with the yawl than I had been in 1829. This I had foreseen, and therefore Mr. Chaffers, who was in charge of the party, took with him a small dinghy, in which he went on after the yawl was stopped by the mud. Having proceeded two miles further, the prospect changed suddenly; instead of wild glens and precipitous heights of porphyritic rock, low flat banks were seen, covered with rushes near the water, and, further from the stream, with luxuriant pasture. It was almost high water when the dinghy reached this spot and entered a fresh water river about a hundred

* Wood and water being easily procured in the regions we were going to visit, we carried only a month's store of those essentials.

† After noon on the 25th, both crews amused themselves on shore in wrestling, racing, jumping, and various games.

‡ About three hundred feet.

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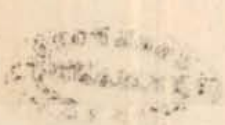

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BRITANNIA OR TOWER ROCK. PORT DESIRE.

ANCHORAGE, AND SPANISH RUINS. PORT DESIRE.

UPPER PART OF PORT DESIRE INLET.

C. Marsens. S. Bull.

BIVOUAC AT THE HEAD OF PORT DESIRE INLET

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yards wide, but so shallow that there was only three feet water in the middle. The river narrowed considerably as they ascended, till at the spot where Mr. Chaffers stopped to take sights of the sun, the stream was but forty yards across. In that place the deepest water was three feet at the top of high tide, over a gravelly bottom; but from the level space between the stream and the foot of the nearest hills, about three quarters of a mile, there was reason for supposing that during floods all the valley might be inundated. From a neighbouring hill, four hundred feet in height, the river could be traced several miles further, making a distance of about eight miles seen by our party, in which the water was quite fresh. It was lost to the westward, winding along an irregular break, or cliff-bounded valley, in the distant hills. The only living creature seen, of any size, was a lame horse, feeding near the river. There were no traces whatever of Indians. Having hastened back with the little boat before the river dried* (at half-ebb), Mr. Chaffers ascended another hill; but saw little more excepting an appearance of water to the southward, about which he could not clearly distinguish whether it was a lake, part of a river, or a salt-pond. I have no doubt, that during particular seasons a large body of fresh water is brought down this valley, but I do not think the river rises near the Andes, because there is no drift-wood on its banks, and the Indians say nothing of it when enumerating the rivers which cross the continent.

Jan. 4th, 1834. In working out of Port Desire, the Beagle struck her fore-foot heavily against a rock, so as to shake her fore and aft; but on she went with the tide, and as she made no water, I did not think it worth while returning into port. I was instantly convinced that we had hit the very rock on which the Beagle struck in 1829, in the night—a danger we never again could find by daylight till this day, when I was, rather imprudently, going out with the last quarter-ebb.

* The tide fell more than fourteen feet perpendicularly; but a small brook remained, perhaps a foot deep, winding its course between the uncovered banks.

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At low-water there are but eight feet on this rock, which is not far from mid-channel, just without the entrance.

We anchored near Watchman Cape, and in other places along the coast, before reaching Port San Julian, and some time was devoted to an examination of the Bellaco Rock and its vicinity, as there is a dangerous reef extending from Watchman Cape towards, but not quite out to the Bellaco.

In my own notes I find this rock mentioned as "almost covered at times, but occasionally showing above water as high as the hull of a ship!" In Mr. Stokes's journal, left with me, it is mentioned in these words: "Passed between the Bellaco Rocks, close to the eastern one, nearly a-wash;" and in the diary of the Nodales' voyage (in 1619), it is spoken of as "una baxa que lababa la mar en ella," which means, a rock a-wash. The rise of tide there is about twenty feet, which explains the various appearances it had to my eye; for at high water I saw it almost covered, or a-wash; and as the Nodales described it similarly in 1619, there can have been extremely little, if any, change in the relative heights of sea and land in this place during the last two hundred and fifteen years.* Some time ago I thought differently, having formed a hasty opinion upon the fact of my having seen the rock as high out of water as a ship's hull. I did not then consider how much the tide falls, nor did I recollect, till I referred to notes, that I had also seen it a-wash (the top almost level with the water), at times during the many days we were in the neighbourhood.

On the day that Mr. Stokes and myself made our respective notes on the Bellaco (without any communication of opinion), an extraordinary effect of refraction was remarked. The meridian altitude of the sun (then far south) observed at opposite horizons, differed no less than sixteen miles! Similar effects had been noticed before, especially on the Patagonian coast, therefore we generally observed both ways; but to nearly

* As the larger and eastern rock is about a hundred yards long and eighty wide, with kelp growing on most parts of it, I do not think the top can wear away while so protected by sea-weed.

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such an extent as this we never either before or afterwards witnessed an error arising wholly from the state of the atmosphere near the horizon; causing the visible water-line to be apparently raised several minutes of a degree. On these occasions we always used the mean of the two results, which agreed closely with the latitude resulting from triangular connection with points on the shore, whose latitude we knew by observations made with the artificial horizon.*

7th. Mr. Stokes and I landed some leagues northward of Port San Julian, near Cape Look-out, and ascended a level-topped range of hills about 300 feet above the sea. The view we obtained was similar to those so tiresomely common in eastern Patagonia. Level, arid, desert-like plains extended to the horizon: a few irregular hills were seen in the distance; some guanacoes and a few ostriches were here and there discerned; a fox crossed our path, and a condor wheeled overhead; nothing more was noticed.

We returned to the low ground near the sea, and there we found plenty of small wood, stunted shrubby trees, fit for fuel; as well as several ponds of fresh-water. The rise of tide on the shore was considerably more than twenty feet, but we had not time to ascertain it accurately.

9th. Mount Wood,† that excellent land-mark for Port San Julian, was seen at daylight: and about noon the Beagle anchored off the bar of the harbour. Mr. Stokes went with me to examine the passage, and before evening our ship was safely moored in the port. This was one, among numerous instances I could mention, where the good qualities of the Beagle, as to sailing and working, saved us days of delay, trouble, and anxiety. All hands immediately set-to about the plan of the port, and such efficient officers as were with me made short work of it. One day Mr. Darwin and I undertook an excursion in search of fresh-water, to the head of the inlet, and towards a place marked in an old Spanish plan,

* Bellaco rocks are the same as Estevan shoal. There are at least two distinct masses of rock. A ship may pass between them.

† Nine hundred and fifty feet high.

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" pozos de agua dulce ;" but after a very fatiguing walk not a drop of water could be found. I lay down on the top of a hill, too tired and thirsty to move farther, seeing two lakes of water, as we thought, about two miles off, but unable to reach them. Mr. Darwin, more accustomed than the men, or myself, to long excursions on shore, thought he could get to the lakes, and went to try. We watched him anxiously from the top of the hill,* saw him stoop down at the lake, but immediately leave it and go on to another, that also he quitted without delay, and we knew by his slow returning pace that the apparent lakes were 'salinas.' We then had no alternative but to return, if we could, so descending to meet him at one side of the height, we all turned eastward and trudged along heavily enough. The day had been so hot that our little stock of water was soon exhausted, and we were all more or less laden with instruments, ammunition, or weapons. About dusk I could move no farther, having foolishly carried a heavy double-barrelled gun all day besides instruments, so, choosing a place which could be found again, I sent the party on and lay down to sleep ; one man, the most tired next to myself, staying with me. A glass of water would have made me quite fresh, but it was not to be had. After some hours, two of my boat's crew returned with water, and we were very soon revived. Towards morning we all got on board, and no one suffered afterwards from the over-fatigue, except Mr. Darwin, who had had no rest during the whole of that thirsty day—now a matter of amusement, but at the time a very serious affair.

Sir Woodbine Parish intends to publish a description of the Spanish settlements on these shores, in which no doubt Viedma's, at Port San Julian, will have place. A full account of it, in the original language, may be found in the diary of Antonio de Viedma, published at Buenos Ayres, in 1837, by Don Pedro de Angelis. Finding no water near the harbour except after rain, which is there rare, Viedma pitched

* Named in the plan 'Thirsty Hill.'

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his tents some leagues inland, near a spring frequented by the Indians, but their doubtful friendship, the progress of scurvy among his own people, their discontent at such a situation, and other reasons, inclined the Spanish viceroy to withdraw the settlement. This dreary port, difficult of access and inhospitable even when the stranger is within its entrance, is well known to readers of early voyages as the place where Magalhaens so summarily quelled a serious mutiny, and conspiracy against his own life, by causing the two principal offenders, captains of ships in the squadron, to be put to death:* and as the scene of the unfortunate Doughtie's mock trial and unjust execution.† That two such remarkable expeditions as those of Magalhaens and Drake should have wintered at Port San Julian, and that two such tragedies should have occurred there is remarkable. In the plan of that port we now see Execution Island, Isle of True Justice, (injustice?) and Tomb Point: the two former being names given by Drake.‡ One naturally asks how their ships obtained water, and the answers occurring to me are,—that they were there in the winter season, when the rain which falls is not soon dried up; and that they may have dug wells, which we did not think it worth while to do, having no time to spare.

15th. A French whaler came in over the bar, at high water, without having sounded it, or knowing what depth she would find. The only instance of similar folly I have witnessed was that of a sealing schooner which I met near Port Famine, whose master had taken her through Possession Bay and both Narrows, without knowing that the tide rose and fell there more than six or seven feet, and without a chart of the Strait. When I told this man that the tide rose six or seven fathoms at the First Narrow, he certainly did not believe me. The bar of San Julian is shingle (or gravel), and often altered in form by south-east gales or unusual tides. Under ordinary circumstances the tide rises thirty feet at full moon.

* 1520. † Drake's Voyage, 1578.

‡ And the latter a memento of Lieut. Sholl, of the Beagle, (vol. I.)

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19th. Sailed, and, for once during our experience of these shores, found a heavy swell setting in from the east.*

On the 20th we anchored again in Port Desire, and our first employment was to look for the rock whose top (Mr. May assured me with a grave face) we had knocked off with our keel.

22d. Both vessels sailed, and at sunset the Adventure parted company, steering for New Island in the Falklands. Lieutenant Wickham was to make a connected survey of the coast of that archipelago, while the Beagle was in other places.† After giving some time to sounding and examining portions of ground in the neighbourhood of Cape Virgins and the eastern entrance of Magalhaens Strait, we passed the First Narrow and anchored in Gregory Bay. There, of course, we had an interview with old Maria and her party. They received us kindly, but with some form, being assembled and seated on the ground near our landing place, with two men standing up in the midst of them, who looked immoveably grave and stupidly dignified. These men were acting as caciques, Maria said, the real chiefs being absent. They were stripped to the waist, and the upper parts of their bodies spotted with white paint.‡ The rest of the people were dressed as usual. An active barter commenced, but the portly actors in the middle did not take part in it, they remained in their solemnity till we left them.

On the 2d of February we anchored in Port Famine, and on the 10th, having obtained chronometric observations for which I went there, we sailed for the neighbourhood of the First Narrow and Lomas Bay (near Point Catherine). We often anchored thereabouts in the prosecution of our work.

On the 17th, as we ran along the curious spit or bank of shingle that fronts San Sebastian Bay, I really could not tell, though I had been in that bay before, whether I had not been

* I think that this easterly swell must have been caused by a south-east gale, though it came to us from the east.

† Appendix, No. 18.

‡ Much as a piece of new knotty wood is spotted with white lead before it receives a coat of paint.

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BUTTON ISLAND, NEAR WOOLLYA.

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deceived as to no channel existing,* so well defined and distinct did a wide opening appear. A few more minutes, however, undeceived me: I discerned low flat land stretching along the western horizon: and soon afterwards we anchored in the bay. The following week was occupied in surveying the north-eastern shore of Tierra del Fuego, which, except San Sebastian Bay, does not contain a port. San Vicente Cove is not worth notice as a harbour.

On the 25th, we anchored at the Hermite Islands, on the north-east side of Wollaston Island. Thence, on the 27th, we crossed Nassau Bay to Goree Road, and the following day entered the Beagle Channel.

The 1st of March passed in replenishing our wood and water at a cove, where we had an opportunity of making acquaintance with some Yapoo Tekeenica natives, who seemed not to have met white men before.

Till the 5th the Beagle was actively occupied, by day, in working to windward (westward) through the channel, and then she anchored at Woollȳa. But few natives were seen as we sailed along: probably they were alarmed at the ship, and did not show themselves. The wigwams in which I had left York, Jemmy, and Fuegia, were found empty, though uninjured: the garden had been trampled over, but some turnips and potatoes of moderate size were pulled up by us, and eaten at my table, a proof that they may be grown in that region. Not a living soul was visible any where; the wigwams seemed to have been deserted many months; and an anxious hour or two passed, after the ship was moored, before three canoes were seen in the offing, paddling hastily towards us, from the place now called Button Island. Looking through a glass I saw that two of the natives in them were washing their faces, while the rest were paddling with might and main: I was then sure that some of our acquaintances were there, and in a few minutes recognized Tommy Button, Jemmy's brother. In the other canoe was a face which I knew yet could not name. "It must be some one I have seen before," said I,—when his sharp eye

* Vol. I. p. 457-8.

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detected me, and a sudden movement of the hand to his head (as a sailor touches his hat) at once told me it was indeed Jemmy Button—but how altered! I could hardly restrain my feelings, and I was not, by any means, the only one so touched by his squalid miserable appearance. He was naked, like his companions, except a bit of skin about his loins; his hair was long and matted, just like theirs; he was wretchedly thin, and his eyes were affected by smoke. We hurried him below, clothed him immediately, and in half an hour he was sitting with me at dinner in my cabin, using his knife and fork properly, and in every way behaving as correctly as if he had never left us. He spoke as much English as ever, and, to our astonishment, his companions, his wife, his brothers and their wives, mixed broken English words in their talking with him. Jemmy recollected every one well, and was very glad to see them all, especially Mr. Bynoe and James Bennett. I thought he was ill, but he surprised me by saying that he was "hearty, sir, never better,"* that he had not been ill, even for a day, was happy and contented, and had no wish whatever to change his way of life. He said that he got "plenty fruits,"† "plenty birdies," "ten guanaco in snow time," and "too much fish." Besides, though he said nothing about her, I soon heard that there was a good-looking‡ young woman in his canoe, who was said to be his wife. Directly this became known, shawls, handkerchiefs, and a gold-laced cap appeared, with which she was speedily decorated; but fears had been excited for her husband's safe return to her, and no finery could stop her crying until Jemmy again showed himself on deck. While he was below, his brother Tommy called out in a loud tone—"Jemmy Button, canoe, come!" After some time the three canoes went ashore, laden with presents, and their owners promised to come again early next morning. Jemmy gave a fine otter skin to me, which he had dressed and kept purposely; another he gave to Bennett.

* A favourite saying of his, formerly.

† Excrescences on the birch trees, and berries.

‡ For a Fuegian.

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FUEGIA BASKET. 1833.

JEMMY'S WIFE 1834.

JEMMY IN 1834.

JEMMY BUTTON IN 1833.

YORK MINSTER IN 1833

YORK IN 1833.

FUEGIANS.

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Next morning Jemmy shared my breakfast, and then we had a long conversation by ourselves; the result of which was, that I felt quite decided not to make a second attempt to place Matthews among the natives of Tierra del Fuego. Jemmy told me that he knew very little of his own language; that he spoke some words of English, and some Tekeenica, when he talked to his family; and that they all understood the English words he used. York and Fuegia left him some months before our arrival, and went in a large canoe to their own country; the last act of that cunning fellow was to rob poor Jemmy of all his clothes; nearly all the tools his Tekeenica 'friends' had left him; and various other necessaries. Fuegia was dressed as usual, and looking well, when they decamped: her helpmate was also well clothed, and had hardly lost anything I left with him. Jemmy said "York very much jaw," "pick up big stones," "all men afraid." Fuegia seemed to be very happy, and quite contented with her lot. Jemmy asserted that she helped to "catch (steal) his clothes," while he was asleep, the night before York left him naked.

Not long after my departure in Febuary 1833, the much-dreaded Oens-men came in numbers, overland, to Woollȳa; obliged Jemmy's tribe to escape to the small islands, and carried off every valuable which his party had not time to remove. They had doubtless heard of the houses and property left there, and hastened to seize upon it—like other 'borderers.' Until this time York had appeared to be settled, and quite at ease, but he had been employed about a suspiciously large canoe, just finished when the inroad was made. He saved this canoe, indeed escaped in it, and afterwards induced Jemmy and his family to accompany him "to look at his land." They went together in four canoes (York's large one and three others) as far west as Devil Island, at the junction of the north-west and south-west arms of the Beagle Channel: there they met York's brother and some others of the Alikhoolip tribe; and, while Jemmy was asleep, all the Alikhoolip party stole off, taking nearly all Jemmy's things, and leaving him in his original condition. York's fine canoe was evidently not

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built for transporting himself alone; neither was the meeting with his brother accidental. I am now quite sure that from the time of his changing his mind, and desiring to be placed at Woollȳa, with Matthews and Jemmy, he meditated taking a good opportunity of possessing himself of every thing; and that he thought, if he were left in his own country without Matthews, he would not have many things given to him, neither would he know where he might afterwards look for and plunder poor Jemmy.

While Mr. Bynoe was walking about on shore, Jemmy and his brother pointed out to him the places where our tents were pitched in 1833, where the boundary line was, and where any particular occurrence happened. He told Mr. Bynoe that he had watched day after day for the sprouting of the peas, beans, and other vegetables, but that his countrymen walked over them without heeding any thing he said. The large wigwams which we had erected with some labour, proved to be cold in the winter, because they were too high; therefore they had been deserted after the first frosts. Since the last depredations of the Oens-men, he had not ventured to live any longer at Woollȳa; his own island, as he called it, affording safer refuge and sufficient food.

Jemmy told us that these Oens-men crossed over the Beagle Channel, from eastern Tierra del Fuego, in canoes which they seized from the Yapoo Tekeenica. To avoid being separated they fastened several canoes together, crossed over in a body, and when once landed, travelled over-land and came upon his people by surprise, from the heights behind Woollȳa. Jemmy asserted that he had himself killed one of his antagonists. It was generally remarked that his family were become considerably more humanized than any savages we had seen in Tierra del Fuego: that they put confidence in us; were pleased by our return; that they were ready to do what we could explain to be for their interest; and, in short, that the first step towards civilization—that of obtaining their confidence—was undoubtedly made: but an individual, with limited means, could not then go farther. The whole scheme, with respect

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MURRAY NARROW - BEAGLE CHANNEL.

COVE IN BEAGLE CHANNEL.

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to establishing a missionary with the Fuegians who were in England, among their countrymen, was on too small a scale, although so earnestly assisted by Mr. Wilson,* Mr. Wigram, Mr. Coates, and other kind friends.

I cannot help still hoping that some benefit, however slight, may result from the intercourse of these people, Jemmy, York, and Fuegia, with other natives of Tierra del Fuego. Perhaps a ship-wrecked seaman may hereafter receive help and kind treatment from Jemmy Button's children; prompted, as they can hardly fail to be, by the traditions they will have heard of men of other lands; and by an idea, however faint, of their duty to God as well as their neighbour.

That Jemmy felt sincere gratitude is, I think, proved by his having so carefully preserved two fine otter skins, as I mentioned; by his asking me to carry a bow and quiver full of arrows to the schoolmaster of Walthamstow, with whom he had lived; by his having made two spear-heads expressly for Mr. Darwin; and by the pleasure he showed at seeing us all again.

As nothing more could be done, we took leave of our young friend and his family, every one of whom was loaded with presents, and sailed away from Woollȳa.

On the 9th of March we were off Beauchesne Island.† Many persons have fancied that there are two islands near together in that place, having been deceived by two hummocks on the only island, which from a distance show just above the horizon like two islets. Next day we anchored in Berkeley Sound; first in Johnson Cove, and afterwards in Port Louis.

We found a state of affairs somewhat different from that of March 1833; but though more settled, in consequence of the presence of an established authority, resident at Port Louis (a lieutenant in the navy), my worst forebodings had not equalled the sad reality.

In a note to page 240, I alluded to the murder of the Buenos Ayrean commanding officer; and to that of Mr. Brisbane. A few weeks before the Clio arrived in 1833, there was a small

* Of Walthamstow. † Near the Falklands.

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garrison at Port Louis, consisting of a sergeant's guard of soldiers, a subaltern, and a field officer. The men mutinied because their superior was thought to be unnecessarily severe, and occupied them unceasingly in drill and parade, to the prejudice of their obtaining food sufficient for health. They were obliged, in consequence of his system, to live upon worse fare than the settlers, because they could not go about to forage for themselves; and the result was that, after many threats, they murdered him. A small armed schooner* arrived a few days afterwards from Buenos Ayres, by whose officers and crew, assisted by some French sailors, the principal mutineers, nine in number, were taken and put into confinement on board. They were afterwards carried to Buenos Ayres.

On the 26th of August 1833, three 'gauchos' and five Indians† (the prisoners before mentioned), set upon and murdered Mr. Brisbane; Dickson, the man in charge of Vernet's store;‡ Simon, the capataz; the poor German; and another settler; after which atrocious acts they plundered the settlement and drove all the cattle and horses into the interior. Only that morning Mr. Low, who was then living with Mr. Brisbane, left Port Louis on a sealing excursion, with four men. Hardly was his boat out of sight, when the deceitful villains attacked Brisbane in Vernet's house: suspecting no treachery, he fell at once by the knife of Antonio Rivero. Simon defended himself desperately, but was overpowered; the others, overcome by fear, fell easy victims. The rest of the settlers, consisting of thirteen men, three women, and two children, remained with the murderers two days, and then escaped to a small island in the Sound; where they lived on birds' eggs and fish, till the arrival of the English sealer Hopeful,§ on board which was an officer of the navy, ‖ who in some measure relieved their immediate distress, but could not delay to protect them from the assaults which

* Sarandi.

† Antonio Rivero, J. M. Luna, M. Godoy,—J. Brasido, M. Gonzales, L. Flores, F. Salazar, M. Lattore.

‡ P. 240. § Nov. 1833.

‖ Mr. Rea. The Hopeful belonged to Messrs. Enderby.

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they anticipated. About a month after the Hopeful sailed, H.M.S. Challenger, Captain M. Seymour, arrived, having a lieutenant of the navy and four seamen on board, who had volunteered from H.M.S. Tyne, and were duly authorized to remain at the Falklands. The following extract from a letter will show what took place on Captain Seymour's arrival.

"Captain Seymour, and the consuls, being anxious to visit the settlement of Port Louis, landed some distance from it (the wind being strong from S.S.W.), intending to walk there. About a mile from the houses they were met by an Englishman named Channon, sent by the gauchoes to see who they were, and whether the ship was a whaler in want of beef, or a man-of-war. He informed them that the gauchoes and Indians had murdered Mr. Brisbane: Dickson, who had been left in charge of the flag by Captain Onslow: Simon; and two others: and had pillaged the houses, destroying every thing in their search for money. He then pointed them out, sitting under a wall, with their horses behind the remains of the government house, ready saddled for a start on our nearer approach. They had two gauchoes, prisoners, who had not been concerned in the murders, and whom they threatened to kill, if he, Channon, did not return. He also stated that one of them was willing to turn king's evidence, and would bring back all the horses, if possible, provided Captain Seymour would ensure his pardon. The whole of them, nine in number, retreated into the interior as soon as they found out it was a ship of war, taking all the tame horses, between fifty and sixty.* As his party were not armed, Captain Seymour thought it right to return on board; but after dark, Lieutenant Smith was sent with a party of marines, and two boats, to try and take them, if they should be still about the houses, and to leave with Channon a bottle containing a crucifix, as a signal for Luna.† On their landing, Lieutenant Smith took all necessary precautions, left six men in charge of the boats, and proceeded cautiously with the

* Thirteen men and three women had escaped to an island in the Sound, as they could do nothing against the murderers, who had all the arms.

† The gaucho who offered to become king's evidence.

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rest. He carefully searched every building in the place, without seeing even a trace of them. All was desolation; yet he learned afterwards from the two innocent gauchoes, that Antonio Rivero and another, suspecting who the party were, had watched them closely: that at one time Lieut. Smith was near treading on them; which seemed hardly credible, until the arrangements made on landing, the marching in Indian file to hide his men, &c. were mentioned. Mr. Smith left with Channon Luna's pardon, who, on the fourth day, brought in two horses—not having been able to obtain more, as the murderers were very watchful and fearful of each other, so much so, that one of them had fallen a sacrifice to suspicion; and Luna's desertion reduced their number to six. With Luna for their guide, on the sixth day Lieut. Smith, four midshipmen and twelve marines, were despatched into the interior. They were absent four days, and marched more than a hundred miles, enduring much fatigue, which was increased by the boisterous state of the weather, and by continual rain for three out of the four days. Water in ravines, which on going out hardly rose above their ankles, on their return had increased to torrents: in crossing them some nearly lost their lives, and on the bleak moors they sunk at every step knee-deep in bog. Without sleep or shelter, they lived for the last two days on beef just warmed through, by fires that it took hours to kindle. They were not successful in capturing any of the murderers, but at one time were so near, that they had the mortification to see them drive their horses away at a gallop, and having all the tame ones but two, they were quickly out of reach of musket-shot. So hasty however was their retreat, that they left their provisions behind them. Captain Seymour finding that capturing the Indians would be a tedious and uncertain task, made one of the ruined houses habitable, and leaving six marines as an additional protection to Lieut. Smith and his boat's crew, proceeded as ordered. The lieutenant endeavoured to make his abode comfortable, by clearing away rubbish and bones, and putting a garden into some order. With the two horses he succeeded in catching and taming two cows,

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which gave about two gallons of milk daily, besides fourteen others, five or six of which were in calf. By one means or other all but one of the murderers were taken, and a cutter was hired to remove them to the flag-ship at Rio de Janeiro."

Before the Beagle's arrival Lieut. Smith had succeeded in capturing the principal murderer, and transporting him to an islet in the Sound, where he was watched, and furnished with provisions by the boat's crew. The lieutenant applied to me for assistance, and knowing that he was not safe while such a desperate character as Rivero was at large, though on an islet, and that the life of Luna (the king's evidence) was still more risked, I took those men, and one named Channon, who was said to have been an accomplice in the plot, though not an active agent, on board the Beagle. Rivero was put in irons, Channon confined to the ship, and Luna left at liberty, though watched.

When Mr. Low returned from his sealing expedition he found that his life was sought, as a friend of Mr. Brisbane; and as he could do nothing on foot against the mounted gauchoes, he retired to Kidney Islet, at the entrance of Berkeley Sound, to await the arrival of some ship. Tired, however, of inaction, he set out to go westward, in search of some whaler, and on the 6th of February, when in great distress, he fell in with our tender, the Adventure, and immediately offered his services as a pilot: they were accepted, provisionally, by Lieut. Wickham, and afterwards by me, trusting that the Admiralty would approve of my so engaging a person who, in pilotage and general information about the Falklands, Tierra del Fuego, Patagonia, and the Galapagos Islands, could afford us more information than any other individual, without exception.

Mr. William Low is the son of a respectable land-agent in Scotland; he was brought up as a sailor, and possesses strong common sense, quick apprehension, a readiness at description, and an extraordinary local memory.

On the 13th the Adventure arrived: she had almost completed her examination of the west, south, and south-east outer coasts, in a very satisfactory manner, having been greatly forwarded

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and helped by Mr. Low's minute acquaintance with every port, and almost every danger. Our tender sailed to continue her coasting examination on the 21st. She returned on the 26th, and sailed again on the 30th. Meanwhile our own boats were constantly occupied in and near Berkeley Sound and Port William.

When I visited the settlement it looked more melancholy than ever; and at two hundred yards' distance from the house in which he had lived, I found, to my horror, the feet of poor Brisbane protruding above the ground. So shallow was his grave that dogs had disturbed his mortal remains, and had fed upon the corpse. This was the fate of an honest, industrious, and most faithful man: of a man who feared no danger, and despised hardships. He was murdered by villains, because he defended the property of his friend; he was mangled by them to satisfy their hellish spite; dragged by a lasso, at a horse's heels, away from the houses, and left to be eaten by dogs.

Besides my own acquaintance with him and opinions derived from the personal knowledge of the Beagle's officers, some of whom had known Brisbane when his vessel, the Saxe Cobourg, was wrecked in Fury Harbour (owing to no fault of his), Mr. Weddell bears testimony to his character on many occasions, particularly by an observation in page 48 (Weddell's Voyage), where he says, "I had full confidence in the care and ability of Mr. Brisbane." (1823.)

In 1830 Mr. Brisbane was wrecked on the eastern coast of Tierra del Fuego, near Policarpo Cove, (54° 38′ S.), when sealing there in partnership with Mr. Bray, who afterwards commanded the sealing schooner 'Transport,' lost in 1833, at Hope Harbour. I have a copy of their log in my possession, from which the following extracts are selected, to show with what enduring patience some of those hardy sealers bear misfortune and distress.

"Feb. 23d. Employed saving things from the wreck: six Indians came to us. 24th. Twenty-five Indians came, with their women and children. 25th. Another visit from natives: men, women, and children. 26th. Indians began to be very trou-

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blesome. 27th. Forty Indians came to us, all armed with bows, arrows, and slings, without women or children. Some of our people employed in building a shallop out of the wreck. 28th. More Indians, with twelve strong women and eighteen children: but unarmed on this day.

"March 1st. More Indian visitors. 2d. Fifty-one natives, armed." To the 9th the crew continued to build their shallop, and were almost daily visited by natives, whom two-thirds of the party were obliged to watch with arms in their hands. On the 21st sixty-one natives visited them (these Indians always went away before dusk). On the 23d the time of high-water was observed to be 4^h. 40^m, and the rise seventeen feet, during moderate westerly wind and settled weather. Mr. Brisbane made the latitude, by observation, 54° 38′ S. and the longitude he estimated at 65°. 30′. W. "29th. Much troubled every day by natives, who tried to steal our tools; and hard pressed by hunger. No supper(*a*) the last three days.

"2d April. Four long guns were found to the eastward, lying on a piece of the forecastle of some large ship, supposed to be a large frigate(*b*), also two leaden hawse pipes attached to the woodwork. 8th. A large party of Indians, who were plaguing us, quarrelled among themselves, and had a severe fight. 9th. Our last remainder of provisions finished. 15th. Employed caulking the shallop's deck, and getting limpets from the rocks. N. B. Almost starving. 17th. Not being troubled to-day by natives, and the sea being smooth, went out in a little boat which we had saved, and caught eleven skate."

After this day several fish were caught at times, which, with shell-fish, afforded a scanty subsistence; but before this time they had been reduced to eating hide, and half putrid blubber, which they got by barter from the Indians. Mr. Bray, as well as Brisbane, told me that hunger and anxiety so wore and excited them, that they could seldom sleep more than an hour

(*a*) Supper was their principal meal; as during the day, while the Indians were about, they had no time to cook or eat. R. F.

(*b*) Perhaps the O'Higgins—(Chilian). R. F.

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or two at night, though working all day, while they were so hard pressed for food.

"22d. Launched the shallop, or rather, hauled her down at low water, and let her float. 24th. Indians more troublesome than ever; obliged to fire at them repeatedly. 27th. Almost starved, eating bullock's hide. 30th. Nothing to eat but bullock's hide and berries. Could not get the shallop over the reef because of a heavy surf.

"May 1st. Got out to sea; found the shallop leak very much: nothing to eat but hide. 2d. Lat. 54°. 00′. Long. east. 63°. 50′. 5th. Made Cape Meredith (in the Falklands), but could not get near for want of wind. 6th. Two men gave out (*c*) for want of food: they had gone six days with but one pound of hide. 7th. A heavy gale; the shallop under bare poles, and almost sinking; sea making a clear breach over her; men quite worn out by constant pumping and baling, and by want of food: we had a very hard job to keep her from sinking: at dusk saw land through the rain and spray, half a mile to leeward; showed the head of the jib, and bore away right before the wind for the nearest part: saw a cove, ran into it, and anchored. Killed numbers of geese; thanked God for our safety. 11th. Many of our men ill from the sudden change. 17th. Went ashore in Pleasant Harbour; saw a great number of cattle; the dog caught two of them, and held them for us to kill.(*d*) 30th of May. Anchored in Port Louis, landed, and hauled the shallop ashore at high-water."

The vessel in which Brisbane and Bray were wrecked, was driven ashore in a northerly gale, while sealing near Policarpo Cove. Their crew consisted of about twenty men, most of whom had fire-arms, and plenty of ammunition. Though it will swell yet more the catalogue of his disasters, I must add that Brisbane was once wrecked on South Georgia, and escaped thence to Monte Video in a shallop, which he and his companions in distress built out of the wreck of their sealing vessel.

(*c*) Could work no longer. R. F.

(*d*) Seized them by the lip. He was a large, strong animal, between a bull-dog and a mastiff. R. F.

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I have now by me two of the tools, almost the only ones, which they had to use: one is a cooper's adze, nearly worn down to the middle; and the other a saw, made out of a piece of iron hoop, fixed to a wooden frame.

6th April. While the Beagle was preparing for sea the body of Lieut. Clive,* late of H. M. S. Challenger, was found lying at high-water mark, in an unfrequented part of Berkeley Sound; and the following morning I buried it in a grave on shore, not far from the tomb of our regretted shipmate Hellyer. After noon, on the same day, we sailed from the Falklands, depressed more than ever by the numerous sad associations connected with their name.

* Lieut. Clive was drowned accidentally, by the upsetting of a small boat:—his body could not then be found.

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CHAPTER XVI.

Soundings—Anchor in Santa Cruz—Lay Beagle ashore for repair—Prepare to ascend River—Set out—View of surrounding country—Rapid stream—Cold—Ostriches—Guanacoes—Indians—Fish—Cliffs—Firewood—Lava Cliffs—Difficulties—Chalia—See Andes—Farthest West—View round—Return—Danger—Guanaco hunters—Puma—Cat—Tides—Sail from Santa Cruz.

In working to the westward from Berkeley Sound to the River Santa Cruz, we sounded frequently, and found that the depth is nowhere much above one hundred fathoms between those places. But the water is not of so little depth between the Falklands and Cape Virgins, or Tierra del Fuego; for there we could not strike soundings in some places, towards the islands, with one hundred and fifty fathoms of line.

On the 13th we anchored in the Santa Cruz, and immediately prepared to lay our vessel ashore for a tide, to ascertain how much injury had been caused by the rock at Port Desire, and to examine the copper previous to her employment in the Pacific Ocean, where worms soon eat their way through unprotected planks. (16th.) When on the beach, at a place we afterwards called 'Keel Point,' it was found that a piece of the false keel under the 'fore-foot,' had been knocked off, and that a few sheets of copper were a good deal rubbed. By Mr. May's exertions all was repaired in one tide; and the following day we were making preparations for an excursion up the river.

17th. An examination, or rather a partial exploring, of the River Santa Cruz had long been meditated. During the former voyage of the Beagle, Captain Stokes had ascended the rapid current as far as a heavy boat could be taken; but his account served only to stimulate our curiosity, and decided my following his example.

Three light boats were prepared (whale-boats strengthened): as much provision as they could stow with safety was put into them, and a party of officers and men selected. Lieut. Sulivan,

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REPAIRING BOAT.

DISTANT CORDILLERA OF THE ANDES.

BEAGLE LAID ASHORE, RIVER SANTA CRUZ.

Published by Henry Colburn, Great Marlborough Street, 1839.

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having to take charge of the ship during our absence, could not go; neither could Mr. Stewart, or Mr. King, who were required to attend to duties on board; but Mr. Darwin, Mr. Chaffers, Mr. Stokes, Mr. Bynoe, Mr. Mellersh, Mr. Martens, and eighteen seamen and marines prepared to accompany me.

Early on the 18th we left the Beagle, and with a favouring wind and flood tide sailed up the estuary, into which the river flows. This wide and turbid estuary receives a torrent which rushes through a confined opening into the ocean, during seven hours, and is opposed and driven back by the flood tide during about five hours of the twelve. On each side of both the estuary and river lie extensive plains of arid desert land: these plains are not, however, on the same level; for, on the northern bank the land is very little raised above the level of high spring tides; while, on the southern side of the river, high, perpendicular cliffs form a striking contrast: but after ascending these heights, by any of the ravines which intersect them, one finds a dead level expanse, similar in every respect to that on the northern shore. In the horizon, another 'steppe,' or parallel plain, at a higher elevation, is seen; which, at a distance, appears like a range of hills of equal height.

Excepting in the porphyry districts, all the eastern coasts of Patagonia, and the little of the interior which I have seen, seemed to me to be a similar succession of horizontal ranges of level land varying in height, intersected here and there by ravines and water-courses. There are, certainly, hills in many places which appear when one is passing at sea, or in the distance, conical, or at all events peaked; but even those hills are but the gable ends, as it were, of narrow horizontal ridges of land, higher than the surrounding country.

The cliffs on the south side of the river have a whitish appearance; and are similar to those on the outer coast, which were said by Sir John Narborough to resemble the coast of Kent. Their upper outline, when seen from a distance, is quite horizontal. Brownish yellow is the prevailing colour, lighter or darker, as the sun shines more, or becomes obscured. Here and there, in hollow places and ravines, a

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few shrubby bushes are seen. But over the wide desolation of the stony barren waste not a tree—not even a solitary 'ombu'*—can be discerned. Scattered herds of ever-wary guanacoes, startled at man's approach, neighing, stamping, and tossing their elegant heads; a few ostriches striding along in the distant horizon, and here and there a solitary condor soaring in the sky, are the only objects which attract the eye. Certainly, upon looking closely, some withered shrubs and a yellow kind of herbage may be discerned; and, in walking, thorns and prickles assure one painfully that the plain is not actually a desert: but I am quite sure that the general impression upon the mind is that of utter hopeless sterility. Is it not remarkable that water-worn shingle stones, and diluvial accumulations, compose the greater portion of these plains? On how vast a scale, and of what duration must have been the action of those waters which smoothed the shingle stones now buried in the deserts of Patagonia.

Fresh water is seldom found in these wastes; salinas† are numerous. The climate is delightful to the bodily sensations; but for productions of the earth, it is almost as bad as any, except that of the Arabian, or African deserts. Rain is seldom known during three quarters of the year; and even in the three winter months, when it may be expected, but little falls excepting on rare occasions, when it comes down heavily for two or three days in succession. Sea winds sometimes bring small misty rain for a few hours, at any time of year, but not enough to do good to vegetable productions. The only animals which abound are guanacoes, and they care little for fresh water, for they have often been seen drinking at the salinas. The puma probably quenches its thirst in their blood; of other animals, supposed to require much liquid, there are none in these regions.

The climate is healthy and pleasant; generally a bright, sunny day is succeeded by a cloudless and extremely clear night. In

* A kind of elder, growing here and there in Patagonia and the Pampas. See page 93.

† Salt depositions or incrustations.

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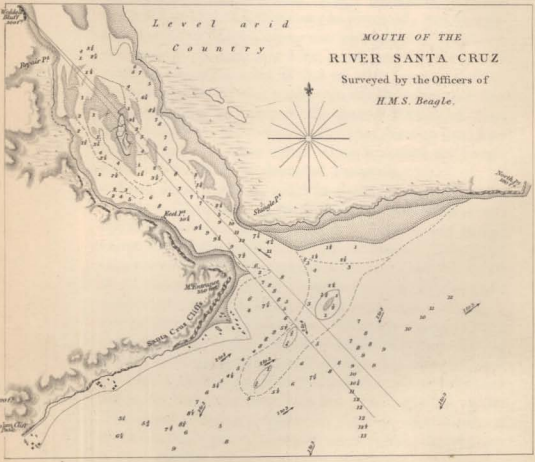

Port Santa Cruz (*Keel Point*) Lat. 50° 6. 45 S.
Long 68. 24. 0. W.
Var. 20. 54. E.
H.W. 5. 45.
Spring Rise 42 feet.
Neap Rise 18.
Strength of tide 3 to 6 Knots.

Scale, Half an Inch one Mile.

Published by Henry Gilbert, Great Marlborough Street. 1839.

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summer the heat is scorching, but not sultry; and in winter, though the weather is sometimes searchingly cold, especially during southerly winds, the air is always elastic and wholesome. Changes of wind are sudden, and cause rapid, though not very great, variations of temperature. Sometimes the sky is slightly or partially overcast, occasionally clouded heavily; but on most days there is bright sunshine, and a fresh or strong westerly wind.

The confluence of a continental torrent of fresh water, with great tides of the ocean, which here rise forty feet perpendicularly, has embarrassed the mouth of the Santa Cruz with a number of banks. They are all composed of shingle and mud, and alter their forms and positions when affected by river-floods, or by the heavy seas caused by south-east gales.

Into the entrance of the Santa Cruz, the flood-tide sets about four knots an hour; one may say, from two to five knots, according to the time of tide, and the narrower or broader part of the opening; and outwards, the water rushes at least six knots on an average in mid-channel. There are places in which at times, when acted upon by wind or unusual floods, it runs with a velocity of not less than seven or eight knots an hour—perhaps even more; but near either shore, and in bights between projecting points, of course the strength of the outward as well as inward current is very inferior.

In such a bight, almost under some high cliffs on the southern shore, the Beagle was moored, and it is easy to conceive the different views presented in this situation, with forty feet change in the level of the water. At high water, a noble river, unimpeded, moves quietly, or is scarcely in motion: at other times, a rushing torrent struggles amongst numerous banks, whose dark colour and dismal appearance add to the effect of the turbid yellow water, and naked-looking, black, muddy shores.

The boats sailed on between some of the banks, with a fresh southerly wind, disturbing every where immense flights of sea-birds. Now and then a monstrous sea-lion lifted his unwieldy bulk a few inches from the stony bank, lazily looked

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around, and with a snort and a growl, threw his huge shapelessness, by a floundering waddle, towards the nearest water.

As far as Weddell's Bluff* we sailed merrily; but there took to the oars, because the river makes a sudden turn, or rather, the river Santa Cruz (properly so called), enters the estuary of the same name from the south-west, as far as can be seen from Weddell's Bluff:—but a little beyond where the eye reaches, it takes a westerly direction. Another river, the Chico of Viedma, also enters the estuary at this place from the north-west. Here, a little above the Bluff, the water was fresh on the surface, and sometimes it is quite fresh, even into the estuary; but in filling casks, or dipping any thing into the stream for fresh water, it is advisable not to dip deep, or to let the hose (if one is used), go many inches below the surface, since it often happens that the upper water is quite fresh, while that underneath is salt. This occurs, more or less, in all rivers which empty themselves into the sea: the fresh water, specifically lighter, is always uppermost.

Wind failing us entirely, we pulled to the south-west. On our left, high cliffs still continued, and at their base a wide shingle beach offered tempting landing-places, with many spots extremely well adapted for laying a vessel ashore, to be repaired or cleaned; on our right, a low shore extended, rising gradually, however, in the north-west, † to cliffs like those near Keel Point.

The flowing tide favoured us until about five, when we landed on the north shore, at a spot where the rise and fall of the tide had diminished to four feet. Here the river was six hundred and forty yards in breadth, running down at the rate of about six knots during a part of the ebb, and from two to four knots an hour during the greater part of the flood-tide. It was perfectly fresh to the bottom, and in mid-channel about three fathoms deep; but this depth extended very little way

* Named after the enterprizing southern navigator.

† On the south side of the north-west arm of the Santa Cruz.

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across, the deep channel being extremely narrow, not more than twenty yards in width.

The distinct difference between the opposite banks of the river had been diminishing, until at this spot* both sides were much alike. We had left the cliffs and salt water, and had fairly entered the fresh-water river. Instead of having a wide extent of dismal-looking banks and dark-coloured muddy shores, we were at the side of a rapid stream, unvarying in width, on whose banks shrubs and grass agreeably relieved our eyes from muddy shingle covered with hosts of crabs.

Our first night passed well, for there were plenty of bushes to supply us with fire-wood. Early next morning, some of the party went upon the nearest hills to look for guanacoes, when they saw that although the surface of the country appeared to an observer near the river to be irregular and hilly, upon ascending the heights it became apparent that the stream ran in a large valley; that the general character of the country was similar to what I have already described, and that those which had appeared to be hills were the terminating sides of extensive plains, whose level was about three hundred feet above the river. Near the fresh water, shrubs, bushes, and grass were not scarce; but every where on the higher ground a sterile, stony waste met the eye. Mr. Stokes† and I went on the heights, to obtain a view of the river; and for a considerable distance we could trace its windings, but were sorry to see a great number of small islands, thickly covered with brushwood, which seemed likely to impede our progress if obliged to track‡ the boats.

The southerly wind blew keenly over the high land, and the surface of the ground was frozen hard; but the air was healthily fresh and bracing. Where, indeed, could it be purer than on these dry hills? At first setting out we tried the oars, but very soon found them unable to contend with the

* The northern bight, or cove, a few miles north-eastward of Islet Reach.

† It was his office to make a map of the country we passed through.

‡ Pull, or tow them along by a rope.

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strength of the stream; so landing all our party, except two in each boat, we made the boats fast to one another, at a few yards apart, in a line a-head: and then taking the end of a coil of whale-line ashore, half our party fixed themselves to it by laniards of broad canvas straps, which passed across their breasts and over one shoulder, and walked together steadily along the river's bank. The bight of the line was passed round a stout mast, stepped in the headmost boat and attended by the two men, who veered away or shortened in the line as the varying width of the stream, or frequent impediments rendered necessary. In this manner, one-half of our party relieving the other about once an hour, every one willingly taking his turn at the track rope,* we made steady progress against the stream of the river, which rather increased in rapidity as we ascended, until its usual velocity was between six and seven knots an hour. While among the islands which I mentioned tracking was difficult and tedious, many were the thorny bushes through which one half of the party on the rope dragged their companions. Once in motion no mercy was shewn: if the leading man could pass, all the rest were bound to follow. Many were the duckings, and not trifling the wear and tear of clothes, shoes, and skin. At intervals stoppages were made for refreshment and observations.

Three chronometers were carried in the boats, with other necessary instruments: among them two mountain barometers, with which Mr. Darwin and myself wished to measure the height of the river above the level of the sea, and the heights of the neighbouring ranges of hills above the level of the river. This afternoon we picked up a boat-hook upon the south bank of the river, which was immediately recognized to be one which had been left by accident sticking in a mud-bank, by the party who accompanied Captain Stokes in his excursion up this river in the year 1827.

It was very cold at our bivouac this night, being a sharp

* Mr. Stokes alone being excepted, as his duty required continual attention.

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frost: and while observing the moon's meridian altitude, dew was deposited so fast upon the roof of the artificial horizon, and froze there so quickly as it fell, that I could hardly make the observation. My sextant was injured a little by the frost, for not having been used before in very cold weather, the brass contracted so much as to injure the silvering at the back of the index glass, and slightly change the index error.

In the morning it was so cold that our usual ablutions were shunned, and all were anxious to have the first spell at the rope in order to warm themselves, though few had slept many minutes, and many had hard work the previous day. The thermometer was at 22° Fahr.—nothing,—indeed warm weather to Polar voyagers, but to us, accustomed to temperate climates, it appeared a severe degree of cold.

20th. As we were going along the bank of the river, which to our great benefit was becoming more accessible and clearer of bushes, we saw some dark coloured animals crossing the stream at a distance, but no one could guess what they were until the foremost of them reached the shore, and rising upon his stilt-like legs, showed himself to be an ostrich. Six or seven of these birds were swimming across: till then I had no idea that so long-legged a bird, not web-footed, would, of its own accord, take to the water and cross a rapid stream: this, however, was a certain proof to the contrary, for nothing had disturbed them that we could discern. As far as we could tell, at so great a distance, they seemed to be of the kind which the Spanish-patagonians call 'Avestruz-petis.' They were, however, far too wild to be approached with a gun. We saw smoke at a distance and anticipated meeting Indians, in the course of our next day's journey. The country around continued similar to that already described: but islands no longer impeded our progress, though some high cliffy banks gave us trouble. At the next place where we passed a night, Mr. Darwin tried to catch fish with a casting net, but without success; so strong a stream being much against successful fishing. A very sharp frost again this night. The net and other things, which

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had occupied but little room in the boat, were frozen so hard as to become unmanageable and very difficult to stow.

21st. We proceeded as usual, dragging the boats up the stream (or rather torrent, for it never ran less than six knots, and in many places more) at the rate of about two miles an hour: and as we were approaching near to the smoke, we chose our position for the night, rather more cautiously than usual, upon a little peninsula.

22d. We had not advanced a mile this morning, when fresh tracks of Indians, on horseback, trailing their long lances, aroused our utmost vigilance. We thought they had been reconnoitring our party, at day-light, and perhaps such was the case. The smoke of their fires was seen behind the nearest range of low hills, on our side of the river, being then on the north bank, but the boats had been tracking on either side, as better ground for walking was found. Proceeding on, a dead animal was found in the water, which proved to be a guanaco; how it came by its death did not appear, as it showed no external wound, but some of our party, hungrier or less squeamish than the rest, immediately proposed dividing and eating it; and hunger carried the day: the dead animal was hauled on shore, cut to pieces, and distributed. The guanaco steaks were much relished by all except two or three, who could not conquer their antipathy to supposed carrion. Our meal was eaten close to the place where we thought a tribe of Indians was encamped: and, in consequence, our arms were kept in readiness, and a careful watch set. Afterwards cautiously proceeding, we arrived at the spot whence the smoke had issued, but saw no human beings: though marks of very recent fire, and numerous tracks of feet upon a soft muddy place at the side of the river, showed that a party of Indians had lately crossed over, and a smoke rising at some distance on the southern shore, pointed out where they were gone. At this spot there was about an acre of good pasture land, by the water side: and the breadth of the river itself was something less than usual, reasons which had induced the na-

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tives to select it as a crossing place.* To pass a river running at the rate of six or seven miles an hour, and about two hundred yards in width, can be no easy task to women and children. But as we saw many prints of very small feet on the muddy bank, both women and children must have crossed at this place with the men. How did they get over? there is no wood, neither are there rushes with which they might make balsas.† Perhaps some of the women and children were put into rough, coracle-like boats, made of hides,‡ and towed across by the horses, holding by whose tails the men swam and perhaps many of the women. This method of holding by the tail, while swimming, is said to be better than resting a hand upon the horse's neck and holding by the mane. None of the Indians sit upon their horses while swimming.

This day (22d) we passed two places which we considered rapids, the stream of the river ran so violently, and we had so much difficulty in passing, even with all hands upon the rope. Besides the strength of the stream we had to contend against high cliffs, over whose upper edges it was difficult to convey the tow-line: yet we made good about twelve miles in the day. The night of the 22d was not so cold as the preceding, but we always found the nights wintry though the days were warm, so much so, indeed, that we were often annoyed by the heat of the sun. So winding was the course of the river that we certainly walked double the distance which was advanced in a direct line: yet very little of interest, as a picturesque subject, had been seen; for no country excepting a desert could wear a more triste and unvarying appearance.

Immense accumulations of shingle, rounded stones, imbedded, as before mentioned, in diluvial deposition, form the level plain, or valley, through which the river pursues its very winding course. The width of this vale varies from one mile to five miles, and the level of the shingle plain is from

* Marked 'Indian Pass' on the plan. † Floats or rafts.

‡ "Me envió tres indios nadadores, provisto de cueros y palos para formar una pelota." (Diario de Viedma, p. 58.)

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three hundred to one thousand feet below that of the adjacent higher, but still horizontal ranges—whose broken-down ends, or sides, form the boundaries of the valley through which the river flows. Those of the higher ranges look like hills when one is in the valley, and it is not until after ascending to their summits that their real nature is seen; when, instead of being inclined to consider those heights as hills, one becomes disposed to think the valley of the river a vast excavation, cut down below the level of the neighbouring country. But on the height, or in the valley, all is an unprofitable waste. Scarcely, indeed, could we find bushes enough, even near the river, to make our nightly fires, after the third day's journey. The wiry, half-withered grass upon which the guanacoes feed is so scanty, that they are obliged to wander over much ground in search of their food. Those few stunted bushy trees which are found here and there, near the river, are a kind of thorn trees, the wood of which is extremely hard and durable.* The night of the 22d we passed by the side of a little cove, which sheltered the boats from the strength of the stream: and, as all hands were tired, we rested during the morning of the following day.

After noon (23d) we went on, and at dark stopped on the south shore. Scarcity of fuel and a cold night, made it necessary to take good care of the wood when cut. There may be honour among thieves, but there was little to be found during a cold night among our party, for the fire of those who happened to be on watch was sure to blaze cheerily, at the expense of the sleepers. A little incident occurred here very unimportant certainly to those unconcerned, yet of much consequence to us: we left our stock of salt behind, and a spade, which latter was much wanted for earthing up the sides of our tents, to keep out the cold wind.

24th. I noticed more than usual a curious effect of the river water being so much warmer than the air over it.† At

* A guanaco was shot this day by the running fire of several guns. He was soon cut up and stowed in the boats.

† The temperature of the air being 30°, that of the water 46°.

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daybreak, and until after sunrise, the river was smoking, quite as if it were boiling. This day we passed some earthy cliffs between two and three hundred feet in height, and where they came in our way it was extremely difficult to manage the boats and tow-lines; but by veering out at those times a great length of rope, our object was accomplished without any disaster. Near these cliffs the valley of the river begins to contract and become more irregular, and the sides or breaking down of the higher ranges become more abrupt and are nearer to the river. In most places we found a cliffy side opposite to a low projecting point of shingle, but in some spots that we passed both sides were high, and we had no choice on which to take the tow-line. The difference, also, between the level of the higher ranges and that of the river, was observed to be much increased.

On this day (25th) our best shots succeeded in killing two guanacoes, but they died out of our reach, and probably became food for pumas, instead of man. The order of our march was usually one or two riflemen in advance, as scouts —Mr. Darwin, and occasionally Mr. Stokes, or Mr. Bynoe, upon the heights—a party walking along the banks, near the boats, ready to relieve or assist in tracking, and the eight or ten men who were dragging the three boats along at the rate of about two miles an hour over the ground, though full eight knots through the water. Difficult places to pass—delays caused by embarking and disembarking frequently to change banks, and avoid impediments—the necessary observations, rest, and meals, occupied so much time that we did not average more than twelve miles in one day: and even that small distance was not accomplished without making both shoulders and feet sore.

26th. In the distance some very level topped, dark looking cliffs, were seen at the summits of elevated ranges, which Mr. Darwin thought must have a capping or coating of lava. Of course we were very anxious to verify a fact so curious, and at noon were quite satisfied that it was so, having approached to the foot of a height thus capped, whose frag-

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ments had in falling not only scattered themselves over the adjacent plain, but into the bed of the river, in such a manner as to make the passage exceedingly dangerous; because large angular masses, in some places showing above the stream in others hidden beneath, but so near the surface that the water eddied and swelled over them, menaced destruction to the boats as they were with difficulty dragged through the eddying rapid; sometimes the rope caught under or around one of those masses, and caused much trouble. Near the spot where we stopped at noon there is a glen, quite different in character from any place we had passed.* Indeed, upon entering the lava district, or that part of the country over which lava formerly flowed, there was no longer a Patagonian aspect around. Steep precipices, narrow, winding vallies, abundance of huge angular fragments of lava, a more rapid and narrower river, and plains of solid lava overlying the whole surface of the country, make this district even worse in its appearance than the eastern coast of Patagonia. Excepting in an occasional ravine nothing grows. Horses could not travel far, the ground being like rough iron; and water, excepting that of the river and its tributary in Basalt Glen, is very scarce.

The glen above mentioned is a wild looking ravine, bounded by black lava cliffs. A stream of excellent water winds through it amongst the long grass, and a kind of jungle at the bottom. Lions or rather pumas shelter in it, as the recently torn remains of guanacoes showed us. Condors inhabit the basaltic cliffs. Near the river some imperfect columns of basalt give to a remarkable rocky height, the semblance of an old castle. Altogether it is a scene of wild loneliness quite fit to be the breeding place of lions.†

No signs of human visitors were discovered: indeed, the nature of the country must almost prevent horsemen from traversing these regions, there is so little food and such bad ground: only in glens or ravines such as this can any grass or bushes be found. Guanacoes absolutely swarm upon the

* 'Basalt Glen.' † "Leonum arida nutrix."

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BASALT GLEN — RIVER SANTA CRUZ.

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heights, a consequence probably of their being undisturbed. They spread over the face of the high country like immense flocks of sheep.

During a long walk this evening Mr. Stokes and I were repeatedly disappointed by the mirage over an extensive stony plain, between two bends of the river. We were tired and very thirsty, and went from one apparent piece of water to another, only to be tantalized and to increase still more our dilemma.

27th. Similar country. On the banks of the river some drift wood was found; the trunks of trees of considerable size. Small trees had been found lying by the side of the river, from time to time, but none so large as these, some of which were almost two feet in diameter, and about thirty feet in length. The wood appeared to be 'Sauci,' of the red kind. That these trees had been drifted from a great distance was evident, because they were much water worn.

28th. In passing a rapid, whose difficulties were much increased by rugged blocks of lava lying in the bed of the river, one of our boats was badly stove and barely rescued from sinking in the middle of the stream: fortunately we got her on shore and there patched her up. There was still no change in the scenery, nor any signs of inhabitants: and our work was as monotonous as heavy.

29th. While upon a high range of lava-capped land, Mr. Stokes and Mr. Darwin descried distant mountains in the west, covered with snow. At last, then, the Andes were in sight! This was inspiriting intelligence to the whole party; for small had been our daily progress, though continual and severe the labour. The river increased in rapidity, while but little diminution had taken place in the quantity of water brought down: the breadth was rather less, certainly, but the depth in most places greater. No fish had yet been caught; indeed, only two had been seen, and those seemed to be like trout.

30th. The snowy summits of the distant Cordillera were more distinctly seen from the heights, near the river, that rise

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about a thousand feet above its level, which, there, is about three hundred feet above that of the sea. Two guanacoes were shot with my rifle by H. Fuller,* who hastened to the boats for assistance. Some of our party went directly with him to bring in the animals, but condors and cara-caras† had eaten every morsel of the flesh of one; though the other was found untouched and brought to the boats. Four hours had sufficed to the cara-caras and condors for the cleaning of every bone.‡ When our party reached the spot some of those great birds were so heavily laden that they could hardly hop away from the place. The guanaco that was eaten by the birds must have been, by his size, at least fifty pounds heavier than any shot by us in Patagonia, therefore about 300lbs. Mr. Darwin and Mr. Stokes had much amusement with these animals, upon the heights. Being so much tamer there and more numerous, whole flocks were driven by them into narrow defiles, where dozens might have been killed had there been more people with guns, lassoes, or balls.

Though the bed of the river is there so much below the level of the stratum of lava,§ it still bears the appearance of having worn away its channel, by the continual action of running water. The surface of the lava may be considered as the natural level of the country, since, when upon it, a plain, which seems to the eye horizontal, extends in every direction. How wonderful must that immense volcanic action have been which spread liquid lava over the surface of such a vast tract of country. Did the lava flow from the Cordillera of the Andes, or was it thrown out from craters in the low country? Its position with respect to subaqueous deposits, its horizontal surface and cellular texture, are reasons, among others, for thinking that it was thrown out of the earth, while these plains were covered by a depth of sea.

The valley, or channel of the river, varies here from one mile, or less, to about three miles; but it looks narrower, owing

* My steward. † A carrion-eating eagle.

‡ The animal thus eaten lay on high ground: the other was in a hollow.

§ From ten to twelve hundred feet.

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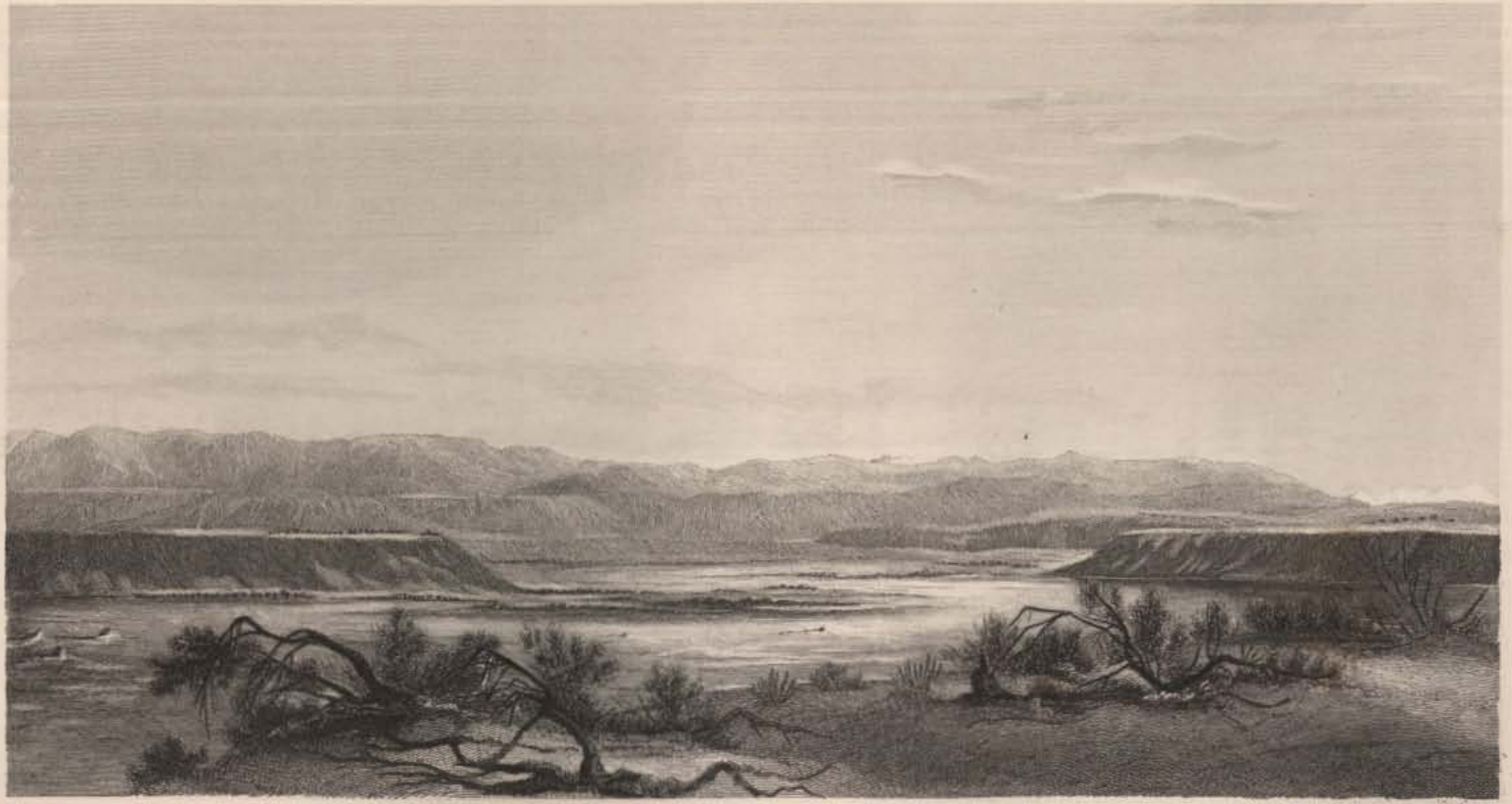

C. Martens

S. Bell

SANTA CRUZ RIVER, AND DISTANT VIEW OF THE ANDES.

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to the deception caused by high land on each side. Some of the views are certainly striking, and, from their locality, interesting; I could not, however, have believed that the banks of any large fresh water river could be so destitute of wood, or verdure of any kind, or so little frequented by man, beast,* bird, or fish.

May 1st. The weather was invariably fine during the earlier part of our journey; but this day it began to change, and two or three gloomy clouded days were succeeded by a few hours only of small rain, and by some strong wind. This night (1st) we slept at the foot of heights whose summits were covered with snow, but the temperature was many degrees warmer than that of the first nights, when it froze so sharply. There was no particular frost after the 21st of April.

We had great difficulty with the boats on the 2d, the river being contracted in width, without any diminution of the body of water pouring down.

On the 3d, we found a more open country, the lava-capped heights receding gradually on each side, leaving a vale of flat, and apparently good land, from five to fifteen miles in extent. The width of the river increased; on its banks were swampy spaces, covered with herbage; and low earthy cliffs, without either shingle or lava, in some places bounded the river. A little further, however, the usual arid and stony plains of Patagonia were again seen, extending from the banks of the river to ranges of hills, about fourteen hundred feet above its level, on which the horizontal lava-capping could be distinctly discerned.

In the distant west the Cordillera of the Andes stretched along the horizon. During three days, we had advanced towards those far distant mountains, seeing them at times very distinctly; yet this morning our distance seemed nearly as great as on the day we first saw their snow-covered summits. A long day's work carried us beyond the flat and into the rising country, whose barren appearance I just now mentioned.

* Excepting guanacoes.

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We were all very tired of the monotonous scene, as well as of the labour of hauling the boats along.

4th. Our provisions being almost exhausted, and the river as large as it was beyond the lava country, our allotted time being out, and every one weary and foot-sore, I decided upon walking overland to the westward, as far as we could go in one day, and then setting out on our return to the Beagle. I was the more inclined to this step, because the river here made a southerly bend, to follow which would have required at least a day, without making much westing, and because I thought that some of our party might walk in that time at least twice as far as they could track the boats, and then return before night. To have followed the course of the river two days longer, we should have needed all the small remainder of our provisions, and probably without being enabled to see further than we might by one day's walk directly westward. Leaving those who were the most tired to take care of the boats, a party set out early, in light marching order. A large plain lay before us, over which shrubs, very small trees, and bushes were sparingly scattered; yet parts of this plain might be called fertile and woody, by comparison with the tracts between us and the eastern sea-coast.

At noon we halted on a rising ground, made observations for time, latitude, and bearing; rested and eat our meal; on a spot which we found to be only sixty miles from the nearest water of the Pacific Ocean. The Cordillera of the Andes extended along the western side of our view; the weather was very clear, enabling us to discern snow-covered mountains far in the north, and also a long way southward; hence much of the range was visible, but of the river we could discern nothing. Only from the form of the land could we conclude that at the end of the southerly reach I have mentioned, the direction of the river is nearly east and west for a few miles, and that then it may turn northward, or rather come from the north along the base of the Cordillera.

There are many reasons for inducing one to suppose that it comes not only from the north, but from a considerable dis-

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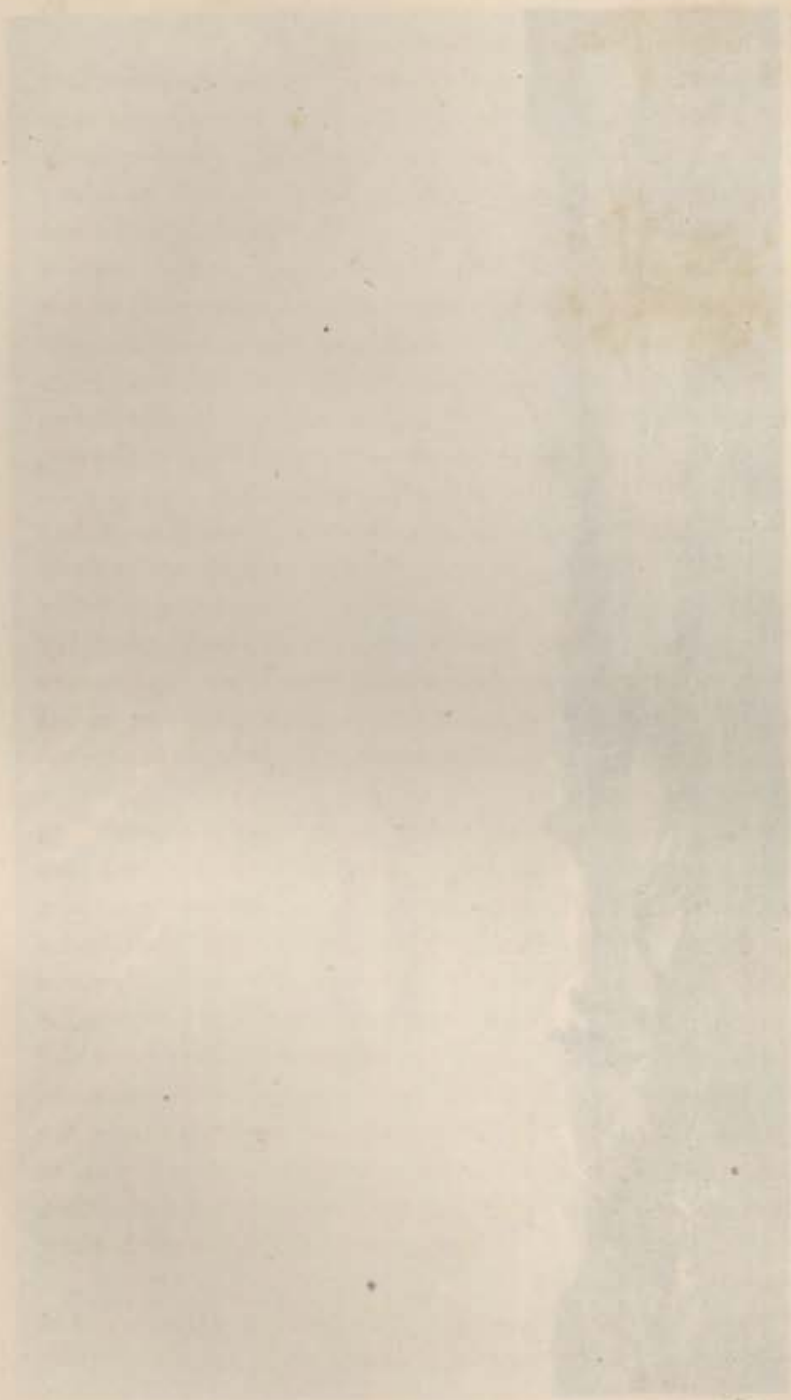

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C. Martens J. Scott

CORDILLERA OF THE ANDES, AS SEEN FROM MONTEVIDEO PLAIN, NEAR THE SANTA CRUZ.

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tance northward. At the place where we ceased to ascend the stream, the Santa Cruz was almost as large as at the places where we passed the first and second nights near the estuary. The velocity of the current was still at least six knots an hour; though the depth remained undiminished. The temperature of the water was 45°, while that of the air was seldom so high, even in the day-time, and at night was usually below the freezing point. Trees, or rather the trunks of trees, were found lying upon the banks, whose water-worn appearance indicated that they had been carried far by the stream. The water was very free from sediment, though of a whitish blue colour, which induces me to suppose that it has been chiefly produced by melted snow, or that it has passed through lakes in which the sediment it might have brought so far was deposited. If filled from the waters of the nearer mountains only, its temperature would surely be lower, approaching that of melted snow: it would also, in all probability, bring much sediment, and would therefore be muddier, and less pure in colour.

When one considers how large an extent of country there is between the River Negro and the Strait of Magalhaens, and that through that extensive region only one river of magnitude flows, it may be difficult to account for the manner in which the drainage of the eastern side of the great Cordillera is carried off, or where the melted snow and occasional heavy rains disappear.

The Gallegos is small, though it runs into a large estuary. The Chupat river is very small: that at Port Desire is scarcely more than a brook. At times, it is true, these smaller rivers are flooded, but their floods (added to their usual streams) seem unequal to carrying off the continual drainage of the Andes. South of the Negro only the Santa Cruz flows with a full and strong stream throughout the whole year, and my idea is that the sources of the river Santa Cruz are not far from those of the southern branch of the Negro, near the forty-fifth degree of latitude; and that it runs at the foot of the Andes, southward, through several lakes, until it turns to the eastward in the parallel of fifty degrees.

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In Viedma's Diary I find that he heard from the Indians at Port San Julian (in 1782) that the river Santa Cruz flowed from a large lake near the Cordillera of the Andes, and that there was abundance of wood on its banks. In consequence of this information, he went, in November, with a party of Spaniards and Indians on horseback, to explore this lake. In his way, Viedma crossed the river Chico, which flows into the estuary of the Santa Cruz, just above Weddell Bluff. The Chico, though small at times and then fordable, was subject, the Indians said, to great floods in the spring, when the melting snows of the Cordillera over-filled a lake, far in the north-west, whence this river ran. Afterwards, Viedma crossed the river Chalia, which they told him rose in another lake near the Cordillera, was likewise subject to floods, and emptied itself into the Santa Cruz: when he passed, it was only up to the horses' knees (after searching many leagues, however, for a ford), but at his return it was deeper. This Chalia can be no other than the stream which flows through Basalt Glen, a mere brook when we saw it in the dryest season of the year. Viedma reached the lake,* and found every thing correspond to the description; for it was deep and large, surrounded by snow-covered mountains, on which were many forests.

Some persons have doubted whether there is ever much drainage to be carried off from the eastern side of the Andes, between the parallels of forty and fifty; but if they will take the trouble to read Viedma's Diary, and some other notices to be found in the work of Don Pedro de Angelis, I think they will be convinced that there is always a considerable drainage, and that at times there are heavy floods to be carried off.†

* Called Capar, or Viedma. MS. Chart.

† As one proof of this assertion, I may quote a passage from Viedma:—"Reconocido pues todo" (all that there was to see in the neighbourhood of the lake whence the Santa Cruz flowed), "nos expusó el Indio Patricio nos debiamos apartar luego de aquí, porque con los vientos fuertes, y el sol, solia derretirse tanta nieve que era imposible vadear los arroyos para regresar, y tendriamos que pasar el verano en aquel pasage hasta que las heladas empezasen."—(Diario de Viedma, p. 57.)

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Reference to the accompanying plan will shew our position when we halted, and I decided to return, not having explored, I should think, more than one-third of its course. At that place the level of the river was found to be four hundred feet higher than that of the sea at the entrance; and as the distance is about two hundred miles,* the average descent or fall of the water must be near two feet in a mile, which, I apprehend, is unusually great. I could not, indeed, believe that the computation and data were correct, until after repeated examination.† Two barometers were used at the river-side, and a very good one was carefully watched on board the Beagle.‡ Certainly, the rapid descent of the river, in many places, was such, that even to the eye it appeared to be running down-hill; and this remark was often made in the course of our journey.

Two days before we reached our westernmost point, many traces of an old Indian encampment were seen; but excepting at that place and at the spot which we passed on the 22d, no signs of inhabitants were any where found. Scarcity of pasture, and the badness of the ground for their horses' feet, must deter Indians from remaining in this neighbourhood; but that they frequently cross the river, when travelling, is well known.

The quantities of bones heaped together, or scattered near the river, in so many places which we passed, excited conjectures as to what had collected them. Do guanacoes approach the river to drink when they are dying? or are the bones remains of animals eaten by lions or by Indians? or are they washed together by floods? Certain it is they are remarkably numerous near the banks of the river; but not so elsewhere.

I can hardly think that the guanaco is often allowed to die a natural death; for pumas are always on the alert to seize invalid stragglers from the herd. At night the guanacoes choose the clearest places for sleeping, lying down together like sheep; and in the day they avoid thickets, and all such places as might

* Following the course of the river.

† The data will be found in the Appendix. ‡ At the level of the sea.

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shelter their ever-watchful enemy. Condors, also, and fierce little wild cats* help to prevent too great an increase of this beautiful, inoffensive, and useful animal.

Late on the 4th we returned to our tents, thoroughly tired by a daily succession of hard work, and long walks. At this bivouac we were about one hundred and forty miles, in a straight line, from the estuary of Santa Cruz, or from Weddell Bluff; and about two hundred and forty-five miles distant by the course of the river. Our station at noon on the 4th, was eight miles in a straight line farther westward, and about thirty miles from the Cordillera of the Andes. The height of those mountains was from five to seven thousand feet above our level, by angular measurement with a theodolite. Early on the 5th we began the rapid descent. Sometimes the wind favoured, and we passed the land at the rate of ten knots an hour; sometimes dangerous places obliged us to turn the boat's head to the stream, pull against it, and so drop down between the rocks. Though easy, the return was far more dangerous than our ascent of the river.

5th. Our first day's work in returning was a distance of eighty-five miles, which had cost us six days hard labour in ascending. Next day we made good about eighty-two miles; and on the 7th we reached the salt water. Although we made such quick progress in returning, our halts for observations were similar to those made in going. While descending the rapid stream, so quickly and quietly, we saw many more guanacoes and ostriches than we had seen before; but our flying shots only frightened them, and time was too precious to admit of any delay. Only one fish was got, and that was a dead one, which had been left on the bank: it was similar to a trout. Not more than half a dozen live fish were seen, and none could be caught either with hooks or nets. Leaving a very small party near Weddell Bluff to look for guanacoes, I hastened on board with the boats; and with the ebb tide reached the Beagle before noon on the 8th. The ship being ready for sea, except-

* Though the wild cat could not injure a full-grown animal, it might destroy a young one with great ease.

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ing a ton or two of fresh water, the yawl and cutter were dispatched to get it and bring on board the shooting party. During my absence satisfactory observations on the tides had been made, which showed that the neap tides rise about eighteen feet, and the springs from thirty-eight to forty-two feet. One day when walking through a woody ravine, not far from the anchorage, Mr. Stewart saw a puma lying under a bush, glaring at him: taking a steady aim, he fired, and laid the animal dead. It was a very large one; and the skin is now in the British Museum. The moment of thus looking a lion in the face, while taking aim, at only a few yards distance, must be somewhat trying to the nerves, I should imagine. A beautiful wild cat was also added to our collections, besides condors and foxes.

9th. The boats, and shooting party, arrived with water and two guanacoes. As the sportsmen were returning with their burthens on the preceding evening, darkness overtook them while yet distant from their tent; and they were soon made uncomfortably* conscious that an enemy was at hand, for the strong and peculiar smell of a lion warned them that one was near. They trudged on with their cargoes, talking to one another; but the scent was still strong until they approached the fire, which had been kept up by their companion, when it ceased entirely. Such a weight as a lion's, added suddenly to that of a guanaco, would have been rather distressing.

We were detained for a day or two by an overcast sky, which prevented my obtaining equal altitudes; but on the 12th the Beagle left the Santa Cruz, and stood towards the alleged place of the shoal, or rock, called 'Aigle,' not far from the westernmost of the Falkland Islands. No such danger, nor any sign of shallow water being found, but, on the contrary, no bottom with one hundred fathoms of line, we steered towards Magalhaens Strait, and on the 18th anchored off Cape Virgins. Next morning I landed on the Cape, taking Mr. Darwin and Mr. Stokes with me, and remained till after the noon observation, when, returning on board, the Beagle weighed and sailed to another station. From this time (till the 25th) we were busily em-

* Being only two in number.

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ployed in sounding in the neighbourhood of Cape Virgins, Point Catherine, Lomas Bay, and Possession Bay.

On the 23d, at day-light, we saw the Adventure coming from the Falklands. After communicating with us, she went on to survey the portion of coast extending from Sweepstakes Foreland to Cape Monmouth; and we remained to complete our own task of sounding the banks about the First Narrow, and examining the south shore of St. Philip Bay. On the 3d of June both vessels were moored in Port Famine, preparing for their passage to San Carlos in Chiloe.

The next chapter will take the Beagle into the Pacific by a route not hitherto used, except by sealing vessels: although it possesses many advantages over either the passage round Cape Horn, or that through the western reaches of the Strait of Magalhaens. Mr. Low is said to be the first discoverer of it, and he certainly was the first to pass through in a ship; but I think one of the Saxe Cobourg's boats had passed through it previously, and I much question whether Sir Francis Drake's shallop did not go by that opening into the Strait of Magalhaens in 1578.*

Before I finally leave Tierra del Fuego, a remark or two may here be made respecting the language of the natives. 'Pichi,' in the Huilliche or Araucanian language, means 'small' or 'a little,' and 're' signifies 'only,' 'but,' 'purely,' or 'simply.' Hence, Pecheray, always uttered in a begging, or whining tone, may have some such signification. In Beauchesne's voyage it is said, that the natives in the Eastern parts of Magalhaens Strait were called 'Laguedi-che,' and those westward, 'Haveguedi-che.'† These words are to me very interesting, because I suppose the first to be a corruption of Laque-che, which means, in Araucanian, 'People with balls' (bolas), and the second is not far removed from Huapi-gulu-che, which means 'people of mountainous islands heaped together,' terms respectively most appropriate for natives of eastern and western Tierra del Fuego.

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* See Burney, vol. i. p. 368 and p. 327, where he shows that Drake discovered Cape Horn, and anchored near it (in or near St. Martin Cove?) in 1578. Another early southern discovery is mentioned in vol. ii. p. 198, where it is stated that Dirck Gherritz discovered land in 64°. S. in 1599, (part of or near South Shetland?)

† Voyage of Beauchesne, in Burney's History, vol. iv. p. 378.

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MOUNT SARMIENTO.

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CHAPTER XVII.

Beagle and Adventure sail from Port Famine through Magdalen and Cockburn Channel — Enter Pacific—Death of Mr. Rowlett—Chilóe —Chile—Government—Adventure sold—Consequent changes—Plans —Mr. Low—Chonos—Lieut. Sulivan's party—Moraleda—Ladrilleros — De Vea — Sharp—San Andres—Vallenar—Mr. Stokes—San Estevan — Distressed sailors — Anna Pink Bay — Port Low—Potatoes— Indian names — Huafo — Volcano—Chilotes—Aborigines—Militia— Freebooters — Climate — Docks—Tides—Witchcraft — Alerse—Calbucanos—Cesares—Search for men—Meteors.

June 9th. Good equal altitudes having been obtained, after an interval of time sufficient for rating our chronometers,* we sailed from Port Famine, went down the Magdalen Channel, enjoying some fine scenery, among which Sarmiento was pre-eminent, and anchored in a cove under Cape Turn. The following day we beat to windward through the Cockburn Channel, and would have anchored at night had a safe place offered in time, but as the only cove near us at dusk was a very small one, I preferred leaving that unoccupied for the Adventure, and remaining under way in the Beagle. The night was long and very dark, small rain fell nearly all the time, and squalls from the westward were frequent. There were but four square miles in which it was safe to sail to and fro after dark, and for fourteen hours we traversed that area in every direction. It was necessary to keep under a reasonable press of sail part of the time, to hold our ground against the lee tide; but with the ebb we had often to bear up and run to leeward, when we got too near the islets westward of us. In a case of this kind a ship is so much more manageable while going through the water than she is while hove-to, and those on board are in general so much more on the alert than when the vessel herself seems half asleep, that I have always been an advocate for short tacks under manageable sail, so as to keep as much as possible near the same place, in preference to heaving-to and drifting.

* The Adventure had four chronometers.

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When the day at last broke on the 11th, we saw the Adventure coming out to us from the cove where she had passed the night, and then both vessels sailed out of the Channel, past Mount Skyring and all the Furies, as fast as sails could urge them. At sunset we were near the Tower Rocks,* and with a fresh north-west wind stood out into the Pacific, with every inch of canvas set which we could carry.

On the 26th we were still together, in latitude 43° and longitude 75°, although gales had occasionally separated us for a few hours. After passing the latitude of 45° we had a succession of bad weather, and adverse (N.W.) winds. Trusting too much to our usual good fortune I had steered in too direct a line towards Chilóe, and in consequence all these north-west winds were against us. Had I shaped a course which would have taken us farther from the land, while we had the wind southward of west, we might have made a fair wind of these provoking north-westers, and arrived at Chilóe at least a week sooner. A few remarks upon the wind and weather, between the parallels of forty and forty-seven, off Chilóe and the Chonos Archipelago, will be found in the Appendix (No. 19).

On the 27th we witnessed the last moments of Mr. Rowlett's existence in this world. He had long been sinking under an internal complaint of which it was impossible to cure him, except by a vigorous and uniform mode of treatment to which he was not willing to conform until too late: but his illness had no relation whatever to the service in which he had been employed. He was much regretted by all of us, having been a kind, honourable friend. The following day we committed the body of our deceased companion to the seaman's grave, that "ever-changing and mysterious main." In the evening we were near the north-west end of Chilóe, and at midnight an anchor was let go in our former berth, off Point Arena. The Adventure arrived two days afterwards, her main-boom having broken in a heavy squall on the 27th, in consequence of which she got to leeward, and was prevented from sooner weathering the north end of the island. A supply of fresh provisions

* Not far from Cape Noir, on Noir Island.

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and good rates for the chronometers were obtained, after which we sailed (14th July) for Valparaiso, and arrived there together on the 22d.

My first object would have been, after seeing the vessels securely moored, to go to Santiago, present my instructions in the proper quarter, and ask for the sanction of the Chilian government, in prosecuting the survey of the coasts of Chile; but I was so much in arrear with respect to computations and charts, that I could not venture to give even a week to an excursion to that agreeable place, where a thousand attractive novelties would inevitably have diverted my attention in some measure from the dull routine of calculation, and attention to the data accumulated by many months' exertion of those on board the Adventure, as well as in the Beagle; therefore I sent Lieutenant Wickham, who spoke Spanish, and had been at Santiago before, to show my instructions to the Authorities, and request their approval of our examination of the shores under their jurisdiction. Nothing could be more satisfactory than the reply (Appendix No. 20), and from that time until the Beagle left Chile she received every attention and assistance which the Chilian officers could afford.

As I proposed to remain at Valparaiso during the winter months, Messrs. Stokes, King, Usborne, and myself, whose occupation would be sedentary and would require room, as well as more light and quiet than we could always have on board, took up our quarters on shore; while those on board attended to the refit and provisioning of our vessels.

At this time I was made to feel and endure a bitter disappointment; the mortification it caused preyed deeply, and the regret is still vivid. I found that it would be impossible for me to maintain the Adventure much longer: my own means had been taxed, even to involving myself in difficulties, and as the Lords Commissioners of the Admiralty did not think it proper to give me any assistance, I saw that all my cherished hopes of examining many groups of islands in the Pacific, besides making a complete survey of the Chilian and Peruvian shores, must utterly fail. I had asked to be

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allowed to bear twenty additional seamen on the Beagle's books, whose pay and provisions would then be provided by Government, being willing to defray every other expense myself; but even this was refused. As soon as my mind was made up, after a most painful struggle, I discharged the Adventure's crew, took the officers back to the Beagle, and sold the vessel.*

Early in November our charts of the eastern coasts of Patagonia and Tierra del Fuego, as well as those of the Falkland Islands (the work of the Adventure) were finished, and shipped off for England; and on the 10th we sailed, alone, to resume our more active occupations on the southern coasts. My former intention was to have filled up all blanks in the charts of the outer west coast of Patagonia, between the parallels of fifty-three and forty-eight, and then carried a connected survey along the coast to the equator; after which the Galapagos Islands; Dangerous Archipelago; Marquesas, Society, Friendly, and Feejee Islands; besides New Zealand; were to have had as earnest an examination as could be effected by both vessels during 1836 and part of 1837. That this plan might have been carried out by the divisions of labour and exertions of the Beagle and her tender may, I think, be inferred from what has actually been executed with inferior means and in much less time. But my reduced arrangements were on a much smaller scale: I could only look to the most useful objects that might be effected within the limited time to which I dared to look forward.

All on board partook, more or less, of the mortification caused by parting with our consort, just as she was most wanted, and most able to take an effective part; and I confess that my own feelings and health were so much altered in consequence—so deprived of their former elasticity and soundness—that I could myself no longer bear the thoughts of such a prolonged separation from my country, as I had encouraged others to think

* Though her sale was very ill-managed, partly owing to my being dispirited and careless, she brought 7,500 dollars, nearly £1,400, and is now (1838) trading on that coast, in sound condition.

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lightly of, while I could hold out to them the prospect of seeing as well as doing a great deal among the islands of the Pacific, besides completing the surveys of Chile and Peru.

I now proposed, first, to go to San Carlos, there set two of our boats at work among the islands eastward of the large island, while the Beagle would survey the more exposed coasts, those to the west and south; then the ship was to examine the seaward shores of the Chonos archipelago, while another of her boats was employed among those islands; and, the Chonos explored, she would return to San Carlos, collect her scattered parties, and proceed along the coast, northwards, taking all the ports and islands in her way.

On the 21st we arrived at San Carlos, and were pleased to find that Mr. Low had returned safe from his difficult undertaking; and that a person (Mr. Douglas) whom I had engaged to make an excursion to Calbuco and into the forests of 'Alerse,' on the Cordillera of the Andes, had also come back with the required information, and was ready to engage himself to act as a pilot and interpreter.

When last at San Carlos I proposed to Mr. Low, then serving as pilot on board the Adventure, to pass the time of our absence at Valparaiso, in exploring part of the Chonos Archipelago with a whale-boat belonging to me, and a crew of natives (Chilotes). Low, ever restless and enterprising, entered eagerly into my views; so furnishing him with money, a chart, and a few instruments, I explained where I wished him to go, and when he should be again at San Carlos, all further arrangement being left to him.

Mr. Low hired a crew of six men,* and set out. After he had quitted the southernmost place at which provisions could be procured, called Caylin, or 'El fin de la Christiandad,' one of his men† persuaded some of the others‡ to eat up the stock

* A Welshman, two Chilotes, a Chilian, and two Sandwich Islanders who had been left at San Carlos by a whaler. † The Chilian.

‡ The Chilotes and Sandwich Islanders. Taffy remained faithful: he and Low, being able-bodied active men, frightened the rest into reluctant submission.

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of provisions in the boat as soon as possible, in order that they might be obliged to return without going far. But Low was too much inured to hardship to be so easily diverted from his plan; he went on, directly south, even after his provisions were consumed; obliging them to live for fourteen days upon shell-fish and sea-weed. After exploring much of the Chonos Archipelago, sufficiently to facilitate our survey materially, he returned with his hungry crew to Caylin.

24th. Lieutenant Sulivan set out with the yawl and a whale-boat, to survey the east side of Chiloé and the islets in the Gulf of Ancud.* With him were Messrs. Darwin, Usborne, Stewart and Kent; Douglas as a pilot, and ten men. Two days afterwards, the Beagle sailed, to examine the western coast of Chiloé, and the Chonos Archipelago.

Dec. 2d. While standing towards distant mountainous land, about the latitude of 45°, we saw a comparatively low and level island;† considerably detached from those which seemed like Tierra del Fuego, being a range of irregular mountains and hills, forming apparently a continuous coast. This level island I have since ascertained to be that formerly called Nuestra Señora del Socorro, where Narborough anchored and landed, in 1670. It was selected in 1740, by Anson, as a rendezvous for his squadron; but no one seemed to know where to look for it: the Anna Pink having made the land in 45°. 35′, and the unfortunate Wager in 47°, near Cape Tres Montes. Narborough mentions seeing 'an old Indian hut' on this island; and in a MS. journal, written by Moraleda‡ (now in my possession) it is said that the former natives of the Chonos used to make annual excursions to that as well as other outlying islands. After witnessing the distance to which savages venture in such frail canoes as those of Tierra del Fuego, it does not surprise one to find them going fifteen or twenty miles across an open

* Orders in Appendix, No. 21.

† About three or four hundred feet in height, excepting one hill, which is seven hundred feet.

‡ MS. Diary of Moraleda's examination of Chiloé and part of the Chonos Islands in 1787-93, given to me at Lima, by a friend to whom I am much indebted for valuable information.

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space of sea in such large canoes as those of the Chonos Indians, which are indeed boats. Fuegian wigwams have been found upon Staten Land and upon Noir Island, each of which is as far from any neighbouring coast as Socorro is from the nearest shore.

While Narborough's ship was under sail, near Socorro, he went in his boat to the island which is nearest to it, by him named Narborough Island.* There he landed, and took possession for his Majesty and his heirs.†

3d. Having passed the night quietly at single anchor, near the north-east point of Socorro, we weighed and continued our route to and fro along the coast, taking angles, soundings, and observations. On the 5th, we were near Huafo,‡ which, to our surprise, we found to be twenty-five miles farther north than the Spanish charts (following Moraleda) showed its position, yet the longitude was almost correct. In a small cove, near the south-east point of Huafo, we anchored, but broke a bower-anchor in doing so; for the cove is small—an unexpected puff of wind gave us too much way—and dropping the bower in haste, it fell upon a rock, and broke.§ Only two days before another anchor was broken, near Socorro, by the ship pitching while a short scope of cable was out, and the anchor hooking to a rock. I found, on landing, that the formation of the island, like that of Socorro and Narborough Island, is a soft sandstone, which can be cut with a knife as easily as a cake of chocolate.

* "Neither the chart in Ulloa, nor any of the Spanish charts lately in use, show the name of N.S. del Socorro to any island near the coast hereabouts. The Spanish Atlas of 1798, places an island very near the coast, in 44° 50′ S. latitude, which in shape and situation answers nearly to Narborough's description of the island, to which he gave his own name."—(Burney, vol. iii. p. 360. Note.)

† "I saw no kind of mineral in it. Not finding this island noted in any draught (chart), I called it after my own name, Narbrough Island, and took possession of it for his Majesty and his heirs."—(Narborough's Voyage to Patagonia and Chile, in 1669-1671.)

‡ Called by Narborough "No-man's Island."

§ Or between two rocks, so that the first sudden strain snapped the shank.

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These three outlying islands are thickly wooded, rather level, compared with their neighbours, and not exceeding eight hundred feet in height. There are few, if any others, like them in the Chonos Archipelago; almost all the rest, however portions of some may resemble them, being mountainous, and very like those of Tierra del Fuego and the west coast of Patagonia, beyond 47° south; therefore I need only remark, that the vegetation is more luxuriant; that there is a slight difference in it, consequent probably upon a milder climate; that some productions, such as canes and potatoes, &c., are found there which do not grow near the Strait of Magalhaens; and that in other respects, as to appearance, nature, and climate, the Chonos Archipelago is like Tierra del Fuego in summer.

We remained a few days in San Pedro harbour; and on the 9th Mr. Sulivan and his party joined us. Next day Mr. Stokes and I endeavoured to get to the top of the mountain named Huampelen, Huamblin, or San Pedro; but after climbing, creeping, struggling, and tumbling about, among old decayed trees, strongly interwoven canes, steep, slippery places, and treacherous bog, we failed, and gave up the attempt. Mr. Darwin, Douglas, and others were with me, but we were all foiled.

11th. Having despatched Mr. Sulivan, with the same party excepting Mr. Darwin, we got under weigh, and hastened towards the middle of the Chonos group, in order to find a port whence Mr. Stokes might set out to explore northwards, while I should examine the southern half of the archipelago.

13th. We succeeded in finding a sheltered, and apparently safe anchorage in a road named by me Vallenar, because it corresponded in situation to an island so called in an old chart, said to be of the Chonos, but which bore no resemblance whatever to them. However, being anxious to remove no "neighbour's landmark," and retain original names, when they could be ascertained, I kept them wherever I was able to do so. As to the native names, those given by Indians, I had not the means of finding them out, for no inhabitants were seen; but, so far as Moraleda had collected them from his Indian inter-

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preters, and made them known by his chart,* I have scrupulously followed him.†

16th. Mr. Stokes set out, in a whale-boat, to work northwards, as near the sea-coast as possible, and meet me at a harbour in the Huaytecas group of islands, now called Port Low. He was accompanied by Mr. Low, Mr. May,‡ and four men.§ Moraleda, in his diary and chart, describes a channel which crosses the Chonos Archipelago, and is called by the natives 'Ninualac.'‖ Through this passage the Chonos Indians used to go once or twice a year to inspect the small herds of goats, or flocks of sheep which they then had upon those outlying islands I have already mentioned, namely Huamblin¶ (Socorro), and Ipun (Narborough); as well as upon others, of which I believe Lemu, a woody island on the north side of Vallenar Road, was one. Moraleda himself explored part of the continent, and some of the islands adjacent to it (between 1786 and 1796), but he saw nothing of the sea face of the Chonos. What few notices of it existed, prior to 1834, were obtained from the voyage of Ladrilleros in 1557; from the Anna Pink in 1741; from Machado in 1769; and from the Santa Barbara in 1792; which, when compared together, tended to confuse a hydrographer more than they assisted him. In Spanish charts of the coast from Cape Tres Montes northward to Taitaohaohuon (a name long enough to perplex more verbose men than sailors) from which all others, of that coast, were copied, that portion must have been originally laid down according to mag-

* Now in my possession.

† His Huamblin and Ipun I take to be Socorro and Narborough Islands, but am not certain.

‡ Having very little occupation on board, in his own particular line, just at that time, Mr. May volunteered to take an oar, as one of the boat's crew.

§ Orders in Appendix, No. 22.

‖ "Gran Canal de Ninualac, que atraviese el Archipiélago, por el informe del practico Huenupal que casi anualmente la transita con el motivo expresado en el Diario."—(Moraleda's MS. Chart, 1795.)

¶ Huamblin, if, as I suppose it, a corruption of Huampelen, means 'on watch,' 'posted as a sentinel:' Ipun means 'swept off,' or 'swept away:' Lemu means 'wood:' names singularly applicable to each of those islands respectively.

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netic, instead of true bearing; and the fragments of knowledge acquired, about the latitude of 46° S., from the master of the Anna Pink, the pilot Machado, and the officers of the Santa Barbara frigate, clashed so much that their result was what we see in the charts hitherto used, a dotted line, and a few straggling islands, totally unlike the truth, leading one to expect a comparatively open space, whereas there is a succession of high and considerable islands, so near one another, that from the offing they 'make' like a solid unbroken coast.

While on this subject I may remind the reader that besides the expeditions above-mentioned, the missionary voyages described by Agüeros (Appendix, No. 23), the important undertaking of Sarmiento, and the disastrous voyage of the Wager, there have been other visitors to the west coast of Patagonia, part of whose acquired information, though slight, is upon record.

In 1552, two ships, commanded by Don Francisco de Ulloa, were sent by Valdivia to gain some knowledge of the Strait of Magalhaens.* The journal of their voyage is not extant. Five years afterwards (in 1557), Don Garcia Hurtado, Viceroy of Peru, sent two vessels to examine the southern part of the coast of Chile, as far as the Strait of Magalhaens. The commander was Juan Ladrilleros, and with him were two pilots, named Hernan Gallego and Pedro Gallego. A mutiny took place, and one ship deserted, but with the other Ladrilleros persevered, passed four months in the Strait at anchor during the winter, then reconnoitred the eastern entrance, and afterwards sailed back to Chile, where he at last arrived with only one seaman and a negro, the rest of his people having perished by exposure to hardships, by scurvy, or by famine. The principal geographical information obtained at so high a price, was some slight knowledge of Chiloé, and the archipelago of islands near it.—(Burney, vol. i. p. 246-9.)

Sarmiento's expedition in 1579-1580, has already been often quoted in the first volume of this narrative.

In 1675 Antonio de Vea was sent from Peru in a ship,

* Pastene, a Genoese, was, I believe, in this expedition. His MS. Journal is said to exist in the archives of Barcelona.

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accompanied by small barks, as tenders, to reconnoitre the Gulf of Trinidad, and the western entrance of Magalhaens Strait. De Vea made an examination of those places, and was convinced, from the poverty of the land, that no settlement of Europeans could be maintained there. One of the Spanish barks, with a crew of sixteen men, was wrecked on the small islands called Evangelists, at the west entrance of the Strait. De Vea returned to Callao in 1767.—(Burney, iv. 76.)

In 1681, the notorious Sharp anchored in a gulf, surrounded by craggy mountains, whose tops were covered with snow, in 50°. 40′. south latitude; where "the difference of the rise and fall of the tide was seven feet perpendicular." Sharp named the anchorage Shergall's Harbour, the sound he called English Gulf; and the islands adjacent "Duke of York's Islands." The account of this buccaneer's visit is sufficiently connected with the object of this volume, to warrant my inserting it in the Appendix, copied verbatim from that interesting work, invaluable to seamen and hydrographers, Burney's History of the Discoveries in the South Sea.*

18th Dec. The Beagle weighed and sailed out of Vallenar Road, after experiencing the shelter afforded by that anchorage, during a heavy gale from the south-west and southward.

At day-light on the 20th we were off Cape Tres Montes: having a fine day and smooth water, we surveyed the coast between that promontory and San Andres Bay, but it became dark before an anchorage could be gained. Next morning we anchored in a narrow creek,† close by a singular cone (1,300 feet high), an unfailing landmark. Finding it a place difficult to get out of, and not to be recommended, unless in distress, we did not stay there long, but moved to a cove at the south-west part of the bay.‡ While under sail for this purpose, advan-

* In this extract from Burney (Appendix No. 23), there is a criticism upon a hydrographical error, made by some copyist, which is interesting to me from its correspondence with what I suspect to have taken place in the old charts of Nassau Bay and Cape Horn.—(See pages 122, 123.)

† Cone Creek.

‡ Christmas Cove.

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tage was taken of an interval of moderate weather to run several miles along the coast northward, and back again. Strong gales set in afterwards and kept us prisoners several days. This Christmas was unlike the last: it was a sombre period. The wind blew heavily (though we did not feel it much, being well sheltered); all looked dismal around us; our prospects for the future were sadly altered; and our immediate task was the survey of another Tierra del Fuego, a place swampy with rain, tormented by storms, without the interest even of population: for hitherto we had neither found traces,* nor heard the voices of natives.

28th. Directly the weather would admit, we weighed and coasted along till the sun was getting low, when we ran under shelter from sea and wind, and anchored in the corner of a bay which I afterwards concluded must be the bay or port called Stephens, and more properly, San Estevan. While we were furling sails, some men were seen on a point of land near the ship, making signals to us in a very earnest manner. Being dressed as sailors, it was natural for us to conclude that they were some boat's crew left there to collect sealskins. A boat was sent to them, and directly she touched the land they rushed into her, without saying a word, as men would if pursued by a dreaded enemy; and not till they were afloat could they compose themselves enough to tell their story. They were North American sailors, who had deserted from the Frances Henrietta (a whaler of New Bedford), in October 1833. When off Cape Tres Montes, but out of sight of land, and in the middle of the night, these six men lowered a boat and left their ship, intending to coast along until they should arrive at Chiloé. Their first landing was effected on the 18th, but owing to negligence the boat was so badly stove that they could not repair her, and all their hopes of effecting a coasting voyage were thus crushed in the very outset.

* With one exception. On a height near Cone Creek Mr. Darwin found, in a sheltered hollow of the rock, strewed with dry grass, what appeared to him the place on which a man had slept. For some time this puzzled us considerably: probably a sealer had slept there.

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Finding it impossible to penetrate far into the country, on account of its ruggedness, and thick forests, which, though only trifling in height, were almost impervious, they began a pilgrimage along-shore; but it was soon evident, to their dismay, that there were so many arms of the sea to pass round, and it was so difficult to walk, or rather climb, along the rocky shores, that they must abandon that idea also, and remain stationary. To this decision they were perhaps more inclined after the death of one of their number; who, in trying to cross a chasm between two cliffs, failed in his leap, fell, and was dashed to pieces. Their permanent abode was then taken up at the point which shelters Port San Estevan, now called Rescue Point; where they passed a year in anxious hope. Of course the few provisions which their boat had carried ashore were soon exhausted, and for thirteen months they had lived only upon seals' flesh, shell-fish, and wild celery: yet those five men, when received on board the Beagle, were in better condition, as to healthy fleshiness, colour, and actual health, than any five individuals belonging to our ship. Few remarks worth noticing had been made by them, as the only experienced man (whose name was John Lawson) lost his life as above-mentioned. There was an almost continual succession of rain and wind for several months after their first landing, except from the 20th to the 29th of December, which passed without rain: in July (1834) they had an extraordinary storm from south-west, which began early one morning, after a rainy night with northerly wind: and in November (1834) there were twenty-one days successively without rain. One day (in May) they saw eight vessels sailing northwards together; excepting which, not a sail was ever seen by their aching eyes till the Beagle hove in sight. Between San Andres, near which they first landed, and San Estevan, the hull of a small vessel was found, quite bedded in sand; she seemed to be about thirty-five tons burthen, from thirty to thirty-five feet in the keel, and about sixteen broad. She was full-built; neither coppered nor sheathed. In a cave, which had been used as a dwelling, near San Andres, the skull of a man was found, and some burned wood. A bracelet of

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beads was lying in the cave, but they noticed nothing else. The skull seemed to them to have been that of a black man. No animals were seen at any time except deer and nutria, seal and otter; the former were of a reddish colour, with short straight horns, and very rough coats: no traces of other quadrupeds were observed, nor during the whole fourteen months did they ever meet a native human being. They told me that the night tides seemed always to be a foot or more higher than those of the day, which, as they said, rose from four to seven or eight feet perpendicularly. I had intended to explore the interior of Port San Estevan; but as they had already done so, and found it terminate in a fresh water river, or rather mountain stream, I gave up that plan, and sailed next day.

29th. While examining the coast towards Cape Taytao* (I must omit haohuon), we found a very dangerous patch of rocks,† five miles from the nearest land; there are soundings near them. In the evening we dropped our anchor under Inche-mo Island; an interesting locality, because there the Anna Pink anchored before she was drifted across the adjacent bay into Port Refuge (in 1741).

30th. On landing an old wooden hut was discovered in a sheltered corner, and we found that the island was over-run with goats, which I suppose to have been left by the Santa Barbara's crew, if not by Machado's people. While Mr. Stokes and I were engaged with the instruments, and two boats sounding, a couple of guns were sent against the goats, and in consequence of their effectual employment in the hands of Mr. Bynoe and H. Fuller, all on board had a good fresh meal the next two days. After noon we sailed across the Bay,‡ and found a snug, though very small cove,§ where we moored in security, and remained till the 4th of January, exploring the neighbourhood—an unprofitable wilderness of rocky mountains, woody and swampy valleys, islands and rocks in pro-

* Cape Taytao is a high bold promontory.
† Hellyer Rocks.
‡ Now called Anna Pink Bay.
§ Patch Cove.

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fusion, and inlets or arms of the sea penetrating in every direction.

On the 4th we moved to Port Refuge, a safe, but out of the way place. In the "narrative of what befel the Anna Pink," given in Anson's Voyage, this harbour is described in very glowing colours; but we may remember that those who discovered it, were there saved from destruction; and naturally looked upon all things around them with excited feelings.* How the officers of the Santa Barbara made their survey of this port and its neighbourhood I am at a loss to know; a mere eye-sketch, drawn upon the spot, might have been much better than that which they gave to the world as a mathematical plan. In their distorted representation of Port Refuge, many soundings have been scattered, apparently at random, and quite at variance with truth. This is so unlike most Spanish works of a similar nature, some of which are very accurate,† considering the date of their manufacture, and the means employed,—that I conclude the officers of that frigate, not understanding marine surveying, merely drew rough sketches of what they saw, which were afterwards 'cooked' into a more regular 'appearance,' by some one who was not on board with them. Had time allowed I should have explored the Gulf of San Rafael, at the back of Tres Montes Peninsula,‡ but knowing that it could only be an object of geographical, not immediately practical interest to do so, I refrained from indulging mere curiosity, much as I desired to corroborate the account of Spanish missionaries who often went there, crossing the Isthmus of Ofqui, in search of Indians among the Guaianeco islands, and even farther south, of whom they might make converts to Christianity. Doubtless some of these voyages were undertaken and completed with benevolent and single-minded intentions; but I suspect that others were conducted on a different principle; and that their chief object was to procure able-bodied slaves to be employed in the mines of

* Anson's Voyage, chapter iii.

† Exclusive of mistakes made by compilers or translators.

‡ Appendix, No. 24.

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Chiloé or Southern Chile. I should be glad to learn that this suspicion is ill-founded.*

On the 7th we anchored in Port Low, and found Mr. Stokes just arrived, after a fagging cruise among the Chonos islands. His journal contains a great deal of information, from which I have extracted those passages most likely to interest the general reader.

His whale-boat was so loaded at starting (16th Dec.) that her gunwale amidships was but a foot above water. She was twenty-five feet long and six feet broad, and then carried seven men, besides instruments and a month's provisions. Of water she had only two 'barecas,' because on that coast fresh water is only too plentiful. In passing a promontory, the following day, while their boat was still deep, the swell became so great that Mr. Low said he had never before been in a boat exposed to greater danger.

In some places where they landed the woods were so thick that Mr. Stokes was obliged to climb trees to get angles; and not being able to tell previously which would answer his purpose, sometimes he made three or four useless ascents, before he could obtain a view: "but," he says "there is a pleasure I cannot express in roaming over places never visited by civilized man." On Rowlett Island potatoes were found growing wild; the largest dug up measured two inches in length, and an inch in thickness: they were quite tasteless.

At the east side of Ipun, on Narborough Island, an excellent small port was found, which was named Scotchwell Harbour. On the shore, near it, was a large bed of strawberries, like those that grow in English woods; and there was a sweet-scented pea, besides abundance of other vegetable produce, both herbage and wood, and plenty of water.

"Hitherto, all the islands we had seen were of slate-rock, some parts so soft, that I could break them easily with my finger, and I found that they blacked my hand, like plumbago;

* It is difficult to account for the present abandoned state of these regions, if no harsh usage was experienced by their former natives.

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but Ipun is quite different in structure, being an earthy sandstone."*

Syzygial high water at Ipun takes place at noon, and the tide rises six or eight feet. The flood-tide comes from the southward.

At May Harbour (which may be the Bello Dique of the Santa Barbara), many cypress trees were noticed, for the first time hereabouts, and a surprising number of otters. The tide rose seven feet. About the Huaytecas Islands, the northernmost of the Archipelago, quantities of excellent oysters were found, quite as good as any sold in London. No quadrupeds were seen, except nutria and otters, which were numerous. Their numbers, and the quantity of birds, show that Indians do not now frequent that quarter; indeed, no traces of them whatever were found by Mr. Stokes, or any of our party, among the Chonos islands.

10th. While lying at Port Low we caught plenty of fish with the seine; we obtained oysters from neighbouring creeks, and shot ducks and geese, so there was no want of fresh provision. Some piraguas from Chiloé were in the port: the Chilotes in them were in search of otters, seals, and nutria, and had come across the gulf of Huafo, in their ill-conditioned vessels, with no little trepidation.

On an outlying islet, near Port Low, I first saw the wild potato. Next to seeing a wild man, I recollect few objects which struck me much more than that group of wild potatoes:—but I have neither inclination nor space here to speak of my own sensations. The stems, leaves, and flowers of these vegetables were as large, and appeared to be as healthy, as those in an English garden, but the potatoes at their roots were small, watery, and insipid. It ought to be recollected, however, that we saw them early in January—corresponding to July—many weeks, at least, before one could expect to find eatable potatoes in an English field.

It was remarked in the Chonos islands, as well as in Tierra del Fuego, that the trees which grow in thin soil, lying upon

* Stokes, MS.

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slaty rocks, extend their roots so horizontally that it is not surprising to find, running through woodland, broad tracts whence the shallow-rooted trees have been swept away, partly by wind, partly by the action of mountain-torrents.* As wood grows even at the water's edge in those countries, where not exposed to the first attack of wind from seaward, and as there are so many loose overhanging masses of rock, one cannot be surprised at the vast quantities of drift-wood found in some places; or think it improbable for a quadruped to be occasionally precipitated into the sea, with a falling mass of rocks and trees, and afterwards drifted by wind and current to some other locality.

From Port Low we saw a notable mountain, one of the Cordillera of the Andes, having three points upon a small flat top, about eight thousand feet above the sea. I called it the Trident at that time; but afterwards learned that there are four peaks (one of which was hid by another from our point of view), and that it is called by the aborigines Meli-moyu, which in the Huilli-che language signifies four points.

Three other remarkable mountains, active volcanoes, are visible from the northern Huaytecas islands, as well as from Chiloé; I mean the Corcobado (hump-backed), of which I do not remember the Indian name; Yanteles (or Yanchiñu, which

* The writer of Anson's voyage, speaking of Juan Fernandez, exactly describes the loose state of trees in such places, when he says, "The northern part of this island is composed of high, craggy hills, many of them inaccessible, though generally covered with trees. The soil of this part is loose and shallow, so that very large trees on the hills soon perish for want of root, and are then easily overturned, which occasioned the death of one of our sailors; who being upon the hills, in search of goats, caught hold of a tree upon a declivity, to assist him in his ascent, and this giving way, he immediately rolled down the hill; and though in his fall he fastened on another tree of considerable bulk, yet that, too, gave way, and he fell among the rocks, and was dashed to pieces. Mr. Brett likewise met with an accident, only by resting his back against a tree, near as large about as himself, which stood on a slope; for the tree giving way, he fell to a considerable distance, though without receiving any injury."—(Anson's Voyage, 8vo. edit., p. 159.)

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means 'having a shivering, and unnatural heat'), and Minchen-madom, which, in the Huilli-che tongue, means 'under a fire-brand'; names so expressive and appropriate as to put to shame much of our own nomenclature. Wherever I have been able to discover the aboriginal name of a place in South America, and could ascertain its meaning, I have been struck by the extreme appositeness, as well as by the copious though condensed allusion usually conveyed.

In Chiloé and about the north-eastern Chonos Islands, almost all the aboriginal names are preserved, because there interpreters could be procured; but, of course, such advantages were generally unattainable in Patagonia and Tierra del Fuego. In Chiloé, as in Araucania, every corner and every conspicuous spot, whether land or water, has a particular and expressive name, a word usually compounded of two or three others: thus, Huapi-quilan means Three Islands: Calbu-co, Blue Water; Cauca-huapi, Gull Island; Huechu-cucuy, Point Cucuy,* or Grandmother; Carel-mapu (Cara-el-mapu), Bad-city-country; Petu-cura, middle stone (a rock in Chacao Narrow), &c.

15th. We sailed from Port Low and went to Huafo once more, wishing to give Mr. Darwin an opportunity of examining it geologically. There are now no inhabitants on that island, though there are a good many sheep belonging to Chilotes, who live at Caylin. Formerly there were Indians called Huyhuen-che,† upon Huafo; but the Spaniards obliged them to quit it, for fear they should give information or supplies to English ships. Near the Beagle, when at anchor, there was a square place, like an entrance to some cave, seemingly cut by man in the soft sand-stone rock; and I have since often reproached myself for having left the place without ascertaining

* Cucuy is the name of a bird, much noticed by the aborigines because its motions are supposed to be ominous: it also means grandmother.

† The Huyhuen-che, often called Huyhuenes, were a tribe of Chonos Indians, adjoining the Pichi-huilli-che, who lived in the northern portion of Chiloé. The word Huyhuen signifies 'whistle,' or 'hiss,' or 'to whistle, or hiss.'

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its real nature. It may be the entrance to some cave, formerly used as a burying-place, similar to those explored by Low, and by the surgeon of the Wager.

On the 17th we sailed, and next day anchored off Point Arena, in San Carlos Harbour. Lieutenant Sulivan, with his party, had arrived a few days previously, after a very satisfactory cruise. We found his boats hauled up and refitted, his people lodged under their tents, and himself with Mr. Usborne busily occupied in my little observatory, laying down the work for which they had collected materials. Thus we were again assembled in safety, after being considerably divided, and, in consequence, exposed to numerous dangers which human prudence can neither foresee nor prevent. As some soundings were still wanted near the English bank, and about the approach to San Carlos, we employed the 19th in taking them, on board the Beagle, accompanied by her boats, and returned to our usual anchorage, close to Point Arena, at dark.

When sounding on the English bank, we repeatedly tried to ascertain its nature by forcing a very long iron lance downwards as far as possible. The instrument penetrated about two feet into sand in all instances but one, when it was stopped abruptly by a substance which bent the lance and turned its point. It did not, however, feel like rock, rather, I should say, like hard wood.* This hard place was about a square yard in extent, and all around was sand.

In the night, or rather from two to three the following morning, Osorno was observed in eruption, throwing up brilliant jets of flame or ignited matter, high into the darkness, while lava flowed down its steep sides in torrents, which from our distance (seventy-three miles) looked merely like red lines. Daybreak diminished the effect, and as the light increased only a dark column of smoke could be discerned. This mountain is one of the most striking in form which I ever saw. It is not only quite conical from the base to the summit, but it is so sharply pointed that its appearance is very artificial. When seen

* Mr. Sulivan had the lance in his hand at that time.

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from the sea, at a distance of ninety or a hundred miles, the whole of the cone, 6,000 feet in height* at least, and covered with snow, stands out in the boldest relief from among ranges of inferior mountains. The apex of this cone being very acute, and the cone itself regularly formed, it bears a resemblance to a gigantic glass-house; which similitude is increased not a little by the column of smoke so frequently seen ascending.

We remained till the 4th of February in the port of San Carlos. Mr. Darwin profited by the opportunity afforded to make an excursion into the interior of the island, while the surveying party were occupied in arranging data, in laying down chart-work, and in taking and calculating observations. I paid Douglas for his services and for a variety of information collected for me, from which—from Lieut. Sulivan's journal—and from my own notes—I shall now add such few notices of Chilóe as I think may be interesting, and which have not been already introduced in the first volume. (pp. 269—301.)

Various accounts have been given of the characters and dispositions of the Chilotes. Some have said that they are a noble, industrious, and docile race; others that they are dishonest, idle, and ill-disposed: to reconcile these contradictory accounts is, therefore, at first sight, rather perplexing. There are four distinct classes of inhabitants in Chilóe and the adjacent islands;† the aboriginal Huyhuen-che, or Chonos; the Huilli-che, who came from southern Chile; the foreigners, those neither born in Chilóe nor descended from Chilotes; and the Creoles. Of these the Chonos are now nearly lost: in consequence of disease and emigration they have by degrees abandoned not only Chilóe but the adjacent Chonos islands, and are only found southward. Some Indians to the south-west of Castro, in the interior of the island near the lake Cucao,

* The volcano of Osorno, or Purraraque, or Hueñauca, is 7,550 feet above the sea level.

† The smaller islands of the Archipelago of Chilóe, those in the gulf between Chilóe and the main-land, called the Gulf of Ancoed or Ancud.

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are under the nominal jurisdiction of their own caciques: whether they are Chonos or Huilli-che, I did not ascertain clearly. Being a race who are naturally little inclined to cultivate the soil, and preferring a comparatively idle life among muscles, seal, and fish, to voluntary labour on their own account, with a considerable degree of compulsory toil for the Spanish Government and priests, they quitted Chiloe in successive families. From them, probably, are derived the glimmerings of religion, and the crosses among the Indians of Madre de Dios, and other parts of the west coast of Patagonia. That their canoes or rather piraguas, should be similar to those of Chiloe seems natural enough; but the fact is that the Chonos people taught the Huilli-che how to make them.* Coming from an inland district near Valdivia, the Huilli-che had never required boats, though they knew how to cultivate potatoes, maize, and beans; how to make 'ponchos,' and take care of sheep and cattle. These, though more industrious, and in some respects better members of society, are a tame and docile race compared with the Chonos, whose spirit of independence has shown itself in their migration, and impatience of mis-government.

The principal population of Chiloe is now Huilli-che, nominally Christian but painfully ignorant of pure Christianity. Abandoned to the crooked direction of ungodly pastors, intent upon their own worldly interest instead of the welfare of their flock, extorting 'primicias'† and tithes from poor Indians, whom they scarcely see once in a year (I speak advisedly)—and taught only the Romish doctrine in its worst form; can any one expect the poor Chilotes to be really religious and consequently moral? That they should be extremely superstitious is much more probable, and such is the fact. Their's is a confused demi-religion, in which a medley of ideas concerning the Virgin Mary, saints, images, and witches,‡ is found far

* These piraguas are extremely like the Madras surf-boats. (See vol. i. p. 285, for a description of the piragua.

† First fruits of everything, animal as well as vegetable.

‡ They are implicit believers in witchcraft.

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more often than any clear reference to our Saviour or the Almighty.

In the foregoing remarks on the Roman Catholic priests at Chiloé whom I conversed with and heard much about between 1829 and 1835, I do not include all. There was certainly one man (I hope there were more) whom I believe to have been as sincerely pious, and therefore good, as any Roman Catholic, but there were others whose lives scandalized even their nominal Christianity.

The foreigners settled in Chiloé of course resemble their own countrymen as to morals and habits, not being likely to take example from the Indians: and the Creoles adopt their ideas as hastily as our milliners adopt French fashions. But there is a virtue in Chiloé, which if sins could be atoned for by the good works of man alone, would go far towards purchasing good treatment and very slight purgatory for the souls of Chilotes: I mean the warm-hearted kindness shewn to one another, and particularly to strangers. Conspicuous as such a feeling of hospitality and disinterested good-nature is among the descendants of Spaniards in South America, it is no where more to be observed than in Chiloé.

Increased intercourse with other countries is annually diminishing the local peculiarities of Chilote society, a remarkable one being that of transacting mercantile business by barter, for want of current coin. Planks of alerse, indigo, tobacco, pepper, salt, &c. were substitutes for silver and gold in 1829, excepting among a very few foreigners or comparatively rich descendants of Spaniards and Creoles. At that time it was extremely difficult to get a few dollars in exchange for a bill upon good security at Valparaiso, even at the exorbitant price of sixty-pence English for each dollar. In 1834, so much had the state of trade improved at San Carlos, that there was no difficulty in obtaining as many dollars as we wanted for forty-eight pence each.

In the first volume most of the products of Chiloé are mentioned, except fish and coal. Of the shell-fish there is a full

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account, but I may here add that smelt, mullet, a kind of bass, and other fish are plentiful during the summer months. The natives often catch many more than they want by placing very simple weirs across creeks at high-water, with a passage in the middle, which is shut when the tide begins to ebb. Some of these weirs are rough stone walls (on a small scale), others are wattled like hurdles. The number of fish kept back by them and left dry, as the water falls, is really surprising. Seals are now rare, and whales are fast diminishing in numbers. There is a good deal of coal in Chiloé, but I am told that it is of an inferior description, like that of Concepcion. Geologists say it is not true coal: lignite would be a more appropriate term. Be this as it may I tried some of it* in my cabin stove, and found it burn readily, though what I had was a lump taken from the surface of the ground. The Chilotes scarcely noticed it then, having so much wood around them, but a day may arrive in which its value may be better appreciated.

Next to San Carlos,† in size and population, is Castro, the former seat of Government, which has dwindled to a mere village. Chacao, where the governor afterwards resided, is only a hamlet. Remains of a town, such as lines of streets and the ruins of a church, are visible, but there are now only a few straggling cottages and a ruinous chapel. It is said, on the spot, that the former church of Chacao was burned by the old Spaniards, to oblige the natives to quit the place and go to San Carlos. Castro, formerly styled a city, now consists of two or three short streets of bad wooden houses and two churches: one of which was built by the Jesuits more than a hundred years ago, and is fast decaying though 'shored up' (supported by props) on all sides.

The first discovery of Chiloé was made by Spaniards in 1558, one of whom was Ercilla. Enthusiastic in every thing, the warrior-poet tells us that he ran to a tree, half-a-mile south

* Obtained for me by Mr. Robert Williams from the neighbourhood of San Carlos.

† Described in vol. i. p. 274-5.

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of the place where his companions halted, and cut some lines on the bark.*

The populous state of Chiloé, in 1558, when first visited by Europeans may be estimated by Ercilla's description, allowing for poetical license. All accounts agree in stating that the Chonos Indians, or Huyhuen-che, were once very numerous.

"Era un ancho archipielago poblado
De innumerables islas deleytosas,
Cruzando por el uno y otro lado
Góndolas y piraguas presurosas:
* * * * * *
Llegó una corva gondola ligera
De doce largos remos impelida."

LA ARAUCANA, Cantos xxxv and xxxvi.

That the Spaniards then with Ercilla, were thought to be deities, is shown by the following lines:—

"Hombres, o Dioses rústicos, nacidos
En estos sacros bosques y montañas,
Por celeste influencia producidos," &c.

IDEM, Canto xxxvi.

Some years afterwards (in 1566) Castro was founded, to be the capital, and Chacao for a sea-port. From this time till about 1633 mines were worked in Chiloé, but then discontinued, partly because they were less productive than those of Chile, and partly on account of the difficulty of obtaining labourers after a raging epidemic had carried off one-third of the aboriginal inhabitants; and fear of infection as well as horror of the mining slavery, had driven away a large portion of the residue.† About this time the Huilli-che were carried to

* "Aquí llegó, donde otro no ha llegado,
Don Alonso de Ercilla, que el primero
En un pequeño barco deslastrado
Con solos diez, pasó el desaguadero
El año de cincuenta y ocho entrado
Sobre mil y quinientos por Hebrero,
A las dos de la tarde el postrer dia,
Volviendo á la dexada compañia."

LA ARAUCANA, Canto xxxvi.

† These were Huyhuenes, or Chonos, whose place was afterwards supplied by Huilli-che from southern Chile.

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Chilóe, in addition to those who had accompanied the fugitives from Osorno (in 1599—1604) to Calbuco, Carel-mapu, and thence to Chilóe; who being a docile patient race, accustomed to agriculture, increased rapidly and supplanted the Chonos emigrants.

We read in the narrative of Brouwer's voyage (1643) that the port which the Dutch called Brouwer's Haven, was by some called Chilova, and by others English Haven: and in 1624, according to Agüeros (quoting D. Cosme Bueno), Englishmen were on this coast: but I think it more probable that the Bank Ingles and Port Ingles, near San Carlos, obtained those names from William Adams, in 1599,* rather than from them. In the Dutch chart published with the journal, this island is called Chiloue, and the adjacent gulf, Ankaos, or Ancoed.† Brouwer alarmed the inhabitants of Chilóe not a little, but they were even more frightened and harassed before that time by Cordes, in 1600; Spilbergen, in 1615; and afterwards by Shelvocke, in 1719; besides others.

To guard against, or rather watch for such visitors, as well as to obtain the earliest intelligence of an enemy being on the coast, the Spaniards established look-out stations in com-

* Voyage of Five Ships of Rotterdam, Burney, vol. ii. p. 193. (supposing 46° should be 42° S.)

† I mention this to show that the accent, or stress, was then upon the second syllable of that name, not upon the third. The name Chilóe is derived from Chilue, or, more strictly speaking, from Chili-hue (see Agüeros and Molina), which means 'farther,' or 'new,' or 'the end of' Chili, and ought, by derivation, to have the accent, as Agüeros placed it, on the o. No reason can be given by a Spaniard for placing an accent on the final e of that word, yet it is almost generally placed there. My own idea is that the French traders to Chile in 1700—1780, first placed an accent on the e in writing, and that Feuillée, Frezier, and others have been followed without inquiry. Had not the stress been laid on the o, surely the natives of Chiloe would have been called Chiloetes, or Chiloenos, instead of Chilotes. As to the name Chile, every one knows it is derived from the Indian word Chili, (Herrera, Ovalle, Agüeros, Molina, &c.) but why it was altered by the Spaniards to Chile, I have never been able to discover.

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manding positions and outer points, such as Cocotue heights, Guabun Head, and Point Centinela; but at the present time no such precautions being thought necessary, there is a supine indifference to molestation.

Wherever Mr. Sulivan went with our boats, nearly all the Indians showed an anxiety for the island to be again under the dominion of Old Spain, and asserted that they were much happier and more prosperous before the revolution than they had ever been since. In a place where he passed two days (Huildad) there was an unusual difficulty in obtaining provisions, and it was accounted for by the natives in the following manner: the proprietor of the tithes had just been there, and had taken from them, in sheep and pigs, the full tenth, not only of those animals, but of the growing crops of corn, apples, and potatoes. He had taken away all that the poor people could be deprived of, excepting only what was absolutely necessary as stock for next year's supply.

Lieut. Sulivan says, in his journal:—"Besides the tithes, they have also to give 'first fruits' to the priests, and so hard are they on their parishioners, with respect to tithes and first fruits, that whether the yearly produce be bad or good, the same quantity must be contributed to swell the revenue of a person whom they seldom see, except at the times of collection."

This oppression, however, is not allowed by the superiors of the Church, when it is duly represented and proved: for not long ago a curate was dismissed from his parish in Chiloé, because he was a severe extortioner: I was informed that during five years that man had amassed more than thirty thousand dollars.* Some of the natives complained bitterly to Lieut. Sulivan of the task-work they were compelled to perform.

At Lemuy he met a small piragua with only three men in it, who were on their way from Castro to Quelan. They had walked across the island from San Carlos where they had been working at the new mole, which all the 'militia'† were obliged

* The number stated to me was 35,000.

† Every able-bodied native man is enrolled in the local militia, and obliged to work thus till disabled by infirmity.

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to do in turn, each man a fortnight: part of which time was allowed for the journey. These three had worked eight days, finding themselves in everything and receiving no pay; two were old men: one more than sixty years of age; and the third was the oldest man's son. They all declaimed against the so-called 'Patriots' (Chilians) very vehemently, and asked repeatedly when they might hope to see the Spanish flag hoisted again. The old man had been a cacique, and under the Spanish authority had charge of a watch-house and a small party of men, on Point Centinela: but directly the Spaniards were overthrown he was made a private militia-man—"not to fight," he said, "but to work." If any public work was in progress, a party of militia-men were ordered to it, in their respective turns: and if the commandant had a friend to oblige, who wanted a job done, he would order a man to work at it for a week, when another would take his place, and so on. For these services no pay was given. The old man said that they were paid in money for every service performed when under the Spaniards; and he could hardly be made to believe that there was no prospect of their returning.

There is a marked difference of climate between the east and west sides of Chilóe, as to quantity of rain and wind. A proportion of both appears to be arrested (as it were) on the windward side of the heights, so that the neighbourhood of Castro and the islands in the Gulf of Ancud, enjoy much finer weather than is met with about San Carlos. But even there the inhabitants say a change has taken place gradually, and that they have not now nearly so much rain as used to fall formerly. They attribute this to the wood being cleared away, not only on Chilóe itself, but on the neighbouring Cordillera. There is an idea prevalent in Chilóe that, after a great eruption of Osorno in particular, or indeed of any of the neighbouring volcanoes, fine weather is sure to follow. Without denying the possibility of some such correspondence, I should incline to think that there have been accidental coincidences; and that fine weather occurring about or soon after those times, has been more remarked than at other periods.

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On the little uninhabited island, Chiut, in the middle of Ancud Gulf, Mr. Sulivan found a great number of wild strawberries: they were not very good, being unripe. Near the islands beyond Chiut (called Desertas), on the shore of the main-land, he saw several piraguas stranded, evidently during a late gale, as their crews were engaged in repairing them on the beach.

In the island Alau, Lieut. Sulivan met an old native, about 112 years of age; who had great-grandchildren about him, from twelve to fourteen years old. His eyesight and intellectual faculties were still good, and he walked firmly. From the inhabitants of Alau, Mr. Sulivan heard that an English armed brig, accompanied by a Spanish vessel of war, had anchored at that island about seventy years before 1835 (1765). Our boats visited Calbuco, and happening to arrive during the time of Mass, found nobody stirring. At last one man came out of church—ran back instantly—as if to tell the news, and immediately hundreds came pouring out to see the strangers.

Calbuco, called also El Fuerte, is much superior to Castro in appearance as well as size. It ranks next to San Carlos, in consequence to the Chilotes. Near here it was that friendly Indians helping the distressed inhabitants of Osorno to escape from the Araucanians (1599-1605), raised a cry of Calbu-co (blue water), when, emerging from the woodland, they caught a glimpse of the sea.

Our party examined places on the east coast of Chiloé, where docks might be constructed, or vessels laid ashore with much facility, as the tide rises from fifteen to twenty-five feet in several land-locked coves where the swell of the ocean never penetrates.

Round Chiloé the flood tide-streams run both ways, from the south-west; and meet in the north-west part of Ancud Gulf; the times of syzygial high water, in all the archipelago, vary only from noon to an hour and half after noon. In December and January our boat expedition found that the night tides were always higher than those of the day, and the inhabitants said that was always the case in summer. In the months of July and

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August 1829 the day tides were higher than the night, I am quite certain; and an old Biscayan, resident near point Arena, told me that they were always so in winter: hence we may conclude they are regularly higher at that time of year.

I refrain from entering here into many very interesting customs of the Huilli-che, because they are almost the same as those of the Araucanian Indians, about whom so much has been sung or said by Ercilla, Molina, and others, because my pages are limited, there being still information of a newer character to be written; but I would ask the reader, who may feel interested about the migrations of our race, to compare such customs with those of the Polynesian islanders, especially that of the 'Minga,' and making 'Cava.'*

The superstitious ideas, arising out of a debased Romish doctrine, have not deprived the Huilli-che of their belief in witchcraft, a belief held in common with all ignorant nations. Mr. Douglas, in his MS. Journal, says:—"No Chilote doubts the existence of wizards (bruxos). When I was a magistrate, a complaint was made to me of a young woman who, they asserted, had tried to bewitch a young man. The witnesses stated that she had bought from a professed witch (bruxa) a charm (llapui), which was produced in evidence. It consisted of a piece of loadstone, with iron filings adhering to it; some fish-scales; some hair and soap suds, proved to have been on the young man's face, and sold by the barber; some parings of his nails; a small dead lizard; some slips of a peculiar tree; and many other ingredients. With this charm, with two prepared apples, and a bottle half full of a liquid mixed by the witch, she proposed to win the young man's affections to such a degree that he would give her all his property. The liquid appeared to be a decoction of the deadly nightshade, and some poisonous ferns. The witnesses stated also, that this witch had a lantern made of the skin of a still-born child, which she lighted with a candle that burned with a blue flame; and gave

* The Minga is described in Molina, and Spanish authors. For an excellent discussion respecting the Cava, see Burney—Brouwer's Voyage, 1643, vol iii. p. 137, 8, 9.

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out sparks, when the witch flew through the air from place to place.

"I have been informed," continues Mr. Douglas, "upon indisputable authority, that such lanterns do exist; and that when two or more witches wish to communicate by signal, one of them ties a lantern to a long pole, and throws it up and down very quickly, making the sparks fly. The other then makes similar use of her lantern, at a considerable distance, and those who casually see the lights, think that a witch has flown from one place to the other. The magical art of the wizard is often exercised in a search for hidden treasure. There are some places where, in a dark night, inflammable gas, or phosphoric light, is seen, near the ground, not like a Will-o'-th'-wisp of Europe, but a clear steady light, of a white, yellow, or red colour. Popular superstition ascribes these lights to the ghosts of departed misers, watching their hidden treasure; and when one is discovered by any person, he calls a friend to assist him and watch it, about the time of new moon, until they ascertain the spot whence it proceeds; and there they dig in search of an anticipated heap of gold or silver. Not succeeding (of course), they apply to a wizard, who pretends to discover where the treasure lies, and what it is, by looking earnestly into a smooth slab of black stone (which I suppose to be basalt). The wizard may not himself find the prize, nor may he be present at the search; but, after telling the people where and when to dig, he takes good care to alarm and frighten them away in some strange manner, just at the moment they expect to grasp the store of gold. Among other devices, the wizard, or witch, pretends to cover a worsted thread with quicksilver, and holding it over the supposed place, allows the quicksilver to run off into the ground, and then he desires them to dig till they find the quicksilver, thus affording time for creating some sudden alarm, which they attribute to the 'devoto,' or familiar spirit of the deceased. It is believed by some that I am able to discover hidden treasure, and for my amusement I have more than once made an experiment before them, by sticking up two stakes in a line towards the light; then going a quarter of a circle

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round it, I stuck up two more stakes, also in a line towards it; and next day followed the lines to their crossing, at which spot I dug, and about two feet underground found a decayed tree." (Whence a gaseous exhalation?)

Mr. Douglas's account of the life of an industrious Calbucano* is interesting. He says, that those who are called 'hombres de bien' (honest men) are generally the sons of worthy parents, and who marry, while young, some hard-working sober woman. Such a pair, as one of these men and his wife, sow some corn and plant potatoes, then leave the land, with their house, in the care of an old relation, and go to the Cordillera to work in an astillero.† If their luck is good, that is, if they find plenty of fine, straight grained trees, not farther than usual from the sea,‡ this pair will cut and bring down five hundred boards in a month; then returning home they clean the potato grounds, and attend to domestic affairs, until their feet heal, and a paralytic motion of the legs, acquired in the astillero, has ceased. When quite refreshed they go for another cargo, and work till their legs and feet can stand it no longer. A third trip is afterwards made by the husband, for about a fortnight, to a nearer astillero, where he cuts pieces of timber and plank of as large a size as he can carry (tablones y cuartones), then returns to collect his harvest, make chicha, and sow corn for next year. The winter months are passed in comparative inactivity, but not without due consumption of cider and potatoes. Occasionally the Calbucano goes to San Carlos, to sell, or rather barter his boards for indigo, tobacco, red pepper, clothes, axes, spirits, &c.; and on these occasions, as well as when they go from Calbuco to the continent, several unite together to man a piragua, in the manner described by Captain King, vol. i, p. 285-6.

Directly his children are able to walk a few miles, he takes them with him to the astillero; begins by giving them two half-boards to carry, and as they grow stronger, increases their

* Native of Calbuco.

† A timber-yard: or a place where alerse is cut down, on the flanks of the Cordillera of the Andes. ‡ From three to five miles.

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load. At about sixteen they borrow an axe, and make the boards they afterwards carry. The alerse forests are like mines to the Calbucano; and nothing but old age or accident can check him from making boards after he has had one season of good luck. The profitable parts of the forests are now, of course, much farther from the sea than they were, owing to constant thinning. To get a load of twenty boards twice as much labour is therefore required as was necessary for a similar purpose thirty years ago. The largest alerse tree that has been found by any Calbucano during the last forty years, measured thirty feet in girth, at five feet from the ground; and more than seventy-six feet to the first branches. This famous tree gave eight lengths of boards and half a length. The two largest trees seen by Mr. Douglas, in his excursion for me, measured one twenty-four, and the other twenty-two feet round, at five feet from the ground: but these were dead trees, hollow in the centre. He saw none above ten feet in circumference, that were quite sound. Report, however, says, that in the Cordillera, out of reach of the Calbuco woodsmen, there are enormous trees, from thirty to forty feet in girth, and from eighty to ninety feet in height to the first branches, above which the heads of those giant trees are said to rise some forty or fifty feet. The alerse has short, stout branches, with leaves like those of a pine, in their bluish green colour, but shorter, being only half an inch long, and one-twentieth of an inch wide: on one stem there are four rows of these small leaves, at opposite sides.

Captain King has fully described the alerse (vol. i, p. 282-3), and the manner of making the boards. I will add a few notices of the way in which it is obtained.

In carrying his load along many miles of bad road from an 'astillero,' to the nearest water conveyance, the Calbucano wears a sheep-skin on his shoulders, under a woollen shirt, and taking a stick, with its lower end forked,* he trudges along

* To steady him across bridges of single trees, thrown over ravines, as well as to assist in supporting the load. Sometimes they climb up or down precipices with their loads, by a fallen tree, notched to receive the feet.

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with the load on one shoulder, and on the other the stick, which partly supports the weight till one shoulder is tired; he then shifts the burthen to the other, and goes on. This half rest is called 'cantuntun.' After eight, ten, or twelve of these, according to his strength, and the road, he casts down the load, and rests about ten minutes. This is his 'descanso;' and he makes about one such every two or three miles. The astillero of Melipulli is ten 'descansos,' a whole day's journey, from the place of embarkation. In examining the different forests of alerse, Mr. Douglas saw some immense land-slips (quechi), one of which was said to have brought down one thousand alerses, some of them being five fathoms round near the roots. This land-slip measured seven hundred yards in length and three hundred yards in width.

Mr. Douglas finds much fault with the manner in which the Chilotes associate for a voyage, or any joint undertaking. He says, "their voyages being planned like a commonwealth, it follows that their government on board must be republican, and the consequence is that every thing is decided by most votes and most noise." He also complains of their extreme selfishness, and of their reluctance to do any thing, however trifling, for a neighbour, unless for a consideration; another evil consequence of democratic inclinations.

When Moraleda was about Chiloé he went across the cordillera to the lake Nahuel-huapi, in quest of information relative to the 'Cesares;' but he could hear nothing positive about any such city or people, from the Indians whom he met near that lake—well known to the Spaniards as a jesuit missionary station. Mr. Douglas's father-in-law* once commanded a party sent from Chiloé to look for this reported city of 'Cesares.'† He got over and beyond the Cordillera to an elevated plain, where he saw a very large number of Indian huts (toldos), placed so as to form regular streets. Near them were large droves of horses and cattle, and small patches of culti-

* A Spaniard of Castile.

† Don Pedro de Angelis, of Buenos Ayres, has collected and published a great number of documents relating to the 'Cesares.'

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vated ground: but he had no time to make further remarks, for his party was discovered, vigorously attacked and driven back, with loss, to the sea. The old man said the climate and soil of that plain were better than those of Chilóe: and, as a proof of it, he found Indian corn with from five to nine large heads, though in Chilóe the same kind of plant only bears from one to three small heads.

A few of the remarks relative to Chilóe, contained in the preceding pages, arose out of an excursion made by me, in 1829, among the neighbouring islands: and many of the other notices mentioned by Captain King (vol. i.) or myself, and given in the narrative as they were received from our associates, were corroborated by what I then witnessed. The excursion alluded to was undertaken in consequence of two carpenters belonging to the Beagle being enticed to desert by a Roman Catholic priest named Forastes, who not only afforded them the means of travelling to Castro and Lemuy, but hid them on his own premises afterwards; and, when he heard that I was seeking for them among the islands, sent them across the gulf of Ancud, in a piragua, to remain in a cove near the Corcovado until the search should be over. One of these men was not worth taking trouble about; but the other was a man who had borne a high character, and had a wife and children in England depending upon him for support. I was satisfied that this man (Wells) had not deserted until overcome by extraordinary temptation and the evil advice of his companion, and determined to do my utmost to recover him. He had pay due for several years' service, and his 'servitude time'* was considerable.

I despatched Mr. Kirke overland to Castro for intelligence; and set out in a light whale-boat, with five men, all as eager as I was myself to rescue their shipmate from the deceitful allurements of Padre Forastes. As a carpenter, also, every one was well aware, that his recovery was of much consequence to our small vessel, in a place where we could not obtain a substitute.

* For the pension granted to seamen in the Royal Navy after twenty-one years' servitude.

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While visiting various islands I was much struck by the good order and cheerful alertness of several schools of boys, and by the apparent respectability of their teachers: and I was informed that these schools were much fostered by General Aldunate and his worthy secretary, Forelius (a Swede).

Nothing could be more pleasing than the appearance of the islands; all highly cultivated, and thickly peopled by a quiet race of men, apparently industrious, certainly most obliging and hospitable.

At Lemuy I heard that the fugitives had just left Chelin and Quehuy, in a piragua belonging to one Antonio Vargas, and were gone to the Cordillera, somewhere near the Corcovado, to kill seals and collect oil for him and Padre Forastes, until we should leave Chiloé, when they would return and work for the priest. This information cost me an ounce of gold, given to Vargas's own brother: and for six dollars, in advance, with a promise of more, I engaged a guide (vaqueano) to go with me to the main land. This man had no idea of moving by night; but, understanding clearly that the piragua was gone to an inlet under the Corcovado Mountain, I sailed at once across the gulf, steering by the light of the volcano, much to the terror of our vaqueano, who shrunk down to the bottom of the boat, drew his poncho over his head, and kept muttering prayers, sometimes to the Virgin and his 'devoto' (patron saint), sometimes to 'bruxos;' but never ventured to look up at the large sail, or watch the boat reeling through the waves, as she sailed across with a fresh westerly wind.

After a variety of petty difficulties and disappointments, and searching every inlet within twenty miles of the Corcovado, without finding a trace of the fugitives, I at last abandoned the pursuit and returned to San Carlos; having relanded our unhappy vaqueano, who, while close to the land, had been useful; but whom we had ruined, he often asserted, by obliging him to promise away all his property in masses, in offerings to saints, and in presents to 'bruxos' for his safe deliverance from such continual peril. After hearing such a melancholy statement of his prospects, I added a present to his earnings, which

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he assured me would amply satisfy both 'bruxos' and 'devotos,' and left him, notwithstanding his temporary fears, a happy man.

In 1834 I learned that we had actually been within a boat's length of the deserters on one occasion, and that they had made up their minds to yield unconditionally. They were hidden in some thick bushes on the borders of an inlet* under the Corcovado, and their piragua was hauled up behind a rock, out of immediate observation.

It is now high time to quit Chiloé, and proceed along the coast northward: but before I do so, let me take advantage of this opportunity to express the gratitude of those with me, as well as of myself, for a succession of private assistance and sincere kindness experienced from many persons at San Carlos, whose names I refrain from mentioning, because I have a great dislike even to the idea of publishing any thing that occurs in the unreserved intercourse of friends.

* Palbitad, or Almangrande.

Extraordinary meteoric appearances have occasionally been noticed about Chiloé, and the islands southward of it. In describing the Carelmapu earthquake, of 1633, Agüeros says that torrents of rain followed; and that on a high hill near the town was seen a globe of fire, which rose for a short interval, and then fell into the sea: the waters of which were in consequence much disturbed. A violent tempest ensued, with hail larger than musket-balls.

Another remarkable earthquake happened thereabouts on the 23d—24th of December, 1737: and on the 30th, in the early part of the evening, a great exhalation or cloud of fire was seen passing, from north to south, over all the archipelago. It fell on the Huayteca islands, covered them with ashes, and burned up the vegetation to such a degree that it was only in 1750, that the islands began again to look green.—Agüeros, pp. 102, 104, 105.

In Sarmiento's voyage an appearance of a similar nature is mentioned, as having been seen near the Strait of Magalhaens: (Viage al Estrecho de Magallanes, p. 205).—Other authorities might be quoted.

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CHAPTER XVIII.

Leave Chilóe — Valdivia — Earthquake — Aborigines — Traditions — Words—Convicts—Tolten — Boroa — Imperial—Mocha—Shocks of Earthquake—Anchor off Talcahuano — Ruins—Account of a great Earthquake which destroyed the city of Concepcion: and was felt from Chilóe to Copiapó; from Juan Fernandes to Mendoza.

At daylight on the 5th of February the Beagle sailed from Chilóe, and passed along the coast of southern Chile, towards the port of Valdivia. This is a bold and high tract of land, without a danger for shipping to avoid; but, at the same time, without a safe anchorage between the ports above-mentioned. Soundings extend some miles into the offing, though the water is deep. At two miles westward of this shore we usually found about forty fathoms water; at three miles about sixty, and at five miles from seventy to eighty or ninety fathoms, with a soft, sandy, or muddy bottom.

Whenever, as in this case, we were obliged to carry on the survey without landing, our observations for latitude—often those for time also—were made at the opposite points of the horizon, as well as in the usual manner, when land did not intervene, and the mean results taken as the most correct. In this way, it is probable that errors occasioned by refraction were in a considerable degree avoided.*

The day before arriving at Valdivia we had a strong northerly wind, with cold, rainy weather, though the glasses were high. Such an anomaly I have elsewhere noticed, especially in Tierra del Fuego; but any attempt to explain it must be deferred. Another singularity was the temperature of the

* We had three sextants, made for me by Worthington, which had additional horizon glasses, enabling them to measure any angle less than 160°. The contrivance was my own, and found to answer. It is described in the Appendix.

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ocean, not being higher than that near the Chonos Archipelago, and very little warmer than that of Magalhaens Strait: this fact will also be recurred to again.

Feb. 8th. We anchored in the deceiving port of Valdivia. I say deceiving, because it offers to the eye ample space and the utmost security, while, in fact, the safe anchorage is very limited; so much mud and sand being brought down by the river that extensive banks are formed, and increase yearly. We were struck by the apparent strength of the fortresses, built originally by the Dutch in 1643, but improved and increased by the Spaniards. Now, however, their strength is but apparent; for a closer inspection shows that they are almost in ruins and the guns out of order; indeed so nearly disabled, that they could hardly fire a salute without danger. Around the port are high hills, completely covered with wood; and they attract clouds so much, that almost as great a quantity of rain falls there as on the western shores of Chiloé. Several rivers empty themselves at this one mouth, which is the only opening among hills that form a barrier between the ocean and an extensive tract of champaign country,* reaching to the Cordillera of the Andes. The principal of these rivers are the Calla-calla† and the Cruces; their tributaries are very numerous, few countries being better watered by running streams than that about Valdivia.

Every facility and kindness in his power was offered to us by Don Isaac Thompson, the Yntendente:—and by his secretary, Don Francisco Solano Perez, I was presented with a rare edition of Febrés's 'Arte de la Lengua Chilena,' which has been of much use in explaining the meaning of aboriginal words and names. Don Francisco wished me to take another curious work, but I declined; and have often regretted since that I did not ask him to let me copy a map in it which contained the tracks of Spanish missionaries from Castro in Chiloé to the lake of San Rafael, isthmus of Ofqui, and archipelago of islands in latitude

* Called "Los Llanos," or the plains.

† On which is the town of Valdivia.

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48-9° S. I thought another copy might be found at Lima, but during my subsequent stay there, not one could be discovered.

The town of Valdivia, formerly dignified by the appellation of city, disappointed our party extremely. It proved to be no more than a straggling village of wooden houses, surrounded with apple-trees; and the only building, even partially constructed of stone, was a church.* Many of us were in the town on the 20th of February, at the time of that great earthquake, which ruined so many places besides the city of Concepcion: an awful event, which will be related in the following pages.

An English carpenter, who had served on board the Beagle, in 1828, but had since settled on the banks of the river Cruces, about thirty miles from Valdivia, came on board his old ship one day, to see those whom he knew. It happened that I had formerly been of some assistance to him, and he was naturally glad to oblige me, by giving such information about the country and the natives as he was able to impart; and having lived nearly four years among them, his accounts were not only interesting, but, I think, worthy of credence.† As some of these were confirmed by what I heard from residents at Valdivia, and I have no doubt of their truth, I shall mention them without hesitation in the course of my narrative.

I was much struck by the peculiar physiognomy of those aboriginal natives whom I saw during my stay: and there must have been some ground for Mr. Darwin and myself remarking at different times, unknown at first to one another, that their countenances reminded us of portraits of Charles I. This was my impression at the first glance; but after closer examination it wore off, and I thought less of that likeness than I did of their resemblance to the Hindoo race. There was neither the open honesty of a Patagonian, nor the brutal look of most Fuegians; but there was a sombre cast of depressed

* That church and other edifices have since been laid in ruins by the violent earthquake of Nov. 7, 1837.

† He was a very intelligent, observing man, and a good workman: while belonging to the Beagle, he was rated carpenter's mate.

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TOWN SEEN ACROSS THE RIVER.

OLD LOOK-OUT TOWER.

VALDIVIA.

Published by Henry Colburn, Great Marlborough Street, 1839.

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intelligence that at once said, " we are restrained, but not subdued." Their countenances were less wide, and more swarthy, than those to which our eyes had been accustomed; and they eyed us with a sinister although resolute glance, which seemed to ask whether we were also come to try for a share of their country. These men were of a middle stature; and formed more slightly than those of the south. They were all tolerably clothed in blue cloth of their own manufacture; and the men of different tribes were distinguished by a slight difference in dress; the Juncos, who live south of Valdivia, wearing a sort of petticoat, instead of trowsers, while the Rancos, another subdivision, wore short loose breeches. In other respects they are similar, as to outward appearance, and their language is that of all southern Chile.* These Juncos and Rancos are but portions of that collection of tribes usually known among Europeans by the celebrated name of Araucanians; but among the natives, by the terms Molu-che, Huilli-che, &c. I certainly gazed at these Indians with excessive interest, while I reflected on the multiplied sufferings undergone by their ancestors—the numbers that perished in mines—or in trying to defend their country—and the insidious attempts made to thin their numbers by frequent intoxication, if not by introducing deadly disease.†

To keep these Indians on peaceable terms, and in order to have early intelligence of any general combination, the Chilians maintain among them 'capitanes de los amigos,' whose apparent office is to take the part of an Indian, if he should be ill-treated by a Chilian (of Spanish descent), and to interpret between parties who wish to barter goods. There is also a 'comisario de los Indios,' who is a centre of reference for the 'capitanes,' and who ought to be the friend and protector of the aborigines. Many tribes, however, will have nothing to say to either the commissary or his captains, seeing through their object, and detesting even the descendant of a Spaniard too deeply to admit any one of that abhorred race into their territory. About Valdivia there are only a few leagues of ground held by Chile, excepting which all that magnificent

* The Huilli-che. † By giving them infected things.

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tract of country, reaching from the Gulf of Ancud nearly to the river Bio-Bio, probably the finest district in all South America, is still kept by the brave Araucanians.

These Indians are extremely superstitious, but in their rites there are curious customs, perhaps indicative of their origin. About Valdivia, whenever an aboriginal and heathen native dies, he is buried in a small canoe, with a scanty supply of provisions and chicha,* on the bank of a river which flows to the sea. Their idea is that the spirit goes by water to that place, in the direction of the setting sun, whence their remote ancestors came. Febrés says, in his work before mentioned, that the island Mocha is the place meant: but if we reflect that Mocha is very small, only twenty miles from the mainland, and that when first discovered, early in the sixteenth century, it was inhabited by Indians who often crossed over to the continent, I think we must look much farther west for the place of departed souls to which these people refer.

The aborigines who live near volcanoes offer propitiatory sacrifices to the evil spirit, Pillan, who is said to cause earthquakes and eruptions. They sacrifice bulls and rams to him, besides offering fruit, vegetables, and chicha. On a mountain called Theghin, or Theg-theghin, (which means to crackle or sparkle like fire), these people say that their early progenitors escaped from the Deluge. There is a word in common use among them, meaning 'the great ancestor,' or 'our great ancestors,' or 'the renowned,' which is hardly to be distinguished from Shem. Febrés spells it 'Them,' but, as the th is frequently pronounced, it would sound like chem.† Can this be handed down from their ancestor of the Ark ?‡

Another word that attracted my notice particularly, was 'minga.' I have a note by me (unfortunately without the proper reference) remarking the resemblance of minga, not

* Fermented liquor made from maize, apples, or other substances.

† Molina, Hist. Civil de Chile. Vol. ii. p. 333. Falkner says that the Vuta Huilliche substitute t for ch, p. 99.

‡ I am informed by Doctor Andrew Smith, that the word Ham is still common among the nations of southern Africa, as a distinguishing appellation,

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only in sound but in meaning, to the Hebrew word mincha. Molina (p. 333) says that these people have a nasal g, which brings the two words to an identity of sound. The Hebrew term, I am told, means an offering or collection of fruits, liquors, &c.; and the corresponding Huilli-che word means a a feast of which those partake who are about to unite in a work for the benefit of him who makes the 'minga.' In the Appendix a few Greek, Latin, and Araucanian words are arranged so as to show the remarkable similarity existing between them.

I was told by the Yntendente that some Englishmen had arrived in his district a few months before we came, whose character and business he did not understand. Rumours had reached his ears of their having escaped from one of our convict settlements, at the other side of the Pacific, and he was inclined to believe the report. Three of these men had married since their arrival, and all but one were industrious members of his community: indeed I saw two of them hard at work on a boat belonging to the Yntendente. Having however no proof of their delinquency, I did not deem myself authorized to ask him to have them arrested and delivered up to me, in order that I might convey them to the senior British officer at Valparaiso. Afterwards I learned that these men, seven or eight in number, had escaped from Van Diemen's land in a very small vessel, and sailing always eastward, had at last arrived on the coast near Valdivia, whence they were conducted by a fisherman into the port. Eventually they were made prisoners by the Chilian authorities, delivered up to our Commodore, and by him sent to England.

I was informed that there is coal in many places about Valdivia; but I did not see any. We sailed on the 22d, after receiving, on all occasions, the kindest treatment from the residents.

As we passed along the low coast about the river Tolten, numbers of Indians on horseback, and armed with lances, were seen riding along the shore, evidently watching our movements. This part of the coast is shoal, and at night would

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be dangerous, for the low land projects considerably, and would not then be readily seen. We could not distinguish the mouths of either the Tolten or the Imperial (or Cauten) quite satisfactorily, but as they are bar rivers—useless to shipping—I would not risk anchoring on so exposed a coast, or sending a boat away into such a surf as we saw breaking, without having more time at my disposal and a higher object in view.

On the Cauten was the city called Imperial—celebrated in Araucanian story—and near its site now live the Boroa tribe, some of whom have light-coloured eyes, fair complexions, and even red hair. I saw one of these Indians at Valdivia, who had blue eyes, but dark hair. She told me that in her own country, 'Boroa,' there were many with eyes like her's; that some were 'rubios,' that is, of a red and white complexion, and that a few had red hair. Her parents had told her, she said, that those people were descended from the 'Huincas.'* How the red hair originated is rather curious; I have heard of it from good authorities at other times, while in Chile.

Late on the 24th we anchored at Mocha, and the following week was occupied in surveying its shores and the space between them and the mainland.† Shocks of earthquakes were frequently felt, more or less severely; sometimes I thought that the anchor had been accidentally let go, and the chain was running out; and while at anchor, I often fancied the ship was driving, till I saw that there was neither swell, current, nor wind sufficient to move her from the anchorage. We naturally concluded that some strange convulsion was working, and anxious for the fate of Concepcion, hastened to Talcahuano Bay as soon as our duty would allow: arriving there on the 4th of March—to our dismay—we saw ruins in every direction.

The following account of this catastrophe was subsequently obtained:—

At ten in the morning of the 20th of February, very large flights of sea-fowl were noticed, passing over the city of Con-

* An Araucanian name for the Spaniards, signifying assassins.

† I shall recur to Mocha again.

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cepcion, from the sea-coast, towards the interior: and in the minds of old inhabitants, well acquainted with the climate of Concepcion, some surprise was excited by so unusual and simultaneous a change in the habits of those birds,* no signs of an approaching storm being visible, nor any expected at that season. About eleven, the southerly breeze† freshened up as usual—the sky was clear, and almost cloudless. At forty minutes after eleven,‡ a shock of an earthquake was felt, slightly at first, but increasing rapidly. During the first half minute, many persons remained in their houses; but then the convulsive movements were so strong, that the alarm became general, and they all rushed into open spaces for safety. The horrid motion increased; people could hardly stand; buildings waved and tottered—suddenly an awful overpowering shock caused universal destruction—and in less than six seconds the city was in ruins. The stunning noise of falling houses; the horrible cracking of the earth, which opened and shut rapidly and repeatedly in numerous places;§ the desperate heart-rending outcries of the people; the stifling heat; the blinding, smothering clouds of dust; the utter helplessness and confusion; and the extreme horror and alarm, can neither be described nor fully imagined.

This fatal convulsion took place about a minute and a half or two minutes after the first shock; and it lasted for nearly two minutes, with equal violence. During this time no one could stand unsupported; people clung to each other, to trees, or to posts. Some threw themselves on the ground; but there the motion was so violent that they were obliged to stretch out their arms on each side, to prevent being tossed over and over. The poultry flew about screaming wildly. Horses and other animals were greatly frightened, standing with their legs spread out, and their heads down, trembling excessively.

After the most violent shock ceased, the clouds of dust which

* Chiefly gulls. † Sea-breeze.

‡ Mean time. Equation=14 m. subtractive from mean time.

§ The direction of these cracks was not uniform, though generally south-east and north-west.

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had been raised by falling buildings, began to disperse; people breathed more freely, and dared to look around them. Ghastly and sepulchral was the sight. Had the graves opened and given up their dead, their appearance could scarcely have been more shocking. Pale and trembling, covered with dust and perspiration, they ran from place to place, calling for relations and friends; and many seemed to be quite bereft of reason.

Considerable shocks continued to harass and alarm at short intervals. The earth was never long quiet during that or the next day, nor indeed for the three days following the great shock; and during many hours after the ruin, it was tremulous, and the shocks were very frequent, though not severe. Many of these, but not all, were preceded by a rumbling, subterranean noise, like distant thunder. Some compared the sound to the distant discharge of many pieces of artillery. These noises came from the south-west quarter, and preceded the shock by one or two seconds; sometimes, but not often, the sound was unaccompanied by any shock.

It was the general opinion that the motion was from south-west to north-east. Some whole walls, whose direction was south-east and north-west, were laid flat, the bricks still maintaining their relative position, though end-wise, without being scattered upon the ground. These walls fell, without exception, to the north-east.* Others were scattered as they fell; but still the greatest masses of brick-work were thrown towards the north-east. Walls standing in the opposite direction, north-east and south-west, suffered far less: none fell bodily or in masses; fragments were shaken or torn off; and some of the walls were very much cracked,† but others suffered little. Houses built of 'adobes,'‡ became confused heaps, and roofs fell in every where. The cathedral, whose walls were four feet in thickness, supported by great buttresses, and built of good brick and mortar,§ suffered more than other buildings. Ad-

* The streets of Concepcion lie north-east and south-west: north-west and south-east.

† Vertically, as if by the undulatory movement of the earth's surface in the direction of their length. ‡ Large unbaked bricks.

§ Both bricks and mortar were excellent.

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REMAINS OF THE CATHEDRAL AT CONCEPCION.

RUINED BY THE GREAT EARTHQUAKE OF 1835.

Published by Henry Colburn, Great Marlborough Street 1839.

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hering to the remains of the walls were left the lower parts of some buttresses—the upper parts of others—while in one place a buttress stood on its own foundation, separated entirely from the wall.

The city of Concepcion stands upon a plain, very little higher than the level of the river Bio Bio. The soil is loose and alluvial. To the eastward and northward lie rocky irregular hills: from the foot of which the loose earth was every where parted by the great convulsion, large cracks being left, from an inch to more than a foot in width. It seemed as if the low land had been separated from the hills, having been more disturbed by the shock.

Women washing in the river near Concepcion were startled by the sudden rise of the water—from their ankles to their knees—and at the same moment felt the beginning of the convulsion. It was said that the dogs avoided the ruin, by running away before it occurred. This, though known with certainty to have been the case at Talcahuano, wants confirmation with respect to Concepcion. Of nine men who were repairing the inside of a church, seven were killed, and two severely hurt. One of these poor fellows was half-buried in the ruins, during five days, with a dead body lying across him, through which it was necessary to cut, for his release. A mother, escaping with her children, saw one fall into a hole; a wall close to her was tottering; she pushed a piece of wood across the hole, and ran on; the wall fell, covering the hole with masses of brick-work; but, next day, the child was taken out unhurt. Another woman missed a child; saw that a high wall was tottering, but ran for her son, and brought him out. As she crossed the street, the wall fell, but they were safe; when the tremendous crash came, the whole street, which she had just crossed, was filled up with part of the ruins of the cathedral. Besides a waving or undulatory movement, vertical, horizontal, and circular or twisting motions were felt. An angular stone pinnacle was particularly noticed, which had been turned half round, without being thrown down, or leaving its base.

Persons riding at the time of the great shock, were stopped

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short; some, with their horses, were thrown to the ground: others dismounted, but could not stand. So little was the ground at rest after the great destruction, that between the 20th of February and the 4th of March, more than three hundred shocks were counted.

Much misery was alleviated by the good conduct and extreme hospitality of the inhabitants of Concepcion. Mutual assistance was every where rendered, and theft was almost unknown. The higher classes immediately set people to work, to build straw-covered huts and temporary houses of board, living meanwhile in the open air under trees. Those who soonest obtained or contrived shelter, collected as many about them as they could assist, and in a very few days all had a temporary shelter, under which they tried to laugh at their misfortunes and the shifts to which they were reduced.

At Talcahuano the great earthquake was felt as severely on the 20th February as in the city of Concepcion. It took place at the same time, and in a precisely similar manner: three houses only, upon a rocky foundation, escaped the fate of all those standing upon the loose sandy soil, which lies between the sea-beach and the hills. Nearly all the inhabitants escaped uninjured; but they had scarcely recovered from the sensations of the ruinous shocks, when an alarm was given that the sea was retiring! Penco* was not forgotten; apprehensive of an overwhelming wave, they hurried to the hills as fast as possible.

About half an hour after the shock, when the greater part of the population had reached the heights,—the sea having retired so much, that all the vessels at anchor, even those which had been lying in seven fathoms water, were aground, and every rock and shoal in the bay was visible,—an enormous wave was seen forcing its way through the western passage which separates Quiriquina Island from the mainland. This terrific swell passed rapidly along the western side of the Bay of Concepcion, sweeping the steep shores of every thing moveable within thirty feet (vertically) from high water-mark. It

* Penco, the first Spanish capital of the province of Concepcion, was overwhelmed by the sea in 1730: and old Concepcion in 1751.

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broke over, dashed along, and whirled about the shipping as if they had been light boats; overflowed the greater part of the town, and then rushed back with such a torrent that every moveable which the earthquake had not buried under heaps of ruins was carried out to sea. In a few minutes, the vessels were again aground, and a second great wave was seen approaching, with more noise and impetuosity than the first; but though this was more powerful, its effects were not so considerable—simply because there was less to destroy. Again the sea fell, dragging away quantities of woodwork and the lighter materials of houses, and leaving the shipping aground.

After some minutes of awful suspense, a third enormous swell was seen between Quiriquina and the mainland, apparently larger than either of the two former. Roaring as it dashed against every obstacle with irresistible force, it rushed—destroying and overwhelming—along the shore. Quickly retiring, as if spurned by the foot of the hills, the retreating wave dragged away such quantities of household effects, fences, furniture, and other moveables, that after the tumultuous rush was over, the sea appeared to be covered with wreck. Earth and water trembled: and exhaustion appeared to follow these mighty efforts.

Numbers of the inhabitants then hastened to the ruins, anxious to ascertain the extent of their losses, and to save some money, or a few valuable articles, which, having escaped the sweep of the sea, were exposed to depredators.*

During the remainder of the day, and the following night, the earth was not quiet many minutes at a time. Frequent, almost incessant tremors, occasional shocks more or less severe, and distant subterranean noises, kept every one in anxious suspense. Some thought the crisis had not arrived, and would not descend from the hills into the ruined town. Those who were searching among the ruins, started at every shock, however slight, and almost doubted that the sea was not actu-

* Thieves were numerous in Talcahuano. Directly after the ruin these scoundrels set to work—though crying 'Misericordia,' and with one hand beating their breast—with the other they stole most industriously.

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ally rushing in again to overwhelm them. Nearly all the inhabitants, excepting a few who went on board vessels in the harbour, passed the night upon the hills, without shelter: and next day they began to raise sheds and huts upon the high grounds, still dreading the sea. It was said, and generally considered certain, that every dog at Talcahuano had left the town before the shock, which ruined the buildings, was felt.

Without explanation it appears astonishing how the shipping escaped destruction. There were three large whale-ships, a bark, two brigs, and a schooner, very near the town, in from four to seven fathoms water: they were lying at single anchor,* with a good scope of cable :† one only was well moored.

With the southerly breeze, which was rather fresh at the time of the earthquake, these vessels lay to seaward‡ of their anchors, having their sterns towards the sea; and were left aground in this position. The captain of the port, D. Pablo Delano, was on board one of the whale ships at the time, with the hatches battened down, and dead lights shipped. All hands took to the rigging for safety. The first great wave came in an unbroken swell to the stern of the vessel, broke over and lifted her along without doing any material harm, more than sweeping her decks: and the slack chain dragging over the mud checked her gradually, as the first impetus of the wave diminished. Whirling her round, the water rushed out to seaward again, leaving the vessel stranded nearly in her former position. From two fathoms, when aground, the depth alongside increased to ten, as the water rose highest during the last swell. The two latter waves approached, and affected the shipping similarly to the former: all withstood their force, though the light anchors were dragged. Some of the vessels were thrown violently against others; and whirled around as if they had been in the vortex of a whirlpool. Previous to the rush of waters, the Paulina and Orion, two merchantmen, were

* Or steadied by a second anchor which was too light to withstand any great strain.

† Chain.—The holding-ground is excellent, a soft, tenacious mud.

‡ Nearly half a cable's length; or from sixty to one hundred yards.

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lying a full cable's length apart; and after it had passed they were side by side, with three round turns in their cables. Each vessel had therefore gone round the other with each wave: the bow of one was stove in: to the other little damage was done. A small vessel* was on the stocks, almost ready for launching; she was carried by the sea two hundred yards in-shore, and left there unhurt. A little schooner, at anchor before the town, slipped her cable, and ran out in the offing as the water fell. She met the wave, unbroken, and rose over it as an ordinary swell. The Colocolo† was under sail near the eastern entrance of the bay—she likewise met the wave, as a large swell, without inconvenience.

Many boats‡ put off from the shore before the sea retired: some met the advancing waves before they broke, and rose safely over them; others, half swamped, struggled through the breakers. The fate of one little boy was extraordinary. A servant woman had taken refuge with him in a boat; the boat was dashed against an anchor, lying on the shore, and divided. The woman was drowned, but the half of the boat containing the child§ was carried out into the bay. It floated, and the boy held firmly. He was picked up afterwards, sitting upright, holding steadily with both hands, wet and cold, but unhurt. The boy's name is Hodges: his father is an Englishman, well known at Talcahuano, and was an officer in the British navy.

For several days the sea was strewed with wreck; not only in the Bay of Concepcion, but outside, in the offing. The shores of Quiriquina Island were covered with broken furniture and wood work of all kinds; so much so, that for weeks afterwards, parties were constantly at work collecting and bringing back property. During three days succeeding that of the ruin the sea ebbed and flowed irregularly, and very frequently: rising and falling for some hours after the shock two or three times in an hour. Eastward of the island of Quiriquina the swell was neither so large nor so powerful as that

* About thirty tons.
† Chilian schooner of war.
‡ Chiefly, if not all, whaleboats.
§ Only four years old.

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which swept over Talcahuano. Having more room to expend its strength in the wider and deeper part of the bay may perhaps have been the reason why the sea swelled rapidly, without breaking, near Lirquen, in the south-east part of the bay; and why it broke over Tomé* with violence, though not so furiously as over Talcahuano. The great waves, coming from the sea, appear to have been divided, at the entrance of Concepcion Bay, by the island of Quiriquina, and turned aside both ways, one part taking its course along the Tumbes, or western shore, towards Talcahuano; the other across the eastern opening, towards Tomé. While the bay of Concepcion was agitated by the great waves, it was noticed by Captain Walford (from his house at Lirquen), that the Colocolo was swept to and fro remarkably. She was under sail near the eastern entrance of the bay. Two explosions, or eruptions, were witnessed while the waves were coming in. One in the offing, beyond the island of Quiriquina, was seen by Mr. Henry Burdon and his family, who were then embarked in a large boat, near Tomé; it appeared to be a dark column of smoke, in shape like a tower. Another rose in the middle of the bay of San Vicente, like the blowing of an immense imaginary whale: its disappearance was followed by a whirlpool which lasted some minutes: it was hollow, and tended to a point in the middle, as if the sea was pouring into a cavity of the earth. At the time of the ruin, and until after the great waves, the water in the bay appeared to be every where boiling; bubbles of air, or gas, were rapidly escaping; the water also became black, and exhaled a most disagreeable sulphureous smell. Dead fish were afterwards thrown ashore in quantities; they seemed to have been poisoned, or suffocated; and for days together the shores of the bay were covered with fine corvinos, and numerous small fish. Black stinking water burst up from the earth, in several places; and in Mr. Evans's yard, at Talcahuano, the ground swelled like a large bubble,

* Tomé is near the eastern entrance of the bay, where the wave would meet with more interruption than near Lirquen, though considerably less than in the western passage.

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then bursting, poured forth black, fetid, sulphureous water. Near Concepcion similar outbursts of water were seen, and similarly described.

By a marked part of the wall of Captain Delano's house, it was ascertained that the body of water reached twenty-five feet above the usual level of high water. It penetrated into the 'altos,'* and left sea-weed hanging to the remains of roofs, or to the tops of broken walls. But this must not be taken as the general height of the wave. A body of water, rushing upon a sloping beach with such force, would naturally preserve its impetus for some time, and run up the inclined plane, to a great height. Those who watched the waves coming in, considered them, while beyond the shipping, about as high as the upper part of the hull of a frigate; or from sixteen to twenty feet above the level of the rest of the water in the bay. Only those parts of the wave which encountered opposition broke, until within half a mile of the beach, when the roar became appalling. Persons who were standing on the heights, overlooking both bays, saw the sea come swelling into San Vicente at the same time that it advanced upon Talcahuano. The explosion in San Vicente, and the sea advancing from both sides, made them think that the peninsula of Tumbes was about to be separated from the main land, and many ran up the hills until they had reached the very highest point.

Strange extremes of injury and harmlessness were among the effects of these overwhelming waves. Buildings were levelled, heavy twenty-four pound guns were moved some yards, and upset; yet a child was carried to sea uninjured; and window-frames, with the glass in them, were thrown ashore upon the island of Quiriquina without a pane being broken! According to a register, kept by Captain Delano, it appears that his barometer fell four or five tenths of an inch between the seventeenth and eighteenth of February, and was still falling on the morning of the eighteenth, after which it rose again. So great† and

* First floor rooms.

† In Concepcion a fall of two or three tenths indicates bad weather; four or five tenths a gale of wind, with much rain.

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sudden a fall, not followed by bad weather, may have been connected with the cause of the earthquake; but some doubt hangs over these observations. The barometers on board the Beagle, at that time in Valdivia, did not indicate any change. Still, at so great a distance, it does not follow that the mercury should move similarly; and (notwithstanding doubts excited by persons at Concepcion who had frequently looked at Captain Delano's barometer,) I am hardly inclined to disbelieve the extract from his register which he gave me.

In a river near Lirquen, a woman was washing clothes at the time of the great shock. The water rose instantaneously, from her feet half way up her legs; and then subsided gradually to its usual level. It became very muddy at the same time. On the sea-beach the water swelled up to high-water mark, at the time of the shock, without having previously retired. It then began to retire, and continued falling about half an hour, before a great wave was seen approaching.

For some days after the devastation the sea did not rise to its usual marks, by four or five feet vertically. Some thought the land had been elevated, but the common and prevailing idea was, that the sea had retired. This alteration gradually diminished, till, in the middle of April, there was a difference of only two feet between the existing, and former high-water marks. The proof that the land had been raised exists in the fact, that the island of Santa Maria was upheaved some feet more than other places.

In going through the narrow passage which separates Quiriquina from Tumbes, the great waves had swept the steep shores to a height of thirty feet (vertically) above high-water mark; but this elevation was attained, in all probability, only at the sides of the passage, where the water met with more obstruction, and therefore washed up higher. That passage is nearly one mile in width, and has ten fathoms water in the middle; but the rocks on the western side diminish its navigable width to half a mile.

Wherever the invading waves found low land, the destruction was great, from those lands being in general well cultivated, and

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the site of many houses. The low grounds lying at the bottom of Concepcion Bay, particularly those of the Isla de los Reyes, were overflowed, and injured irreparably: quantities of cattle, horses, and sheep were lost. Similar effects, in an equal or less degree, were felt on the coasts between the river Itata, and Cape Rumena. Large masses of earth and stone, many thousand tons in weight, were detached from the cliffs, and precipitous sides of the hills. It was dangerous to go near the edge of a cliff, for numerous chasms, and cracks in every direction, showed how doubtful was the support. When walking on the shore, even at high-water, beds of dead muscles, numerous chitons and limpets, and withered sea-weed, still adhering, though lifeless, to the rocks on which they had lived, every where met the eye—proofs of the upheaval of the land.

Besides suffering from the effects of the earthquake and three invading waves, which, coming from the west round both points of the island, united to overflow the low ground near the village, Santa Maria was upheaved nine feet. It appeared that the southern extreme of the island was raised eight feet, the middle nine, and the northern end upwards of ten feet. The Beagle visited this island twice—at the end of March and in the beginning of April: at her first visit it was concluded, from the visible evidence of dead shell-fish, water-marks, and soundings, and from the verbal testimony of the inhabitants, that the land had been raised about eight feet. However, on returning to Concepcion, doubts were raised; and to settle the matter beyond dispute, one of the owners of the island, Don S. Palma, accompanied us the second time. An intelligent Hanoverian, whose occupation upon this island was sealing, and who had lived two years there and knew its shores thoroughly, was also passenger in the Beagle.

When we landed, the Hanoverian, whose name was Anthony Vogelborg, showed me a spot from which he used formerly to gather 'choros,'* by diving for them at low tide. At dead low water, standing upon the bed of 'choros,' and holding his hands up above his head, he could not reach the surface of the water:

* A large kind of muscle.

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his height is six feet. On that spot, when I was there, the 'choros' were barely covered at high spring-tide.

Riding round the island afterwards, with Don Salvador and Vogelborg, I took many measures in places where no mistake could be made. On large steep-sided rocks, where vertical measures could be correctly taken, beds of dead muscles were found ten feet above the recent high-water mark. A few inches only above what was then the spring-tide high-water mark, were putrid shell-fish and seaweed, which evidently had not been wetted since the upheaval of the land. One foot lower than the highest bed of muscles, a few limpets and chitons were adhering to the rock where they had grown. Two feet lower than the same muscles, chitons and limpets were abundant.

An extensive rocky flat lies around the northern parts of Santa Maria. Before the earthquake this was covered by the sea, some projecting rocks only showing themselves: after it, the whole surface was exposed; and square acres (or many quadras) of the rocky flat were covered with dead shell-fish, the stench arising from which was abominable. By this elevation of the land the southern port of Santa Maria was almost destroyed: there remained but little shelter, and very bad landing: the soundings having diminished a fathom and a half every where around the island.

At Tubul, to the south-east of Santa Maria, the land was raised six feet. The waves did not enter that river's mouth until about one o'clock; and then in greater number, but with less force, six or seven having been counted. Might not this be owing to the meeting of the divisions of the great wave which passed around Santa Maria.

At the island of Mocha the shock of the earthquake was so strong that people could not stand. The sea washed over the rocks at the end of the island, higher than it had ever reached in a heavy gale of wind. Anthony Vogelborg was on one of those rocks, or rather on an islet at the south end of Mocha, at the time, with a party who were sealing. Their boat was hauled up on the top of the rocky islet, and, expecting to be washed off, they held by it in readiness. The boat was lying

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nearly east and west. During the earthquake some water in her bottom ran as fast from one end of the boat to the other as if some one were quickly lifting one end off the ground and letting it down again. It did not wash from side to side at any time. Two forked sticks were stuck in the ground, about three yards apart; another lay across them for hanging things to dry. These sticks also were nearly east and west of one another: and during the shock they waved to and fro till the forks touched, and the cross stick fell. Strong shocks were felt by vessels under sail near Mocha; and between Mocha and Concepcion, the same was experienced by several vessels, not only on the 20th, but during following days.

At anchor off Mocha on the 24th, a shock was felt by me, which resembled the sudden dragging of the anchor over rocks. Under way on the 2d of March, it was thought that a chain-cable was running out at the hawse. In one vessel they supposed she had run ashore: on board of another, that the ship had passed over a whale. Vogelborg thought that the land had been upheaved about two feet; and from his accuracy in other matters, I am inclined to trust to his opinion.

At Valdivia the shock began gently, increased gradually during two minutes, was at its strongest about one minute, and then diminished. The motion was undulating and regular, like waves rolling from west to east, but strong; and it lasted nearly ten minutes. There was no difficulty in standing or walking, but the houses waved and cracked. The stone church tottered, but was not injured; its roof was very light. All the dwelling-houses being strongly built of wood, withstood the shock. Most people thought the motion was from south-west to north-east, but Mr. Darwin and a person with him at the time, thought the reverse.

The river increased, or rose, at the same time, and rapidly fell again to its former height. In the port the sea swelled suddenly upon the shore to high-water mark, though it was then nearly the time of low-water, and quickly fell again. Both sea and river rose and fell frequently during the remainder of the day. The river never fell below its usual height, neither did the sea retire

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beyond its proper place, at that time of tide; but each swelled from time to time and again sunk down. This happened once or twice in an hour. After the great convulsion, other slighter shocks occurred at intervals of a few minutes during an hour. In the afternoon, at about five, a smart shock was felt, which made the people run out of their houses.* One man and one woman were drowned by the sudden rise of the sea near Niebla: it was supposed that they were upon the rocks gathering shell-fish. Excepting in this instance, no injury was done at Valdivia. No noise preceded or accompanied any of the shocks.†

This great earthquake extended to the island of Chiloé, and probably still farther to the southward. The shock was there slight, but lasted during six or eight minutes; it was neither preceded nor followed by any subterranean noise. At about thirty-four minutes after eleven,‡ the beginning of the shock was felt. The motion was undulating and not strong. The swell of the sea was felt there, but I know not at what time. A man was going to leave the shore§ in his boat; he went a short distance to fetch something, and returning found the boat aground and immoveable: puzzled and vexed he went away, but had not gone many yards before his son called to him that it was afloat.

* Although built of wood.

† (Valdivia has since been ruined). "Valdivia, Nov. 7, de 1837.

"El gran terremoto que ha esperimentado este pueblo en la mañana de este dia, sin tocar los limites de la exajeracion, se puede asegurar sea el mayor de los hasta aqui acontecidos. Dió principio a las 8 y 5 minutos; y terminó a las 8 y quarto: advirtiendo que el movimiento de la tierra en este espacio de tiempo fué tan extraordinario que con dificultad podia un hombre sostenerse en pié. Continuó en seguida hasta las 9 y media con interrupcion solo de momentos, y desde esa hora hasta las 12 y tres cuartos que son actualmente se esperimentan los mismos movimientos, aunque no con igual fuerza. Las dos unicas iglesias que habia en este pueblo, y todos los edificios fiscales, se han arruinado completamente y si no les ha caido igual suerte a las demas casas de esta poblacion ha contribuido sin duda la circumstancia de ser ellas de madera, aunque por lo general han sufrido grande detrimento. "Isidro Vergara."

"Al Sr. Yntc. de la prov. de Concepcion, Dn. Manuel Búlnes."—Extracted from the 'Araucano' of Chile, Dec. 8, 1837.

‡ Mean time (exact?). § Point Arena—San Carlos.

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In the small port of Coliumo, close to the northward of Concepcion Bay, the waves rose about as high as at Tomé, nearly fourteen feet before they reached the shore. The little village of Dichato shared the general calamity; but, standing rather higher and more distant from the sea than Talcahuano, it escaped the ravages of that element.

At the mouth of the Maule the force and height of the waves must have been considerably diminished; for no particular effect was noticed at the time, nor were there any marks upon the shore by which the height of the wave could be afterwards ascertained. That the sea should not there have occupied attention is not surprising, when one considers the locality of La Constitucion, as the port and town are called. On level low land, at the south side of the river, lies the town; between which and the sea there is high land, and a distance of about a mile. The river winds round the northern promontory of the high land, and then fights its way to sea over a bar, on which there are always breakers. There are no houses on the sea-shore; and, without going half a-mile up the hill, the sea cannot be seen; naturally then, for some time after the town was ruined by the earthquake, the inhabitants would be engaged in saving and sheltering their property, rather than looking at the ocean. I could not ascertain whether the river had risen or not: and having previously heard that the waves were very powerful at the mouth of the Maule, I was a good deal surprised to find they had been almost unnoticed: but all attention seemed to have been engrossed with the earthquake.

A vessel, lying close under the promontory mentioned above, was obliged to move as quickly as possible, when the shocks began, so serious was the shower of stones which rattled down the hill and fell about, and on board of her. I was assured by the governor, by the chief pilot, and by other residents, that instead of the land having been elevated at all, they considered that it had sunk about two feet. The pilot said he had found two feet more water on the bar, since the great shock, and that he was certain the banks of the river were

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lower, though he could not say exactly how much. A rush of water might have shifted the loose sands of the bar; but whether the land had sunk seemed to me very doubtful. Certainly, however, it had not risen.

The island of Juan Fernandes was very much affected. Near Bacalao Head an eruption burst through the sea, in a place about a mile from the land, where the depth is from fifty to eighty fathoms. Smoke and water were thrown up during the greater part of the day, and flames were visible at night.* Great waves swept the shores of the island, after the sea had retired so much that old anchors were seen at the bottom of the anchorage.

This earthquake was felt at all places between Chilóe and Copiapó: between Juan Fernandes and Mendoza. On the sea-coast, within those limits, the retiring and swelling of the ocean was every where observed. At Mendoza the motion was evenly gentle. Copiapó, Huasco, and Coquimbo felt similar, although rather more forcible undulations. Towns, and houses which lay between the parallels of thirty-five and thirty-eight, suffered extremely; nearly all were ruined; but northward and southward of those latitudes, slight injury was done to any building. In the parallel of thirty-three and a-half, Juan Fernandes suffered, yet Valparaiso, opposite, escaped uninjured.

As to the state of neighbouring volcanoes, so various were the accounts of their action, both after and before the earthquake, that I had no means of ascertaining the full truth; but I heard from Valdivia that directly after the earthquake all the volcanoes from Antuco to Osorno, inclusive, were in full activity.†

* The highest summit of Juan Fernandes was "found to be burned, full of fissures and hot," in 1743. Ulloa saw a small flame there.—Voyage of Juan and Ulloa; translated by Adams.

† Of another earthquake the "Araucano," of Dec. 8, 1837, states as follows:

"Talcahuano, Nov. 7, 1837.

"Fué bastante recio y duró como cuatro o cinco minutos, con la particularidad notable de haberse advertido un pequeño retroceso de la mar á cia su centro en Talcahuano, y haber quedado interrumpido por algunos dias el flujo y reflujo de sus aguas."

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CHAPTER XIX.

Mocha — Movement of Land — Penco — Ulloa — Shells — Coal — Maule — Topocalma — Aconcagua — Valparaiso — Horcon — Papudo — Pichidanque — Conchali — Herradura — Coquimbo — Wreck — Challenger — Blonde — Ride — Estate — Colcura — Villagran — Arauco — Former caciques — Colocolo — Caupolican — Scenery — Quiapo — Night travelling — Leübu — Tucapel — Valdivia — Lautaro — Challenger.

When the Beagle entered Concepcion Bay, she had only one heavy anchor left, having broken or lost the others; and as there were none fit for her at Talcahuano, it became absolutely necessary to go to Valparaiso: accordingly, on the 7th of March we left the melancholy ruins and their disconsolate tenants, and on the 11th dropped our only anchor at Valparaiso. There our wants were soon supplied, and we sailed on the 17th to revisit Concepcion.

From the 27th the time was occupied in surveying the neighbourhood of Concepcion, Arauco Bay, the island of Santa Maria, and Mocha, until the 17th of April.

Mocha is a prominent land-mark for navigators, but dangerous rocks lie about its south-west quarter, and as the current usually sets northward, a ship ought to beware of them. Previous to the eighteenth century it was inhabited by Araucanian Indians, but they were driven away by the Spaniards; and since that time a few stray animals have been the only permanent tenants. Most of the early voyagers speak of it. We found the anchorage indifferent, the landing bad, and no supplies to be obtained except wood, and, with much difficulty, water.

Our duties were greatly forwarded while about Concepcion, by the earnest and very kind assistance of the yntendente, Don José Alemparte; and the active friendliness of Mr. Rouse, the British consul. Though their houses were levelled, and they themselves without any of what most Englishmen would call comfort, we were received and attended to by them and the

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'Penquistos,'* as cordially as if their nerves and minds had endured no strain.

Although it was indisputably proved to the satisfaction of every person in the neighbourhood, that elevations of land had occurred to the extent mentioned in the previous chapter, I strongly suspect that a sinking down has taken place since that period, to a very considerable amount, if not quite enough to counterbalance former elevation. This idea is suggested by the fact that when I was last at Talcahuano, in July 1835, only four months after the great convulsion, the shores of Concepcion Bay had regained their former position with respect to the level of the sea:†—by what the people of Tubul told me, when I rode by, of the sea having returned to its centre,‡ (meaning that it had regained its usual height),—and by what the inhabitants of Santa Maria said, when they told me that for three or four weeks immediately following the earthquake, their little port was much shallower than it was when I went there seven weeks afterwards.

Whether this conjecture be well founded a short time may show: if it should be, an explanation might thus arise of the differences of opinion respecting the permanent elevation of land near Valparaiso, where some say it has been raised several feet during the last twenty years, while others deny that it has been raised at all. It may have been elevated, or upheaved as geologists say, for a time, but since then it may have settled or sunk down again gradually to its old position. In a place like Valparaiso Bay, where dust is so much blown from the land to the water's edge, and even out to sea; and where many streams bring detritus from ravines, no decisive judgment can be formed as to the rise of land, because of the beach increasing gradually, and the water diminishing in depth.

* Natives of Concepcion: so called because they formerly lived at Penco: before that city was overwhelmed in 1730.

† Close to the landing place at Concepcion is a rock that was usually covered at high-water, previous to the earthquake (of 1835), but which was two feet above the highest tides of the next few weeks. In July, 1835, that rock was covered at ordinary high-water, as in 1834.

‡ 'Està ahora el mar à su centro.'

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In a ride along the beach of Concepcion Bay, with Mr. Rouse, we examined the solid wall of old Penco Castle, and found on one side the date 1686 and on another 1687.

This castle and the adjoining foundations of houses, are so near the level of the sea, that I am surprised the inhabitants should not have feared being frequently inundated, even by tides only a few feet higher than usual.

If all this coast has been more or less upheaved during comparatively modern times, how is it that the foundations of Penco still stand at the water's edge, very little above the level of a high spring tide? Ulloa remarks, that "the country round the bay, particularly that between Talcahuano and Concepcion, within four or five leagues from the shore, is noted for a very singular curiosity, namely, that at the depth of one-half or three-quarters of a yard beneath the surface of the ground, is a stratum of shells of different kinds, two or three toises in thickness, and in some places even more, without any intermixture of earth, one large shell being joined together by smaller, and which also fill the cavities of the larger. From these shells all the lime used in building is made, and large pits are dug in the earth for taking out those shells, and calcining them. Were these strata of shells found only in low and level places, the phenomenon would be more easily accounted for by a supposition no ways improbable, namely, that these parts were formerly covered by the sea, agreeable to an observation we made in our description of Lima. But what renders it surprising is, that the like quarries of the same kind of shells are found on the tops of mountains in this country, fifty toises above the level of the sea. I did not indeed personally examine the quarries on the highest of those mountains, but was assured of their existence by persons who had lime-kilns there; but I saw them myself on the summits of others, at the height of twenty toises above the surface of the sea, and was the more pleased with the sight, as it appeared to me a convincing proof of the universality of the deluge. I am not ignorant that some have attributed this to other causes; but an unanswerable confutation of their

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subterfuge is, that the various sorts of shells which compose these strata both in the plains and mountains, are the very same with those found in the bay and neighbouring places. Among these shells are three species very remarkable: the first is called 'choros,' already mentioned in our description of Lima; the second is called 'pies de burros,' asses' feet; and the third 'bulgados,' and these to me seem to preclude all manner of doubt that they were originally produced in that sea, from whence they were carried by the waters, and deposited in the places where they are now found.

"I have examined these parts with the closest attention, and found no manner of vestige of subterraneous fires. No calcinations are to be met with on the surface of the earth, nor among the shells; which, as I have already observed, are not intermixed with earth; nor are there stones, or any other heterogeneous substances found among them. Some of these shells are entire, others broken, as must naturally happen in such a close compression of them, during so long an interval of time.

"The pie de burro has its name from the fish enclosed in it, resembling, when taken out, the foot of an ass. This fish is of a dark brown colour, firm and filaceous; it is an univalve, its mouth almost circular, and its diameter about three inches. The bottom of the shell is concave within, and convex without. The colour within is perfectly white, the surface very smooth; the outside scabrous and full of tubercles. Its thickness in every part is about four or five lines; and being large, compact and heavy, it is preferred to all others for making lime.

"The bulgados, in the Canaries called bulgaos, are snails, not at all differing in their form from the common, but larger than those of the same name found in gardens, being from two inches to two inches and a-half in diameter. The shell is also very thick, rough on the outside, and of a dark brown colour; and, next to the preceding, makes the best lime.

"All these species of shell fish are found at the bottom of the sea in four, six, ten, and twelve fathom water. They are caught by drags; and what is very remarkable is, that no shells, either the same, or that have any resemblance to them, are seen either

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on the shores continually washed by the sea, or on those tracks which have been overflowed by an extraordinary tide. They adhere to a sea-plant called cochayuyo (*a*).

"This plant divides itself into several branches, equal in dimensions to the main stem. These branches successively produce others of the same proportion, so that the produce of one single root covers a prodigious space. At the joints, where the branches spring, is found this kind of shell-fish, where they both receive their nourishment, and propagate their species."—Ulloa's Voyage, translated by Adams, vol. ii. pp. 252-254.

Not far from Old Penco is the stratum of coal about which there has lately been much discussion.

Herrera says, "There is coal upon the beach, near the city of Concepcion: it burns like charcoal."* Frezier bears witness that near Talcahuano there is good coal, which can be obtained without digging deeper than two feet; and he declares that the natives were astonished at his companions taking a substance out of the earth to burn as fuel in their forge.† Captain Basil Hall saw the place whence coal had been "worked without any trouble. The seam is thick, and apparently extensive, and might probably, with due care and skill, be wrought to any extent."‡ Captain Hall "laid in a supply of coals at this place. The coals, which were brought for us to the beach, cost twelve shillings per ton, every thing included."§ Stevenson says, "To what extent the coal reaches, has never yet been ascertained; all that has been used has been obtained by throwing aside the mould which covers the surface. This coal is similar in appearance to the English cannel; but it is reasonable to suppose that if the mine were dug to any considerable depth, the quality would be found to improve."‖

Many other authorities¶ might be cited to prove that coal exists abundantly near Concepcion, and that it has often been

(*a*) See note at end of chapter.

* Dec. 8, l. 6, c, 11.

† Frezier's Voyage, p. 146.

‡ Hall's Journal, vol. i. p. 303.

§ Idem, p. 307.

‖ Stevenson's South America, vol. i. p. 121.

¶ The Earl of Dundonald for instance.

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used. There are objections to it, by no means insuperable, which have alarmed people, and checked the working of those mines. It is said to be very bituminous—that it burns too quickly to ashes to answer well for smith's work, because it does not give heat enough—and that it is liable to spontaneous combustion. The last objection might be removed by keeping the coal under water,* and coking† would render it available for the forge. Some geologists say that it is 'mere lignite,' and think very lightly of its quantity or value; but practical men will doubtless attach some value to what has been proved by experience.

On the 17th of April, the Beagle sailed from Concepcion Bay, examined Coliumo, and, coasting along, anchored off the Maule River on the 20th. In a very thick fog, during the night of the 19th, while carrying sail to get an offing, we were within a fathom of being run down by a vessel crossing us on the opposite tack. As both ships were under all sail, and it was dark, our momentary sensations were far from agreeable.

To land here was perplexing enough, for a heavy surf broke on the bar of the river, and nearly as much along the shore; but with some risk and difficulty we effected our purpose in two light whale-boats, which could be hauled up directly they touched the beach. Nearly all the population of a thriving village, called Constitucion, came down to meet us (on the 21st), and assist in hauling our boats up the steep though yielding sand, where, for our comfort, they told us a whole boat's crew had been drowned, not long previously, in attempting to land. From a height overlooking the river, village, and neighbourhood, we enjoyed a very pleasing view, so long as we turned away from the bar of the river, and the surf. A rich country and a fine river are pleasing things at all times, but the difficult approach to Constitucion mars half its beauty. Only the smallest craft can cross the bar; it is dangerous

* I do not mean merely wet, but well saturated and covered with water till required for use.

† It has been coked, and found to answer well.

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for boats to land on the outer beach: and difficult for them to profit by the few opportunities which occur of passing the bar without risk.

Notwithstanding these local disadvantages, Constitucion may thrive wonderfully hereafter, by the help of small steamers, for she has a most productive country around her, abounding in internal as well as external wealth, and a navigable river at command. Besides this, in 1805, a very practicable passage was discovered through the Andes, about seventy leagues south of Mendoza, not far from the latitude of the River Maule, almost entirely level, and fit for waggons—the only pass of such a description between the isthmus of Darien and Patagonia.

From the Maule we sailed along the coast northward; limited time, and work in prospect urging us to hasten more than could have been wished. The shoal, or rather rocks of Topocalma, or Rapel, were examined; some coves looked at, fit only for coasting launches, and the line of this bold, but uninteresting coast tolerably well determined. Before sunrise, on the 22d, we had a splendid view of the Andes—their range or cordillera being unclouded, and distinctly visible from south-east almost to north. The sharp summit of Aconcagua, 23,000 feet above the sea level, towered high over any other.

At noon, on the 23d, we hove-to off Valparaiso, and sent boats ashore. Mr. Darwin came on board, and among other pieces of good news, told me of my promotion. I asked about Mr. Stokes and Lieut. Wickham, especially the former; but nothing had been heard of their exertions having obtained any satisfactory notice at head-quarters, which much diminished the gratification I might otherwise have felt on my own account. Mr. Darwin returned to the shore, intending to travel overland, to meet us at Coquimbo, his very successful excursion across the Andes having encouraged him to make another long journey northward.

On the 25th, we anchored in Horcon Bay, a place (by some curious accident) entirely left out of all former charts, although there is good anchorage, and a fishing village not far

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from a populous small place called Puchancavi. From this station we sailed to Papudo, a small port rising into repute, on account of copper-mines in its neighbourhood. It is well marked by a high-peaked hill, called Gobernador. Next to Papudo lies Ligua, a place where boats only can go; farther north, or 'down the coast' (as they say in Chile and Peru), is Pichidanque, an excellent cove, rather than port, now much used for shipping copper, and formerly a smuggling place; rendered more notorious by the murder of Burcher, the master of an English smuggling vessel called the Scorpion, who was enticed ashore and assassinated, after which his ship was seized and plundered. This took place in the present century; and an individual, who was said to have taken an active part in the tragedy, was living at Quillota, in 1835.

Close to Pichidanque is a high pointed hill, called 'Silla' (from its saddle shape), seeing which distinctly from Valparaiso, is said to be a sign of an approaching northerly wind.

I landed at Conchali after dark on the 30th, leaving the Beagle under sail in the offing. My reception was very hospitable; but the people made sure I was a smuggler; and some of the principal inhabitants rode with me several miles next morning to the place where my boat was hauled ashore, thinking all the time that I was only waiting for a favourable opportunity to tell them my secret, and make advantageous terms. All this coast, except a few corners, is bold and high, barren and uninteresting; though picturesque in outline.

May 2d. Another smuggling cove, called Quilimari, was examined by me. There is but doubtful landing, and no shelter for a vessel; balsas, however, might do a good deal of work for such a character as I was taken for at Conchali.

On the 4th, having hastily reconnoitred the coast nearly as far as Coquimbo, we ran into Herradura Cove, and moored ship securely. It was my intention to refit there thoroughly, and prepare the Beagle for receiving a large supply of stores and provisions at Valparaiso, which would enable her to run down the coast to the Galapagos, and thence cross the Pacific to Sydney in Australia. In Herradura she lay quietly close

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to the land until the 6th of June: and all her crew were encamped on shore near the ship, while she was thoroughly cleared out, re-stowed, and painted. At Coquimbo (or Serena) we always met with a hearty welcome whenever duty required that we should go there, or when we went for our own amusement. The Yntendente, Yrrisarte, the kind-hearted Mr. Edwards and his family, and others, will not easily be forgotten by the Beagle's officers.

As another real benefactor to the public service, I may be allowed to mention Don Francisco Vascuñan, who lent me a vessel of thirty-five tons, called the Constitucion, to be employed in forwarding the survey. This craft was built in the River Maule, and bore a very high character as a sea boat. Lieutenant Sulivan, Mr. King, Mr. Stewart, and Mr. Forsyth volunteered to go in her; so giving them a boat's crew, a small boat, a native pilot with his balsa, and as good an outfit as my means would allow, I despatched this new tender to examine a portion of coast near Coquimbo, which the Beagle had not seen sufficiently, and directed Lieut. Sulivan, if he found the vessel efficient, to continue afterwards surveying along the coast of Chile, as far as Paposo, whence he was to repair to Callao.*

On the 6th of June, the Beagle left Herradura, and sailed towards Valparaiso. Anxious, however, to communicate with Don Diego Portales,† who was staying at his country-house, near Papudo, I touched there in my way; arrived at Valparaiso on the 14th of June, and immediately began the arrangements necessary for our preparations to quit Chile. The liberal assistance rendered by Don Francisco Vascuñan, in lending me his own vessel, without any kind of agreement or remuneration whatever, had enabled me to look forward to adding much of the coast of Chile to our gleanings in hydrography; for I well knew that Lieutenant Sulivan would not only make despatch, but extremely correct work.

Here I may remark, that if little is said henceforth about

* Orders in Appendix.

† Don Diego Portales, one of the ablest men in South America, was murdered, in 1837, by some of his ungrateful countrymen.

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places so well known as the coasts of Chile, Peru, and other countries often described, it is because I feel bound to avoid mere repetition as far as possible, and because the limits of my narrative are fixed. For the present, leaving the Beagle to get her stores and provisions on board, I must turn to another scene.

16th June. By the post which arrived from Santiago this morning, an English merchant received a laconic account of the total loss of his Majesty's ship Challenger. This report spread as quickly as bad tidings are wont to do: but no official information arrived during that day, or the ensuing night. Recollecting that a Swedish ship had come lately into Valparaiso, whose officers had seen what they described as "an American brig" cast away near Mocha; I found out the ship and questioned the master and mates. They had arrived at Valparaiso on the 25th of May, and all agreed in stating that on the 20th of that month, they saw a large vessel ashore on the coast of the mainland, to the northward and eastward of Mocha. They saw her at daylight, but as they had light airs of wind and a very heavy swell until three in the afternoon, to save themselves from danger they were obliged to make all sail away from the land, and lost sight of the wreck.

The vessel looked large, with fore and main masts standing, and top-gallant masts an end until eight o'clock, when the fore-topmast went over the side, or was struck: her fore-topsail yard remained across; no main-top-gallant yard was seen; the main-top-gallant mast was standing all day, and there was a large ensign at the mast-head: white and red were seen, therefore it was thought to be American. Her bow was to seaward, as if she had anchored; her sails were loose all day; people were seen on the after part of what appeared to be a roundhouse painted green. Bulwarks very high—ports very large—no boats on deck or at the quarters—no guns on upper deck. Looking at her end on, with the masts nearly in a line—all her upper deck could be seen, though very indistinctly, owing to hazy weather, the additional haze caused by spray thrown up from a furious surf, and their own distance from the wreck; which was never less than four miles.

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The log of the Swedish ship was produced, which exactly corroborated their statement. The master said he could not lower a boat, so great was the swell; and during five hours of almost calm, he was drifting helplessly towards the wreck, and expecting to share her fate. The two masts and red and white ensign, caused them to consider her an American brig, and as such she was reported to the consul for the United States.

A few of the preceding data convinced me they had seen the poor Challenger, but I was more strongly assured of the fact by pointing to the Conway, then at anchor near us, and asking whether she was like that ship—and near her size? Yes, sir, they replied. The green roundhouse abaft, seemed to have been a deception caused by looking at the curved green taffrail of the Challenger. I concluded that the mizen-mast had been cut or carried away; perhaps used as a raft: that the boats had been lowered, and that the ensign was St. George's, (Sir G. E. Hamond's flag being white at the mizen) but did not fly out, as there was no wind. The quarter-deck guns were close to the side, or perhaps below. Such were my thoughts, but other persons were of a totally different opinion. I was astonished that the Commodore did not hear officially from Santiago—particularly as the merchant's private notice was received through our Consul-general.

17th. At the Post-office I obtained a large packet, directed to our vice-consul, the moment the post-master opened the mail bag; and hastening to the consul's office, I was surprised to find it shut, and to hear that no one would be there for an hour or two. Such apathy—upon such an occasion! Not choosing to break the seals, though I saw by the direction what were the contents (Despatches by Challenger), I went in search of the proper person to open the packet: took the Commodore's letters, and hastened with them to the Blonde. Every doubt was then ended. The Challenger was lost on the night of the 19th of May, at the spot described by the Swede: but all her crew were saved except two; and on the 26th of that month, Captain Seymour, the officers and men were encamped near the wreck, at a place called Molguilla. The Blonde pre-

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pared for sea: an offer of such assistance as I could render was accepted by the commodore; and, having arranged the Beagle's affairs, as far as then necessary, I went on board the Blonde, taking with me Mr. Usborne, J. Bennett, and a whaleboat. Lieut. Wickham was to forward the Beagle's duty during my absence, and take her to Copiapo, Iquique, and Callao, before I should rejoin her.

18th. Weighed at three in the morning and cleared the port before daybreak. A northerly, freshening wind favoured us much when in the offing.

21st. Anchored in the bay of Concepcion, off Talcahuano, at noon. As soon as I could get a boat I landed, and hastened to obtain information, horses, and a guide, as the commodore wished me to go to Captain Seymour, and concert measures for removing the crew and the remaining stores.

The captain of the port told Commodore Mason that the part of the coast on which the Challenger went shore, is quite inaccessible in any weather, but that boats had entered the mouth of the river Leübu, near Molguilla.

Lieutenant Collins (of the Challenger) had been at Talcahuano, trying to procure a vessel, in which the shipwrecked crew might embark by means of boats, at the Leübu, but not succeeding he had returned to his shipmates; whom he expected to find at the mouth of the river. It was said that a large body of Indians was in motion towards them, that the crew were short of provisions, and that they were becoming sickly. Assisted by the governor of Talcahuano, horses and a native guide were soon obtained; but I wanted a more energetic assistant, and engaged a Hanoverian who was used to the half Indian natives of the frontier, and well known among them. This man was Vogelberg, or Vergara, already mentioned. With orders and letters from Commodore Mason, accompanied by Vogelberg and H. Fuller, and provided with five horses, I left Talcahuano the same evening.

Being personally acquainted with the Yntendente, and his second in command, I hastened immediately to their houses at Concepcion, wishing to get an order to pass the Bio Bio River

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that night, and to procure a circular letter to the local authorities. Not a minute was lost by either of those zealous officers in attending to and complying with my requests. Alemparte left his dinner to write a circular letter, in his own hand; and neither he nor Colonel Boza would return to their respective parties, until they had ascertained that I was properly provided with horses and a guide, and that I required no further assistance.

Although orders were issued and the ferry-boat at her station, no crew were to be found, and only those men who belonged to the boat knew how to cross over safely. Vexatious as the delay seemed, I was afterwards glad of it; for judging by the work in day-light, I doubt our having ever reached the opposite bank with our horses, in a dark night.

While talking to Colonel Boza I remarked a watchful, wild-looking, young Indian, in a Chilian half-uniform, standing in the house. Something unusual in his manner attracted my notice though hurried, and I have since regretted losing that opportunity of acquainting myself with the son of Colipi, a famous cacique, who is the principal, and a very powerful leader of the northern Araucanians, though at present a friend to the Chilians. Colipi is a very tall and unusually strong man; his onset and his yell are talked of with a shudder, by those who have suffered from Indian hostility. Educating his son at Concepcion is one of the methods used to conciliate the 'Barbaro.'

22d. Before the dawn of day we were looking for the watermen; and, as the sun rose, succeeded in getting their boat, or rather flat-bottomed barge, into motion. We rode into the river, about two hundred yards, until we reached the barge, then lying close to an overflowed bank. By some persuasion of voice, whip, and spur, the horses were made to leap out of the water, over the gunwale and into the boat. They certainly showed more sense than horses usually have, in understanding so readily how to behave; but whether their owners showed more than asses, in having so clumsy a ferry-boat, may be

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doubted. In leaping in the horses nearly knocked down, or trod upon, those who were dismounted; and when leaping out again, they made such a splashing of the water in the leaky ferry-barge as effectually washed our faces. The river is wide, deep, and rapid; and there are many sand-banks. The boatmen use oars as well as long poles; but are slow and awkward to a degree I could scarcely have believed, had I not witnessed their progress. The breadth at the ferry is about a quarter of a mile, when the river is low, but upwards of half a mile when flooded, as at this time. The south bank is steep; and from San Pedro, a little village at the ferry, the land rises in a south-east direction, towards a lofty range of hills; but towards the south-west, it is low, level, and firm. Across this excellent galloping ground we tried our horses, and made the miles seem short, till we reached a low range of hills over Point Coronel. There, dismounting, we used our own legs until the hills were passed, and before us lay two long sandy beaches, called 'Playa Negra,' and 'Playa Blanca.'

In our gallop we passed the house of Don Juan de Dios Rivera,* whose estate on the south side of the Bio Bio is mentioned by Captain Hall as an instance of the progressive tranquillization of the Indians. Several large barn-like buildings spread over about two acres of ground, enclosed by a high fence of rough posts and rails, showed an eye accustomed to the country, that the proprietor held in his own hands a large estate: but that collection of thatched irregular roofs, and the utter absence of any thing like outward neatness or regularity, brought to my mind a very neglected rick-yard, near which not even a cottage appears.

Yet this was the house of a man of large property; and not by any means a bad one, compared with others in that country. Many reasons might be adduced to explain why Chilian gentlemen are reluctant to expend either time, trouble, or money in building good houses. Earthquakes are very frequent; property is yet insecure; and the country has been occupied,

* Yntendente of Concepcion in 1821.

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but so lately that there has not been any leisure time in which to think of more than the first necessaries of life. Noble trees surround this 'casa de hacienda.'* No underwood impedes your riding at a rapid pace in any direction: and beyond the woody spaces, extensive plains stretch towards the sea and to the bank of the river. These plains are intersected by numerous streams, and adorned with irregular clumps or thickets of trees: smaller indeed than those which shade the 'casa de hacienda,' but of a size sufficient to shelter cattle.

This estate, which is not considered a large one in that country, comprises, besides many square leagues of wild hilly country, more than one hundred square miles of excellent land, well watered, abundantly wooded, and most pleasantly as well as conveniently situated. The owner is said to be a most worthy man, and numerous instances of his active goodness as well as excellent disposition, have been related to me at different times; one of which I must stop to relate.

My attendant, Vogelborg, passed near the door of Don Juan de Dios Rivera, while executing a commission entrusted to his most speedy despatch. Stopping a moment to ask the way, Don Juan remarked that he looked ill, and had better rest. Vogelborg thanked him, but explained the necessity of hastening onwards: in truth he was ill and very tired, though anxious to proceed. Don Juan then suggested the quicker method of forwarding the letters, entrusted to Vogelborg, by his own confidential servant, and forthwith despatched him upon one of his own horses, desiring Vogelborg to take possession of an excellent bed; where he remained two days under the kind care of Don Juan de Dios and his wife, who till that time, had never seen him.

Abreast of Negra Beach is an anchorage, sheltered from the north and north-west winds by Point Coronel, but exposed to the southerly and west winds. Here, as well as in coves further south, much smuggling was carried on in the time of the Spaniards.

Leaving the sea-shore, and some slippery rocky places over

* Country-house upon the owner's estate.

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which we were obliged to lead our horses, we ascended the heights of Colcura. For our reward, after a muddy scramble up to the top of a steep hill, we looked down upon a fine though but partially wooded country, forming an agreeable succession of valleys and high grounds; while to seaward there was an extensive view of the coast, with the island of Santa Maria in the distance.

Perched on a height overlooking the sea, and directly above a very snug little anchorage, is the hamlet called Colcura; and thither we hastened, inattentive to the complaints of our guide (who was likewise guardian of the horses), and trusting to Vogelborg's recollection of the road. Riding into a sort of field entrenchment at the top of Colcura hill, we were accosted by a sly-looking, sharp-visaged character, whose party-coloured jacket appeared to show that its owner held some office of a military nature, but whether that of 'cabo,'* or a higher, I could not determine until I heard him say he could give us a good meal, and that he had three fine horses near the house; when at once styling him 'gobernador' I rebuked myself for having thought ill of his physiognomy, and proceeded to unsaddle. Disappointed, however, by a scanty bad meal, we thought to regain our tempers upon the backs of our host's horses; but not an animal had he sent for; nor, to our further vexation, could any inducement tempt him to lend one of those fine horses, which, he still said, were close by. The Indians, he declared, were expected daily; he knew not the moment he might have to fly for his life; on no condition would he lend a horse: no, not if a fleet of ships were wrecked, and I were to offer him an ounce of gold for each mile that his horse should carry me.

Every Chilian residing on the frontier endeavours to keep by him a good horse, on which to escape, in case of a sudden attack of the Indians; for, as they never give quarter, and approach at a gallop, it is highly necessary to be always prepared. Those who can afford to do so, keep horses solely for the purpose of escape, which are the finest and the swiftest they can procure. I remember hearing, that when General

* Corporal.

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Rosas was carrying on a war of extermination against the Pampa and Patagonian Indians, on the banks of the rivers Colorado and Negro, he had with him horses so superior, that it was said he could always ensure escape, if by chance he should be pursued: and one of them was invariably led about, saddled and bridled, near his tent.

Saddling our own steeds, and quitting the thin-faced dispenser of tough hens and sour apples, we set off at a gallop, leaving the lazy guide whom we brought from Talcahuano, to return there with the two worst animals (it was fortunate indeed we had brought with us a spare one), and in two hours we reached the foot of Villagran; that hill so famed in Araucanian story.

Being a natural barrier, it was a spot often chosen by the Araucanians, at which either to lie in ambush for the Spaniards, or openly oppose them. In one battle, the brave Villagran, after whom this ridge of hills is named, and a small Spanish force, opposed a multitude of Indians who had hemmed them in on every side. The only opening by which Villagran could escape, was stopped up with a barrier of branches and fallen trees, behind which the Indians stood discharging arrows and slinging stones. Ercilla gives an animated description of this scene; but as his book is scarce, I will attempt a free translation of that passage, lame as it must necessarily be.

——— ——— the veteran Villagran,
Heedless of any kind of death,
Hazarded all upon a cast.

He rode a stately powerful horse,
Purest of Spanish blood—
Strength and activity were well combined
In that courageous steed—
Swift and high-spirited, he yet obeyed
The slightest touch of finger on the rein.

The danger reached—instant as thought—
The warrior's spurs excite the noble brute—
He dashes on—and down the barrier goes.
A deafening crash and dire dismay
Followed, as onward tore their way
Those few determined men.

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> The gallant steed unhurt appeared,
> Strove foremost in the fight, and feared
> Only to be the last!
>
> ERCILLA. Canto VI.

We ascended the heights by winding narrow paths, up which our horses were led, in order to spare them as much as possible, and met a small party of Chilians, on their way from the wreck of the Challenger towards Concepcion, from whom we heard that the wreck had been abandoned, and that the officers and crew were entrenched in a secure position, on the height of 'Tucapel Viejo,' close to the mouth of the river Leübu. We were also told that the Indians increased in number daily, and that great fears of their hostility were entertained.

From the summit of Villagran we had an extensive view, reaching from Tumbes Heights, at the west side of the Bay of Concepcion, to Cape Rumena. The low island of Santa Maria, with its sandy spit, shaped like an arm, seemed to be within a few miles of us, though distant several leagues. I could trace the long, low, and almost straight beach of Laraquete till ended by the white cliffs of Tubul: I could distinguish the height immortalized by Colocolo's name, and under it smoke arising from the classical Arauco. Southward, a large extent of fertile, level, and rather woody plains reached to distant ranges of hills, which showed only a faint blue outline. Time allowed no delay, but with a hasty glance, as we mounted our horses and cantered along the summit, I saw a schooner* in the distance, off the Paps of Bio Bio, working her way to the southward.

Descending the hill, we reached 'Chivilingo,' a village near a small river which runs through a 'hacienda' belonging to the 'Santa Maria' family. We called at the door of their large, barn-like dwelling, to ask if horses could be spared. The mistress of the house happened to be at home, having lately arrived from Concepcion; and directly she heard my story she ordered every horse to be put in requisition; but, unfortunately, two only were within reach, one of which was lame. All the others had been sent to grass at a distance. After acknowledg-

* The Carmen, with Mr. Usborne on board—see page 456.

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ing her kindness, and paying her 'mayor domo' for the hire of the horse, we pushed on with that one and two of the least jaded of our own animals.

Between Chivilingo and the rivulet called Laraquete is a hill, unimportant at present, though it may hereafter become of consequence, as it contains coal. Some that I carried away with me was thought to be almost equal to cannel coal, which it very much resembled. The little river Laraquete, which will admit a large boat at high water, runs at the foot of the hill, and there is no surf where it enters the sea. Very glad I was then to see nothing like a hill between us and Arauco. We urged our horses along the dead level, and reached a pass of the Carampangue river as the sun was sinking below the horizon. From his sickly appearance and the black gathering clouds, I thought we should not be long without heavy rain, and that the sooner we could house ourselves the better. The Carampangue is shallow, except in the middle, but wide. Men and animals are carried over it on a 'balsa,' made of several logs of light wood fastened together, and pushed or poled across with their burdens by one man. These contrivances are very convenient where the water is shallow near the bank, and where the bank itself is low: for a horse can walk upon them from the shore without difficulty, or any scrambling; and as soon as they ground on the opposite side, it is equally easy to disembark. Where wood is not plentiful, balsas are made of rushes tied together in bundles; or of hides sewn up and inflated, or made into a rough kind of coracle.

The last few miles had been slowly accomplished by dint of whip and spur; but from the river to Arauco was a long league over unknown ground, in the dark, and while rain fell fast. Heavily we toiled along, uncertain of our way, and expecting each minute to be bogged; our horses, however, improved as we neared their anticipated resting place, and almost tried to canter as lights appeared twinkling within an open gateway in the low wall of Arauco.* We asked for the house of the 'coman-

* It is a low wall, or rather mound of earth, enclosing a number of 'ranchos' (cottages or huts).

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dante,' and were directed to a rancho rather higher and larger than the rest. Without a question we were received, and told to make the house our own. That we were wet and tired, was a sufficient introduction to the hospitable Chilian.

Before thinking of present comfort, it was necessary to secure horses for the next day's journey, and dispose of our own tired animals; but money and the willing assistance of the comandante (Colonel Ger°. J. Valenzuela), soon ensured us both horses and a guide. In the colonel's house, a barn-like building, entirely of wood, and divided into three parts by low partitions, I was surprised to see an arm-chair of European make, which in no way corresponded to the rest of the furniture. Some large shells, not found in these seas, also caught my eye, and tempted me to ask their history. They had been brought only the previous day from the wreck of the Challenger, and were given by Captain Seymour to Don Geronimo, who had himself but just returned from assisting the shipwrecked party. His account and the chances of an attack being made by the Indians, increased our anxiety to proceed; it would, however, have been worse than useless to attempt finding our way in a dark night, while it was raining fast and blowing very hard; but at daybreak in the morning we saddled, and soon afterwards were splashing along the low flat tract of land extending from Arauco westward towards Tubul. Heavy rain during the night had almost inundated the low country, and to our discomfort appeared likely to continue during the day. In half an hour after starting we were soaked with mud and water; but being well warmed by galloping, we felt indifferent to the rain, and to a heavy gale of wind that was blowing.

Arauco, famous in Spanish song and history, is simply a small collection of huts, covering a space of about two acres, and scarcely defended from an enemy by a low wall or mound of earth. It stands upon a flat piece of ground, at the foot of the Colocolo Heights, a range of steep, though low hills, rising about six hundred feet above the sea.

In the sixteenth century, Arauco was surrounded by a fosse, a strong palisade, and a substantial wall, whose only opening

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was secured by a gate and drawbridge. Now the ditch, dug by the old Spaniards, is filled up, and the remains of their drawbridge have disappeared, having been used probably as fuel. This was the first place assaulted by the Indians, after their grand union against the Spaniards, at the end of the sixteenth century. To relate even a part of the history of those times would be digressing too much; but an anecdote of Colocolo and the great Caupolican may shorten our journey, and divert us for a time from mud, and rain, and wind.

Ashamed at having given way to men, at first imagined to be gods, and indignant at the outrages and oppressions of their invaders, a general gathering of the Indian tribes took place near Arauco. Ercilla names sixteen caciques of renown, besides others of inferior fame, who assembled with their followers. At the feast which followed their first consultation, great disputes arose among the rival caciques. A general was to be chosen, and each esteemed himself worthy of that high distinction. Insulting words induced an appeal to arms, and desperate strife was about to commence, when Colocolo, the oldest and most respected chief, advancing hastily,* with haughty strides, exclaimed :—

"What madness is exciting you, Caciques!
Thus eagerly to rush into a war
Against the very sources of our strength—
To tear each other's entrails out, as beasts,
And utterly forget the tyrant foe?
Turn your arms and angry blows
Against those authors of your slavery,
Whose shameful inroads on our fathers' land
Heap infamy upon Arauco!
Arauco's sons yourselves display—
And cast their galling yoke away.
Husband every drop of blood,
To mingle with a Spanish flood!"

Having gained attention and temporary silence, the Araucanian Nestor continued an eloquent address to the angry

* Ercilla, canto ii.

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chiefs, in which, after expostulating with them upon their ruinous rivalry; he exhorted them to choose a leader by some trial of ability, which should be publicly made; and suggested that the man who could bear a heavy weight for the longest time must be the fittest to endure the burthen of governing.

The caciques agreed to his proposal, and prepared a large trunk of a tree for this great trial of strength. Colocolo well knew that the qualifications of an Indian general were not bodily strength and activity, unless accompanied by qualities of mind proportionably superior; but it happened that Caupolican exceeded all his countrymen in mental, and all but Lincoya in bodily qualifications. Accident had impeded his attendance at the 'gathering,' and the object of Colocolo in proposing so tedious and otherwise absurd a trial was to gain time for Caupolican's arrival.

Fourteen chiefs successively bore the ponderous tree upon their shoulders. No one gave up the trial, until he had endured more than four hours' oppression; some even sustained the burthen six, eight, or ten hours; and one hardy mountaineer carried the tree for fifteen. But the famed Lincoya claimed the prize; confiding in his Herculean strength, he had allowed all others to precede him in the trial. When at last he threw the mantle from his Atlas shoulders, he took the tree from the ground as if it had been a stick; ran, jumped, and danced with it on his back, seeming to feel no weight; and the multitude, astonished, exclaimed, 'Lincoya shall be general! the rest are infants in comparison!' but the wise Colocolo insisted upon the completion of the trial, knowing that Caupolican would soon arrive, and that Lincoya's antics would exhaust even his great strength, and make it possible for an inferior to carry the tree longer. The crafty veteran had himself excited Lincoya to the unnecessary exertions which he knew would undermine him. From sunrise, until noon of the following day, full thirty hours, did the gigantic Lincoya sustain his immense load. While the air yet resounded to the shouts of 'Lincoya,' Caupolican arrived, and demanded to try his strength; but Colocolo interposed, saying that Caupolican had arrived from a

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great distance, and ought to rest. Until the next morning, therefore, the trial was postponed.

During the night, great excitement animated the vast multitude. The strength and ability of Caupolican were well known; even Lincoya doubted the result; he had deemed his only rival far off; and the antics in which he had indulged had prematurely exhausted his strength. At daybreak the tribes again assembled, and as the sun rose, Caupolican lifted the tree, and quietly poised it upon his shoulder. His manner, and the ease with which he placed his burthen, excited the surprise and admiration of all, except Lincoya, whose spirits sunk as he watched the cautiously guarded manner and easy movements of his rival.

During that day and the following night, lighted by the full moon; during the whole of the next day, and throughout the second night, did Caupolican sustain that overpowering weight which men of common strength could only bear during a very few hours: and when the sun rose on the third morning, the still untired chief lifted the tree above his head, and dashed it to the ground, with an effort which showed that his powers were far from being exhausted. He was unanimously chosen general, amidst extraordinary shouting and applause: and no sooner had the other caciques acknowledged his authority, than he began to take measures for acting immediately against the Spaniards.

Arauco, their nearest strong hold, was to be attacked. Eighty chosen men approached, disguised as the serving Indians, who supplied the Spanish soldiers with firewood, and forage for their horses. Each man, with his load of fuel or grass, in which his arms were hidden, advanced unsuspected to the fort, when, by preconcerted signal, they threw down their loads and attacked the unprepared Spaniards. This assault was the signal for other Indians to rush towards the fort; but the Spaniards, although surprised, made so good a defence, that almost all the eighty chosen men were killed, and no others could gain admittance. The whole Indian multitude then surrounded Arauco; and the Spaniards, seeing that they must be

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overpowered if they remained, opened the gate in the dead of the night and escaped. Thus began this famed insurrection, which caused the destruction of seven towns, and drove every Spaniard from Araucania.

Leaving the low land near the sea, we ascended sloping hills, and found ourselves in a beautiful country. Though I did not see it distinctly until my return, I will endeavour to describe it in this place:—the outer range of hills, near the sea, is a succession of downs, free from wood, except here and there in the valleys, and every where covered with short sweet grass:—there is no sandy or barren rocky land. Numbers of fine cattle were seen grazing in the neighbourhood, but very few sheep. In-shore of the downs is a very luxuriant country: gradually rising hills, every where accessible; extensive valleys, woods of fine timber trees, very little encumbered with underwood; spaces of clear grass-land, like fields; beautiful lakes, and numerous streams of excellent water, together with a rich soil clothed with sweet grass, disposed me to think this the finest country I had ever seen.

Generally speaking, the soil is clayey; but there is every where a layer of vegetable mould upon the surface; which indicates that the country was covered with wood until the Indians partially cleared it by burning. While they were so numerous as they are said to have been in the sixteenth century, large tracts of ground must have been cultivated by them, or cleared for their sheep. In riding across this now unemployed land, regretting at every mile that it should be so neglected, fine bullocks often crossed our path; or wild-looking, but well-conditioned troops of horses. These animals must be very nearly wild: for restrained by no fences, looked after by nobody, they are free to roam and feed where they please. Once only in a year they are driven together, if they can be found, to be counted, marked, or killed. Here and there a stray cottage, or rather hut, was seen, with a high thatched roof, like those of Chiloé. But for these cottages, and a field or two near them, this excellent country would have appeared to be quite deserted by the human race, though possessing every desirable

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quality. We passed over no hills of any consequence as to height, though generally we were ascending or descending. An in-shore circuit was taken, to avoid crossing three rivers, which, near the sea, are difficult to pass; and having lost our way (notwithstanding the alleged excellence of our guide), a native, almost Indian, was easily prevailed upon to run by the side of our horses until he put us into the right track. Before running through the bushes, he carefully tucked up his loose trousers as high as possible; thinking, I suppose, that his skin was less likely to be torn than the trousers; and thus bare-footed and bare-legged he ran before us for several miles with the greatest ease. At the cottage from which he came, a very good horse, in excellent condition, and well cleaned, was standing in a yard. I asked the owner to let me hire or buy him, but he would consent to neither; alleging that, in the Indian country, his life depended upon having a good horse close at hand. Three thousand Indians had assembled, he told me, and were expected to make an attack upon the Chilian frontier; but on what particular part was quite uncertain. They had heard of the wreck, and were actually going to the place to plunder the crew, when accidentally met and driven back by Colipi, with his friendly tribe. Dogs seem to be kept at these cottages for the same purpose as those at the 'ranchos,' in the Pampas, namely, to give warning of the approach of enemies. Small parties of Indians seldom or ever attack a house without reconnoitring carefully; and this they cannot effect if there are many dogs about.

After our running guide had left us, though put into the right track, we were soon at a loss again; so numerous were the tracks of horses and cattle in this rich pasture land. The professed guide whom we had brought from Arauco, was more useful in recovering half-tired horses, than from knowing the way: no sooner did he get upon a horse, which one of my party could not persuade to go out of a walk, than he started off at full gallop, exulting in his skill. Perhaps his secret lay in a sharp pair of iron spurs: for the thick skin and coarse

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hair of horses, so roughly kept as these, is proof against ordinary spurs, used with humanity.

Going very much by chance, often losing our way, and often taking a cast round to look for the most frequented track, we at last arrived at Quiapo, a hamlet consisting of five huts only, just in sight of one another on neighbouring hills. To which of them the name belongs, I know not, as 'Todo es Quiapo,' was all the answer I could get from my guide.

Riding up to the nearest hut, we tempted a young man who occupied it, to sally forth in the rain in search of fresh horses. This exertion was caused by the sure stimulant—money. We might have talked of the wreck, and the Indians, until that day month, without exciting our acquaintance to move; but the touch of dollars at once overcame the apathy with which he listened to our first request for food and horses. His wife told us to kill a fowl, if we could, for there was nothing else to be had; so forth we sallied, and as each understood that the permission applied to himself, great was the confusion among the poultry. To the dismay of our hostess, we soon reappeared, each with a fowl; but a certain silver talisman quickly hushed her scolding, and set her cooking. Meanwhile the rancho was ornamented with our wet clothes hanging about it to be dried; but rain came through the roof in so many places that our trouble was useless. Dripping wet, having been soaked since the morning, and of course cold, we could not go near the fire, because of the smoke; so with a long pole we poked a hole through the thatch, which let the smoke out, and then closing round the fire, we surprised the good woman by our attack upon her half-roasted fowls.

All these huts are much alike. Under one thatched roof, there is a place where all the family (including the dogs, cats, and pigs) eat, while sitting or lying round the fire, which is on the ground in the middle; and there is a kind of 'dais,'* where the same party afterwards seek that sound sleep from which none of the insect tribe appear to awake them, however

* Raised half a foot above the ground.

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much they may plague others. Sometimes there is a sort of bedstead, and a slight partition for the older people; but the others take their rest upon the raised part of the floor, wrapped in sheepskins, or goat-skins, and rough woollen clothes. A large heap of potatoes occupies one corner of the hut, and another is filled by a granary, curiously contrived with stakes about six feet in length, driven into the ground in a circle of perhaps six feet diameter. Rough wicker-work unites the stakes, and forms a bottom about half a foot from the ground. Straw is then inserted into the wattled-work, until there is enough to prevent any corn from falling through. This large fixed basket is filled at harvest time, and supplies the family during the whole year: neither rat or mouse can get at it without making a rustling noise, which instantly alarms each cat and dog.

Before our host returned with horses it was evening. He would have detained us until the next morning, could his arguments have availed, but finding that with or without him, on we were resolved to go, he set out at a good pace towards Leübu. Less rain and wind encouraged hopes of a fine night, so we trotted or galloped along while day-light lasted, but as the night grew dark rain again poured down: and, obliged then to go slowly, we followed one another as close as possible, placing the guide in front with a white poncho. While in the open country we got on pretty well, but, after two hours easy work, we found that the track was taking us through thick woods. My first intimation of the change was being nearly knocked off my horse by the bough of a tree, so pitchy dark was the night; and after this I kept my head on the horse's neck, trusting to his eyes entirely, for I could see nothing. That our guide could find the way has been matter of astonishment to me ever since: he never failed once. Some of the defiles through which he led were knee-deep in clayey mud, so stiff that the horses could hardly move. Often we were set fast in such places, obliged to get off, and feel for the track,—knee-deep, and up to our elbows in mud,—for it was upon hands and knees that we went, oftener than upon our legs. Our guide knew we were in the

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right track, but each of us was obliged to seek safe footing for himself and his horse, in the defiles among steep ravines and streams, swelled by heavy rains. Passing these streams was dangerous, and there only did the guide hang back. At one brook which seemed by the noise, to be deep and large, he refused to cross, saying his horse would not go on, and that we could not get over in the dark. However, Vogelborg was not to be so stopped. Leaving his own horse stuck fast in a slough, he scrambled through, hauling my horse after him by the bridle. Holding by my horse's long tail, and driving him on, I scrambled after: Vogelborg then went back, and with the guide brought the others over. In several places, while in the ravines, I had recourse to the tail of the guide's horse for my support and dragged my own animal after me, for it was hopeless to remain on his back, so often was he stuck fast or down in the mud. The last man, Fuller, fared the worst, as he had no one behind him to drive his horse on; and frequently we were obliged to stop and holla to one another, to avoid parting company. At last we emerged from the wood and from those horrible ravines. Before us we could then see that there was space, nothing interfering between our eyes and the clouds; but while under the trees and in the water courses, utter blackness surrounded us to a degree I never witnessed in any other place. Our eyes were not of the least use, for I could not even see the white poncho of our guide, though close before me. Feeling and hearing alone availed. Heavy rain during the whole time prevented the mud from forming too thick a coat upon us. Another hour brought our small party to an Indian settlement, near the river Leübu; and as we rode by the huts, our guide talked to those within at the utmost pitch of his voice, as if determined no one should be ignorant of his adventure. Hearing their conversation carried on in the Indian language, was rather an impressive novelty. We continued our route, and at last reached the Leübu.

The north side of this river (on which we were), is low and sandy near the sea, but the south side rises to a high, remark-

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able headland, called the 'Heights of old Tucapel,'—('Altos de Tucapel viejo.') The breadth of the river is about one hundred yards. Tucapel was the name of one of the more powerful caciques who united under Caupolican, to resist and expel the Spaniards. In his district and near his usual residence, which bore the same name, the daring but avaricious Valdivia was overwhelmed by numbers and taken prisoner, though not until every one of his small party had desperately fought and devotedly died for the cause which many among them considered that of God and their king.

Religion had so much influence over the minds of the earlier Spaniards, and was so warped and misinterpreted by the priests of their day, that actions, in themselves most unjustifiable, found defenders and active supporters among churchmen, and energetic performers among those who trusted their consciences to other men's keeping. An enthusiastically religious feeling, strengthened them to persevere under all trials and disappointments, and helps to account for the wonderful energy and constancy, shown in discovering, exploring and subduing the New World. This high sentiment of religion, urging them to conquer in order to convert to Christianity, and to honour God by serving their king, was an impelling motive in the minds of the early adventurers, at least as strong as the desire of riches. I here allude to those leaders who first opened the roads, which crowds of inferior men afterwards followed. One proof of this feeling is the fact, that the last of Valdivia's faithful companions who fell, was his chaplain, without whom, it appears, he did not even go to battle.

Valdivia had set out in the morning with only fifty Spaniards, besides a body of friendly Indians, intending to attack and disperse the multitude of his opponents. As he approached Tucapel, some fugitive friends* entreated him not to proceed, assuring him that twenty thousand Indians were there who had sworn to take his life, or sacrifice their own. Despising the natives and used to conquer, Valdivia listened

* Friendly Aborigines.

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to no cautions. The three thousand Indians, supposed to be friendly, accompanied him to the battle but turned against him: and his own page, Lautaro, who there immortalized his name among his countrymen, was the first to set the example and proved himself the most daring in the fight. (It should be mentioned that Lautaro's servitude was compulsory, having been brought up against his inclination, in the Spaniard's house.)* Onward dashed Valdivia, at the head of his small band, and was speedily surrounded by a countless throng. Hemmed in on every side, and overpowered by men who till then used to fly from a man in armour and mounted on a horse, all that desperate brave men could do, was done: but their horses tired, slaughter appeared to diminish neither the number nor rage of their opponents, and one after another sunk to the ground. Valdivia's chaplain fell the last, except the general himself, who fought like a lion at bay: till, seeing that he was alone, he turned and fled. The goodness of his horse enabled him to escape for a little while, but he was hunted by the swiftest and strongest, whose speed exceeded that of a tiring horse. His steed failed, and he was taken prisoner to be tortured and put to death, after suffering every torment that savage ingenuity could devise. When he was at the stake, the rage of the older Indians could not be repressed: and an aged man named Leocato, who had suffered long and severely by Spanish oppression, struck him on the head with his club, and at one blow deprived him of life.

Although surrounded by a multitude, so resolute and energetic were the companions of Valdivia, that they were actually gaining the day, until Lautaro rallied the retreating Indians, and by his heroism turned the tide of victory against the Spaniards. The natives' superstitious awe of these superior men, once thought gods, added to their being mounted on

* Lautaro was the son of an Araucanian chieftain, who fell in battle against the enemies of his race. Though brought up and educated in the family of Valdivia, from a mere child, he had never ceased to long for an opportunity of turning his forced acquirements to the disadvantage of his instructors, and revenging the death of his father.

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horseback and clad in armour, were such immense advantages, that to oppose the progress of a few resolute Spaniards even by the numbers of a multitude, was a daring effort.

In consequence of this and many subsequent acts of valour and conduct, the young Lautaro became a most celebrated leader, and was chosen by Caupolican as his lieutenant and successor.

But I must return to the banks of the Leübu, which we were approaching as fast as our tired horses could drag their hoofs through deep, loose sand, when a solitary light moving on the dark side of the opposite high land, showed the place where our countrymen were anxiously waiting for assistance: we had heard that their encampment was under Tucapel Heights, and close to the river's mouth.

As soon as we arrived at the water side, I hailed as loudly as I could call, but no answer was returned. Again I hailed "Challenger's a-hoy," and a faint 'hallo' repaid us for every difficulty. "Send a boat!" I called. "Aye, aye!" echoed from the hills. Lights appeared directly coming down the hill: a little boat came across the river, and very soon we were embarked in the Challenger's dinghy,* the only boat saved. The master and one man were in her, from whom we heard that all the party were well, and that they had not yet been molested by natives.

Captain Seymour was at the landing place. Old friends, meeting under such circumstances, can say but little. Hastening to the encampment, where all had turned out to hear the welcome news of assistance being at hand, we made their hearts rejoice by saying that the Blonde was at Talcahuano, and coming to their relief. With the officers, I found our excellent consul, Mr. Rouse.† At the first intimation of the Challenger's loss, he had hastened to the spot without an hour's delay; well aware how useful his influence and information would prove, and supposing that the officers would not be

* At midnight. The horses were sent back to the Indian huts, with whose owners our guide held such noisy intercourse as we passed.

† H. B. Majesty's consul at Concepcion.

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conversant in Araucanian habits and language, even if they should have made a slight acquaintance with those of Chile. His assistance proved to be of the utmost consequence, for not only did his explanations intimidate and discourage open or disguised enemies, who were not wanting, but his credit and influence procured daily supplies of provisions: while to his address and good sense every one of the shipwrecked crew was much indebted in many transactions.

Daylight found Seymour and myself still talking, though he had given me his bed. Partly at that time, and partly in subsequent conversations, he gave me the following account of the loss of the Challenger; but without mentioning his own exertions or conduct, which I heard of from his officers.

I will take this opportunity of mentioning that there is a large fox, called 'culpen,' in the Araucanian country, which was mentioned to me as being more like a wolf than a fox; but at that time I paid very little attention to the subject. Stevenson says, "the culpen is rather more foolish than daring, but not void of the latter quality. It will advance within eight or ten paces of a man, and after looking at him for some time, will retire carelessly." "Its colour is a dark reddish brown, with a long straight tail covered with shaggy hair; its height is about two feet."—Stevenson's South America, vol. i. p. 115. (Is not this like the Falkland animal?)

(Note referred to in page 423.)

(*a*) Ulloa said that the word 'cochayuyo' meant 'lake herb.' His authority is too good to be lightly questioned, otherwise I should have had no doubt that the word was derived from 'cochun,' 'salt,' or 'bitter,' and 'yu,' a thread: as the plant grows with long thread-like stalks, which taste salt, like most sea-weed: and 'lavquen' is the word generally used for 'lake,' as well as 'sea,' rather than 'cocha.'

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CHAPTER XX.

Challenger sails—Sounds off Mocha—Wrecked on the main-land—Crew saved—Stores landed—Camp formed—Great exertions and excellent conduct—Mr. Consul Rouse—Leübu—Plague of mice—Curious rats—Return to Blonde—Ulpu—Araucanian dress—Arauco—'Boroanos'—Tubul—Bar rivers—Apples—Ferry—Blonde sails—Seek for the Leübu—Schooner Carmen—Errors and delay—Embark Challenger's crew—Rescue the Carmen—Talcahuano—New Concepcion—Valparaiso—Coquimbo—Challenger's sail in Conway—Reflections.

THE Challenger sailed from Rio de Janeiro on the 3d of April 1835: she had much bad weather off Cape Horn, which lengthened her passage considerably.

On the 18th and 19th of May, strong north-west winds, with thick weather and heavy rain, prevented observations being taken; except a few for time only. The ship was approaching the land, and her position estimated by dead reckoning from the last observations.

At five P.M. on the 19th, the Challenger hove-to, bent cables, unstowed the anchors, and sounded, but no bottom was found with two hundred and ten fathoms of line. This sounding was taken as a matter of form rather than utility, for no one supposed that the ship could be less than fifty miles from a steep coast, off which soundings extend a very little way. At this time, she was really about twelve miles from Mocha, which bore from S.E. to S. The weather was clear overhead, but too hazy near the horizon to see land, or any object distant more than four or five miles. Mocha is high, bold land, which in clear weather may be seen at thirty, forty, or even fifty miles distance; but soundings are no guide in its neighbourhood. They are irregular, and indeed not to be got, except very near the land.

A course was shaped for passing Santa Maria, and approaching the entrance of Concepcion Bay; and with a strong wind from W.N.W., the ship ran eight or nine knots an hour, under treble-reefed topsails, courses, and jib, steering N.b.E. until

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eight o'clock, when it was thought prudent to haul to the wind until daylight. By many on board even this step was deemed unnecessary caution. Captain Seymour proposed putting her head to the south-west till daylight; but the master felt so confident of the ship's place, and so much disliked the idea of losing both time and ground, that his opinion was preferred, and her head was kept to the northward. About nine, or soon after that time, the Challenger was lying from N. to N. ½ E., going about four knots, under the sail before-mentioned. The wind had moderated; but a thick haze surrounded the ship, though the sky overhead was clear.

Captain Seymour had been walking the deck for some time, and had only just gone to his cabin, when a change in the appearance* of the water alongside, and an unusual motion of the ship, startled the officer of the watch, and induced him to order the 'helm' down and 'about ship,' while a midshipman was sent to tell the captain there was a suspicious alteration in the water. Just then breakers were seen by the look-out men and by the officer of the watch at the same moment; and as the captain flew up the ladder, (the ship coming round) he saw her position, and gave the order, 'mainsail haul,' as she was rising to a heavy rolling breaker. The after-yards swung round, but while bracing them up, she struck heavily; then 'hauling the head-yards,' and bracing up, she seemed to 'gather way;'—the foam alongside, from the recoiling waves, probably deceiving their eyes. A high breaking sea struck her bows—and astern upon the rocks, a helpless wreck, the proud Challenger was dashed.† Again, a great roller approached, threatening to overwhelm her; but it broke short, and only drenched her fore and aft with force sufficient to wash men overboard. While bracing-up, the topmen had been ordered aloft to shake the reefs out, and readily they went, without

* Lines of foam, and intervals of light-coloured water.

† When the ship was thus hove violently astern, her rudder, stern-post, dead-wood abaft, gun-room beams, cabin-deck, and many timbers, besides planking, crashed awfully as they broke at once before the resistless power of an ocean swell.

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a moment's hesitation. They were, however, quickly recalled —a few moments sufficing to show that saving lives was all that could be attempted. Each succeeding sea drove the ship's stern higher than the bow* upon the shore, and along shore withal, inside some rocks, which partly deadened the fury of the great south-west swell, that rolls in directly against this part of the coast. That the sea did not break at first upon the hull of the vessel, and drive every thing before it, is accounted for by her position—with the bow to seaward—and by the defence afforded by a large rock near her bow which received the first shock of each wave.

Heavily the ship continued to beat upon the shore, reeling from side to side as seas struck her, yet her masts, though tottering at every shock, did not fall; nor did her strong hull yield to the continual striking, until hours had passed. Then, indeed, the rising of the tanks and contents of the hold showed that her frame had given way, and that the well-built Challenger would never float again. There was scarcely any wind; but the roar of the breakers and the clouds of spray would have almost stupified the crew, had not life been at stake. No land could be discerned till after the moon had risen—no one could even conjecture where the ship had struck, excepting only the master, who thought they must be on the Dormido shoal, off the island of Santa Maria. The purser collected the ship's papers, and saw them headed up in a water-tight cask: each person endeavoured to secure some valuable:—till daylight came further preparation would have availed nothing.

The captain was asked to cut away the masts; but he refused to let more than the mizen-mast be touched, because their weight, after the first few seas, steadied the ship, as she lay over, and prevented her rolling to seaward with the recoiling waves. When she first struck, he was asked to let go the anchors; another request which he wisely refused, rightly judging that having struck, anchoring could not improve their

* The peculiarity of her form—drawing as much water forward as she did abaft—may have been partly the cause of her bow remaining to seaward, which contributed so much to the preservation of lives.

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condition, but might prevent their drifting past the rocks and nearer to the shore; both anchors, however, were kept in readiness, in case the water astern should deepen, which might have happened had they struck upon an isolated shoal, like the Dormido.

Soon after the moon rose, at about two in the morning, land was seen astern of the ship, not far distant. It seemed to be rather extensive, though not high; and as there was no longer any doubt of their having struck upon the mainland, better hopes of saving life relieved the torturing, anxious suspense they had hitherto endured. Daylight shewed them the shore on which they were. Near the ship lay an extensive sandy beach, and beyond it, gradually rising in the interior, a thickly wooded country appeared to reach to distant mountains. The mizen-mast was then used to form part of a raft; the jolly-boat was lowered over the stern; and in her Mr. A. Booth (mate), after a long struggle, reached the shore, with the end of the deep-sea lead-line. Mr. Gordon (midshipman), next tried to land in another boat, to assist in hauling a rope ashore, but the boat was upset, rolled over and over, and Mr. Gordon and one of the men were drowned. The other man was saved. Mr. Gordon was one of the most active and able young men of his age, and very much esteemed by all his shipmates.* His fellow-sufferer, John Edwards, was one of the best men in the ship.

A stream of tide or current, setting two or three knots an hour, along the shore, much increased the difficulty of reaching it, or of assisting those who were making the perilous attempt. Meanwhile, each succeeding heave of the sea forced the ship higher upon the sandy beach, and rendered the situation of those on board less critical.

The men who reached the land safely, hauled stouter ropes ashore with a line; rafts were then made; the large boats got overboard; the sick landed, and a party was sent ashore to protect them. A few Indians appeared at a distance, whose approach, with numbers of their countrymen, was a serious evil in prospect.

* He had anxiously sought to go in the first boat.

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Before much had been done in landing stores, a great many Indians and some creole natives had assembled. Nearly all came on horseback, and many assisted in hauling the rafts ashore, or helping the people to land. Even the Indian women rode into the furious surf, and with their lassoes helped very materially: some took the boys up behind their saddles, and carried them ashore; others fixed their lassoes to the rafts. Thus instead of molesting the sufferers, these 'uncivilized barbarians' exerted themselves much for them. What a lesson to the 'wreckers' of some other coasts, whose inhabitants are called civilized!

But notwithstanding these friendly acts, Captain Seymour was too prudent to put confidence in the natives. He remembered the saying, 'Nunca, nunca fiarse à los Indios;' and forming a small encampment upon the beach, he barricaded it with spars, boats, casks, and other moveables.* There every thing was carried when landed, and put under care of the guard. All this day was anxiously occupied in landing stores and provisions. A small party remained on board; but the rest were on shore, during the night of the 20th.† Throughout the following days, some of the officers and all the men who were not on guard ashore, were constantly occupied in bringing provisions, ammunition, and stores from the wreck. Heavy and laborious as this duty proved, it was persevered in until every transportable article of value was removed. Two boat carronades were mounted on shore, which, with small arms and the barricade above mentioned, would have kept off a considerable force of Indians.

On the 21st, Lieutenant Collins and Mr. Lane (assistant-surgeon) set out to go to Concepcion: whence, directly after they arrived, Mr. Rouse set out, with horses and mules, taking such few useful things as he could carry, among which were two small tents, that had belonged to the Beagle, and were lent to Mr. Rouse, when his own house was shaken down by the destructive earthquake of February.

* The barricade was finished on the 25th.

† It was on this day that the Swede saw the unfortunate Challenger.

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Wherever Mr. Rouse went he carried with him the thorough good-will and high respect of the inhabitants of the province of Concepcion—a feeling inestimably valuable at such a time, and totally different from the mere outward formal civility shown to him as the British consul! This feeling forwarded him on his journey, induced others to assist in earnest, and afterwards enabled him to procure a large supply of fresh provisions for the shipwrecked crew.

From Concepcion Lieutenant Collins went to Talcahuano, to hire a vessel. Only one fit for such a purpose was in the port, the Carmen, an American schooner, but her owner asked a price so utterly unreasonable, that the Lieutenant refused to engage with him, and returned to the wreck.

After Lieutenant Collins was despatched to Concepcion, Captain Seymour and the master went to examine the mouth of the river Leübu, about eighteen miles to the N.N.W. of Point Molguilla, where the ship struck. They found that boats might enter and leave the river with most winds; that there was no bar at the entrance; and that under Tucapel Heights* there was a spot very suitable for their encampment, until some means of embarkation should offer. Travelling overland so great a distance as to Concepcion, in such a country, would have been almost impracticable, except as a last resource; for it must have involved the total loss of every thing which they could not carry on their backs, and rendered useless the many days hard labour, in a raging surf, by which so much had been landed. It was therefore resolved, that as soon as all valuable stores which could be removed were landed, measures should be taken for shifting their camp to the Leübu.†

When the consul arrived his advice strengthened the opinion

* Immediately over the entrance of the river.

† While Captain Seymour was away at the Leübu, the officers availed themselves of the opportunity to get the greater part of his stores and private property, books, &c. landed; for he would not allow any of his own things to be moved, or a man to be employed about them, while an article of the ship's stores could be saved, though his private property was very valuable.

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of Captain Seymour, and their immediate removal was decided upon. Though the Indians as yet had been inoffensive, Mr. Rouse had heard as he came of a large body who were approaching from the interior, and whose intentions he suspected to be hostile. The tribe then about Molguilla was that of an Indian cacique, in alliance with the Chilians, and therefore inclined to be civil, while the plunder was not very tempting, and while all the party were well armed and on the alert.

A few days after the ship was wrecked, this cacique gave a fine young heifer to Captain Seymour, who thanked him for his present, and expressed regret that any thing he could offer in return must be very trifling; when he was startled by a violent exclamation from the chieftain, who indignantly refused to accept any thing from men in distress. He would not take the paring of a nail from them, (biting his thumb-nail angrily as he spoke).

By Mr. Rouse's exertions and assistance, as interpreter and adviser, several yoke of oxen were procured, as well as many horses, mules, and donkeys; but even with such unhoped-for help, the removal of the heavy stores which had been saved was a tedious and difficult undertaking. Once established, however, at Leübu, they felt comparatively secure: tents were made out of sails; a palisade was fixed and a ditch dug: but the guns, spars, anchors, cables, and large boats, were left on the beach, as they were too heavy for removal overland; and to transport them by sea, from such an exposed coast, was out of the question.

Leaving their good ship a wreck upon the shore, in the hands of those who would soon destroy her, to get at the copper and iron, was to all a melancholy sensation. But the feelings of her captain at that moment—how little those who obeyed orders had to feel, compared with him who gave them!

On the 8th of June the wreck was abandoned: and the whole party were encamped at Leübu. Time passed away but no tidings of assistance arrived. Sickness began its insidious attacks: for cold wet weather had succeeded to a duration of fine dry days unusual at that time of year. Some of their

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essential articles of provision were exhausted: inactivity and uncertainty were depressing the minds of all, and Captain Seymour had begun to concert measures for abandoning the ships' stores, which had been so painfully saved, and travelling overland to Concepcion, when the letters from Commodore Mason were given to him. It ought not to be forgotten that Mr. Rouse decided to remain with Captain Seymour, and share his fate, whatever plan he might adopt.

Among evils of magnitude trifling vexations are little noticed; an absolute plague of mice caused amusing occupation, rather than annoyance. The ground, the tents, their beds, everything and every place was infested by mice: nothing was safe from their teeth; provisions were hung up, and people were obliged to watch them. Hundreds were killed every hour, for they literally swarmed over all that part of the country, and curiously enough the old people attributed their appearance to the earthquake! Besides these mice, which had feet like those of a lizard, enabling them to climb in all directions, even along the smallest line or branch of a tree, there were animals that they called rats, about the encampment at Leübu, which deserve mention, not on account of their numbers (as there were comparatively few) but because they were formed like opossums, having a pouch to contain their young for some time after birth.

Early the next morning (24th) I went up with Captain Seymour to the heights of Tucapel, which overlook the river and command an extensive view of the sea. Flag-staffs had been erected there, and large piles of wood collected, in order that flags might be kept flying by day, and fires burning at night. The little camp below presented a regular and very respectable appearance: fourteen or fifteen tents, pitched in regular order, and surrounded by a palisade with a ditch, would have caused even a large body of Indians to hesitate before they attacked it. I was much struck by the strength of the position, and the ease with which it might be defended by a small force against numbers, and still maintain communication with the sea. There was formerly a small settlement there, called a

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town, though in truth only a very small village: but latterly, the river Leübu has scarcely been noticed, except as the last retreat of the pirate Benavides. Nevertheless it is a situation admirably adapted for a commercial as well as agricultural settlement.

Though bread and other things were deficient, the shipwrecked party never knew the want of water, and they had always an abundant supply of a very fine kind of potato, which perhaps is hardly to be surpassed in size or quality by any in the world. Not one of the officers of the Challenger had seen its equal, and I never recollect eating any that were so good, and at the same time so large.* Neither beef nor mutton were scarce, in consequence of the 'credit' obtained by Mr. Rouse. Money was soon exhausted, but the high character of the consul was known all over the country, and the natives trusted implicitly to his word.

The report of a 'wreck' had quickly drawn numerous plunderers, even from Concepcion and Talcahuano: but those pilferers satisfied themselves secretly, I believe, without attempting any daring robbery. During the confusion of the first day no doubt much was stolen by Indians, and hidden in the neighbourhood: since many articles were sold to the Talcahuano people for spirits or tobacco, and being taken by them to that place, occasioned a report of the officers and crew having been stripped and plundered.

But it must not be supposed that Captain Seymour and his officers had no internal troubles, and that strangers were their only foes. Shameful acts of robbery were committed by some of the Challenger's own party: a very few of her marines scrupling not to rifle chests and boxes belonging to officers. This conduct, in connexion with a spirit of insubordination which began to show itself, among some of those who knew Captain Seymour the least, occasioned his calling the crew together on the beach, and causing one man to be corporally punished.

* The officers of the Blonde were of a similar opinion, after trying a great many that were sent on board from the Leübu.

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On this trying occasion Captain Seymour animadverted on the thoughtless conduct of a few who talked of what ought to be done, as if they were on equal terms with those whose authority at such a time was more than ever necessary; and who, in their unguarded conversations, heeded not who was listening, or which of their inferiors might be influenced by their opinions. He reminded them of the treacherous and often hostile disposition of those Indians who then surrounded them, and were daily increasing in numbers; and made known not only his own determination to stay by the stores, at all hazards, but that those who attempted to desert should do so at the peril of their lives. He well knew that the majority (and that majority included all the worthiest and best) would stand by him to the last, and think little of difficulties or dangers incurred in doing their duty.

After this well-timed public admonition not a word more was heard about "abandoning the stores, and making the best of the way to Concepcion." Neither was there again occasion to inflict punishment. This one act of necessary justice, executed so properly and decidedly, was probably the means of saving much property, of upholding character, and even of preserving many lives: for when once anarchy begins, who can foretel all its consequences?

Anxious to return as soon as possible to tell the Commodore how easily the Blonde might take off both people and stores, at the mouth of the Leübu, that he might lose no time in effecting the embarkation—I recrossed the river and was galloping towards Quiapo, before noon (on the 24th) hoping to reach Arauco ere midnight; and, certain of fresh horses, I and my two companions spared neither whip nor spur. Our guide dropped behind, but as we could find the path by our tracks of the previous day, we did not wait for him. Such ravines (quebradas) as we passed: how we got through them during the black darkness of the preceding night astonished me, for we could hardly scramble along in broad daylight: and had I known the nature of those passes, I certainly should not have tried to get through, excepting by day.

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At Quiapo we had a mixture of corn and water, which I thought tolerably good. It is a common mess among the lower class of natives in many countries besides Chile.* A few handfuls of roasted corn, roughly pounded between two stones, were put into a cow's horn, half full of cold water, and well stirred about with a stick until changed into a substantial mess of cold porridge. Our haste shortened the journey, and we should have reached Arauco in good time, had not a second guide (the man who waited at Quiapo with the Arauco horses) mistaken the road, and taken us along a track which was crossed by two rivers, not then fordable. His error was not discovered until too late, and to pass the rivers we were obliged to make a delay of several hours. The tract of country we traversed this day, was as fine as any that I have attempted to describe. I do not think we rode over or even saw an acre of unproductive land. The woody districts were very pleasing to the eye, and as specimens of a rich and fertile country almost in a state of nature, equally so to the mind. In many places our road lay through an open forest, where fine trees stood at considerable distances apart, and not being surrounded by underwood allowed us to gallop between them as we pleased. I thought of England's forests in the 'olden time.'

In one of the quiet woodland glades we passed through, some of the finest cattle I ever saw were grazing. One immense animal would have attracted admiration, even by the side of show-cattle in England. Very large, well-shaped, and extremely fat, he looked and moved as if few things had ever caused him to turn against his will. These cattle have owners, I was told, but are seldom molested: once perhaps in some years a large number may be killed for the sake of their hides and tallow; and even then so extensive and so little known are these woods, that a considerable proportion of the cattle are not seen by their indolent destroyers, nor yet at the almost nominal musters which take place annually. The

* Among the Araucanian aborigines it is made with maize, and called ulpu.

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soil being usually of a tenacious, clayey nature, and streams of water numerous, moisture sufficient for vegetation is ensured, even at the dryest periods. Indeed, these countries never have suffered from drought; their climate being a happy mean between the dry, parching heat of Northern Chile, or Peru, and the continual wet, wind, and chilliness of Chiloe.

The first river we had to cross was not more than fifty feet wide, but the banks were hollow and rotten. Our guide looked along the stream till he found a tree which had fallen across, so as to form a bridge over two-thirds of the width: and with a pole in his hand, he climbed as far as the boughs would bear him: then finding that the water beneath was not above his middle, he waded through the remainder. Unsaddling, we sent all the gear across by help of the tree and lassoes, and turned the horses over, much against their will, for they had to plunge in and scramble out.

Again using our spurs, we hoped to pass the second river also before dark, but in vain; there was only just daylight enough left to see that it had overflowed its banks, and seemed to be wide and rapid. Even Vogelborg thought it impossible to cross before the next morning, so we turned back to look for some hut in which we might obtain shelter from heavy rain, which was beginning to pour down. The night was very dark and our prospect rather comfortless, when we were fortunate enough to find a 'rancho,' and there we gladly took refuge. Its owners were absent at a merry-making in the 'neighbourhood' (about twenty miles off!); their daughters, however, and an Indian captive (from Boroa) were not deficient in hospitality. Poor girls! they were rather frightened at first, at their house being so suddenly occupied, but our guide quieted their alarm. As soon as the horses were provided for, we looked about for food for ourselves, and could find nothing but potatoes, till, hearing Vogelborg call for help in his broken English, I ran to him thinking he was hurt or attacked. He was struggling with a sheep which he had caught, and was dragging to the hut. Greatly were the poor girls alarmed when they saw that the sheep was to be sacrificed; they ex-

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claimed that their father would beat them terribly, that the sheep was worth eight rials!* A dollar for the sheep, and another for each of themselves, altered their tone; and before long we had such a fire and supper as the old 'rancho' had not witnessed since the wedding-day of its owners.

But what a night of penance we passed—the place swarmed with fleas, not one moment could I rest, though very tired; and it was raining too hard, and was too cold to sleep outside in the open air. These insects are the torment of travellers in Chile. The natives appear either not to feel, or not to be attacked by them, but an unlucky stranger who ventures to sleep within the walls of an inferior kind of house, or even any country house, in Chile, is sure to be their victim. When I stripped to bathe the next day, I found myself so covered, from head to foot, with flea-bites, that I seemed to have a violent rash, or the scarlet fever.

As the day broke (on the 25th) we mounted our horses, eager to get away from such unceasing tormentors: and the Indian girl undertook to show us a place where we might pass the river, even flooded as it was. By the help of fallen trees, lassoes, and poles, we conveyed ourselves and the saddles across; but to get the horses over was very difficult. The stream being rather wide and rapid, and the banks steep and rotten, occasioned so much difficulty, that two whole hours were spent in getting the animals across and out of the river. Our united strength applied to good lassoes, was barely sufficient to help the struggling and frightened creatures up the muddy broken banks. When one had passed, the others followed in their turns more readily; but I thought we should have lost one of them. From this river to Arauco was not above an hour's ride, at the pace we went, though it is called seven leagues.

During the last two days I had seen several Indians of pure Araucanian blood, in their native dress, and was much struck by the precise similarity of that worn by the women, to the dress of the aborigines of Peru, as described and figured in Frezier's voyage. The square cloak, or mantle, thrown over the shoulders,

* Or a dollar, equal to about four shillings.

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and fastened in front by a pin with a very large flat head, the size of a dollar, or even the palm of a hand; the broad band round the waist ornamented with beads; and the beaded or brass ornaments in the hair, ears, and round the neck, caught my eye sooner than their features, which are so similar to those of the almost Indian breed who live on the borders, that at first sight the difference was hardly noticed. Perhaps the eye of one of those Indians who has never lived with civilized people, is the only feature which differs strikingly: so much have the lower classes of Chilian creoles mixed with the aborigines. In the eye of a free, wandering Indian, there is a restless suspiciousness, which reminds one of the eye of a wild animal: but this peculiar expression is soon removed by civilization.

The clothing of the Araucanians, made by themselves, is very strong good cloth. Indian ponchoes will keep out rain longer than any others. Dark blue is the usual colour of their clothes, from ponchoes to petticoats; and they are all of woollen manufacture.

The women dress their hair with some pains, and ornament it with beads, bits of brass, or large-headed pins, such as those I have described. Some few have ornaments of gold: and to see an Indian woman dressed in her national costume, with large golden ornaments, quite transports the imagination to the days of Cortes and Pizarro. I saw but one so ornamented, a fine-looking young woman, the daughter of a cacique, who had accompanied some of her tribe to look at the ship-wrecked white men. Her horse was a beautiful animal, looking as wild as herself.

At Arauco the worthy colonel welcomed me to breakfast, but regretted that I had been prevented from proceeding to the wreck: he thought some accident had happened, and hardly could believe that we had actually passed a night at the Leübu. D. Geronimo told me he had received intelligence of a large body of Indians, about three thousand strong, who were marching northward against Colipi, and his allies, the Chilians. He thought it probable that they would molest the Chal-

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lenger's people, for the sake of plunder as well as because they had been on friendly terms with Colipi.

This hostile tribe, whose visit he was anticipating, was that called 'Boroanos,' by the Chilians ('Boroa-che,' by the Indians). I have before said that in Boroa there are fair Indians; and that I saw, when at Valdivia, one of the natives of that district. The Indian girl, whom I mentioned just now as a captive, agreed exactly in what she stated of them, with the account I had previously heard. She and the 'Boroana' at Valdivia both said, that "their fathers had told them that the 'rubios' (meaning red and white, or red-haired people) were children of the women whom their ancestors took prisoners when they destroyed the seven cities." Many of these 'rubios' had blue eyes, with rather fair complexions; and some few had red hair. If this is the true story, they must be gradually losing such striking peculiarities; and the assertion made a century ago that there were white Indians in Araucania, might well be thought erroneous now. Both of the 'Boroanos' whom I saw had dark blue or grey eyes, and a lighter complexion than other Indians; but their features were similar to those of their countrywomen, and they had long black hair.

In our way to Arauco this morning, we passed by Tubul, a place admirably adapted for a large town, but now occupied only by a few poor families living in huts. Hills surround a fine plain, through which the river Tubul winds to the sea: lying in that river, I saw the remains of a whaler (the Hersilia) captured by Benavides, when at anchor near the island of Santa Maria.* She was brought into the Tubul, plundered, and partly burned.

Some years ago, ships of two hundred tons could enter the mouth of this river, and pass up nearly a mile; but the late earthquake had raised the land so much, that only very small vessels could enter at this time. May not changes of relative level, similar to this, have occurred at the rivers

* Captain Hall's Journal, vol. i. p. 312-13.

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Cauten, Tolten, and Bueno? The Cauten, or Imperial, is spoken of by the earlier writers on Chile, as admitting ships of burthen; but now the entrance of each of those rivers is almost closed by a bar.

In opposition to this idea it may be urged, that where a large river runs into the sea exactly against the direction of the prevailing wind and swell, a bar of sand, shingle, and mud must be formed by deposition from the opposing waters; and that it is only where a river runs uninterruptedly into the sea, protected from wind and swell by a projecting islet or point of land, that a perfectly clear entrance may be expected; and, therefore, that the Spanish accounts must have been incorrect. I suspect that they described those rivers as they found them at some distance in-land, not at the mouth.

Leaving the hospitable colonel assembling a remarkably awkward squad, whom he was anxiously preparing for the threatened attack of the 'Boroanos,' we rode away upon the good horses which, three days previously, had brought us from Concepcion.

At the Carampangue there was no balsa. What was to be done? To wait until some one brought a boat from the opposite shore might expend the day; but the river was wide and deep, and the weather too cold for so long a swim: nevertheless, five dollars excited our guide, or rather horse-keeper, to make the trial, and during several minutes I thought he must have been drowned: for, instead of slipping off the horse, and holding by the mane or tail when he began to swim, the man sat bolt upright, so that the poor horse's head was scarcely visible; and both horse and man appeared to get confused, turning round in the stream two or three times, while the current was carrying them down the river. At last they struggled out, to my infinite joy, and galloped off in search of the men whose business it was to attend at the ferry with a balsa. While we were anxiously waiting, a large party appeared on the opposite bank, with whom were the balsa-men. They had been merry-making, the previous day having been the feast of St. John; and as they had hardly recovered from the effects of 'chicha,'

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and other favourite libations, to carry so large a number across upon a small raft, was a difficult undertaking. Talking at the pitch of their voices, laughing and tumbling about, their reaching the opposite shore without a cold-bath, was attributed by Vogelborg to the protection of the saint whose anniversary they had so dutifully celebrated. The 'chicha,'* is sometimes fermented, and then soon affects a person's head, if drank to excess: but these votaries of St. John had doubtless improved its insipid taste by aguardiente. During the chicha season, or autumn, the Indians are said to be more dangerous than at other times, as they indulge in this, their favourite beverage, to excess.

Apple trees are now abundant in southern Chile, throughout the Indian as well as Spanish territories. They were also plentiful on the eastern side of the Andes, particularly about the river Negro and the great lake 'Nahuelhuapi,' in the middle of the last century. Whether they are indigenous, or were planted by the early missionaries, has been much disputed in that country; but as the Indian name for them is 'manchana,'† I should incline to think they were introduced by the first missionaries.

Our road over the heights of Villagran was much worse than at our former passage. Heavy rain and constant traffic, in consequence of the wreck, had worn it into a curious succession of steps: and each animal endeavouring to place his feet in the holes made by those which had previously passed—the rain having filled up the hollows with mud and water—had worked the clayey track into a continuation of transverse ridges and trenches. A man might step from ridge to ridge without wetting his feet; but the horses always planted their legs, up to the knees and hocks, in the mud and water of the trenches. Their motion was just as if they were stepping over logs of timber: unpleasant enough for the rider, and extremely tiring to themselves. We helped them however as much as possible, to the surprise of our lazy guide, by dismounting and leading them up the hills as well as down.

* 'Chicha' is made with maize, apples, or other things.

† Manzana is Spanish for apple.

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We reached 'Playa Blanca' as it got dusk. The heights near Point Coronel were difficult, in the dark, but we passed without worse disaster than a roll in the mud, from my girths breaking while struggling in a slough. Along the level lands of Don Juan de Dios Rivera we galloped briskly, until we were completely bewildered in the darkness. At last we found ourselves among enclosures, and by pulling up rails and breaking fences, made our way to a farm-house, where such information was obtained as enabled us to reach San Pedro, on the south bank of the Bio Bio, soon after midnight. No inducement could prevail upon the owner of the ferry-boat to let her take us across before daylight, so we sat down by a fire, after feeding our excellent horses, and dozed till daybreak.

With the first dawn we drove the lazy boatmen to their barge, urging them alternately with money, entreaties, reproaches, and threats. The river was exceedingly swollen by late heavy rains, so that it was almost twice as wide, and quite as rapid, as usual. Our heavy ferry-boat was 'tracked' up it until it seemed possible for us to reach the other bank before the current swept us out to sea; but the appearance of the boat and men, and the utter uncertainty caused by a very thick fog, gave me no great hopes of reaching Concepcion in any reasonable time, though a vivid expectation of passing a few hours upon a sand-bank at the mouth of the river, if we escaped being hurried into the open sea. In this clumsily-built, flat-bottomed boat (a sort of large punt) were five horses, a troublesome young bull, six men, and three nominal boatmen, one of whom merely attempted to steer. With very long poles our unwieldy craft was pushed into the stream, and while the shore could be distinguished through the fog, made progress in a proper direction, though most crab-like was the movement. When fairly out of sight of land, the boatmen became alarmed and puzzled; but just then a large bell was heard tolling at Concepcion, which served to animate them, and to ensure our trying to go in the right direction. After an hour's unpleasant work, in a very cold morning, we landed about a mile below Concepcion, having started about as much above it on the oppo-

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site side. No time was then lost in galloping to Talcahuano, and going on board the Blonde, so that Captain Seymour's letter was delivered to Commodore Mason soon after ten.

I found that the commodore had engaged an American schooner* to go in search of the crew of the Challenger; and that Mr. Usborne had been sent in her, with the second master of the Blonde,† three seamen of that ship, my coxswain, and the whale-boat which I took from the Beagle; she was a poor craft, and wretchedly found, though reputed to have sailed well, and to have been a fine vessel in her time. They left Talcahuano on the day after a gale from the north-west (on the 24th), which, by all accounts, was one of the severest that had been experienced during many years.

The Blonde sailed from Concepcion Bay on the 27th, the morning after I arrived; but unfortunately, during all that day, thick weather and half a gale of wind from the northward, prevented our having even one glimpse of the land, as we were running towards the entrance of the Leübu.

On the 28th, thick weather kept us in the offing. On the 29th, at daylight, the schooner Carmen was seen, and soon afterwards, through the haze, we made out Tucapel Head. At this time, neither Vogelborg (who was on board as local pilot) nor I, knew that the Heights of Tucapel Viejo were identical with the headland we recognized by the name of Tucapel Head. We both thought that Tucapel Viejo was in the bay where the river 'Lebo' is placed in the old Spanish charts. This error appears almost unaccountable to me now; though both he and I were then drawn into it by a variety of reasons unnecessary to detail here, and we therefore advised the commodore to run along-shore towards the supposed place of the Leübu (or Lebo), which he did; but the weather was so unfavourable, so thick and hazy, that nothing could be seen distinctly. Scarcely indeed could we discern the line of the surf, heavily as it was beating upon the shore; and at noon we were obliged to haul off, on account of wind and rain.

* The Carmen; for which such exorbitant demands had been made in answer to Lieutenant Collins. † Mr. Biddlecombe.

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I should have mentioned that we spoke the schooner at eight in the morning, when Mr. Usborne said they had seen nothing in their run along-shore on the 26th, the only clear day they had had. After speaking us, he kept to the northward, intending, as we concluded, to close the land about Tucapel Head, and again run along-shore to the southward. In the haze we quickly lost sight of the schooner; but thinking that we should soon meet again in clearer weather, little notice was taken of this circumstance, which was afterwards so much regretted. Continual thick weather prevented any observations being taken, as well as the land from being seen, until the 2d of July, when Tucapel Head was indistinctly made out in the distance. But strong wind and a high swell were reasons sufficient to keep the Blonde far in the offing, while thick hazy weather lasted; and after making the land we actually stood to sea again, without even attempting to show the ship to the poor fellows on shore. In the course of this night a few stars were seen; and their altitudes were the only observations that could have been obtained at any moment since we left Concepcion Bay, during six days of constantly clouded and hazy weather, in which neither sun, moon, nor stars, nor even the horizon could be seen!

On the 3d, Tucapel Head was again made out indistinctly; but nothing was done, a wide offing being still preserved.

On the 4th, the weather had improved enough to allow of a partial view of the coast between the supposed place of the Leübu and Cape Tirua; but no signal-fire, nor any thing like a flag, could be perceived on any of the heights.

Land appears so different when viewed from an offing at sea and when seen closely, especially from the land side, that it is less surprising that Vogelberg, who had visited the Leübu dozens of times by land, and also by sea in a boat, should be as much at a loss as myself to recognise the height which we had both ascended with Captain Seymour.

How it happened that I, who had surveyed this coast, should be ignorant of the real place of the Leübu, as I then certainly was, is another affair entirely, and one which I feel bound to

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explain. A momentary reference to my instructions shows that the Beagle was only expected to "correct the outline, and to fix the positions of all the salient points"* of the coast between Chiloé and Topocalma (near Valparaiso); and the Beagle's charts of that coast prove that a great deal more was accomplished than was thought practicable when those instructions were framed.

Between Cape Tirua opposite Mocha, and Tucapel Head, the shore was laid down on our chart as determined by triangulation connected with the ship under sail, her distance from the land varying from one mile to five miles; and as no river was seen thereabouts, nor any break in the coast-line where a river's mouth could be, our chart contained merely a note, saying, "River Lebo, according to the Spanish chart." Now, the erroneous place of this Lebo (meant for Leübu) was twenty miles south of the real position, which, shut in behind Tucapel Head, could never have been seen from any vessel sailing past, however near the shore she might have been. The coast-line in the Beagle's chart was proved to be perfectly correct; but the place of the Leübu, which could only have been obtained by landing, or having a local pilot on board, was not known; and not being a navigable river, I did not deem it of sufficient consequence to be worth our delaying on an exposed coast, without an anchorage or a landing-place—so far as I then knew—while it was sought for.

Considering the multiplicity of places the Beagle had to visit subsequently, I often found it necessary to sacrifice such details as seemed to me of least consequence. Every seaman knows how very difficult it is to make out the openings of some small rivers, while he is sailing along a coast little known, and all marine surveyors know that there is seldom any way of making sure of such openings without landing; or entering them in a boat. I do not say this to excuse neglect—not feeling culpable—but simply to explain how the case stood.

On each day, when near the land, guns were fired at intervals, and sometimes three or four were fired at once; blue

* Hydrographer's Memorandum, p. 31.

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lights also were occasionally burned during the nights, in hopes that the schooner might see them.

On the 5th of July, the day broke clearly for the first time during the longest week I ever passed, and we saw the land distinctly, from Cape Rumena to Tirua, with Mocha Island, strange to say, for the first time—near it as we had often been. Now that the tops of the hills were quite free from fog or cloud, I recognised the Heights of Tucapel at the first glance; and after looking for some minutes at their summits, through a good glass, I distinctly saw smoke rising. Standing towards them—in half an hour flags were discerned on the heights, and there was no longer any doubt; yet no steps were taken until near one o'clock, though it was a beautiful, and almost calm day. From nine in the morning until one, the Blonde lay almost becalmed, about five miles from the land. At one, three boats were sent to the mouth of the Leübu, with some money and a small supply of bread; but a current setting along the shore from the northward delayed their reaching the entrance of the river until evening.

We found the greater part of the Challenger's crew still in health; but delay and bad weather had increased the sick-list, and two of her party (the assistant-surgeon and a young midshipman) were in danger: waiting so long in uncertainty, and without employment, in a wet, dirty place, had tried all their constitutions severely. It was too late to attempt going out into the offing after the Blonde, (which was standing to sea) with the gig and cutter, two indifferent boats; so manning the barge with a double crew, one crew being men of the Challenger, and taking one of her officers (Lieutenant Collins) with me, I hastened out of the river as the sun was setting. A light breeze from the land favoured us, and though the Blonde was hull down in the south-west when we started, we were happy enough to get on board at about eight o'clock.

In going off to the ship after it became dark, we kept the end of a piece of old gun-breeching burning, held up in the bow of the boat. The light, as strong almost as that of a false fire, was seen plainly on board the ship, and then she was hove-to.

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As soon as the barge was hoisted in, the frigate again made sail off shore; but a fortunate mistake caused the main-yard to be squared about midnight, and at daybreak next morning we were in a good position off the entrance of the river. The Blonde then steered towards the land, and at nine anchored near the River Leübu, about a mile from Tucapel Head. Every boat was hoisted out, and the work of embarkation proceeded rapidly. Though a swell made the ship roll heavily, and delayed the boats along-side, the weather was so fine and a south-east wind so favourable, that the quickness of going and returning made amends for some delay in discharging each cargo. At six in the evening, Captain Seymour came on board with the last party of his crew, and at eight, the Blonde weighed and made sail, before a fresh and favourable breeze.

Most of the tents remained standing, being of very little value, and some of the stores were left. For what was abandoned, both there and at Molguilla, the commodore appointed Vogelborg to be agent, leaving him on the spot to take charge: and he wisely asked one of the Chilians who lived in the neighbourhood, and had generally supplied the shipwrecked crew with provisions, to join him in his undertaking. Between them they might have recovered many things of value to individuals, but, to the British Government, nothing worth the great expense of carriage to Concepcion.

Mr. Rouse sent his servants back by land, with his horses and mules, and accompanied his esteemed friend, Captain Seymour, in the Blonde. The numerous Indians and others whom we left gathering round the encampment, in all probability saved Vogelborg and his partner the trouble of taking care of much of the property. They reminded me of the vultures which in those countries gather round the places where men are slaughtering cattle.

During the night of the 6th, the Blonde passed rapidly northward, running before a fresh southerly breeze; and at eleven in the morning of the 7th, she was off Point Tumbes, when seeing a dismasted vessel, with an English blue ensign hoisted, about five miles to the northward of us, the frigate stood towards

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her, and finding that she was the schooner Carmen, closed and took her in tow. But for the Blonde's opportune arrival, she would have been drifted to the northward, and obliged to run into any port she could reach. Mr. Usborne came on board, and as soon as he had refreshed himself by a few hours' sleep, gave me the following account of his proceedings and accidents.

After leaving Talcahuano, wind and weather favoured the Carmen until she had run along the coast from Tucapel Head to Cape Tirua, at about a mile from the surf, without seeing either smoke, flags, people, or wreck; but, during one night, a fire was seen on Tucapel Head. When Mr. Usborne spoke the Blonde, on the morning of the 29th, the schooner was on her way to the place where she had seen the fire; and he would have said so when the Blonde hailed him had he had time, but as she passed on without stopping, and he felt sure that the Challenger's people were not in the direction which she was taking, he kept a different course. At about two in the afternoon of that day, while four seamen were aloft on the topsail yard, furling the topsail, the schooner gave a sudden plunge into a high swell, and away went the foremast head, fore-topmast, and topsail-yard. The four men were carried overboard, but saved; though one (James Bennett) was severely bruised. The mainmast followed, being dragged downwards and broken by the rigging attached to the head of the foremast; and in this state, a mere wreck, the Carmen drifted towards Mocha. So wretchedly was the vessel provided in every way, that the only tools which they had to cut the laniards of the rigging with, were knives and a cooper's old adze.

After clearing the wreck, they got up a small spar abaft, on which was set the Beagle's boat's sail; and by means of cleats,* Bennett and J. Nutcher (boatswain's mate of the Blonde), got to the head of the stump of the foremast, although, being loose in the step, it swayed to and fro as if it would go overboard, and fixed temporary rigging. A staysail and trysail were then set, and just saved her from going ashore upon the wea-

* To secure these cleats to the mast, they were obliged to draw nails out of the vessel's beams, having no others.

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ther side of Mocha, while it was blowing hard, with a high sea running; and in all probability, not one person would have been saved had she struck. If Mr. Usborne had not known this land well, from his late survey, it is not likely that they would have escaped, because when they found themselves about half a mile from the breakers, the tack which appeared to the others to be by far the best, was in truth the worst: had they gone on that tack, nothing could have saved them. Mr. Usborne saw their position exactly, and knowing how the current would affect them, determined upon what they thought the wrong tack, and rescued them. I say that Mr. Usborne did this; because Mr. Biddlecombe was sick, and the master of the vessel reluctantly yielded to the person who he saw was at home, while he himself was utterly bewildered.

After this narrow escape, the schooner was drifted to the southward, as far as the latitude of Valdivia, before the southerly wind, which took the Blonde to the mouth of the Leübu, drove the Carmen back slowly to the northward. Mr. Usborne and his companions had almost entered the opening of the Bay of Concepcion early in the morning of the day on which the Blonde took them in tow, but had been drifted away again by a fresh wind, and were falling to leeward fast, for want of sail, when the Blonde arrived. Mr. Usborne recovered from his fatigue in two or three days, but Bennett was ill for a fortnight.

During the few days they were away, they suffered much. As for the ten men belonging to the vessel, they were utterly useless, being frightened or sick during the whole time; so that but for the exertion of the Blonde's seamen, of Bennett, of the master of the vessel (Mr. Thayer), of Mr. Biddlecombe, and above all, Mr. Usborne, the Carmen might have left her remains on the shore, when perhaps few, if any, would have survived to tell the fatal tale.*

The Blonde worked to windward, with the schooner in tow, during the remainder of the day and early part of the night, and at midnight they both anchored off Talcahuano.

* Mr. Usborne's narrative of this affair is in the Appendix, No. 27.

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Until the 10th, it was necessary to remain at anchor, as there were accounts to settle between the commodore, the consul, the pursers, the officers, and the owner of the schooner; there were visits to the Authorities, to thank them for their assistance, and, as usual on board men-of-war, there was much to do in very little time. To Don José Alemparte, the yntendente of the province; to Colonel Boza, the principal military authority; to D. Miguel Bayon, the governor of Talcahuano; and to Don Pablo Delano, captain of the port, sincere thanks were really due for their earnest exertions. Mr. Rouse took his leave of us on the 10th, and we then sailed.

While the Blonde was lying off Talcahuano, I had a few opportunities of looking about, and seeing that both Concepcion and Talcahuano were rising out of their ruins, and that their unfortunate inhabitants had, at least, roofs over their heads. Concepcion was, and is still nominally, a city: but it will be long before it again appears as such to the eye of a stranger. Some idea may be formed of the low scale to which every thing was there reduced, when I mention that it was very difficult to find a carriage of any kind in which the Commodore could go to visit the Yntendente.

Great discussions had arisen on the subject of rebuilding the city. The government party wished to remove the site to a better position; but there was so strong an opposition, that the result was likely to be the gradual rebuilding of the town in the same place, while the removal was still undecided, and under consideration. Two situations were named as much more eligible than the former: one on the banks of the little river Andalien, about a mile from the old city; and the other, on a rising ground about two miles on the Talcahuano side of Concepcion. This latter position has many and great advantages, as all acknowledged; but people were reluctant to move; each one had or fancied an advantage in the old situation of his house, encumbered as it was with ruins. Besides, many more serious difficulties would arise in leaving small freeholds, and obtaining equivalents in another place: however, an active government might have accomplished so desirable a change without injuring

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any one, by purchasing the ground, and distributing it so fairly that each man should gain rather than lose. The sum necessary for purchasing ground for a new city, would not have been greater than might have been borrowed; and repaid in ten years out of the custom-house.

Perhaps there is not a situation in the world much more advantageous to the prosperity of a commercial city than this of which we are speaking. Centrally placed between the great and navigable river Bio Bio, the port of San Vicente, the noble bay of Concepcion, and an easy communication by land with the best part of Chile, a part which may well be called one of the finest countries in the world:—with a large extent of level and fertile land on all sides—with the means of obtaining water by sinking wells to a small depth, as well as by an aqueduct from the Bio Bio—and with the blessing of an unexceptionable climate—how could the New Concepcion fail to thrive, and increase rapidly? It might be shaken down and destroyed by an earthquake as soon as built, may be said. Probably, may be replied, if the inhabitants should be so unwise as to build houses of brick and stone, one or two stories in height, and with heavily tiled roofs. But let them try another mode of building. Wood is abundant, and let them make that the only material of which either walls or roofs shall be composed. A strong frame-work, similar in some measure to that of a ship, lightly covered or ceiled with thin planks, and roofed with shingles,* would, if placed on the ground and not let into it as foundations usually are, withstand the convulsions of any earthquake which has yet happened in that tormented country. Why do not the Chilians pay more attention to the remark of the aborigines of Peru, who, when they saw the Spaniards digging deep foundations for their buildings, said, "You are building your own sepulchres?"†

The houses of the natives of Peru were in those days built without foundations, simply upon the levelled ground; and they withstood the severest shocks. No house should extend far

* Small pieces of wood, like tiles. † Ulloa, vol. i. p. 340.

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upwards. Nothing should be above the ground floor but a light strongly-secured wooden roof: and they should be placed upon firm ground—if possible, upon rock. The principal objections against the present site of Concepcion are—that the earth upon which the houses stand is every where loose, and sandy, and that it is too near the river.

One day, while visiting a gentleman at Talcahuano, he called three little Araucanian boys into the room where Mr. Rouse and I were sitting with him, and desired them to harangue or make speeches to one another in their own way. The little fellows stepped forward boldly, and one of them spoke to the other two in a very fluent and expressive manner; but ended every marked sentence, or portion of his subject, by the singular sharp rise of the voice which has so often been noticed as a peculiarity in the oratory of Indians in this country. Another boy replied in a similar manner; and then they began to fight with their fists. This part of the display of course we stopped; but we were much interested by the composure and readiness with which the little boys spoke. One of the speakers was son of a cacique. All three had been obtained by actual (though secret) purchase from their countrymen, through the intervention of one of the 'Capitanes de los Amigos,'* one of whose offices is to take the part of and protect the natives. Perhaps, in the first instance, these boys had been stolen or taken prisoners, and were not the children of those who sold them to the 'captain of the friends.' In the family of Don —— those boys found a comfortable and a happy home; he had taken them from the rascally 'capitan de los amigos' as an act of charity, and intended to give them employment and land on his estate. I thought of Lautaro, as I noticed the bright eye of the little cacique.

When I took leave of the Yntendente, he said that he was about to make a journey to the frontier, for the sake of inspecting the outposts and securing the assistance of the friendly Indians: and this, I afterwards understood, was in consequence

* See page 399.

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of the rumoured approach of those hostile tribes of whom Colonel Valenzuela had spoken to me at Arauco.

We sailed from Talcahuano with a fair wind, which carried us quickly and pleasantly along-shore; but crowded, and anxious as we were, the ship could not go fast enough for us. The sick people, excepting Mr. Lane, were improving when we reached Valparaiso on the 13th. Much attention and kindness were shown to Captain Seymour by his acquaintance at Valparaiso; but it could not be expected that he should be cheerful, or inclined to see people, excepting intimate friends, at that time; particularly as the death of Mr. Lane was an additional blow much felt by him. I was very glad when we weighed anchor, on the 17th, for every hour caused an increase of painful feeling.

A fresh fair wind drove us in twenty-four hours to Coquimbo, where the Conway was at anchor ready for sea. It was then arranged, that all the officers and two-thirds of the crew should go home in the Conway; and, of course, no small bustle of preparation for so many passengers was caused. Captain* and Mrs. White already occupied one-half of the captain's cabin, and their luggage a considerable space below; but as both Captain Eden and the senior lieutenant, Johnstone, were bent upon accommodating the ship-wrecked party to the utmost of their power, stowage-room was cleverly contrived.

How striking the contrast appeared between the fertility and verdure of the Concepcion country, and the dry barrenness of the naked earth or rocks about Coquimbo. Scarcely any one went on shore; a mixture of unpleasant feelings occasioned a gloomy heaviness in most of our minds.

On the 22d, both ships sailed from Coquimbo, and soon afterwards parted company. The Conway stood to the westward, 'close-hauled;' while the Blonde steered towards the north with a fresh southerly wind.

What caused the loss of the Challenger?—is a question not easy to answer with certainty. The error in her reckoning

* Then Vice-Consul at Valparaiso.

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amounted to more than forty miles; and the only way in which I can account for it to my own satisfaction is, that while the north-west wind was blowing, a current set to the southward and eastward, for which no allowance was made, as those on board could not be aware that such a current might be found, its existence not being known. A south-east current was not to be expected thereabouts; for the general set of the waters is northerly, excepting near the land, and they thought themselves in the offing. But currents are very uncertain and treacherous in most places. Unusual winds, peculiar seasons affecting the weight of the atmosphere, and those powerful interrupters of all order—earthquakes, have immediate effect upon the great ocean, as well as upon small bodies of water, though not always so visibly.

Scarcely four months had elapsed since that tremendous earthquake, which destroyed so many towns in Chile, had altered the movements of the Pacific Ocean upon all the extent of coast which reaches from latitude forty-five to the parallel of twenty-five. Even in July, the land about Concepcion was scarcely considered to be at rest, and recovered, as it was said, from those awful convulsions. Can it then be considered improbable that the currents of that sea should have taken unusual directions, and betrayed even cautious seamen, such as Captain Seymour and Mr. Macdonald (the master) were well known to be. So much care and judgment had always been shown in conducting the Challenger, and she had visited so many places in the Atlantic, in the Pacific, and among the South Sea Islands, that of all the King's ships at that time in commission, those who sailed in her (unconnected even with her management) thought her one of the last that would end a voyage disastrously.* The surprising manner in which the hull of the Challenger held together, and so long resisted heavy shocks, reflects infinite credit upon her architect (Hayes), and upon the dockyard where she was built.

* This I have heard from several persons who were wrecked in the ship, whose opinions I have reason to respect.

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CHAPTER XXI.

Andes—Aconcagua—Villarica—Islay—Powder—Callao—Rejoin Beagle —Constitucion —Plans — Wilson — Carrasco — 'Galāpagos' — Iguanas —Lava Rocks — Land-tortoises —Craters —Turtle — Shells — Dye— Volcanoes—Settlement—Albemarle Island—Cyclopian Scene—Tagus Cove —Tide Ripples — Settlers — Climate — Salt—Dampier—Birds— Transportation of Tortoises—Currents—Temperature of Water.

THE irreclaimably barren appearance of the sea coast of Northern Chile, is very repulsive to an eye accustomed to woodland scenery: yet there is an effect in its lofty mountains, which seem to rise abruptly almost from the ocean, that charms one for a time. Just before sunrise is generally the most favourable moment for enjoying an unclouded view of the Andes in all their towering grandeur: for scarcely have his beams shot between their highest pinnacles into the westward vallies, when clouds of vapour rise from every quarter, and during the rest of the day, with few exceptions, obscure the distant heights.

It has been long supposed that the Andes are higher about the equator than near or beyond the tropic; but the Beagle's measurements of Aconcagua* and Villarica,† prove that there is still much to be ascertained on this subject. Few results, depending upon angular measurement, are more difficult to obtain with accuracy than the heights of distant mountains. With respect to Aconcagua, though a variety of measurements, taken by different officers at various times, agreed together so closely as to give from 23,200 to 23,400 feet for the vertical elevation of that volcano above the level of the sea, I would not claim to be much nearer the truth than within 500 feet.

The Blonde touched at Cobija, Arica, and Islay—hapless arid dwelling-places for either man or beast, as I have ever

* Lat. 32°. 39′. S.: height, 23,000 feet above the sea level.

† Lat. 39°. 10′. S.: height, 16,000 feet above the sea level.

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seen. Of these and other ports along the coasts of Northern Chile and Peru, nautical information will be found in the Appendix. I will only delay the general reader with one or two observations.

From near Iquique to Arica the precipitous coast is so lofty, and approaches so much to the character of enormous cliffs, about a thousand feet high, that it is really sublime. Near Islay, the land is in several places covered with a whitish powder, or dust, which lies many inches thick in hollows or sheltered places, but is not found abundantly in localities exposed to wind. Much difference of opinion has arisen about this powder. People who live there say it was thrown out of a volcano near Arequipa a great many years ago: other persons assert that it is not a volcanic production, and appertains to, or had its origin, where it is found. My own idea was, before I heard any thing of the controversy, that there could be no doubt of its having fallen upon the ground within some hundred years, for it was drifted like snow, and where any quantity lay together, had become consolidated about as much as flour which has got damp in a damaged barrel.

In one of the old voyages there is a passage which seems to throw some light upon this subject: "As they (of Van Noort's ship) sailed near Arequipa, they had a dry fog, or rather the air was obscured by a white sandy dust, with which their clothes and the ship's rigging became entirely covered. These fogs the Spaniards called 'arenales.'"—Voyage of Van Noort, in 1660, from Burney, vol. ii. p. 223.

On the 9th of August, the Blonde anchored in Callao Bay, and I enjoyed the satisfaction of finding all well on board the Beagle. She had touched at Copiapó and Iquique, for Mr. Darwin, in her way to Callao, where she arrived on the 19th of July. Lieutenant Sulivan brought his little vessel safely to an anchor near the Beagle on the 30th, having accomplished his survey in a very satisfactory manner. So well did he speak of the Constitucion, as a handy craft and good sea boat, and so correctly did his own work in her appear to have been executed, that after some days' consideration I decided to buy

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her, and at once set on foot an examination of the coast of Peru, similar to that which Mr. Sulivan had completed of the coast of Chile. Don Francisco Vascuñan had authorized the sale of his vessel at Callao: she was purchased by me for £400, and immediately fitted out afresh.

I could not spare Lieutenant Sulivan to remain on the coast of Peru, while the Beagle would be crossing the Pacific, on her return to England by way of the Cape of Good Hope; but there was Mr. Usborne, able and willing to undertake the task, who, from his station, could be spared without prejudice to the duties yet remaining to be executed on board the Beagle, and a better man for the purpose I could not have desired. With him Mr. Forsyth volunteered to go, and Commodore Mason was prevailed upon to allow Mr. E. Davis, a master's assistant of the Blonde, to join the little expedition; who, with seven good seamen, and a boy, volunteers from the Beagle, completed Mr. Usborne's party.

A stranger might well smile at the idea of such a boat affair being started to survey, in eight or at most ten months, the whole coast of Peru, from Paposo, near Atacama, to the River Guayaquil; but the task was completed; the charts are now engraved; and very soon seamen will be able to test their accuracy.

Most people are aware that the coast of Peru is free from storms; that the wind blows moderately along the land or from it; and that there is little or no rain. Consequently, as the sea is seldom much disturbed (except by a south-west swell), and there are neither 'races' nor dangerous streams of tide, an open boat might undertake such a task, if safety alone were to be considered, provided that she did not try to land in a surf. The real impediments to surveying that coast are—the surf caused on those steep rocky shores by an occasional heavy swell, almost amounting to rollers, from the south-westward; the delays and doubts created by prevalent fogs; and the loss of positions, as well as time, consequent upon being drifted by currents during a calm. Mr. Usborne had also to prepare for, and provide against, as much as possible, difficulties of a very different nature—those arising out of the disturbed state

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of that country—the anarchical internal dissensions which are the bane of all South America, but especially of Peru. In this respect there were so many prospective dangers, as well as difficulties, that I should not have ventured to let him encounter them, had we not had such a man as Belford Hinton Wilson* to rely upon for foresight, advice, influence, and as hearty unflinching assistance, as any one public servant could afford to another. Mr. Wilson's exertions were unceasing, until he procured every passport and document that could by any possibility be required for Mr. Usborne. He introduced him as well as myself, to the hydrographer (Don Eduardo Carrasco) who assisted us in many ways most materially; and after I left the coast he showed every possible attention and kindness to all the Constitucion's party; winding up by advancing a large sum of money out of his own purse, to forward the service in which they were engaged, and increase their comfort during a long passage to England round Cape Horn.

Captain Carrasco, formerly in the Spanish navy, and now Director of the Nautical School at Lima, gave me, and afterwards Mr. Usborne, every particle of information which he and I thought might be useful—both verbally and in writing—besides which he ransacked the archives for manuscripts, charts, and books, from which he allowed extracts to be taken or copies made, in the most truly liberal manner; and I long to see the results of our voyage, whatever they may be, laid before him and his friends, as an acknowledgment—however slight—of their free assistance and co-operation.

On the 6th of September Mr. Usborne sailed.† He was to commence near Paposo; work along the coast thence to Guayaquil, and afterwards return to Callao.

The following day the Beagle left Callao, and steered direct towards the Galāpagos Islands, of which, as they are novel ground, I shall be rather minute in my description.

15th. Uncertain of the strength, and even of the direction of the currents—though aware that at times the former is very

* Then consul-general, now chargé d'affaires of H.B.M. in Peru.

† Orders in Appendix.

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considerable—we were anxiously looking out for land, when what appeared to be an islet was seen from the mast-head. This seeming islet turned out to be the summit of Mount Pitt, a remarkable hill at the north-east end of Chatham Island. (Charles Island of Cowley, 1684). As the breeze and current carried us onwards, the tops of other hills successively appeared, and for a short time looked very like a cluster of islets.

Gradually rising above the horizon, the greater part of Chatham Island became distinctly visible: in this neighbourhood it is not often that the air near the water is clear enough to allow of very distant high land being thus gradually raised above the horizon of an eye at the mast-head; for, in general, clouds hang about these islands, and the atmosphere itself is hazy. Towards evening the higher parts of the land were clouded over, but we were near enough to see that the island was very rugged—in some places quite barren—in others covered with a stunted and sun-dried brushwood—and that the heights, on which the clouds hung, were thickly clothed with green wood. The shores seemed to be bold, and easy to approach, though not to land upon, because of a continual high surf.

A number of little craters (as they appeared to be) and huge irregular-shaped masses of lava rock, gave a strangely misleading appearance to the lower parts of the island; and when first seen through that indistinct glimmer which is usually noticed over land on which a hot sun is shining, were supposed to be large trees and thick wood.* Hood Island, small and rather low, was seen before dusk, when we tacked and stretched to seaward for a few hours.

16th. Assisted by a current running to the westward, we worked up to Hood Island during the night, and at daylight lowered a boat down and prepared her for Mr. Chaffers,

* This glimmering haziness is at times a great impediment to making accurate measurements of an object, when both it and the observer's eye are near the ground. Raising either some few feet higher, remedies this inconvenience, which is much felt when using a micrometer for measuring a base.

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who, with Mr. Mellersh, was to examine this island and the anchorages about it. Under the land we saw two whalers at anchor, which showed North American colours. The island is small—neither high nor low—rugged, covered with small sun-burnt brushwood, and bounded by a bold, rocky shore. Some small beaches of white sand are visible here and there.

As soon as Mr. Chaffers had set out, the Beagle steered towards Chatham Island, with a moderate breeze, which allowed us to prepare the yawl for another party, under Lieutenant Sulivan. At noon, Barrington Island was visible from the deck, and appeared to be distant about twenty miles; when with Messrs. Stewart and Johnson, and ten chosen seamen in the yawl, Mr. Sulivan left us to examine the central islands of the archipelago.

In continuing our course, we passed through several ripplings, apparently caused by the meeting of streams of current which set along the shores of Chatham Island, from the east towards the west. If not so caused, they must be the effects of currents passing over very uneven ground, but we got no bottom, with fifty fathoms of line. When such appearances are created by shoals, it should be remembered that the shallowest place is generally under the smoothest part, close to the ripple. Favoured by smooth water and fine weather, we passed close to the low south-west extreme, and anchored directly that point was found to defend us from the swell.

This part of the island is low, and very rugged. We landed upon black, dismal-looking heaps of broken lava, forming a shore fit for Pandemonium. Innumerable crabs and hideous iguanas started in every direction as we scrambled from rock to rock. Few animals are uglier than these iguanas; they are lizard-shaped, about three feet in length; of a dirty black colour; with a great mouth, and a pouch hanging under it; a kind of horny mane upon the neck and back; and long claws and tail. These reptiles swim with ease and swiftness—but use their tails only at that time. At a few yards from the water we found vegetation abundant, though the only soil seen was a little loose dusty earth, scattered upon and between the

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broken lava. Walking is extremely difficult. A hand-barrow was lying at the landing-place, which showed that terrapin were to be got near us, though we did not then see any. The men from whalers and sealing vessels carry the large terrapin, or land-tortoises, on these barrows.

Ascending a little hill, we were surprised to find much brush or underwood, and trees of considerable size, as large in the trunk as one man could clasp. These were prickly pears, and a kind of gum-tree: how their roots are able to penetrate, or derive nourishment from the hard lava, it is hard to say; for earth there is scarcely any. Wild cotton shrubs are numerous. This first excursion had no tendency to raise our ideas of the Galāpagos Islands.

17th. Weighed and stood alongshore, sounding. There was good anchorage, until near the south-west point of Stephens Bay, off which the water is shoal, and the bottom uneven. We anchored in Stephens Bay, and found an American whaler lying there. This bay is large, and the anchoring ground generally good; but the landing is bad at low water. There is no fresh water: and it is frequently difficult to enter, as well as to leave, because usually becalmed by high land, it seldom feels the true wind. Enderby Cove is only fit for a boat; at low water it is full of rocks. The Kicker Rock is a curious mass of stone, rising almost perpendicularly from the bottom of the sea, where it is thirty fathoms deep; and in the offing is another (called the Dalrymple, by Colnett), which looks exactly like a ship becalmed, with all sail set. Seeing a remarkable hill at the north-east side of the bay, which had not an appearance like other parts of the island, I went to it in a boat, hoping to find water near the foot, and to have a good view from the summit. Disappointed in both ways, the hill being composed of a crumbling sand-stone, and almost inaccessible, I returned to the ship early next morning. Several new birds were seen by those who were on shore, and many fish were caught on board, of which the best and most numerous were a kind of rock cod, of large size.

18th. Weighed and stood alongshore until noon, when we

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anchored close to a low rugged point, near the north-east end of the island: employed two boats in examining the shore, and landed a party to look for terrapin: Mr. Darwin and Mr. Stokes went to the top of a neighbouring hill. Throughout this day it blew so fresh a breeze, that double-reefed topsails were as much as could be carried: but I think this strength of wind only prevailed under the lee of the island, where the wind rushed down in squalls, after having been intercepted and checked by the high land. All the hills appear to have been the craters of volcanoes: some are of sandy mud, others are lava. There is plenty of wood hereabouts, though stunted and dry. On no part of this shore is there a chance of finding water; all is stony, without any soil which could either collect or carry it off.

Our party brought eighteen terrapin on board. In size they were not remarkable, none exceeding eighty pounds. This animal appears to be well defended by nature; but, in truth, it is rather helpless, and easily injured. The shell is slight, and becomes weaker (in proportion to the animal's size), as the tortoise grows older.

19th. Sailed round the north-east extremity of the island, and worked to the southward against a tide, or rather current, setting strongly to the north-west.

20th. At daylight we were off the south-east part of the island; and continued working to the south-west, during the forenoon, along a shore quite bold, excepting the small rocks above water in 'Middle' Bay. At noon, seeing a small cove, I went in a boat to examine it, and look for water. We found no signs of any in that place; but a little farther west, a fine stream was seen falling from a lava cliff, about thirty feet high. Mr. Low had described this waterfall correctly; and his account of the watering place near it was soon verified, by our discovering a cove half a mile to the westward of the cascade. We landed on a stony beach in the cove, and found a fine stream of excellent water: two others were likewise seen, but they were inaccessible. This water runs from the highest parts of the island (which are almost always enveloped in

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clouds) down a large valley.* All this southern side of the island is well wooded; and on the higher ground the wood is very green.

Continuing our course along shore, we arrived at our former anchorage in Stephens Bay soon after dark, when Mr. Chaffers returned on board, having reached the anchorage in the morning.

22d. So generally cloudy is the weather here, that a day such as this proved to be, of hot, vertical sunshine, was much felt by every body; and to show how objectionable our anchorage was in this respect, I may mention that a fresh breeze was blowing all day in the offing; yet in the bay only light variable airs were felt.

Some fine turtle were brought on board, the first we had seen here; they are rather like the green turtle of the West-Indies, but not exactly. Among the shells found about the islands one is common, which reminded me of the purple murex, as the fish emits a strongly dyeing liquid of a similar colour.† A kind of mangrove grows near the water, on the sandy beaches of this island; and the shape and colour of that curious tree are some relief to an eye tired of looking at rugged lava or withered bushes.

23d. While becalmed we tried the clamms‡ in fifty fathoms water, and brought up as much sand as would fill a bucket, but nothing curious. Afterwards we had a breeze, and passed Barrington Island pretty closely. It is not high, yet the shores are bold and fronted by cliffs; the more elevated parts appear to be level, and rather woody. This night was spent under sail between Charles and Hood Islands.

24th. While we were endeavouring to reach the anchorage in Post-Office Bay (Charles Island), Mr. Chaffers and Mr. Mellersh went away in a boat to visit the islets that lie near the eastern side of that island: and it was found that they had all

* There is no other place in the Galāpagos where ships can water at all times of the year. † Found also on the coast of Peru (Ulloa).

‡ An indifferent contrivance of mine, made and put together by our own armourer.

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been the summits of volcanoes. Charles Island is peculiar in its outline: for a succession of round topped hills, precisely similar in shape, though differing in size, shews on every point of view. This exact similarity is very remarkable. Must not all these volcanoes* have been thrown up under the same circumstances, such as similar action of the ocean, or even a strong wind—perhaps at the very same time? †

The highest and largest of these hills rises 1,800 feet, the next about 1,700; the rest are of various smaller heights. The northern sides of the island are wooded, but the wood looks as brown as that on the lower parts of Chatham Island. Post-Office Bay is sheltered, easy of access, has excellent anchorage, and only wants fresh-water to make it a most desirable harbour for shipping. Its name is the result of a custom established by the whalers: a box was placed on a post, to receive letters, and homeward-bound ships examined the directions, taking with them all which they might have means of forwarding; but since the island has been peopled the box has been empty, for letters are now left at the settlement.

25th. Mr. Nicholas O. Lawson, acting for the governor of this archipelago, ‡ came on board. With him and me a party went to another anchorage called Black Beach Road, landed, and walked up towards the settlement. In 1832, the republic of the 'Ecuador' decided to use these islands as a place of banishment, and sent a small colony to Charles Island. 'La Floriana' is the name given to this island by the Guayaquilians, though by the Spaniards it was once called 'Santa Maria de l'Aguada.' The governor, at the time of our visit, was Don José Villamil. There were then about eighty small houses, or huts, and nearly two hundred souls upon the island, most of whom were convicts.

After walking rather more than a mile along a good path, through the underwood (which as the ground rises becomes very thick), we reached a small spring of water, near which are a few huts, but no cultivated ground. The water from this

* For volcanoes they certainly have been. † See page 493.

‡ An officer of the republic of the Equator.

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spring might be conveyed to shipping by means of leaden pipes, without much difficulty, but it is not of very good quality. Having ascended gradually during another half-hour's walk, we reached the ridge of that height which limited our view from the sea; when surprisingly sudden and agreeable was the change. Heated and tired by a dusty uphill walk, through sun dried trees and over rugged lava stones, our bodies were here refreshed by a cool breeze, while our eyes enjoyed the view of an extensive, fertile and cultivated plain. Surrounded by tropical vegetation, by bananas, sugar canes, Indian corn, and sweet potatoes, all luxuriantly flourishing, it was hard to believe that any extent of sterile and apparently useless country could be close to land so fertile, and yet wear the most opposite appearance. Our eyes having been accustomed to the desert shores of Peru and northern Chile, during many months, were completely dazzled by a sight so new and unforeseen.

It appears that rain falls very frequently on these higher grounds, and is absorbed by rich black mould of a nature sufficiently clayey to enable it to retain moisture. During the wet season this plain becomes quite muddy, while the little rain that falls on the lower ground is so quickly absorbed, or finds its way so soon through the loose lava stones that its effects are not there visible.

Most of the houses are in this fertile space, but it appears that a house on the dry ground, and plantations in the moist valley, would answer better: for at Mr. Lawson's house salt cannot be kept dry, books and paper become mouldy, and iron rusts very quickly. At his table we found the welcome of a countryman, and a variety of food quite unexpected in the Galāpagos Islands, but fully proving their productiveness. At the foot of a hill we saw water dropping plentifully, and from this spring, called the "Governor's Dripstone," the inhabitants obtain a certain supply throughout the year.

Although most of the settlers were sent here against their wish, there are many who do not desire to return to the continent. Some are married and have children on the island.

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In a small cave near the "governor's dripstone," an old sailor lived during several years: he had been unfortunate, and was tired of the world. Terrapin and potatoes were his food, till a former friend, the master of a whaler, recognised him, and carried him away by force. So strongly was the old man attached to his cave, that he shed tears when taken away.

There are goats and hogs upon this island, but they are scarce and wild, not having yet had time to increase much; they are hunted with dogs, though it would be wiser to let them alone for a few years. The settlers have abundance of vegetables, and depend chiefly upon terrapin for their meat. Many of these animals being large and heavy, the people who go in search of them kill and open them on the spot, then take out the fleshy pieces and put them in a bag. Thus one man can carry away the useful parts of more terrapins than several men could lift.

The quantity of tortoise shells lying about the ground, shows what havock has been made among these helpless animals. On the lower ground, near the spring, I saw an apology for a garden, in which the large terrapin shells were used to cover young plants, instead of flower pots. In a place one has not seen before, some marked peculiarity occasionally reminds one, more forcibly than the ordinary novelties of scenery, that all around is strange and new. The palm-trees and arid appearance of St. Jago, the sedan chairs of Bahia, the boats of Rio de Janeiro, the beef carts of Monte Video, the travelling waggons of Buenos Ayres, the 'toldo' of the Patagonian, the wigwam of the Fuegian, the wooden houses and clogs of San Carlos de Chiloé, the stockades of Valdivia, the effects of earthquake at Concepcion, the concentrated bustle of Valparaiso, the quiet and uniform serenity of Coquimbo, women riding astride and troops of ill-used donkeys at Lima, are a few instances among the multitude of such local peculiarities.

Small birds are numerous on this island, and so remarkably tame that they may be knocked down with a stick. Lizards are also numerous; and there are a few small snakes, but those

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we caught were not venomous. Among the useful vegetables we noticed the plaintain, pumpkin, yuca, Quito orange, castor oil plant and melon, besides those before mentioned.

Returning on board we met Mr. Stokes on his way from the southern parts of the island: he described the lava thereabouts as having such a form and rugged surface as the sea would present if suddenly congealed, while ruffled by a very strong wind.

26th. After completing the necessary observations in Post-Office Bay, we weighed and worked round to an anchorage off Black Beach: and at nine in the evening Mr. Chaffers returned, having been round the south side of this island after visiting the small eastern islets. He found much difficulty in landing on them, but succeeded, and from the top of Gardner Islet saw a dangerous breaker about a mile to the south eastward.

27th. Being Sunday, many of the officers and ship's company were on shore in the afternoon, and some of the officers went to the top of the highest hill, which has a crater, as have all the hills we examined about these islands; and these craters are all similarly broken down on the side towards the south.

28th. Having taken on board live pigs and a quantity of vegetables, we weighed and stood towards Albemarle Island. Four small islets, the remains of volcanoes, lie near the low south-east extreme of this island, and together with Brattle Islet, are extremely useful in warning vessels of their approach to a very dangerous piece of coast. So low are the south-eastern extremities of Albemarle Island that they are not discernible until you see the surf on the shore. A heavy swell setting towards the land, and generally light winds, add to the danger of getting near this coast; but there is anchorage in case of necessity.

Albemarle Island is a singular mass of volcanic ejections. Six volcanoes have there raised their summits from two to four thousand feet above the ocean, and from them immense quantities of lava have from time to time flowed towards the

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sea; so that this island, large as it is, may be literally described by saying that it consists of six huge craters, whose bases are united by their own overflowed lava. The southern side, which is exposed to the trade wind, and completely intercepts it, with all the clouds it brings, is thickly wooded, very green, and doubtless has fresh water; but how is that water to be obtained where such a swell rolls upon the shore? The weather side of Chatham Island is partially protected from the great south-west swell of the Pacific by Hood Island, yet even there it is difficult to land.

We passed this night under easy sail, off the south-west extreme of Albemarle Island; and on the 29th we found a small cove, in which we anchored; but such a wild-looking place—with such quantities of hideous iguanas as were quite startling! Hence I despatched Mr. Mellersh and Mr. King, to examine the depth of Elizabeth Bay, and rejoin us beyond Narborough Island; we then weighed, and continued our examination of this unearthly shore. Passing a low projecting point, our eyes and imagination were engrossed by the strange wildness of the view; for in such a place Vulcan might have worked. Amidst the most confusedly heaped masses of lava, black and barren, as if hardly yet cooled, innumerable craters (or fumeroles) showed their very regular, even artificial looking heaps. It was like immense iron works, on a Cyclopian scale!

When this lava flowed from the heights it must have been stopped rather suddenly (cooled) by the water; for the lava cliffs are in some places twenty, and in others forty feet high, while close to them there is water so deep that a ship could not anchor there, even in a calm while the sea is quite smooth. Until we rounded this point the wind was very strong, eddying round the high south-west cape; but here we were becalmed, and passed some anxious hours, till at length light variable airs carried us off-shore.

30th. This morning we passed a remarkably fine American whaler, the Science, carrying nine whale-boats! On the south-

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eastern height of Albemarle, smoke was seen issuing from several places near the summit, but no flame. Profiting by every breeze, we hastened towards Tagus (or Banks) Cove.

Narborough Island is exactly like a part of Albemarle—a great volcano, whose base is surrounded by an extensive field of lava: it is utterly barren and desolate. A few mangroves, on the sandy beaches near Albemarle Island, are not seen in the distance; neither are there enough of them even to diminish the dismal appearance of the island.

We entered the passage in the afternoon, and anchored in the little cove first described by Capt. Pipon, who then commanded H.M.S. Tagus. This cove is the crater of an extinct volcano, and its sides are so steep as to be almost inaccessible.*

1st October. Our first object was to find water: none could be got in the cove, but at a short distance from it a few holes were found, out of which a bottle might be filled in an hour. Around this scanty spring draining continually through the rock, all the little birds of the island appeared to be collected, a pretty clear indication of there being then no other fresh-water within their reach: yet during the rainy season there must be considerable streams, judging by gullies which are worn in the rock. All the heights hereabouts, and the sides of the craters, are composed of sandstone that looks like fine sandy mud half baked; but the low grounds are lava. The crater in which we anchored gave me the idea of its having been a mud volcano. The climate is very different from that of the Windward Islands; for wind clouds and rain appear to be obstructed in their northward passage, by the heights on the southern part of this island. The heat is here far greater than in other parts of the archipelago, and the land is more sterile. Numbers of another sort of iguana were seen for the first time, and many were killed and eaten. In size and shape they resemble the black kind, but their colour

* In 1825 H.M.S. Blonde, commanded by Lord Byron, anchored here. In her voyage (pp. 92, 93, 94) the black and the red (or brown) iguanas are described, and it is stated that a specimen of the black kind was brought to England from Mexico. Lord Byron saw a volcano burning on Narborough Island.

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is a dirty orange red, inclining to reddish brown above and yellow beneath. These reptiles burrow in the earth like rabbits, and are not bad eating. Of the black kind a vast number run about the rocks near the sea, living either upon fish or sea-weed. As we went afterwards in a boat along the ragged irregular shore, we saw numbers of turtle. There are small sandy beaches here and there, to which these animals approach in the evenings: when, as it gets dark, they land and usually lie on the beach during the night, even if it is not the season in which they seek a place for their eggs.

From a height near Tagus Cove dismal indeed was the view, yet deeply interesting. To see such an extent of country overwhelmed by lava, to think of the possible effects of the seven dormant volcanoes then in sight, and to reflect that at some one period all was activity and dreadful combustion where we then witnessed only silent desolation, was very impressive.

2d October. We passed this day and the following night in Banks Bay. On the 3d, Mr. Mellersh returned, having examined Elizabeth Bay and the western shore of Narborough Island. We then went round the north-west end of Albemarle Island, and passed the night under sail off the north extreme. At daybreak, on the 4th, we made all sail towards Abingdon Island, which is small, rather high, and tolerably covered with stunted wood; we did not maintain a position even near where I wished to pass the night, but were carried about forty miles away, dead to leeward, during only a few hours of light wind. The current hereabouts runs between one and four knots an hour to the north-westward, yet the depth of the water is unfathomable by ordinary means: excepting for which it is like a vast river in the sea.

5th. While working to windward, endeavouring to regain our lost ground, we saw Bindloes Island: and passed through many ripplings, some of them dangerous for a boat; these were northward, and rather eastward of Abingdon. During the 6th, other indications of a strong current were noticed, besides ripplings such as these, which, in very deep water, and in the open sea, are difficult to explain: sometimes at night, while all

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around was smooth and tranquil—a short, deep plunge suddenly startled every one: but in a minute afterwards the ship was again quiet. We continued to work to the southward in order to reach James Island, and meet Lieutenant Sulivan.

7th. While working to windward we saw Towers Island, which is different in appearance from all the other islands of this archipelago, being low and flat. We passed it about noon, and Bindloes at sunset. The latter has an irregular hilly surface, partially wooded, but like the rest is a mass of lava, and indurated sandy mud.*

8th. The Beagle was close to James Island, a high, large, and well-wooded tract of ground, or rather lava. We anchored at the northern end, and a boat came alongside loaded with fish, for there was a party of settlers here, detached from Charles Island, whose employment was salting fish and extracting oil from terrapin.† This oil is of a light colour, and exceedingly good quality, being very like pure olive oil. Lieutenant Sulivan returned with his party, and I then detached Mr. Chaffers in the yawl, accompanied by Mr. Johnson and six men, to examine Bindloes, Abingdon, and Towers Islands. As Mr. Darwin anxiously desired to see as much as possible of the productions of this central and large island, he was landed, accompanied by Mr. Bynoe, besides his servant and H. Fuller, to remain until the Beagle's return. Although there is abundance of water on the higher parts of this island, so broken and dry are the lower grounds that it does not arrive at the shore: at two places only can enough water for even a boat's crew be procured, in the dry season; and for a ship there is scarcely hope of a sufficiency. The poor fellows who brought us the fish had been living so long upon terrapin, and the produce of their lines, without any thing else, that half a bag of biscuit (50 lbs.) which we gave them, appeared to be an inestimable treasure, for which they could not sufficiently thank us. We sailed in the evening, but made very little

* Of course much of the information given in these pages was collected by the officers.

† They also salt the terrapin; or tortoise.

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progress towards our destination (Chatham Island) this day (9th). The winds appear to be much lighter and more variable, to leeward of the archipelago, while the current is considerably stronger.* We got pretty close to Chatham Island at dusk, worked to windward during the night, and on the following morning stood along the weather shore towards the watering place.

11th. How remarkably different is the climate of the windward and leeward islands of this group! Here we were enveloped by clouds and drizzling fog, and wore cloth clothes. At Tagus Cove and James Island, a hot sun, nearly vertical, overpowered us;—while the south side of Albemarle, Charles, and Chatham Islands, were almost always overshadowed by clouds, and had frequent showers of rain. We anchored close to the watering place: but it appeared strange to remain at anchor in such a spot, only three cables' lengths from a surf breaking high upon a steep cliffy shore, with nothing but the ocean between us and the antarctic; and such was our position; yet it was a safe one, because the great south-west swell of the Pacific is interrupted by Hood Island, and the southerly trade, or perennial wind is so moderate, that it has neither power to raise a sea nor to harm a vessel lying at anchor, if her ground tackle is not defective.

The 12th was spent in filling water, washing, cutting some wood, and bringing thirty large terrapin on board. These animals abound hereabouts; and some are very large, deserving the name of elephant-tortoises. Two of our party tried to reach the higher and thickly wooded part of the island, but found their task impracticable, in so short a time as they could spare, for the wood grows impenetrably thick, though none is straight or of a large size. The upper grounds have a rich loamy soil, lying upon rock, in which the terrapin wallow like hogs, and may be found by dozens. This was a very hard day's work for so few men as were then on board our small vessel. (13th) We had some difficulty in 'casting,' so as to

* It appears that the Norfolk Island of Colnett, is the north-east extreme of Indefatigable Island.

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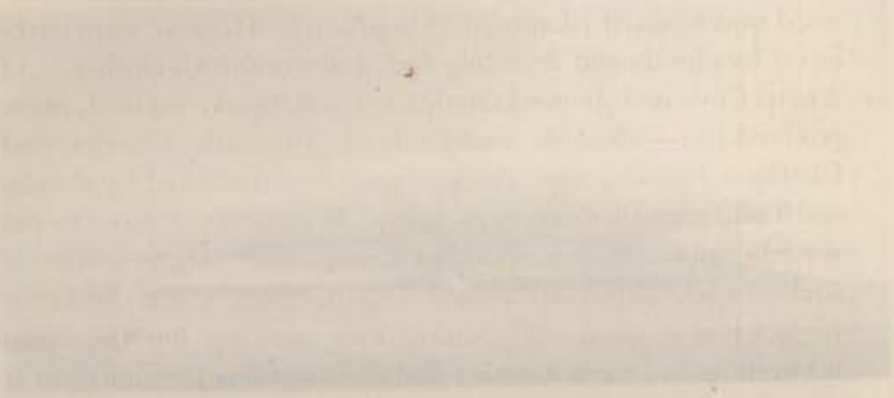

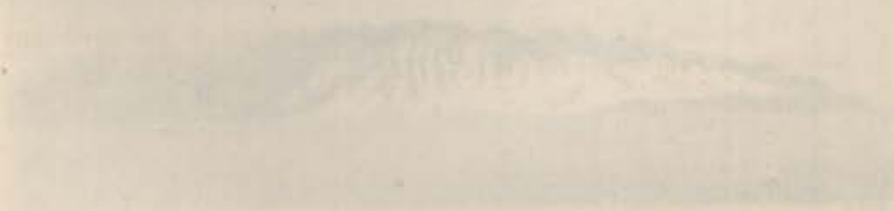

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Drayton.

CHARLES ISLAND.

Watering Place.

CHATHAM ISLAND.

WATERING PLACE.

ALBEMARLE ISLAND.

Published by Henry Colburn 13 Great Marlborough Street. 1839

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clear the land, but got out of the scrape and were working towards Hood Island when the man looking out aloft reported a breaker, which proved to be on a rock at the west end of MacGowen shoal. When first seen it was on the horizon, and hardly differed from the topping of a sea;—once only in about ten minutes it showed distinctly. We steered for it, lowered two boats, and employed the rest of the day in examining this very dangerous shoal, and fixing its position. One rock at the west end is just a-wash, but there is another under water, except in the hollow of a swell, about half-a-mile to the eastward, which is exceedingly treacherous. We had two narrow escapes this day; while weighing from Chatham Island, baffling winds sent us a great deal too close to the cliffs before our anchor was up, or the ship under command; and while sounding along the edge of MacGowen shoal we were drifted so close to the second rock, mentioned above, that I was not sure on which side of us it lay.

14th. Anchored and examined Hood Harbour, having heard there was a sunken rock in it which our boat had not discovered, but we found nothing dangerous for a ship. Shoal water and large blocks of lava lie near the shore in the harbour; but a vessel must have stood too close in if she touches thereabouts. Left Hood Island at noon, and steered for the southern part of Charles Island. Having a fine breeze we rounded Saddle Point at eight, and anchored at nine off Black Beach.

15th. I went to Post-Office Bay and near the best landing place, found some excellent salt, which though but small in quantity gives a hint that more may be got elsewhere.

16th. Weighed in the afternoon, having obtained the necessary observations, and went to Black Beach Road to take in wood, potatoes, and pigs. We there found a small schooner at anchor, just arrived from Guayaquil, and having, among other things, a bag of letters from England, for the Beagle. That very evening we were to leave Charles Island; not to return! In the schooner were some emigrants; who brought cattle, and information that the governor, Villamil, might be

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expected to arrive in a few days, with a vessel laden with animals, and supplies for the settlement. We stood across, during the night, to the four islands near Point Woodford; and at daylight next morning (17th) resumed our usual occupations, while sailing along the east side of Albemarle Island. At noon we steered for Albany Islet, to embark Mr. Darwin and Mr. Bynoe; and after our party were on board, we returned towards the shore of Albemarle Island, and there passed the night under sail, in order to start early from a particular position. Our landsmen had enjoyed their stay and profited by it, though the heat was oppressive, and the sky nearly cloudless by night and by day: how different was this from the weather we had had on board! The higher grounds of James Island are extensive, and would be adapted to cultivation if the wood, which now grows thickly, were cleared. There is a fine salt spring, or lake, in an old crater; the salt is excellent, in colour and quality: and the men employed by Mr. Lawson were using it daily for curing their fish and terrapin.

When at some height upon the island, among the thick wood, it is extremely difficult to find the way: men have been lost thereabouts, and it is said that some of the bodies never were found. The day we re-embarked Mr. Darwin there was a man missing, belonging to an American whale ship, and his shipmates were seeking for him. The master of this whaler was very obliging to our party, supplying them with water, and offering his hearty assistance in any way which lay in his power. The earnest wishes to be of use, and the attentions of North Americans to us on all occasions, have been often and gratefully remarked by many on board the Beagle.

18th. Continued our examination of Albemarle Island. When off the northern volcano, the black streams of lava, which have flowed in every direction down the sides of the mountain, looked like immense streams of ink. Thence we steered for Abingdon Island to meet Mr. Chaffers. I thought the current less strong, and setting more to the west, than when I was here on a former day.

On the 19th we were close to Abingdon Island, where there

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is a fine bold-looking cliff, at the west side, considerably higher than any I had seen in the Galapagos. Mr. Chaffers soon came alongside after we closed the land; when, his orders being all executed, the boat was hoisted in, and we made sail to the north-west in search of Wenman and Culpepper Islets.

Next day (20th) we saw and steered for Wenman Islet, another crater of an extinct volcano. It is high, small, and quite barren: correctly speaking, there are three islets and a large rock, near each other, which, at a distance, appear as one island, but they are fragments of the same crater. We afterwards passed Culpepper Islet, which is a similar rocky, high, and barren little island. At sun-set we made all sail and steered to get well into the south-east trade wind, so as to expedite our passage towards the dangerous archipelago of the Low Islands, and thence to Otaheite (or Tahiti). While sailing away from the Galapagos, impelled westward over a smooth sea, not only by favouring easterly breezes but by a current that set more than sixty miles to the west during the first twenty-four hours after our losing sight of Culpepper Islet, and from forty to ten miles each subsequent day until the 1st of November,* I will look back at those strange islands, and make a few more remarks on them.

There are six principal ones, nine smaller, and many islets scarcely deserving to be distinguished from mere rocks. The largest island is sixty miles in length, and about fifteen broad; the highest part being four thousand feet above the sea. All are of volcanic origin, and the lava, of which they are chiefly composed, is excessively hard. Old Dampier says,† "The Spaniards, when they first discovered these islands, found multitudes of 'guanoes' and land-turtle, or tortoise, and named them the Galapagos‡ Islands." Again, "the air of these islands is temperate enough, considering the clime. Here is constantly a fresh sea-breeze all day, and cooling refreshing winds in the night; therefore the heat is not so violent here

* Lat. 10°. 14′. S. long. 120°. 35′. W.

† Dampier's Voyage round the World, 1681—1691. (At the Galapagos in 1684).

‡ Galāpăgo being Spanish for tortoise.

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as in most places near the equator. The time of the year for the rains is in November, December, and January: then there is oftentimes excessive dark tempestuous weather, mixed with much thunder and lightning. Sometimes before and after these months there are moderate refreshing showers; but in May, June, July, and August, the weather is always very fair."* I can add nothing to this excellent description, except that heavy rollers occasionally break upon the northern shores of the Galapagos during the rainy season above-mentioned—though no wind of any consequence accompanies them. They are caused by the 'Northers,' or 'Papagayos,' which are so well known on the coast between Panama and Acapulco. Colnett also gives a good description of these islands:—in his voyage, p. 58, he says, "I consider it as one of the most delightful climates under heaven, although situated within a few miles of the equator." The buccaneers often resorted to them for refreshments, and as a place where they might refit their vessels, share out plunder, or plan new schemes of rapine, without any risk of being molested.

Striking instances of the manner in which high land deprives air of its moisture may be seen at the Galapagos. Situated in a wind nearly perennial, those sides only which are exposed to it (the southern) are covered with verdure, and have water: all else is dry and barren, excepting such high ground as the passing clouds hang upon indolently as they move northward. In a similar manner may we not conclude that western Peru is deprived of rain—since the easterly trade wind which carries moisture, and consequent fertility, to eastern Peru, is drained, or dried, as it crosses the Andes? And may we not extend this reasoning to other countries similarly situated, such as Patagonia, perhaps Arabia, and even Africa, upon whose arid deserts no moist wind blows? Currents of air, moving from ocean to land, convey vapour; but as these currents pass over

* During the rainy season, or from November to March (which is not, however, at all to be compared to a continental rainy season) there are calms, variable breezes, and sometimes westerly winds: though the latter are neither of long duration, nor frequent.

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high land, or even a considerable extent of low country, much if not the whole of their aqueous contents is discharged, and until such a body of air has again acquired moisture, it is found to be dry, parching, and unfavourable to vegetation.

All the small birds that live on these lava-covered islands have short beaks, very thick at the base, like that of a bull-finch. This appears to be one of those admirable provisions of Infinite Wisdom by which each created thing is adapted to the place for which it was intended. In picking up insects, or seeds which lie on hard iron-like lava, the superiority of such beaks over delicate ones, cannot, I think, be doubted; but there is, perhaps, another object in their being so strong and wide. Colnett says, p. 59, "they observed an old bird in the act of supplying three young ones with drink, by squeezing the berry of a tree into their mouths. It was about the size of a pea, and contained a watery juice, of an acid, but not unpleasant taste." "The leaves of these trees absorb the copious dews which fall during the night; the birds then pierce them with their bills for the moisture they retain, and which, I believe, they also procure from the various plants and evergreens.' "The torch thistle contains a liquid in its heart, which the birds drank, when it was cut down. They sometimes even extracted it from the young trees by piercing the trunks with their bills." For thus squeezing berries, and piercing woody fibre, or even only stout leaves, a slight thin beak would be scarcely available. Colnett* observes, that some of the birds which he saw resembled a few that he had seen at New Zealand, but as he also remarks that all the dead shells which he found upon the beach were familiar to him, I think one may suspect the accuracy of his eye, if not his memory, in those instances.

Mr. Stokes made some notes about the tortoises (terrapin), while with me, and as he and I are satisfied as to the facts, I will add them. Fresh water was first discovered on Charles and on James Islands, by following the terrapin paths. These animals visit the low, warm ground to seek for food and de-

* Colnett's Voyage to the South Seas, pages 52, 55, 57.

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posit their eggs; but it must be a toilsome journey indeed for them to ascend and descend the rugged heights. Some that Mr. Stokes saw in wet, muddy places, on high ground, seemed to enjoy themselves very much, snuffling and waddling about in the soft clayey soil near a spring. Their manner of drinking is not unlike that of a fowl: and so fond do they appear to be of water, that it is strange they can exist for a length of time without it; yet people living at the Galapagos say that these animals can go more than six months without drinking. A very small one lived upwards of two months on board the Beagle without either eating or drinking: and whale-ships have often had them on board alive for a much longer period. Some few of the terrapin are so large as to weigh between two and three hundred weight; and, when standing up on their four elephantine legs, are able to reach the breast of a middle-sized man with their snake-like head.* The settlers at Charles Island do not know any way of ascertaining the age of a terrapin, all they say is, that the male has a longer neck than the female.† On board the Beagle a small one grew three-eighths of an inch, in length, in three months; and another grew two inches in length in one year. Several were brought alive to England. The largest we killed was three feet in length from one end of the shell to the other: but the large ones are not so good to eat as those of about fifty pounds weight—which are excellent, and extremely wholesome food. From a large one upwards of a gallon of very fine oil may be extracted. It is rather curious, and a striking instance of the short-sightedness of some men, who think themselves keener in discrimination than most others, that these tortoises should have excited such remarks as—"well, these reptiles never could have migrated

* When their long necks and small heads are seen above low bushes they look just like those of snakes.

† Their eggs were found in great numbers in cracks of a hard kind of clayey sand; but so small were the cracks that many of the eggs could not be got out without being broken. The egg is nearly round, of a whitish colour, and measures two inches and a half in diameter—which is about the size of a young one when first hatched.

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far, that is quite clear," when, in simple truth, there is no other animal in the whole creation so easily caught, so portable, requiring so little food for a long period, and at the same time so likely to have been carried, for food, by the aborigines who probably visited the Galapagos Islands on their balsas,* or in large double canoes, long before Columbus saw that twinkling light, which, to his mind, was as the keystone to an arch. Honest Dampier immediately reverted to the tortoises of the West Indies, and of Madagascar,† when he saw those of the Galapagos. He had observed too many varieties caused by climate, soil, food, and habits, to entertain a doubt of their being other than a variety of the tortoise kind. As to the 'guanoes' they were, to his eye, familiar objects.

The currents about these islands are very remarkable, for in addition to their velocity, which is from two to five miles an hour, and usually towards the north-west,‡ there is such a surprising difference in the temperature of bodies of water moving within a few miles of each other, that this subject must be reserved for further discussion. On one side of an island (Albemarle Island) we found the temperature of the sea, a foot below the surface, 80°. Faht.; but at the other side it was less than 60°. In brief, those striking differences may be owing to the cool current which comes from the southward along the coasts of Peru and Chile, and at the Galapagos encounters a far warmer body of water moving from the bay of Panama, a sort of 'gulf stream.' The retentive manner in which such ocean rivers preserve their temperature has been frequently remarked: and must have a great effect upon the climates of countries near whose shores they flow.

* I have heard that driftwood, not the growth of these islands, is frequently found on the south-east shores. On this subject Colnett says (p. 58), "on several parts of the shore there was driftwood, of a larger size than any of the trees that grow on the island: also bamboos and wild sugar canes, with a few small cocoa nuts at full growth, though not larger than a pigeon's egg." † Dampier, vol. i. p. 102.

‡ In the twenty-four hours immediately previous to first making these islands, the Beagle was set fifty miles to the west north-west.

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CHAPTER XXII.

Dangerous Archipelago of the Low Islands—Krusenstern—Squalls—Discoveries—Otaheite—Matavai—Natives—Houses—Point Venus—Theft—Singing—Pomare—Sugar—Papiete—Church—Mr. Pritchard—Thierry—Shells—Mr. Nott—Bible—Paamuto Natives—Falkner—'Ua'—Papawa—Relics—Divine Service—Hitote—Henry—Audience—Queen—Missionaries—Roman Catholics—Forming head—Meeting at Papiete—Dress—Behaviour—Eloquence of natives—Honourable feelings—Interesting discussion—Venilia.

After sailing before the wind twelve days, our approach to land was indicated by a black tern which flew past the ship.* Tropic birds were seen on the previous day (2d), but they roam farther than tern. On the 9th we saw Honden Island, one of the low coral formations, only a few feet above water, yet thickly covered with cocoa-nut trees.† Our observations corroborated the position assigned to it by Admiral Krusenstern,‡ in his excellent chart and memoir, the only documents of any use to us while traversing the archipelago of the Low Islands. This archipelago is indeed extremely deserving of its appellation, 'Dangerous;' for numerous coral islets, all low, and some extensive, obstruct the navigation, while unknown currents and strong squalls, and a total want of soundings, add to the risk of sailing there at night. Singular interruptions to the trade-wind are caused by these low lagoon§ islands; not only does the easterly wind often fail among them, but heavy squalls come from the opposite direction, and more frequently by night than by day. This is especially the case from November to March.

I have before remarked (pp. 65, 66), that extensive shallows, such as the Abrolhos and Bermudas, are liable to heavy squalls;

* 3d November, lat. 11°.45′ S., long. 126° W.

† About 110 feet from the water level to the top of the trees.

‡ Admiral Krusenstern had the kindness to send me a copy of his Atlas of the Pacific Ocean, accompanied by an elaborate memoir.

§ Most of them are little better than dry reefs encircling a shallow lake or lagoon.

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and so far as I have heard or observed, it is usually the case that on land, a wide tract of flat country, without hills, or at sea, a considerable space of partly-covered ground, nowhere rising much above high-water, is subject to more frequent and violent blasts of wind than mountainous or even hilly regions, whether continental or island.

Clouds are certainly attracted, even if their formation be not hastened, by land; especially when it is covered by trees: and as low islands (such as those of the Dangerous Archipelago, between 14° and 20° south) have no hill or height of any kind, about which clouds attracted by the archipelago (taken together) can gather and discharge a portion of their contents, electrical as well as fluid, it may, I think, be inferred, that the want of such a conductor as would be furnished by a mountain five or six thousand feet high, is the reason why clouds in various electrical conditions unite or oppose one another, as the case may be; and, in consequence, cause rapid changes in the atmosphere around them; of which the effects are seen in squalls (sometimes with heavy rain, sometimes without), and even in whirlwinds. Where high land acts as a conductor between the earth and certain portions of our atmosphere, there may be a continual, though unperceived, electrical action. In connection with this subject I would, if I were able, consider the effects of rapidly varying temperature over land, and comparatively uniform temperature over ocean during twenty-four hours; which latter fact I might suspect to be one reason why the great Humboldt could not discover any particular electrical action, as indicated by his electrometers, while sailing from Europe to Brazil: although those same instruments were far from inactive after he landed. But I feel myself out of my depth, and will leave such speculations to those who are qualified to indulge in them.*

On the 13th, after having passed some anxious nights in very squally weather,† we were gratified by seeing an islet whose existence we had not suspected. Tairo is the name by

* See note (*a*) at the end of this chapter.

† All the squalls were from the westward.

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which it is known to the islanders of the archipelago. A few hours afterwards we ranged along the shore of another and much larger island, or rather group of islets, till then not laid down in any chart, the native name of which is Cavahi. We saw a number of islets covered with cocoa-nut trees, surrounding a lagoon; but could not delay to examine the south side, because we had been so unexpectedly detained by contrary winds, and I was very anxious about the chronometer measurement, the interval being already considerable.

Hastening on, therefore, we passed between the Elizabeth and Wittgenstein (or Faarava) groups, which are similar to Cavahi in appearance, and carried a press of sail to reach the Society Islands. It was singular that directly we were clear of the Low Islands, we got into a steady trade-wind, such as we had enjoyed before seeing Honden Island; and were no more troubled by westerly wind, or squalls, till long after we had left Otaheite* and were approaching near New Zealand.

15th. Early this morning we saw Otaheite; but clouds hanging over the high land and a haziness about the horizon, at first disappointed our expectations. As the sun rose higher, the clouds shrunk away, vanishing as they rolled along the grandly formed mountains: high, sharp, irregular peaks, and huge masses of rock appeared between the mists, and again were hidden—deep vallies or glens showed darkly, and while the shadows passed, seemed to be denied the light of day. Strikingly different in appearance were the lower hills and dales, and the richly wooded land at the sea-side. There the bright sunshine heightened the vivid and ever-varying tints of a rich verdure. The beautiful alternation of light and shade, each moment changing as the flitting shadows passed over every kind

* Some diversity of opinion has arisen respecting the spelling of this name. No person now doubts that Tahiti is the native word, and therefore the most correct to be used when talking to Polynesian islanders, or writing for them; but as our immortal countryman, Cook, wrote Otaheite, and it is difficult to hear or see the word without thinking of him, I shall beg to be allowed the same privilege that Frenchmen claim when writing 'Londres,' or Englishmen when they write 'Sicily;' and for the future use only the word Otaheite.

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OTAHEITE OR TAHITI.

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of green; the groves of graceful palm-trees; the dazzling white foam of the breakers on the coral reefs, contrasted by the deep blue of the sea, combined to form a most enchanting view. At a distance in the west, Eimeo (Moorea) showed a picturesque outline, and added to the beauty of a scene which surpassed our ideas, even heightened as they had been by the descriptions of former voyagers.

Passing Point Venus, and avoiding the Dolphin Shoal, we worked up to an anchorage in Matavai Bay. No pilot appeared, but had we waited in the offing, a very good one* would have offered his services. With a fresh breeze, we gained the anchorage so quickly that few natives had time to hasten on board, as is their usual custom: only one long canoe came alongside while we sailed in: it was made of half a tree, hollowed out, with a narrow rough plank laced to each side, and an out-rigger, consisting of two crooked branches, secured to the canoe and to a long piece of light wood which floated in the water parallel to it. This out-rigger extended eight or ten feet from the ticklish conveyance, and enabled four men to sit at their ease in the narrow trunk of a tree that had never exceeded a foot in diameter.

The personal appearance of these men was to me most remarkable: tall and athletic, with very well-formed heads and a good expression of countenance, they at once made a favourable impression, which their quiet good-humour and tractable disposition afterwards heightened very much. To my eye they differed from the aborigines of southern South America in the form of their heads; in the width or height of the cheek-bones; in their eye-brows; in their colour; and most essentially in the expression of their countenances. High foreheads; defined and prominent eyebrows; with a rich, bronze colour, give an Asiatic expression to the upper part of their faces; but the flat noses (carefully flattened in infancy), and thick lips, are like those of the South Americans.

By the time the vessel was secured, a number of canoes had

* Called James Mitchell, though an aboriginal Otaheitan.

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assembled, each containing from two to ten persons. A few, indeed, were so small that they could only hold one man each. The outriggers hindered their approach, as much as hoops impeded the motions of our maternal ancestors; but those who could not get near looked equally happy at a distance. All were cheerful, tractable, and patient, though eager to see the 'manuâ' (their corruption of man-of-war), and dispose of their merchandize (shells and fruit) to the new-comers.

The work necessary for securing the ship being completed, permission was given to admit the natives; and on board they swarmed like bees. In a minute, our deck became a crowded and noisy bazaar. 'One dălă' (dollar), and 'my ty' ('maitai,' meaning 'good, fine, agreed,' &c.) sounded in all tones, except those of women, none of whom appeared afloat. The current price of every article was 'one dala': a pig, a shell, a whole basket of shells, a roll of cloth, a heap of fruit, or a single fish-hook, of the worst description, were offered as equivalents for the coveted dollar. Old clothes, if of cloth, they would not take, unless as a gift; but linen was acceptable. Every man had a light linen or cotton garment, or the remains of one, of some kind; the more respectable wore shirts, and loose wrappers for trowsers; a few had jackets and trowsers. Many had straw hats; some had a wreath of leaves, some flowers in their hair: only a few of the youngest boys were nearly naked.

Mr. Darwin and I went to Point Venus, and landed among a mob of inquisitive, laughing, and chattering natives, most of whom were women and children. Mr. Wilson, the respected missionary, so long resident at Matavai, met us on the beach; and with him we went, attended by the younger part of the mob, to his house. Ten minutes' walk along level land, every where, except at the sea-side, covered or shaded by thick underwood, tall palms, and the rich foliage of the bread-fruit tree, brought us to the quiet dwelling. The free, cheerful manners of the natives who gathered about the door, and unceremoniously took possession of vacant seats, on chairs, or the floor, showed that they were at home with their benefactors; and that any seclusion or offensive intimation of superiority had

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not existed in the conduct of Mr. or Mrs. Wilson. Two chiefs, of inferior rank, made acquaintance with us; they walked into the room, shook hands, sat down at their ease, and conversed with Mr. Wilson in exactly the manner of respectable English farmers. They were large, but inactive-looking men, and round-shouldered—suitably clothed, above the knees, in clean white jackets, shirts, and wrapper trowsers, with their closely-cut hair hidden by a large straw-hat—their appearance was very respectable. 'Ia-orana,' pronounced 'yoronha,' was a salutation we soon learned; but one of my younger shipmates was a little perplexed during his first excursion, "Why does every one call me 'Your honour,'" said he. Most of our officers and many of the men passed the evening on shore, and Mr. Darwin and myself rambled about until darkness summoned all on board.

Often as the native houses have been described, I found them different from the idea I had formed. Perhaps they are now rather slighter, and not constructed exactly like those of other times. Upon slight posts, placed in the ground in a long ellipse, a very light and elegant frame-work of 'purau'* is supported. This frame-work forms the low, but extensive roof; and upon it a thatch of pandanus leaves,—simply doubled upon twigs or reeds placed crosswise on the purau-wood rafters, which have their ends outwards,—forms a light covering, impervious to water, regular, indeed pretty to the eye, impenetrable by heat, and easily replaced once in eight or ten years. The middle of the roof forms an obtuse angle, as a common low roof does elsewhere; but the ends are rounded. The purau rafters are placed at equal distances around the circumference, converging as radii to the centres and central line of the ellipse. All of them are of equal length and size, and their ends are generally ornamented with a neat matting, made of a mosaic† pattern. Each line of twigs, holding the leaves, is straight and equi-distant from the next; and as, in the house, only about three inches of the smooth surface of each leaf is seen between the lines of twigs, the flat under surface, of an uniform appearance and

* The 'purau' is something like bamboo. † Or arabesque.

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light straw colour, aids the smooth, round purau in agreeably surprising the eye of a stranger by a new kind of architecture, as admirable as it is simple. Around the house, instead of a wall, are strong canes, regularly placed between the supporting posts, at distances (one or two inches) equal to the diameter of the canes; they are driven into the ground, and secured to the roof; one opening only is left for a door. Within are some screens of native cloth, or framed bed-places, or simply mats spread upon dry grass. There are a few low stools, some baskets, joints of bamboo holding cocoa-nut oil, and calabashes with water, besides a variety of smaller things, which I had not time to examine. What house in a tropical climate could be more agreeable than one of these elegant wicker-work cottages, shaded round by large trees, and profiting by the fresh air of every breeze?

Pretty shades for the face (they cannot be called hats, as they encircle and project from, without covering the head) are made with the palm-leaves. When fresh, adorned by white, or deep red flowers, and tastefully placed, this head-dress is unique and pleasing.

Perhaps my eyes were prejudiced in favour of features and complexion; for the shambling gait and flat noses of the native women had no charms for me. I saw no beauty among them; and either they are not as handsome as they were said to be, or my ideas are fastidious. The men, on the other hand, exceed every idea formed from the old descriptions.

On this day, with us the 16th, but to agree with the reckoning of Otaheite and those who came from the west, changed to the 17th, I was fully occupied in making observations upon the spot where once stood Cook's observatory, a classical, and to us, important place. Upon the situation of this celebrated point, Venus, depend most of the geographical positions of islands in the South Sea; and its locality upon our globe has been deemed well known. Messrs. Wales, Green, and Bayley are particularly entitled to the greatest share of credit for having by their observations attained to so great a degree of accuracy.

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While we were engaged with the instruments on shore, a crowd of natives were eagerly displaying their merchandise along side or on board the ship. From the dawn of day, until they were admitted at breakfast time, canoes had been approaching from every direction. Their occupants had heard of the dollars, and every canoe within reach had been loaded. This sort of competition could not last; so I thought it better to give them as much opportunity to dispose of their wares as our small deck allowed; and desired Lieut. Wickham to let the market be held till trade grew dull. Some wanted to build us a house; many asked to be allowed to wash our clothes. There appeared to be no want of will to work, if dollars were to be gained.

On shore it was difficult to make the required observations, among a crowd of curious observers of ourselves and our instruments; for though they readily drew back as far as we wished, it was quite impossible to keep them from running about and shaking the ground. While employed with the dipping needle under a tent, I thought myself fortified: but they besieged the small opening so closely, in their eagerness to see the sight, that the heat caused by a vertical sun was soon increased to that of an oven, from their thus blocking up the only air-hole.

At my return to the ship in the evening, I found that the fair had not lasted above an hour after breakfast. All the natives had behaved well excepting two; one of whom absconded with the top of a brass stanchion. The other tried to carry off an axe; but was detected, and pointed out to the more respectable of his countrymen, who said he should be tried, and that his sentence would probably be a fine of ten hogs.*

This evening some of our party were much pleased by hearing the pretty plaintive songs of the children, as they sat in groups upon the shore. Their voices accord in the most perfect manner; and, although the tunes are rather monotonous,

* The man who tried to steal the axe wa fined eight hogs and a large piece of cloth. Five of the pigs went to the queen, and three were sent on board the Beagle. The cloth was given to the man who caught the thief.

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they detained us, sitting upon the sandy beach, till we could stop no longer.

18th. Mr. Wilson went with me in a boat to Papiete, the most frequented harbour of Otaheite. We passed inside the reefs, by narrow twisting passages among the coral rocks. Seeing two marks set up on an extensive rocky flat, partially covered by the water, I concluded they were placed as beacons; but was told they were tabu (taboo) marks to keep people from fishing or picking up shells upon the queen's 'preserve.' We passed the royal burying-ground, which is adorned by that peculiar tree, the aito, whose wood is so hard that it is called iron-wood. This tree looks like the English yew. It is purposely planted by the natives near their burying-grounds, and used to be considered sacred. Another remarkable tree, resembling (although larger and finer than) the ilex, also casts a solemn shade over the tomb of Pomare.*

The point of land on which the tombs and one of the royal houses stand, is one of the most agreeable places on the island, in point of position; and was a favourite residence of old Pomare. A portion of their superstition hangs about the natives yet: I could not persuade them to approach the tomb of their king, although they told me to go and look at it. The tomb is a plain mass of masonry, sheltered by a roof of wood.

At Toanoa, between this place (called Papawa) and Papiete, we saw Mr. Bicknell's sugar-mill. The sugar made there from native cane is of a very good quality, and cheap. Mr. Bicknell told me that the natives brought their canes to him; and that latterly he had given up growing and attending to them himself. Noticing a large deficiency in some lead-work, he remarked: "That lead was stolen in the last civil war; our books were then in high request, not to be read, but to make cartridges." That such a sad misapplication of numbers of books sent out by missionary societies, has also occurred in New Zealand, as well as among the eastern Indian nations, I have heard from many quarters.

* The late king.

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Papiete is a pretty and secure little bay. Around it is low land, ornamented with trees and European as well as native houses: but immediately behind the level part, hills rise to a height of two or three thousand feet. Lying to leeward of the island it enjoys less sea-breeze, and is therefore hotter than other harbours. In the middle of the bay is a little island belonging to the queen, where the colours of Otaheite (red, white, red, horizontal) are displayed.

Several neat-looking white cottages showed that European ideas had extended their influence hither: but I was sorry to see the new church, a large wooden structure capable of holding six hundred people, covered by a partly Otaheitan roof, in lieu of one formed completely in their own style. Instead of the circular end, an ugly gable terminates a high box-shaped house, resembling a factory.

Mr. Pritchard* arrived from Eimeo as we landed. Leaving him for a short time, I went to see a person who styled himself Baron de Thierry, King of Nuhahiva† and sovereign chief of New Zealand. About the house in which resides this self-called philanthropist,—said to be maturing arrangements for civilizing Nuhahiva and New Zealand—as well as for cutting a canal across the Isthmus of Darien,—were a motley group of tattowed New Zealanders, half-clothed natives of Otaheite, and some ill-looking American seamen. I was received in affected state by this grandee, who abruptly began to question me with—"Well, Captain! what news from Panama? Have the Congress settled the manner in which they are to carry my ideas into effect?" I tried to be decently civil to him, as well as to the 'baroness'; but could not diminish my suspicions, and soon cut short our conference.

In his house was a pile of muskets, whose fixed and very long bayonets had not a philanthropic aspect. He had been there three months, and was said to be waiting for his ships to arrive and carry him to his sovereignty. Born in England, of French emigrant parents; his own account of himself was that

* Now Her Majesty's Consul. † One of the Marquesas.

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he was secretary of legation to the Marquis of Marialva, at the congress of Vienna; and that in 1815 he belonged to the 23d Light Dragoons (English). In 1816 he was attaché to the French ambassador in London. In 1819 he was studying divinity at Oxford. In 1820-21, he was a student of laws at Cambridge. Afterwards he travelled on the continent: and lately had been sojourning in the United States. He visited and brought letters from the Governor of St. Thomas, in the West Indies. He showed papers to prove these assertions: had a wife and four children with him; and he had succeeded in duping a great many people.

Mr. Pritchard had seen the queen (by courtesy called Pomare, after her father, though her name was Aimatta) at Eimeo, the day before he arrived at Otaheite; and as she had not intimated an intention of coming thence, I agreed to go with him in a few days to pay my respects to her, and to make a formal application upon the subject of the Truro, a merchant vessel plundered and destroyed by the Low Islanders in 1830-31.* I returned to Matavai in the evening, and, after landing Mr. Wilson, remained nearly two hours listening to the natives singing. I asked them to dance; but they said it was forbidden, and that the watchman would take them to the governor of the district, who would fine them heavily. Singing, except hymns, is also forbidden to the grown people, but they seemed to like listening to the children.

This evening, before dark, there was a sight upon the Beagle's deck, which delighted us who wished to collect shells but had not time to look for them. An Englishman† had spread out a large collection which he had just brought from the Low Islands, and soon found eager purchasers.

19th. We weighed anchor, and went into the little cove of Papawa, for the sake of watering quickly, without exposing the men and boats to a heavy surf. It is easy to avoid the numerous rocky patches, while there is a breeze, and the sun

* This I was requested to do by Commodore Mason.

† John Middleton.

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TIMEO NEAR OTAHEITE.

NEAR MATAVAI IN OTAHEITE.

MR NOTT'S OLD CHAPEL.

OTAHEITE OR TAHITI.

Published by Henry Colburn, Great Marlborough Street, 1826.

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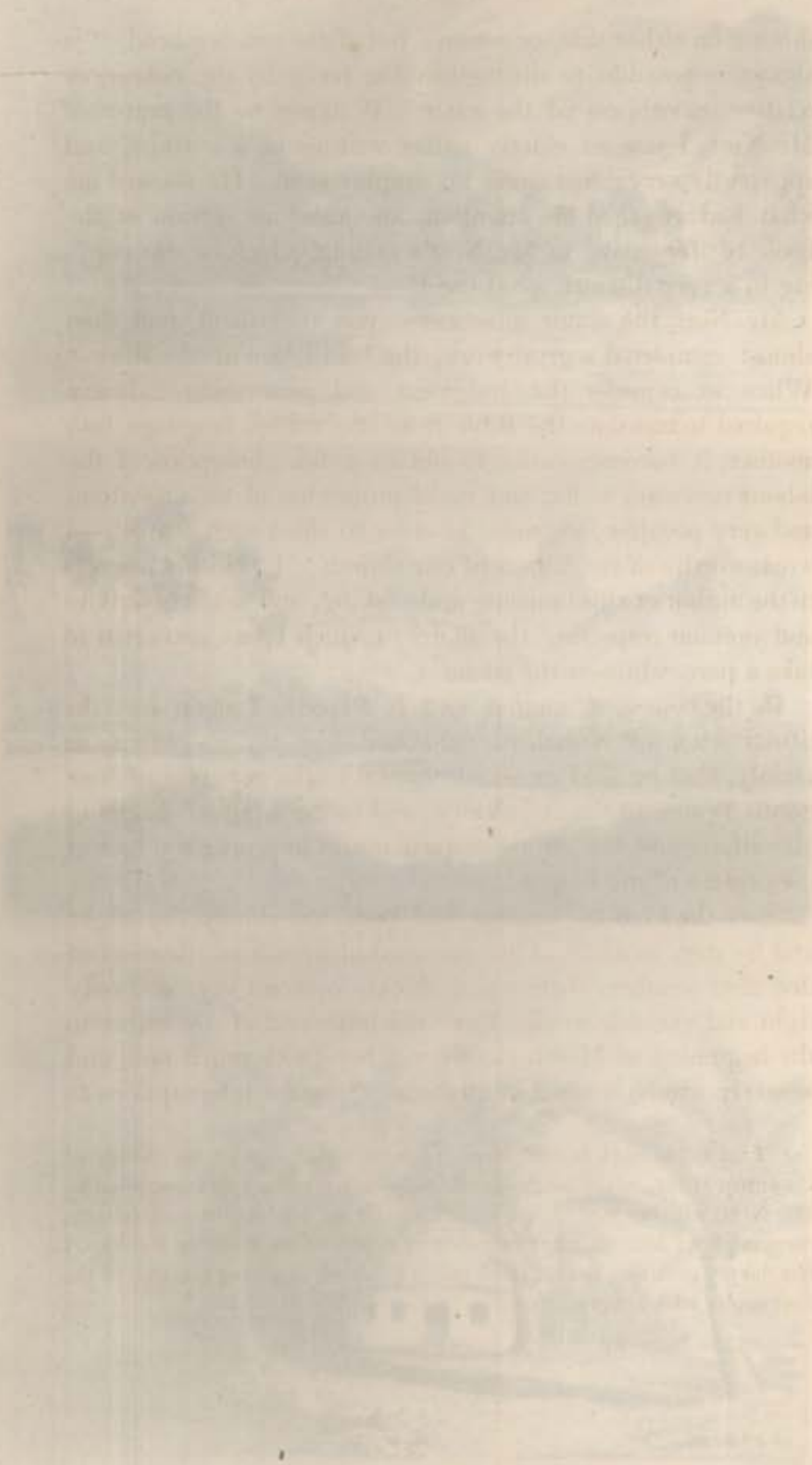

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shining on either side, or astern; but if the sun is a-head, it is almost impossible to distinguish the reefs, by the colour, or relative smoothness of the water. Walking to the house of Mr. Nott, I saw an elderly native writing in a cottage, and apparently very intent upon his employment. He showed me what had engaged his attention, an Otaheitan version of the book of Jeremiah, in Mr. Nott's writing, which he was copying in a very distinct, good hand.

Mr. Nott, the senior missionary upon the island, had then almost completed a great work, the translation of the Bible.* When we consider the judgment and persevering industry required to translate the Bible from one written language into another, it becomes easier to obtain a fair conception of the labour necessary to fix, and make proper use of an unwritten, and very peculiar language, in order to effect such a work,—a work worthy of the fathers of our church. I paid my respects to the author of this immense undertaking, and asked his advice and opinion respecting the affairs in which I was instructed to take a part, while on the island.

In the course of another visit to Papiete, I again met the titular king of Nuhahiva, and told him my suspicions, so plainly, that he said he should appeal to the governor of New South Wales, to the Admiralty, and to the king of England himself, against the unjust suspicions and improper conduct of the captain of the Beagle!

Since the 17th the weather had been too cloudy, by night and by day, to admit of astronomical observations. Instead of fine clear weather, there was a thickly overcast sky, and only light and variable wind. From the latter end of December to the beginning of March cloudy weather (with much rain, and westerly winds) is usual at Otaheite. Singular interruptions to

* This noble work is completed. I have now lying by me a copy of the entire Bible, in the language of Otaheite, translated and compiled by Mr. Nott, who has just sailed from England on his return to Otaheite, carrying with him an ample number of copies of the Book of Books. I felt deeply gratified by that good man's kindness in giving me one of the first copies which were printed.

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the regularity of the trade-wind occur among all the tropical islands of this ocean. One instance has already been given of the uncertain and changeable state of the weather among the Low Islands, and many more may be found in the narratives of voyages in the Pacific between the tropics.

20th. While conversing with Middleton about those Low Islands (where he had passed much time), I was very much struck by the unpleasant personal feeling shewn by him when alluding to the missionaries, and their regulations, as contrasted with the strong terms in which he mentioned the good effects of their intercourse with the Low Islanders; and how much more missionaries were required. His own words, as I find them in a paper of remarks he gave me, are, "the inhabitants (of the Low Islands) are familiarized to Europeans; and are partly civilized, owing to the Gospel having been preached to them by the missionaries." In another place he says, "there are inhabitants enough to require the constant residence of one or two missionaries. They have some books of the Gospel in their hands, but are yet too ignorant to profit by their contents." His own antipathy to the missionaries had arisen, I found, in consequence of their restraints upon his conduct, while at Otaheite.—Among other information he said that the natives of Chain Island told him frequently, that the first ship they ever saw was manned with black people; but the captain, whom the natives styled the 'King of the Spirits,' was a white man. They were much alarmed when they saw the vessel come close to their island, and their old men deemed it an omen of impending disasters. Soon after this event, the island was inundated by the sea, and many people perished. They were then cannibals, and always at war with the natives of the neighbouring islands: since that time, which was 'long ago' (how long he could not ascertain), the Chain Islanders have invaded and successively conquered the other Low Islands, invariably killing and eating the greater proportion of their captives. (The Low Islands are called Paamuto.)

Middleton arrived at Otaheite from Chain Island, only two days before this conversation took place, He came in his

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own open whale boat, with a crew of five natives; two being Chain Islanders, one a native of the Gambier Islands, one from the Marquesas, and one from the ferocious set who live upon an island called Aura.* Knowing their habits, and understanding their language, radically the same though differing in dialect, had assisted his daring and enterprising disposition in a series of wanderings about all the islands which lie in this quarter of the Pacific. He sold me a chart, made by himself, in which, he said, every one of the Low Islands was marked, though not correctly.† From him I obtained their native names also, with the proper pronunciation. He says the natives are great talkers, and have very good memories: for hours at a time he has often listened, with the deepest interest, to their traditions, and to the terrible tales of their inhuman warfare. About the year 1800, as near as he could ascertain, a ship was cast away upon the low island Arutua:‡ her crew were Europeans (meaning white men). The people of Arutua offered no violence, but the blood-thirsty natives of Aura hearing of the wreck, repaired to the place in a body, and massacred every man.

In the year 1831, the master and mate of the unfortunate Truro, passing by Aura in a small boat, were invited ashore by many friendly signs. They suspected no danger, landed together, without arms, were instantly speared by the treacherous natives, and fell, embracing each other.§ Those islands are supposed, by Middleton, to have received their earlier inhabitants from the Marquesas; and a few, latterly, from Otaheite.

By frequent intercourse, by presents, and by some slight knowledge of medicine, Middleton thought he had established

* Excepting the savages of Aura the natives of Chain Island have conquered, successively, all the other islanders in their neighbourhood. On Chain Island there are more hogs and fruits than on any other low island.

† Some of these data were used in adding to Admiral Krusenstern's chart. ‡ I do not know its position.

§ I remarked that the heads of the Otaheitans and those few of the Chain Islanders whom I saw, were strikingly different, but truly conformable to their respective characters.

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himself among the low islanders so securely that he scrupled not to visit any of their islands, Aura alone excepted. How necessary it must be for a missionary to have a knowledge of medicine and surgery. The Jesuit, Falkner, wandered alone in safety among the tribes of South American Indians, owing, in a great measure, to his knowledge of the healing art.*

21st. I went to see 'Ua,' an old man, who remembered 'Toote' (Cook); yet was still strong and active: he told me that in those days he was a little boy. There were many more people then in Otaheite; ten to one, as compared with the present numbers: but sickness had destroyed a great many, he thought. The island was not so healthy as in former times; and they had caught diseases, in those days unknown. Asking who brought this or that disease, he imputed the worst to the ships which came after Cook's first visit, and left men upon the island until

* "Mr. Thomas Falkner was the son of a surgeon of eminence at Manchester, and was brought up in his father's profession, for which he always manifested the most promising disposition. To complete his professional studies, he was sent to London to attend St. Thomas's Hospital; and, happening to lodge in Tooley-street, on the Surrey bank of the Thames, he made an acquaintance with the master of a ship, employed in the Guinea trade, who persuaded the young surgeon to accompany him in his next voyage in his professional capacity. On his return to England, he engaged to go in the same situation on board a merchant ship to Cadiz, from which he continued his voyage to Buenos Ayres, a Spanish settlement on the River La Plata. Here he fell sick, and was in so dangerous a state when his ship was ready to depart, as not to be in a condition to be carried on board; so she sailed without him. The Jesuits, of which there was a college at Buenos Ayres, nursed him during his illness with the greatest care and kindest assiduity; and perceiving the very great advantage which they would derive, in their missions, from possessing a brother who was so well skilled in medicine and surgery, spared no pains to win his affection and secure his confidence. In short, they so worked upon his mind, as to persuade him to enter into their college, and finally to become one of their order. He now entered upon his ministry among the Indians who inhabit the vast track of country between the River La Plata and the Straits of Magellan. His skill in the cure of diseases, and in performing chirurgical operations, together with his knowledge of mechanics, rendered his mission successful beyond example. In this country he remained near forty years, and was among the persons appointed

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their return the following year.* Curvature of the spine, or a hump-back, never appeared until after Cook's visits; and as he had a hump-backed man in his ship, they attribute that deformity to him. 'Ua' told me that I need not yet have any anxiety about a westerly wind, or bad weather. "The wind would be light and variable during that day, but on the morrow would draw round to the eastward, and two days afterwards the sky would be nearly free from clouds." Thanking the old man with some presents, I returned on board; and the Beagle then got under weigh, 'swept' out of the harbour, and, by the sails and sweeps, alternately employed, regained her former anchorage in Matavai Bay. In the course of a walk among the cottages between Papawa and Matavai, I found numerous tokens of industry, such as I had not expected in a South Sea island. In an enervating climate, where abundance of food is easily procured, one ought not to expect the contented natives to distress their minds or bodies, with anxious and industrious endeavours to supply wants which they do not feel, in any degree like the inhabitants of cold or temperate climates; yet the men of Otaheite undergo great fatigue, and carry heavy burthens up and down most difficult tracks in the

pointed by the Spanish government to make a survey of the coasts between the Brazils and the Tierra del Fuego, Falkland Island, &c. When the society of Jesuits was dissolved, he was sent back to Spain, and after an absence of near forty years, arrived in his native country. Soon after his return to England he became domestic chaplain to Robert Berkeley, esquire, of Spetchley, near Worcester, a Roman Catholic gentleman of distinguished knowledge, most respectable character, and large fortune. There he wrote the account of Patagonia, which has been quoted in this volume, and was afterwards published, with a map corrected from that of D'Anville, according to his own observations. Mr. Falkner possessed a very acute mind, a general knowledge, and most retentive memory. Of his medical experience and practice, I have heard physicians of eminence speak in the highest terms of commendation. His manners, as may be supposed from the tenor of his life, were at once singular and inoffensive: and he retained somewhat of his Indian habits to the last. He died, as I have been informed, about the year 1781."—Colnett's Voyage, page 25, note.

* Spanish ships, from Lima, in 1774-6.

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mountains, in a manner astonishing, if not impossible, to Europeans. Mr. Darwin, who made a three days' excursion among the wildest parts of the mountains, was quite enthusiastic in his account of the strength, activity, and above all, the excellent disposition and good conduct of the two natives who were his companions and guides.

At the door of one house I saw the owner reading a book attentively. It was the New Testament translated into his native language. His wife was rolling up some of the large green leaves which they use as substitutes for plates; and two merry little children had been running after me, singing, in hopes of a present of some trifle. The superior expression of that man's countenance, and his unaffected employment (for I came upon him suddenly, and unperceived till the children spoke), made an impression upon my mind, which, I hope, will not be forgotten.

In my way back, passing some tall palm trees, I asked a native to get me some cocoa-nuts. Putting a strip of bark between his feet, he threw off his shirt, and jumped 'at' the tree, catching the trunk with his feet and hands at the same moment; then moving his hands alternately, and his feet by short jumps, the band of bark assisting their hold on the slender trunk, in a few seconds he was at the top of a tree seventy feet in height, quite straight and perpendicular, and tapering in size from a foot to six inches in diameter.

Some curious relics of former times were found for me, which had long remained in dusty quiet; among them were tortoise-shell masks, and head pieces surmounted by feathers of the tropic bird; also an apron, ingeniously, or rather laboriously made of small pieces of mother of pearl. So long was it since they had been used, that a native about thirty years of age did not know what they were for: but from the signs and expressions of the old man to whom they belonged, I think they formed part of the dress of a priest, used when sacrificing a (perhaps human) victim.* Two English sixpences also found their way to me, bearing the date 1787; memorials of the ill-fated Bounty.

* A whole dress may be seen at the British Museum, brought to England by Cook in 1771.

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News arrived that the queen intended to return to her head-quarters at Papiete, and that she had ordered a present of fruit and pigs to be prepared.

22d. Sunday. Early this morning a party went with me to Papiete, and others went to Mr. Nott's church, while those who could not go far from the ship attended Mr. Wilson, to hear as well as see the natives at divine service. At Mr. Pritchard's church we found an orderly, attentive, and decently dressed congregation. I saw nothing "grotesque," nothing "ludicrous," nor anything which had a tendency to "depress the spirits," or "disappoint one's expectations."*

The church was quite full and many were sitting outside; I suppose six hundred people were present besides children, who, like others of their happy age, required an occasional touch with the white wand of a most stern looking old beadle, to prevent their chattering to one another about the strangers, and their 'money.'†

Mr. Pritchard's fluent delivery in the native language surprised and pleased us much. The greater part of the natives were very attentive. Two were making notes upon paper, of the subject of his discourse. A few were careless, but only a very few; and their eye-wanderings were caused chiefly by the strangers in uniform. Where is the English congregation of five or six hundred persons, in which a captious observer could not occasionally detect inattention to the clergyman? Hymns were sung with much propriety, and a very pleasing musical effect. The language is so soft and so full of vowels, that the good voices and very correct ears of the natives succeed admirably in hymns. After the service in the native language had ended, we repaired to the English chapel with Mr. Pritchard, who performed divine service in the manner of the Independents. Occasional visitors from ships at the island, and the few European residents who are within reach, frequent this chapel.

* I had read Kotzebue's voyage a few days previously.

† All gold or silver is by them called 'money;' the gold lace on a coat, an epaulette, a gold coin, or a dollar, is 'money.'

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It was certainly better to suppress altogether, rather than only to restrain and alter their former licentious amusements, but it seemed to me that some kind of innocent recreation was much wanted by these light-hearted islanders. There is a void in the mind where a naturally thoughtless and volatile disposition exists, which it is extremely difficult to fill with serious thoughts of any duration. To such minds "a quiet reflecting day," (as my respected and much lamented messmate in the Thetis, the Rev. Henry Hall, used to term Sunday), is, in a great measure, a vacant time of leisure, which if not occupied by innocent thoughts which interest without doing harm, is certain to be seized upon by evil imaginations and bad passions.

During the time we passed in the churches it was sufficiently plain that there was no harshness usually shewn towards the children: for they clustered round their minister so closely when he moved about, that he was obliged to push them away, good naturedly, several times. From the manner of elderly, as well as young natives, I should conclude that "Pritate,"* as they called Mr. Pritchard, was a favourite.

23d. With Mr. Henry (the son of the missionary) a well known chief, 'Hitote,' came on board to share our breakfast. Captain Beechey has introduced him in his work and described his character. Mr. Henry was born upon the island, and had never visited England, yet a more English countenance, or more genuine English ideas, I have seldom met with in any part of the world. From him I received some information, to me very interesting, and to those for whom it was my duty to collect nautical intelligence, I hope useful.† Afterwards I hastened to Papiete to pay my respects to Queen Pomare. I was in time to see her arrive from Eimeo, sitting on the gunwale of a whale-boat, loosely dressed in a dark kind of gown, without anything upon her head, hands, or feet, and without any kind of girdle or sash to confine her gown, which was fas-

* Having so few consonants in their language, obliges them to change most of our names.

† Mr. Henry's data were also used in adding to Krusenstern's chart.

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tened only at the throat. There was no reception at landing: no attendance, no kind of outward ceremony showed that the 'Queen of the Isles' had arrived at her home.

Some time afterwards, when I heard that she was inclined to give an audience, I went to the royal cottage with Mr. Pritchard. A parcel of half-dressed merry looking damsels eyed us with an amusing mixture of shyness and curiosity. These, I concluded, were a part of the 'Queen's mob,' as our interpreter had ignorantly or democratically called the royal attendants. Only a few men were about the house, one of whom was the queen's foster-father ('feeding father' in the Otaheitan language) and another her husband.

Entering a small room, 'Ia-orana Pomare,' with a shake of the hand, was the salutation given by Mr. Pritchard, and by myself, following his example. On the only three chairs in the room we sat down, but the queen looked very uncomfortable, and certainly not at all dignified. I could not help pitying her, for it was evident she was expecting a lecture on the subject of the Truro, and felt her utter helplessness: I was therefore glad, after a few words of compliment, to see her mother, husband, and foster-father enter the room, though they sat down upon chests or the floor.

I delivered a letter from Commodore Mason, which she asked Mr. Pritchard to interpret, and sent out to her secretary. A meeting of the chiefs, herself presiding, was proposed and decided to be held on the following day. Some conversation then passed on other subjects, and we took our leave by shaking each individual by the hand. This is certainly preferable to pressing noses, but I was sorry to see that the missionaries had attended but little to the outward demeanour, to the manners, to the attendance, and to the dwelling of the sovereign of a people whose happiness and improvement would certainly be increased by raising the character, and improving the condition of their ruler. While called a queen, Pomare ought to be supported by some of those ceremonious distinctions, which have, in all ages and nations, accompanied the chief authority. That the missionaries should interfere harshly

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or sweepingly, would doubtless irritate; but a beneficial influence, almost unnoticed except in its effects, might be exerted in these temporal, and seemingly trifling affairs, which might assist hereafter in a day of need.

I have been told that the natives have been very ungrateful to the missionaries. Perhaps they are not all aware what a debt of gratitude they owe. Certainly, the better informed and the older inhabitants understand and appreciate the kindness and the labours of their devoted teachers; but whether the younger or the lightly-disposed have, generally speaking, a kindly feeling towards them I doubt. More temporal enjoyments, and more visible or tangible benefits are asked for by the younger inhabitants, who are daily becoming more aware of the manners and habits of civilized nations. Surely the queen, a young and lively woman, is likely to compare her own habits and personal comforts, and the degrees of attention or deference shown to her, with those of foreigners, either resident in or visiting Otaheite.

Dispensing temporal benefits, with an evident desire to better their condition in every way, excites the gratitude of ignorant minds, and often paves the way towards teaching them to acquire abstract ideas, and to wage war against many of those things which they would rather do than leave undone. There is a Roman Catholic mission at the Gambier Islands, amply provided with presents and property fit for the natives, and it is said that they are succeeding well. At Otaheite the missionaries were afraid that the doctrines of the Roman church would obtain a greater influence, and agree better with the disposition of the natives than the strict discipline in which they have hitherto been held. Unless preventive measures are taken in Europe, religious strife and internal warfare may again be caused in these islands, even by those whose aim is peace. Already there is a remarkable bitterness of feeling on the subject, which is unlikely to diminish if the success of the Roman Catholic mission increases.

But I have wandered away from Pomare—her small ill-furnished room and her awkwardly-contrived house, neither Eng-

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lish nor Otaheitan. Before she became sovereign, she was known by the name of Aimatta, which signifies 'eye-eater;'* but Pomare has since been adopted as the royal name. In affixing her signature, 'Vahine' is added, which means 'female'—thus 'Pomare Vahine.' Her husband is a young, intelligent man; but he has no share in the government, being only king-consort. This man was the only native of the island, that I saw, whose nose was sharp and projecting. It is amusing to think that they call a man 'long nose,' in this country, when they wish to wound his feelings deeply.

During the first few days after a child is born, the mother or her attendants keep pressing the back of the infant's head with one hand, and the forehead and nose with the other, to make the head high and the nose and brow flat. Children of the higher ranks undergo more compression, because they are more carefully attended.† How the queen's husband escaped, or could be chosen by her with such a nose, I am at a loss to discover.

24th. With all the officers who could be spared from the duty of the ship, Mr. Darwin and I repaired early to Papiete. Mr. Wilson, Mr. Henry, and Hitote, were of the party. Arrived at the hospitable abode of Mr. Pritchard, we waited until a messenger informed us of the queen's arrival at the appointed place of meeting—the English chapel. From our position we had just seen the royal escort—a very inferior assemblage. It appeared that the chiefs and elderly people had walked to the chapel when our boats arrived, leaving only the younger branches of the community to accompany Pomare. The English chapel is a small, wooden structure, with a high, angular roof; it is about fifty feet in length and thirty feet wide; near the eastern end is a pulpit, and at each corner a small pew. The rest of the building is occupied by strong benches, extending nearly from side to side; latticed windows admit light and air; the roof is thatched in a partly Otaheitan manner; none

* I need not remark upon the offering made to the king in the time of human sacrifice.

† Mitchell, the native pilot, described this process to me minutely.

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of the woodwork is painted, neither is there any decoration. Entering the chapel with my companions, I turned towards the principal pews, expecting to see Pomare there; but no, she was sitting almost alone, at the other end of the building, looking very disconsolate. Natives sitting promiscuously on the benches saluted us as we entered:—order, or any kind of form, there was none.

The only visible difference between Pomare and her subjects was her wearing a gay silk gown, tied however round the throat, though entirely loose elsewhere; being made and worn like a loose smock-frock, its uncouth appearance excited more notice from our eyes than the rich material. In her figure, her countenance, or her manner, there was nothing prepossessing, or at all calculated to command the respect of foreigners. I thought of Oberea,* and wished that it had been possible to retain a modified dress of the former kind. A light undergarment added to the dress of Oberea might have suited the climate, satisfied decency, and pleased the eye, even of a painter.

Disposed at first to criticise rather ill-naturedly—how soon our feelings altered, as we remarked the superior appearance and indications of intellectual ability shown by the chieftains, and by very many of the natives of a lower class. Their manner, and animated though quiet tone of speaking, assisted the good sense and apparent honesty of the principal men in elevating our ideas of their talents, and of their wish to act correctly.

Every reader of voyages knows that the chiefs of Otaheite are large, fine-looking men. Their manner is easy, respectful, and to a certain degree dignified; indeed on the whole surprisingly good. They speak with apparent ease, very much to the

* Queen of Otaheite in 1767. "Both men and women are not only decently, but gracefully clothed, in a kind of white cloth, that is made of the bark of a shrub, and very much resembles coarse China paper. Their dress consists of two pieces of this cloth: one of them, a hole having been made in the middle to put the head through, hangs down from the shoulders to the mid-leg before and behind; another piece, which is between four and five yards long, and about one yard broad, they wrap round the body in a very easy manner."—Wallis's Voyage Round the World, 1767.

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purpose in few words, and in the most orderly, regular way. Not one individual interrupted another; no one attempted to give his opinions, or introduce a new subject, without asking permission; yet did the matters under discussion affect them all in a very serious manner. Might not these half-enlightened Otaheitans set an example to numbers whose habits and education have been, or ought to have been, so superior?

It had become customary to shake hands with the queen, as well as with the chiefs. This compliment we were expected to pay; but it seemed difficult to manage, since Pomare occupied a large share of the space between two benches nearest to the wall, and the next space was filled by natives. However, squeezing past her, one after another, shaking hands at the most awkward moment, we countermarched into vacant places on the benches next in front of her. The principal chiefs, Utaame, Taati, Hitote, and others, sat near the queen, whose advisers and speakers appeared to be Taati and her foster-father. It was left for me to break the silence and enter upon the business for which we had assembled. Desirous of explaining the motives of our visit, by means of an interpreter in whom the natives would place confidence, I told Mitchell the pilot to request that Queen Pomare would choose a person to act in that character. She named Mr. Pritchard. I remarked, that his sacred office ought to raise him above the unpleasant disputes in which he might become involved as interpreter. The missionaries had approached, and were living in Otaheite, with the sole object of doing good to their fellow-men, but I was sent in a very different capacity. As an officer in the service of my king, I was either to do good or harm, as I might be ordered; and it was necessary to distinguish between those who were, and ought to be always their friends, and men whose duty might be unfriendly, if events should unfortunately disappoint the hopes of those interested in the welfare of Otaheite. These expressions appeared to perplex the queen, and cause serious discussions among the chiefs. Before any reply was made, I continued: "But if Mr. Pritchard will undertake an office which may prove disagreeable, for the

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sake of giving your majesty satisfaction, by forwarding the business for which this assembly was convened, it will not become me to object; on the contrary, I shall esteem his able assistance as of the most material consequence."

The queen immediately replied, through the chieftain at her right hand, Taati, that she wished Mr. Pritchard to interpret.

Removing to a position nearer the queen and chiefs (he had been sitting at a distance), Mr. Pritchard expressed his entire readiness to exert himself on any question which might affect the good understanding and harmony that hitherto had existed between the natives of Otaheite and the British; and he trusted that those persons present who understood both languages, (Messrs. Wilson, Bicknell, Henry, and others,) would assist and correct his interpretations as often as they thought it necessary.

Commodore Mason's letter to me, authorizing my proceedings, was then read—in English, by myself—and translated by Mr. Pritchard. Next was read an agreement or bond, by which Queen Pomare had engaged to pay 2,853 dollars, or an equivalent, on or before the 1st day of September 1835, as an indemnification for the capture and robbery of the Truro at the Low Islands.

The queen was asked whether her promise had been fulfilled?

Taati answered, "Neither the money nor an equivalent has yet been given."

"Why is this?" I asked. "Has any unforeseen accident hindered your acting up to your intentions; or is it not to be paid?"

Utaame and Hitote spoke to Taati, who replied, "We did not understand distinctly how and to whom payment was to be made. It is our intention to pay; and we now wish to remove all doubts, as to the manner of payment."

I observed, that a clear and explicit agreement had been entered into with Capt. Seymour; if a doubt had arisen it might have been removed by reference to the parties concerned, or to disinterested persons; but no reference of any kind had been made, and Mr. Bicknell, the person appointed to receive the money, or an equivalent, had applied to the queen, yet had not obtained an answer.

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I then reminded Pomare of the solemn nature of her agreement; of the loss which her character, and that of her chiefs, would sustain; and of the means England eventually might adopt to recover the property so nefariously taken away from British subjects. I said that I was on my way to England, where her conduct would become known; and if harsh measures should, in consequence, be adopted, she must herself expect to bear the blame.

These words seemed to produce a serious effect. Much argumentative discussion occupied the more respectable natives as well as the chiefs; while the queen sat in silence.

I must here remark, in explanation of the assuming or even harsh tone of my conduct towards Pomare, at this meeting, that there was too much reason for believing that she had abetted, if not in a great measure instigated, the piracy of the Paamuto people (or Low Islanders). For such conduct, however, her advisers were the most to blame. She was then very young; and during those years in which mischief occurred, must have been guided less by her own will than by the desires of her relations.

I had been told that excuses would be made; and that unless something like harshness and threatening were employed, ill effects, instead of a beneficial result, would be caused by the meeting: for the natives, seeing that the case was not taken up in a serious manner, and that the captain of the ship of war did not insist, would trouble themselves no farther after she had sailed away; and would laugh at those by whom the property was to be received.

The 'Paamuto,' or Low Islands, where the piracies have occurred, in which she and her relations were supposed to have been concerned, were, and are still considered (though nominally given up by her), as under her authority and particular influence. Her father was a good friend to all the natives of those islands; and the respect and esteem excited by his unusual conduct have continued to the present time, and shown themselves in attachment to his daughter. So much hostility has in general influenced the natives of different islands, that

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to be well treated by a powerful chief, into whose hands a gale of wind, or warfare throws them, is a rare occurrence.

The Paamuto Isles are rich in pearl oysters. Pomare, or her relations, desired to monopolize the trade. Unjustifiable steps were taken, actuated, it is said, by her or by these relations; and hence this affair.

They soon decided to pay the debt at once. Thirty-six tons of pearl oyster-shells, belonging to Pomare, and then lying at Papiete, were to form part of the equivalent; the remainder was to be collected among the queen's friends. Taati left his place near her, went into the midst of the assembly, and harangued the people in a forcible though humorous manner, in order to stimulate them to subscribe for the queen. After he had done speaking, I requested Mr. Pritchard to state strongly that the innocent natives of Otaheite ought not to suffer for the misdeeds of the Low Islanders. The shells which had come from those ill-conducted people, might well be given as part of the payment; but the queen ought to procure the rest from them, and not from her innocent and deserving subjects. A document, expressing her intention to pay the remaining sum within a stated time, signed by herself and by two chiefs, with a certainty that the property would be obtained from the Low Islanders, would be more satisfactory than immediate payment, if effected by distressing her Otaheitan subjects, who were in no way to blame.

Taati replied, "The honour of the queen is our honour. We will share her difficulties. Her friends prefer assisting her in clearing off this debt, to leaving her conduct exposed to censure. We have determined to unite in her cause, and endeavour to pay all before the departure of the man-of-war."

It was easy to see that the other principal chiefs had no doubt of the propriety of the demand; and that they thought the queen and her relations ought to bear the consequences of their own conduct. Taati, who is related to her, exerted himself far more than Utaame, Hitote, or any of the others. This part of the business was then settled by their agreeing to give the shells already collected, such sums of money as her friends

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should choose to contribute, and a document signed by two principal chiefs, expressing the sum already collected and paid; and their intention of forthwith collecting the remainder, and paying it before a stipulated time. Difficulties about the present, as compared with the former value of the shells, were quickly ended by arbitration; and their value estimated at fifty dollars per ton: the ready way in which this question about the value of the shells was settled, gave me a high idea of the natives' wish to do right, rather than take advantage of a doubtful point of law.

I next had to remark, that the queen had given up the murderers of the master and mate of the Truro in a merely nominal manner, and not in effect; and that she must expect to receive a communication upon that subject by the next man-of-war.

She asked me—whether I really thought they would be required from her by the next man-of-war?

I replied: "Those men were tried and condemned by the laws of Otaheite. Your majesty, as sovereign, exercised your right of pardoning them. I think that the British Government will respect your right as queen of these islands; and that his Britannic Majesty will not insist upon those men being punished, or again tried for the same offence; but the propriety of your own conduct in pardoning such notorious offenders, is a very different affair. It will not tend to diminish the effect of a report injurious to your character, which you are aware has been circulated."

After a pause, I said, "I was desired to enquire into the complaints of British subjects and demand redress where necessary. No complaints had been made to me; therefore I begged to congratulate her majesty on the regularity and good conduct which had prevailed; and thanked her, in the name of my countrymen, for the kindness with which they had been treated."

I then reminded Pomare of the deep interest generally felt for those highly deserving and devoted missionaries, whose exertions, hazardous and difficult as they had been, and still were, had raised the natives of Otaheite to their present en-

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lightened and improved condition; and that every reason united to demand for them the steady co-operation of both her and her chiefs. Finding that they listened attentively to Mr. Pritchard's interpretation, which I was told was as good as it appeared to me fluent and effective, I requested permission to say a few words more to the queen—to the effect that I had heard much of her associating chiefly with the young and inexperienced, almost to the exclusion of the older and trustworthy counsellors whom she had around her at this assembly. To be respected, either at home or abroad, it was indispensably necessary for her to avoid the society of inferior minds and dispositions; and to be very guarded in her own personal conduct. She ought to avoid taking advice from foreigners, whom she knew not, and whose station was not such as might be a guarantee for their upright dealings: and she ought to guard carefully against the specious appearances of adventurers whose intentions, or real character, it was not possible for her to discover readily. Such men could hardly fail to misinform her on most subjects; but especially on such as interested themselves; or about which they might entertain the prejudices and illiberal ideas which are so prevalent among ignorant or ill-disposed people. I tried to say these things kindly, as the advice of a friend: Pomare thanked me, acknowledged the truth of my remarks, and said she would bear them in mind.

Turning to the chiefs, a few words passed, previous to Taati asking me, in her name, "Whether they were right in allowing a foreigner to enlist Otaheitans to serve him as soldiers; and in permitting them and other men to be trained, for warlike purposes, upon their island?"* My reply was, "If Otaheitan subjects, so trained, almost under the queen's eye, act hostilely against the natives of any other island, will not those natives deem her culpable? To my limited view of the present case, it appears impolitic, and decidedly improper to do so." After a few words with Utaame and Hitote, Taati rose and gave notice that no Otaheitan should enlist or be trained to serve as

* With reference to the so-called Baron de Thierry.

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a soldier, in a foreign cause. By this decree de Thierry lost his enlisted troops, except a few New Zealanders, and whaling seamen.

One of the seven judges, an intelligent, and, for an Otaheitan, a very well educated man, named 'Mare,' asked to speak to me. "You mentioned, in the third place," said Mare, "that you were desired to enquire into the complaints of British subjects, and demand redress, if necessary. You have stated that no complaint has been made, and you have given us credit for our conduct: allow me now to complain of the behaviour of one of your countrymen, for which we have failed in obtaining redress." Here Mare detailed the following case of the 'Venilia,' and said that no reply to their letter to the British government, had yet been received. Mare then added, in a temperate though feeling manner, "does it not appear hard to require our queen to pay so large a sum as 2,853 dollars out of her small income; while that which is due to her, 390 dollars, a mere trifle to Great Britain, has not obtained even an acknowledgment from the British government?"

I ventured to assure Mare that some oversight, or mistake, must have occurred, and promised to try to procure an answer for them, which, I felt assured, would be satisfactory.

The letter on the subject of the Venilia, very literally translated, is as follows: it is, for many reasons, a curious document.

"Our friend, the king of Britain, and all persons in office in your government, may you all be saved by the true God!

"The following is the petition of Pomare, of the governors, and of the chiefs of Tahiti.

"A whale-ship belonging to London, has been at Tahiti: 'Venilia' is the name of the ship, 'Miner' is the name of the captain. This ship has disturbed the peace of the government of Queen Pomare the first. We consider this ship a disturber of the peace, because the captain has turned on shore thirteen of his men, against the will of the governor of this place, and other persons in office. The governor of this district made known the law clearly. The captain of the ship objected to

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the law, and said that he would not regard the law. We then became more resolute: the governor said to the chiefs, 'Friends, chiefs of the land, we must have a meeting.' The chiefs assembled on the twenty-second day of December 1831. The governor ordered a man to go for the captain of the ship. When he had arrived on shore, the governor appointed a man to be speaker for him. The speaker said to the captain of the ship, 'Friend, here are your men, take them, and put them on board of your ship; it is not agreeable to us that they should remain upon our land.' The captain said, 'I will not by any means receive them again: no, not on any account whatever!' The governor again told his speaker to say, 'Take your men, and put them on board your ship, we shall enforce our laws.' The captain strongly objected to this, saying, 'I will not, on any account, again receive these bad men, these mutineers.' We then said, 'It is by no means agreeable to us for these men to live on shore: if they are disturbers of the peace on board the ship, they will disturb the peace on shore.' Captain Hill, who has long been a captain belonging to Britain, spoke to the captain of the ship: this is what he said to him: 'It is not at all agreeable to the laws of Britain that you should discharge, or in any manner turn away your men in a foreign land.' This is another thing Captain Hill said, 'you should write a document, stating clearly the crime for which these men have been turned on shore; that the governor and chiefs may know how to act towards them, and that they may render you any assistance.' But this was not agreeable to the captain; he would not write a document. The governor then said to the captain, 'If you will not take your men on board again, give us the money, as expressed in the law.' The captain said, 'I will not give the money, neither will I again take the men: no, not on any terms whatever; and if you attempt to put them on board the ship, I will resist, even unto death.' The governor then said, 'We shall continue to be firm; if you will not give the money, according to the law, we shall put your men on board the ship, and should you die, your death will be deserved.' When the captain perceived that we were determined

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to enforce the law, he said, 'It is agreed; I will give you the money, three hundred and ninety dollars.'

"On the 24th of December the governor sent a person for the money. The captain of the ship said, 'He had no money.' We then held a meeting: the governor's speaker said to the captain, 'Pay the money according to the agreement of the 22d day of this month.' The captain said, 'I have no money.' The governor told him, 'If you will not pay the money we will put your men on board the ship.'

"One Lawler said, 'Friends, is it agreeable to you that I should assist him? I will pay the money to you, three hundred and ninety dollars! I will give property into your hands: this is the kind of property; such as may remain a long time by the sea-side and not be perishable. In five months, should not the money be paid, this property shall become your own.'

"Mr. Pritchard said that this was the custom among foreigners. We agreed to the proposal.

"On the 26th of December we went to Lawler's house to look at the property, and see if it was suitable for the sum of money; and also to make some writings about this property. While there, Lawler made known to us something new, which was, that we should sign our names to a paper, written by the captain, for him to show his owners. We did not agree to this proposal, because we did not know the crime for which these men were turned on shore. We saw clearly that these two persons were deceiving us, and that they would not pay the money; also that the captain would not again take his men; but we did not attempt to put his men on board the ship, because another English whaler had come to anchor. We told the captain that we should write a letter to the British government, that they might order this business to be investigated, and might afford us their assistance.

"This is the substance of what we have to say:—We entreat you, the British Government, to help us in our troubles. Punish this Captain Miner, and command the owners of the Venilia to pay us three hundred and ninety dollars for thirteen of their men having been left on our land; and also to send the wages

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of a native man who was employed to supply the whole crew with bread-fruit while at anchor here. Let them send a good musket for this man, because the captain has not given him a good musket according to the agreement at the beginning. Captain Miner also gave much trouble to the pilot. He took his ship out himself: the pilot went after the ship to get his money, and also the money for Pomare, for anchorage. He would not give the pilot his share. After some time he gave the pilot some cloth for his share.

"In asking this, we believe that our wish will be complied with. We have agreed to the wish of the British government in receiving the Pitcairn's people, and in giving them land. We wish to live in peace, and behave well to the British flag, which we consider our real friend, and special protection. We also wish that you would put in office a man like Captain Hill, and send him to Tahiti, as a representative of the king of Great Britain, that he may assist us. If this should not be agreeable to you, we pray you to give authority to the reverend George Pritchard, the missionary at this station.

"This is the conclusion of what we have to say. Peace be with you. May you be in a flourishing condition, and may the reign of the beloved king of Britain be long! Written at Tahiti on the sixth day of January, one thousand eight hundred and thirty-two.

"On behalf of POMARE, the queen.

"Signed by APAAPA, chief secretary.
ARUPAEA, district governor.
TEPAU, district governor.
TEHORO, one of the seven supreme judges.
MARE, a district judge, (since raised to be a supreme judge)."

"Addition:—"This man, Lawler,* is an Irishman: he has

* This Lawler was so remarkably good-looking a man, that the natives used to say (literally translated) that "he was as beautiful as a glass tumbler." (Many years ago, when Wallis discovered the Society Islands, a drinking-glass excited so much notice, that ever since it has been referred to as one of the most beautiful of objects.)

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been living at Tahiti about three months: he came from the Sandwich Islands. Of his previous conduct we can say nothing. We much wish that a British ship of war would come frequently to Tahiti to take to their own lands these bad foreigners that trouble us. It is useless for us to depend upon the consul at the Sandwich Islands. We have long known that we can obtain no assistance from him.*

"We wish to do our duty towards you Britons. You are powerful and rich—but we are like weak children.

"On behalf of POMARE, the queen.

APAAPA, chief secretary."

"Paofai (close to Papiete),
Tahiti, 7th January 1832."

This interesting letter needs no apology for its insertion at full length. Besides explaining Mare's application, it helps to give an idea of the state of Otaheite; and it appeals to our better feelings in a persuasive manner.

* The British government has since appointed Mr. Pritchard to act as Consul for the Society and Friendly Islands.

Note (*a*) referred to in page 507.

That the electric agent (whether fire or fluid) goes upward from the earth to the atmosphere, as well as in the contrary direction, showing that a mutual action takes place between air and land, many facts might be brought to prove: I will only mention two.

"On October 25th we had a very remarkable storm: the sky was all in flames. I employed part of the night in observing it, and had the pleasure of seeing three ascending thunderbolts! They rose from the sea like an arrow; two of them in a perpendicular direction, and the third at an angle of about 75 degrees."—(De Lamanon, in the Voyage of La Pérouse, vol. iii. pp. 431-2).

While H.M. corvette Hind, was lying at anchor off Zante, in 1823, in twelve fathoms water, an electric shock came in through her hawse, along the chain-cable, by which she was riding. Two men, who were sitting on the cable, before the bitts, were knocked down—felt the effects of the shock about half an hour—but were not seriously hurt. A noise like that of a gun startled every one on board; yet there was neither smell, nor smoke, nor any other visible effect. The sky was heavily clouded over; small rain was falling; and there was distant thunder occasionally, but no visible lightning. The cable was hanging slack, almost 'up and down.' I witnessed this myself.

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CHAPTER XXIII.

Continuation of the Meeting at Papiete—Questions—Explanation—Meeting ends—Pilotage—Mr. Wilson—Queen's Visit—Fireworks—School Intelligence—Letters—Inhabitants—Dress—Conduct—Abolition of Spirits—Defect in Character—Domestic Scene—Aura Island—Newton at Bow Island—Pearl Oyster-shells—Divers—Steering—Queen's Letter—Collection—Sail from Otaheite—Whylootacke—Flight of Birds—Navigators—Friendly—Feejee Islands—English Chief—Precautions—La Pérouse.

Reverting to the meeting at Papiete:—The queen's secretary next asked to speak, and said that a law had been established in the island, prohibiting the keeping, as well as the use or importation of any kind of spirits. In consequence of that law, the persons appointed to carry it into effect had desired to destroy the contents of various casks and bottles of spirits; but the foreigners who owned the spirits objected, denying the right to interfere with private property. The Otaheitan authorities did not persist, as they were told that the first man-of-war which might arrive would certainly take vengeance upon them if they meddled with private property. He wished to ask whether the Otaheitans ought to have persisted in enforcing their own laws; and what I should have done, had the law been enforced with a British subject, and had he made application to me.

My answer was, "Had the Otaheitans enforced their law, I could in no way have objected. In England a contraband article is seized by the proper officers, and is not treated as private property while forbidden by the law."

Much satisfaction was evidently caused by this declaration: also, at a former part of the discussions, when a remonstrance was made against Otaheitans paying the Truro debt, the greater part of the assembly seemed to be much pleased.

A respectable old man then stood up, and expressed his gratification at finding that another of King William's men-of-war had been sent—not to frighten them, or to force them to do as they were told, without considering or inquiring into their own

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opinions or inclinations, but to make useful enquiries. They feared the noisy guns which those ships carried, and had often expected to see their island taken from them, and themselves driven off, or obliged in their old age to learn new ways of living.

I said, "Rest assured that the ships of Great Britain never will molest Otaheitans so long as they conduct themselves towards British subjects as they wish to be treated by Britons. Great Britain has an extent of territory, far greater than is sufficient for her wishes. Conquest is not her object. Those ships, armed and full of men, which from time to time visit your island, are but a very few out of a great many which are employed in visiting all parts of the world to which British commerce has extended. Their object is to protect and defend the subjects of Great Britain, and also take care that their conduct is proper—not to do harm to, or in any way molest those who treat the British as they themselves would wish to be treated in return."

I was much struck by the sensation which these opinions caused amongst the elderly and the more respectable part of the assemblage. They seemed surprised, and so truly gratified, that I conclude their ideas of the intentions of foreigners towards them must have been very vague or entirely erroneous.

The business for which we had assembled being over, I requested Mr. Pritchard to remind the queen, that I had a long voyage to perform; and ought to depart from her territories directly she confided to me the promised document, relating to the affair of the Truro; and I then asked the queen and principal chiefs to honour our little vessel by a visit on the following evening, to see a few fireworks: to which they willingly consented: some trifling conversation then passed; and the meeting ended.

Much more was said, during the time, than I have here detailed: my companions were as much astonished as myself at witnessing such order, so much sensible reasoning, and so good a delivery of their ideas! I shall long remember that meeting at Otaheite, and consider it one of the most interesting sights

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I ever witnessed. To me it was a beautiful miniature view of a nation emerging from heathen ignorance, and modestly setting forth their claims to be considered civilized and Christian.

We afterwards dined with Mr. Pritchard, his family, and the two chiefs, Utaame and Taati. The behaviour of these worthies was extremely good; and it was very gratifying to hear so much said in their favour by those whose long residence on the island had enabled them to form a correct judgment. What we heard and saw showed us that mutual feelings of esteem existed between those respectable and influential old chieftains and the missionary families.

It was quite dark when we left Papiete to return, by many miles among coral reefs, to the Beagle; but our cat-eyed pilot undertook to guide our three boats safely through intricate passages among the reefs, between which I could hardly find my way in broad daylight, even after having passed them several times. The distance to the ship was about four miles; and the night so dark, that the boats were obliged almost to touch each other to ensure safety; yet they arrived on board unhurt, contrary to my expectation; for my eyes could not detect any reason for altering our course every few minutes, neither could those of any other person, except the pilot, James Mitchell. Had he made a mistake of even a few yards, among so many intricate windings, our boats must have suffered (because the coral rocks are very sharp and soon split a plank), though in such smooth and shallow water, a wrong turning could have caused inconvenience only to ourselves, for there was little or no danger of more than a wetting.

The observations at Matavai being completed, I was enabled to leave the place, and invited Hitote and Mr. Henry (who had returned with us) to pay another visit to Papiete in the Beagle, and meet the royal party.

25th. At daylight this morning, while the Beagle's crew were unmooring and hoisting in the boats, I went to Mr. Wilson's school-house, then used also as a chapel—the old chapel having been blown down by a violent gale of wind. Divine service (a hymn, a long extempore prayer, and another hymn) was

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performed. This is the established custom at all the missionary stations at Otaheite on Wednesday mornings: on other mornings one or two hours after daylight are employed in the schools. The congregation was numerous, and very attentive. I noticed that all the principal men of the district, besides Hitote who came from a distant part of the island, were present.

Mr. Wilson's manner pleased me much; it was the sincere, and naturally impressive manner of a kind-hearted, honest man, earnestly performing a sacred and paramount duty. I went to see the new chapel after the morning-service was ended; but only the floor-timbers and the posts for the roof were then fixed in their places. The natives were irregular in their work, sometimes doing much, at others little, just as they felt disposed. Being a voluntary work, they took their time about it.

Mr. Darwin and I breakfasted with Mr. Wilson at his house: it happened that Mr. and Mrs. Henry were about to make a journey to some distance; that a favourite son was undertaking a new and difficult mission at the Navigator's Islands, and that we were both about to take leave of the pious teacher of the heathen: and for each he asked a blessing, in an extempore prayer of some length, the result of unaffected, genuine piety. A kinder, or less exceptionable prayer, so far as I could pretend to judge, than that unprepared one by Mr. Wilson, I could not have wished to hear. That it was unprepared I feel certain, because he had not expected us to be present, and the manner in which our prospects were intermingled with those of the others he mentioned, showed that there was no premeditation. There was no affected expression, or unusual tone: it was the sincere devout manner of a pious plain-spoken man.

When under sail we tried to approach the entrance of Papiete Harbour, but baffling winds prevented our anchoring until three in the afternoon; and then, anticipating the royal visit, we tried to make such preparations as our little vessel could accomplish. Dressing the ship with flags, and preparing to man yards, was all we were able to do: salute we could not, on account of the chronometers.

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We were told that the queen had walked to Papawa, distant about two miles, to inspect a quantity of fruit, cocoa-nuts, pine-apples, &c. (which she had ordered to be collected as a present to the man-of-war): and, with our glasses, we saw the royal party hastening along the beach, and in the midst of a number of women, children, and men, the queen was observed advancing at a quick walk. Soon afterwards, when it was supposed she had rested and dressed, we sent the boats. The chiefs were already on board. Mr. Pritchard undertook the troublesome offices of interpreter and master of the ceremonies, and by his assistance we saw the whole party collected on the Beagle's upper deck, while the seamen manned yards, and we all gave the queen three cheers.

A bad dinner, accepted after the four mile walk, in a manner it did not deserve,—was succeeded by a few rockets, blue lights, and false fires,—the only fireworks we possessed. Luckily the rockets were good and gave high satisfaction. Lying in the middle of a bay, whose radius, supposing it semi-circular, may be half-a-mile, our ears were startled by a thrilling outcry of delight echoing around the beach, as each successive rocket rushed into the sky and burst. This outcry from the natives on shore, who were taken by surprise (the night being very dark) showed how much they enjoyed the sight. Our visitors on board, being told what would happen, only repeated 'maitai,' 'maitai,'* with earnestness. I much wished then to have had a few good fireworks of a more artificial character. To any one about to visit distant, especially half-civilized or savage nations, let me repeat a piece of advice given to me, but which from inadvertence I neglected to follow: "take a large stock of fireworks."

Some presents to each of our guests helped to amuse them and keep up their cheerfulness. After tea I proposed hearing a few of the seamen's songs,—as some of our crew were very good singers,—not at the time thinking of their prejudices against any singing except hymns. Mr. Pritchard had no word to interpret 'song' but 'himene;' and Rule Britannia,

* Very good—beautiful.

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with one or two other grave performances, passed off very well, but, to the perplexing of Mr. Pritchard and surprise of the Otaheitans, a merry comic song was struck up, which obliged Mr. Pritchard to answer the queen's inquiries plainly, by saying, "No, that was not a hymn," it was "sea singing." 'God save the King' sounded more gravely, and suited better.

We landed the party almost at their own doors, and if they were half as well pleased as we were, our little preparations had not been a waste of time and trouble. Their behaviour on board was extremely correct: their habits and manners perfectly inoffensive. No doubt they are improving yearly, and the example of the missionary families has an influence over them, exceeding that of very differently disposed people by whom they are too frequently visited.

26th. At daylight this morning some of us visited the school. As I had heard of 'compulsion' and other absurdities, I went early to get there before Mr. Pritchard arrived, without having hinted at such an intention.

About the large chapel or church, groups of elderly and old people were sitting by threes and fours in a place, helping each other to read the New Testament. While one read the others listened, and, if able, corrected him. One man not less than fifty years of age, was learning to read, with spectacles. Some came in, others went out, just as they chose, for there was not any one even to watch them till Mr. Pritchard came: and during about an hour after sunrise, every day, those people, both women and men, thus instructed one another, previous to beginning their daily out-of-door labours.

In the school-house I found a number of children, waiting for their teacher, who soon arrived and gave them their tasks. The greater part of them wrote sentences on slates from his dictation, with ease and correctness. One sentence he gave them was, 'the captain wishes you happiness,' which they wrote instantly, and some of their own accord added, 'and we wish happiness to the captain.' The handwriting of many, indeed most of the elder girls and boys, was very good: and to verbal questions they replied readily. They seemed to be in good discipline, and yet a merrier or more cheerful looking

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set of children I never saw. A hymn excellently, or, I ought perhaps to say, prettily sung, ended their attendance.

Returning by way of the church, I saw Hitote, his brother, and other chiefs, engaged in eager discussion. Mr. Pritchard and I went in: "You are just come in time," said they, "we are disputing about the lightning conductors on board the Beagle, and cannot determine whether they end in the ship's hold, or whether they go through her bottom, into the water." Mr. Pritchard explained: a momentary pause ensued—each seemed trying to understand the puzzling subject; when a shrewd old man, hitherto a quiet listener, remarked—"you white men are wonderfully clever, you know and do most things, I wish some of you (passing his hand over his chin in a drolly rueful manner) I wish some of you would tell us how to rid our faces of these troublesome beards!" (He had just been shaved).

The rapidity with which intelligence is communicated among savage, or partially civilised nations, has often been remarked: but I do not remember meeting with an explanation, till Mr. Nott told me it was passed verbally—from one to another—each man calling to his neighbour. No method could be speedier, where a population is numerous; as at Otaheite or New Zealand, when Cook was there.

In the course of the morning I waited upon the queen to inform her that the Beagle was then going out of the port; and that I waited only for her commands, and the letter she had promised: upon which she sent for her secretary and the chiefs; when we left her for a time. Two of the persons who had been on board our vessel the previous evening, sent me letters this morning, which are so peculiar and interesting, in many points of view, that I here insert them.

Translation of a letter from 'Mare,' one of the seven supreme judges of Otaheite; written in a round distinct hand, in his own language, and directed to me.

"Tahiti, Nov. 26, 1835.

"To you the officer of King William!

"May the peace of God be with you. This is what I have to say to you, my dear friend. I praise you with grateful feelings in my heart for your kindness to me, an insignificant man,

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in giving to me a box and some other things besides. I and my wife will feel grateful to you when we look at these things. This is another thing with which I feel pleased; your having shown me the many good things on board your ship; and your men; they have great excellence, and a good character.

"That you may be saved is the wish of your servant,

"MARE."

A letter from Paofai, the brother of Hitote, directed to 'Fitirai,' is similar.

"Dear Friend, "Tahiti, Nov. 26, 1835.

"Peace be unto you and your family, in the name of God. These are my words to you. I feel very much gratified by your great kindness in giving me a trunk, and several other things. For this cause I thank you with grateful feelings. My wife and family will also feel grateful to you. Dear friends may the peace of the Messiah, who is the King of Peace, be with you. Amen. "PAOFAI."*

Among the natives of Otaheite let us not overlook the sons and daughters of the earlier missionaries. Those whom we had the pleasure of seeing did credit to the country of their parents; to Otaheite; and to those excellent persons who must have taken such pains with their education. I presume not to speak from what I have seen only, but from the corresponding accounts of others, added to what I witnessed myself.

I will now make a few general remarks, previous to quitting the island. It did not appear to me that the men of Otaheite are separated visibly into two classes, as some accounts had led us to expect. All of the higher class, whom we saw, or about whom we could learn anything, certainly were large, but rather unwieldy: yet among the lower class there were numerous stout tall men, as tall as the chiefs, and more actively made. A few were of a middle size, and a very few, low in stature: but all well-proportioned and muscular; though their muscles are not hard and knotty, like those of a hard-working white man; they

* The original letters, in the hand-writing of Mare and Paofai, are in my possession.

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are rounded, and smooth. They stride along in an imposing manner, occasionally recalling ideas of the giants of history. Although, generally speaking, they are taller than the Patagonians, they do not, to the eye, appear so large. This ocular deception must arise from the better proportion of the Otaheitans. The native of Patagonia has a large, coarse looking head, with high cheek bones, and a 'mane-like' head of hair: his shoulders are high and square; his chest very wide; while to heighten the effect of these traits, each of which gives one an idea of size, a great rough mantle, made of the woolly skin of the guanaco, thrown loosely round his shoulders, hangs almost to his feet. But the Otaheitan head is singularly well formed; and, if phrenology is not altogether a delusion, few men are more capable of receiving instruction, or doing credit to their teachers, than these islanders, so often described, yet by no means enough known. Their hands, and more especially their feet, have been said to be of the Papua form; but the shape of the latter is owing, it appears to me, to their always going barefooted: and I observed their hands particularly without being able to distinguish any peculiarity whatever in the form.

The young men frequently wear a wreath of leaves, or flowers, round the head, which, though becoming, has rather a Bacchanalian appearance. Some cut their hair short, others shave the greater part of their head, but solely from caprice: not one could give me any reason beyond that which is implied in "it is the fashion."

It is seldom that one meets a native entirely naked; I mean naked excepting the girdle which is always worn: generally they have a garment, or a piece of one, obtained from a white man. These remnants, often tattered, and, among the lower classes, always dirty, disfigure them much. Those whom I saw, with only a native girdle, but whose bodies were tattowed in the old fashion, appeared to my eye much less naked than the young men, not tattowed, and only half clothed. I shall not forget the very unpleasant impression made upon my mind, at first landing, by seeing a number of females, and children, with a few men, half dressed in the scanty, dirty, and tattered

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scraps of clothing, which they unfortunately prefer to their native dress. A woman, who has around her waist a substantial native garment, which falls as low as the calf of the leg; and over her shoulders, folding in front across the bosom, a mantle, or cloak, of similar material—appears to the eye of a stranger much more decently dressed than the hasty lover of novelty; who seems proud of a dirty cotton gown, tied only at the neck, and fluttering in the wind. Their Sunday dresses, however, are clean and decent, though those of other days are certainly much the contrary. An under-garment alone need be added to the women's former dress of native manufacture, to make it answer every purpose. Why should not home ingenuity, and domestic industry be encouraged?

The moral conduct and character of these islanders have undergone so much discussion; so various have been the decisions, and so varying are the opinions of voyagers and residents, that I, for one, am satisfied by the conclusion, that the good and the bad are mixed in Otaheite, much as they are in other parts of the world exposed to the contamination of unprincipled people. That the missionaries have done so much, in checking and restraining depravity, is to me matter of serious reflection. But let us also remember, that the testimony of very trustworthy witnesses shews that there, even in earlier days, iniquity did not search after those who sought not her abode!*

The Beagle's stay was too short to enable us to form any

* Cook says—"Great injustice has been done the women of Otaheite, and the Society Isles. The favours of married women, and also the unmarried of the better sort are as difficult to be obtained here, as in any other country whatever. I must, however, allow, that they are all completely versed in the art of coquetry, and that very few of them fix any bounds to their conversation. It is therefore no wonder that they have obtained the character of libertines."

In the excellent descriptions of Turnbull, we read:—"Much has been said as to the licentiousness and loose conduct of the women. It is but justice to say, that I saw nothing of this. Their ideas of decency are doubtless very different from ours; they must be judged therefore by a very different standard."

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just conclusions. I witnessed no improprieties, neither did I see any thing that would not have inclined me to suppose (had I read or heard nothing of them), that their habits are, in most ways, better than those of many civilized nations. The missionaries have succeeded in carrying attention to religion, and general morality, to a high pitch: may they continue to succeed, in future years, and become an example to larger, older, and nominally wiser nations.

Is it not a striking fact, that the people of a whole country have solemnly refrained from drinking spirits: does not this act alone entitle them to respect, and high consideration? So sincere are they on this subject, that, a short time since, when they heard that a small vessel, lying in their harbour, had on board a cask of rum, which the master intended to sell to some of the residents, they went off to the vessel, and destroyed the obnoxious liquor.

Upon enforcing their first law on this subject, every part of each house was searched. They were very minute in their scrutiny, but overlooked a bottle of brandy, which Mr. Pritchard had kept in the house for medical purposes. After their search, when leaving him, he called them back and showed the bottle, saying for what purpose it had been kept. Some said, 'keep it for that purpose;' others said 'no, it is 'ava,'* destroy it! let us make no distinction, let us utterly discard the use of so baneful a liquor! have we not other medicines, about whose use there can be no doubt?' However, the milder party prevailed, and the brandy bottle would have preserved its contents had not Mr. Pritchard poured them on the ground before their eyes.†

One horrible defect in the former character of the Otaheitans has hardly been mentioned in the earlier writers. They were

* Or cava, their word for intoxicating liquor of any kind.

† I was surprised, when I first arrived at Otaheite, by finding that none of the natives who came on board would touch spirits; and that they would drink but very little wine. Afterwards, however, one chief was noticed who seemed differently disposed.

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unkind, and utterly inattentive to the old and infirm:—they were yet worse: they scrupled not to destroy their aged or sick, yes, even their parents, if disabled by age or by sickness.*

Mr. Wilson assured me that in former times, when a person had lingered in sickness, they would carry him to the water-side, under pretence of bathing him, dig a hole, and bury him alive! Thus they ended the life of a young man who had been servant to Mr. Wilson, until he sickened, and, by the natives, was supposed to be dying. Mr. Wilson tried all he could do, in the way of medical assistance, and had hopes of his recovery, when he suddenly disappeared: and not until a long time afterwards could he ascertain the horrid cruelty of which the natives had been guilty!

That they do not even now pay that attention to infirm old age which, in our estimation, is a sacred duty, may be inferred from the following anecdote. Mr. Stokes rambled into a secluded spot near Matavai, where, surrounded by old trees, stood a small and tottering hut. On a filthy worn-out mat, lay a venerable looking old man, hardly covered by a ragged cloth. His only friend, an aged hobbling dog, limped to his side as if hoping that his example would excite some one to show compassion to the old man, his master.

The helpless state of this poor sufferer, whose legs were swollen by elephantiasis to an unwieldy bulk, and his utter destitution, induced Mr. Stokes to make immediate inquiries, and endeavour to get him relieved from some of his misery. It was ascertained that a daughter and son-in-law were usually living with him, but the new 'manuâ' had engrossed their attention, and the poor father had been left to the care of his faithful though helpless dog!

At Matavai the memory of the captain of H.M.S. 'Racoon,' known as the 'long captain,' also as 'Tapane matapo,' or 'Captain blind eye,' is still cherished. The conduct of both him and the officers of the Racoon, seems to have highly delighted all classes. How pleasant it is to hear a countryman,

* From enquiries made among the missionaries and natives, I convinced myself of this startling fact.

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especially of one's own cloth, spoken of in such terms of friendship and respect, and how much that pleasure is increased when one reflects, that many years have elapsed since the conduct took place which caused these sensations.

Mr. Stokes passed some nights in Otaheitan cottages. He told me that the natives, both men and women, are extremely fond of their children, and are very kind to them. Not content with nursing and amusing them, they cram them as managers of poultry cause turkeys to be crammed, not exactly with pepper corns, or walnuts,* but with bananas and other nutritive food. At each end of the houses he visited there was a small fire, one being for the elder, the other for the younger folks; this was in the evening, at their last meal time.

Breadfruit, which had been previously roasted, and wild plantains brought from the mountains, were put to the fire to be warmed. Meanwhile cocoa-nuts were opened, their milk was poured into cups, made of empty nutshells, and handed about with the nuts. Each person had a nut and a cup of the milk, or juice.† Taro-root roasted was then served, together with the bread-fruit and plantain, on leaves freshly gathered; there was also a piece of brownish yellow wood, like the rotten root of a tree, hanging up in the hut, which the people sometimes eat; it is called Ti.‡ Grace was said (a duty never omitted), and a clean, comfortable meal enjoyed by the whole party. Afterwards the fires were put out, and a queer little wooden pipe passed round. The strongest tobacco is thought the best, and they like to swallow the smoke. Sometimes, instead of tobacco, they use an indigenous herb.

Before sleeping the oldest man said prayers: one of the young men read a short portion of the New Testament, and then a hymn was sung by the whole family. A lamp was kept

* The very best things for fattening turkeys.

† Cocoa-nut milk makes an indelible black stain, and is sometimes used for dyeing.

‡ The root of the Ti plant is sweet, like sugar cane of indifferent quality. Molasses has been made from it.

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burning all night. A curious snuff was observed by Mr. Stokes, and from the method of using or taking it, I am inclined to think it an old custom, not imported by the white men. A substance, not unlike rhubarb in its appearance, but of a very pleasant fragrance, was rubbed on a piece of shark's skin, stretched on wood; and much it appeared to please an old man, who valued this snuff-stick so highly, that he would not part with it.

The Otaheitans are fond of going to sea, and take great interest in seeing new countries. Mr. Henry said there was no difficulty in getting a crew of natives, for boats or small vessels, provided that a promise was made to bring them back to their own island. From four to six yards of ordinary linen, or cotton cloth, with good provisions, was accounted enough remuneration for the zealous services of an able-bodied active man, during one month.

While we stayed at Otaheite we were supplied with excellent beef, and passably good vegetables; the latter however happened to be scarce. Most of the cattle belonged to the missionaries, who were trying to persuade the natives to rear them, and were beginning to succeed, though the people are fonder of their horses, of which there are a good many on the island, but ill kept and little understood.

Mr. Stokes obtained another account of the murder of the master and mate of the Truro, which says: "The master and mate of the Truro had left the northern end of Aura Island, intending to go to Otaheite; the chief of the northern district having treated them very kindly, and told them to avoid the south end of the island, because bad men lived there.

"The wind would not allow them to keep a sufficient offing; and a small canoe, with only two men, approached their boat with the apparent design of offering fruit for sale; but when near the boat they threw spears with such effect, that the white men were both killed." I place more confidence in the former account.

The seizure of a ship at Bow Island (barque Newton, of

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Valparaiso, under Chilian colours, though owned by British subjects), has by some persons been supposed to have been excited by Queen Pomare: but the following statement, from Mr. Middleton, who was pilot on board the ship at the time, gives a very different idea.

The master of that vessel (named Clarke) had employed some natives of Bow Island to dive for pearl oyster-shells on his account; he had agreed to pay them a certain quantity of cloth, and to give them so much provision per month. Repeated ill-treatment, and a miserable supply of provisions (at one time only one cocoa-nut each day, without any thing else), induced the natives to think of deserting him; yet they were unwilling to lose the reward of their labours, which had been very severe. One morning he had agreed to the pilot's earnest request that the natives should have more food, and had ordered a biscuit a-piece for them! Soon after the pilot, who was charged with the care of the natives, had delivered the biscuits, the master came on deck, affected to deny his orders, snatched the biscuits away from each of them, and threw them overboard! Sullen and fierce looks were exchanged; and the pilot warned Mr. Clarke that the natives would attack him, and take the vessel, if he did not alter his harsh conduct: to which he replied, by defying half a hundred of them!

A few words from the pilot, in their own language, appeased their resentment at the moment, and the brooding storm passed over; but in the course of that day, while Middleton was away getting shells, the master beat a chief. This was an unpardonable affront; they took possession of the vessel; bound all the white people; and carried them on shore.

What extraordinary mildness among savages!

When the pilot returned with his cargo of shells, he saw none of the crew; and at first hesitated to approach. But the natives seeing this, hailed him, saying, that they did not intend to hurt any one; that they were his friends; and had touched none of his things. This he found true. His own cabin was shut up—untouched; though every other place in the ship had

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been ransacked, and the furniture of the hull torn to pieces. They afterwards allowed the pilot to take the vessel to Otaheite, where she was sold by auction for the benefit of those who had insured her.

Obtaining the pearl oyster-shell is well known to be a difficult and dangerous employment: though the divers at the Paamuto Islands seldom go down deeper than four or five fathoms, they remain at the bottom from one to three minutes, sometimes bringing ten shells at one time to the surface; and during four or five hours they continue this extreme labour. After a long dive, blood gushes from the ears and nose; and the poor diver is quite blind during ten or twenty minutes. He may then be seen squatting on the reef, his head between his knees, and his hands spread over his face—a pitiable object: yet for the small monthly pay of ten or twelve yards of calico, or coarse linen, do those hard-working natives endure such straining exertions!

At some of the islands, a good hatchet or axe will purchase as many shells as would fill a small canoe.

In making their voyages from one island to another, the natives steer by the stars, by the direction of the wind, and the flight of birds; but their ideas of distance are extremely vague. Those who have seen a compass used in a boat esteem it highly. Middleton, who had made many voyages among the Low Islands, in whale-boats manned solely by natives, said that they always expressed astonishment at his predicting the time at which they would arrive at their destination. Sometimes they asked if he could see the land in the compass; more than once they exclaimed, "Ah, you white men! you know every thing! What simpletons we are, notwithstanding all our canoes!" The canoe occupies so much time and labour in constructing, and is so essential to their every purpose, that a fine one is to the natives of any of these islands what a three-decker is to us.

The queen's letter being finished, and sent to me by her messenger, I will give the translation made for me on the spot by Mr. Pritchard.

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"Tahiti, November 26, 1835.

"To the Captain of the ship of war:

"This is what I have to say to you, before you leave us, respecting the debt. We have 2,338 dollars, which we are now taking to the person who is to receive this property, who is Mr. Bicknell. We are now collecting the remainder.

"Peace be with you,

"And with your king, William,

"(Signed) POMARE VAHINE.

"(Witnessed by) HITOTE and TAATI."

Taking leave of the queen was our next engagement. At the door of her house was a table, on which the loyal and kind-hearted natives were depositing their dollars, and fractions of dollars: to enable her to pay the debt. To me it was an affecting and an unpleasing sight,—not the proofs of loyalty and affection—Heaven forbid!—but the reflection that those individuals had in no way done wrong, and that their dollars had been hardly earned and were highly prized. To show how little a metallic currency was then understood, I may mention that many individuals wished to subscribe fractions, who could not afford a whole dollar; but they were prevented, at first, because the collector knew not how to reckon a fraction of a dollar. Mr. Pritchard easily explained this, and then the smaller coins, (rials, and two rial pieces,) were soon numerous upon the table. Frequently, while walking about the island, men had asked me to give them a dollar in exchange for its value in small coin, which, to their surprise, I was always glad to do, when I had dollars with me.

About Pomare was rather a large assemblage of maids of honour, but their postures and appearance, as they sat about upon the floor, were not the most elegant. The contrast between our own neatly dressed, and well-mannered country-women, whom we had just left in the house of Mr. Pritchard, was rather striking as compared with these brown and oily Otaheitans: but our visit was not long, and we tried to make it agreeable. Returning by the beach, we talked for some time

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with Taati, Utaame, and others. Old Ua was there also, to thank me for some trifles sent to him by one of the queen's maidens, who had attended her when on board the Beagle; and I was glad to hear that the damsel had executed her commission in a most punctual manner.*

They expressed great anxiety about the arrival of another man-of-war, with, perhaps, harsher orders: and were very desirous to know when I should arrive in England, and when they would hear from me. I endeavoured to satisfy them on these points, before Mr. Darwin and I wished them farewell (in the most earnest meaning of the word) and, after taking leave of Mr. Pritchard's family, embarked. Mare and Mr. Pritchard accompanied us to the vessel, then under sail outside the reefs, —wished us a great deal more happiness than most of us will probably enjoy, and returned with Mr. Henry and the pilot in their own boats. We made all sail, and soon lost sight of this beautiful island.

Easterly winds swept us along a smooth sea for many days, after leaving Otaheite.† At daylight on the 3d of December we saw Whylootacke (or Wailutaki) a small group of islets encircled by a coral reef, from four to eight miles in diameter. The principal one is 360 feet high, and nearly four miles long. There was a native missionary upon it, educated at Otaheite. On the 11th a few white tern were seen near the ship, (in lat. 28°. S. and long. 180°.) and as she was about 120 miles from any land then known, this notice may help to show within what limits the sight of those birds may be considered to indicate the vicinity of land. I am not at all surprised that the early voyagers should have taken so much notice of the appearance and flight of birds, when out of sight of land; since in my very short experience I have profited much by observing them, and I am thence led to conclude that land, especially small islands or reefs, has often been discovered in consequence of watching

* She was his grand-daughter.

† We sailed with the land breeze, which at Otaheite is so regular that a ship might sail round the island (in successive nights) with the wind always a-beam, and off the land!

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particular kinds of birds, and noticing the direction in which they fly, of an evening, about sunset. Short winged birds, such as shags or boobies, seldom go a hundred miles from land, and generally return to their accustomed roosting place at night; and even those with longer wings which fly farther, do not habitually remain on the wing at night, though they are known to do so sometimes, especially if attracted by a ship, on which, doubtless, they would perch if she were to remain motionless, and her crew were to be quiet for a short time. Mistakes may occur in consequence of floating carcases, trunks of trees, wrecks of vessels, or drifting seaweed, all which attract birds and afford them rest at night; but, generally speaking, if there is land within fifty miles of a vessel, its existence will be indicated, and the direction in which to look will be pointed out by birds. Decided oceanic fowl, such as albatrosses and all the petrel family, sleep upon the surface of their favourite element; therefore the flight of that description of bird can be no guide whatever, except in the breeding season, when they frequent the vicinity of land.

Until I became aware of these facts, the discovery of the almost innumerable islands in the great ocean of Magalhaens, (erroneously, though now probably for ever called Pacific,) caused great perplexity in my mind. That Easter Island, for instance, such a speck in the expanse, and so far from other land, should have been—not only discovered—but repeatedly visited and successively peopled, by different parties of the human family, seemed extraordinary, but now, connecting the numerous accounts related by voyagers of canoes driven hundreds of miles away from their desired place, with these facts respecting birds, much of the mystery seems unravelled.

Every one is well aware that uncivilized man is more attentive to signs of weather, habits of animals, flight of the feathered tribe, and other visible objects, important to his very existence, than his educated brother,—who often diminishes the perceptive faculties of the mind, while he strengthens the power of reflection and combination.

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Before arriving at New Zealand I will add a very brief remark or two about the Navigators, the Friendly, and the Feejee Islands. At the first mentioned, where De Langle and Lamanon were massacred, there is now a prosperous mission established by the exertions of the London Missionary Society, and I hear that a large proportion of the islanders are no longer blood-thirsty savages. At the Friendly Isles much opposition had been encountered, chiefly in consequence of former hostilities brought on by a runaway convict, who excited the natives to murder the first missionaries who went there: and the prejudices then caused are scarcely yet removed. Mariner's account of the Tonga, or Friendly Islands, is considered by English residents at Otaheite, to be a very accurate one,* and is full of interesting information. I obtained a few notices of the Feejee group from the owner of a schooner that was lost there; and as they are comparatively little known, my mite may as well be contributed in this place to the general fund.

The whole group of islands called Feejee, or Fidji, by Europeans, but of which the native name is, I believe, Navihi—is of very dangerous navigation: not only on account of coral reefs, scarcely hidden by a few feet of water, but because the natives are ferocious and treacherous cannibals. My informant† said, that the master of his schooner‡ (who was long detained a prisoner among them, his life being spared in hopes of obtaining a large ransom), was an unwilling participator in a cannibal feast on some prisoners of war, taken in an attack on a neighbouring island. That they have an idea of the superiority of white men may be inferred from a message sent previous to this battle, saying, "We shall kill and eat you all—we have seven white men to fight for us!" Although many unfortunate seamen have fallen victims to the thoroughly savage Feejee Islanders, a few whites have not only escaped death,

* Among a variety of very curious facts mentioned by Mariner, one may be noticed here, because I shall have to refer to it in a future page. I mean the rat shooting practised by the chiefs as an amusement.

† Mr. Green, of Valparaiso.

‡ 'The Terrible;' Clark, master.

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but have established themselves in some authority among the natives. A man known by the name of Charles, was more respected than almost any of their own chieftains, on account of his extraordinary valour: and so highly was he considered by all of them, that he was allowed to have a hundred wives.*

No small vessel ought to venture near any of the Feejee islands without being armed, and prepared to act defensively. Boarding nettings, if she has them, should be triced up; and no professions, or appearance of friendship, ought ever to put strangers off their guard. In case of an unavoidable rupture, a chief, the highest in rank that can be secured, should, if possible, be made prisoner—by force if fair means fail; and he should be made to understand that his life depended upon the conduct of his countrymen. Of course no right-minded man would act otherwise than to avoid or prevent any hostilities with ignorant savages, so long as he could do so without risking the lives of his own countrymen; but he must remember that, in hand to hand fighting, a band of fierce savages, armed with a variety of weapons, are more than a match for seamen unused, perhaps, to muskets, and equally awkward with pistols or swords: however brave and determined they may be, if dispersed, as usually happens, they are sure to be by far the greatest sufferers. I here allude to those savages who are really warriors. At some islands, and other places, they are comparatively timid, though seldom less treacherous.

Remarking on the criticisms of such as have animadverted on officers who found themselves obliged to take harsh measures in self-defence—La Pérouse, whose humanity and good sense not one individual among the nations who regret his untimely loss, ever questioned, says, "I am, however, a thousand times more angry with the philosophers who extol the savages, than with the savages themselves. The unfortunate Lamanon, whom they massacred, told me the very

* Only chieftains of note are able to maintain many wives: very few had so large a number as that man: scarcely any had more.

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evening before his death, that the Indians (meaning the natives of the Navigator Islands) were worthier people than ourselves!

"Observing rigidly the orders I have received, I have always treated them with the greatest mildness; but I confess to you, that if I were to undertake another voyage of the same kind, I would demand different orders.

"A navigator, on quitting Europe, ought to consider the savages as enemies, very weak indeed, and whom it would be ungenerous to attack and barbarous to destroy, but whose assaults he has a right to prevent when authorised to do so by well-grounded suspicions."—Voyage of La Pérouse, vol. iii. p. 413.

When a vessel approaches the Feejee Islands, numberless canoes put off, and soon surround her so closely, that unless the wind is pretty fresh, she is placed in no slight jeopardy. At such a time the principal chief ought to be invited on board; and presents should be given to him, while he is made to understand that it is necessary he should order the canoes to keep off. His commands will be implicitly obeyed; and while he is on board, and well treated, there will be less risk; but he must not be relied on implicitly.

Some of the canoes are very long, from sixty to eighty feet in length: and when two such are fastened together, with a light structure erected upon them, the men who stand on their raised deck are above the level of a small vessel's bulwark.*

* Heaps of stones form not only ballast but ammunition for these formidable canoes. Indeed, among all savage nations, a stone held in the hand, or thrown, perhaps from a sling, is a common, and by no means despicable weapon. These easily collected missiles, and the manner of using them, recal to mind the victory gained by the English fleet over that of France, off Sluys, on the 22d of June 1340; in which "though the battle was fought on the sea, it could scarcely be called maritime; for little depended on the accidents of winds and waves, or on the skill of a commander in availing himself of them. Piles of stones on the deck formed a part of the magazines. The archers of both nations used their crossbows as if they had been on land. They employed grappling irons for boarding, and came to such close quarters as to exhibit a succession of single combats."—Mackintosh, vol. i. p. 294.

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At the time that Mr. Clark was a prisoner among them, a musket was considered to be a fair ransom for a white man; and (perhaps fortunately for him) they had then an idea that the flesh of white men was not wholesome.

They have many articles of trade, such as shells, tortoise-shell, coral, spermaceti, whales' teeth, 'bicho de mar,' mats of exquisite workmanship, fruit, and provisions: among the latter are pigs and 'iguanas.' Excepting a great alligator, the Feejee men never saw an animal on their island larger than a dog or a pig. The monster just mentioned made its appearance on the island Pau, the largest of the group, some years ago, to the extreme consternation of the natives, who thought it was a sea-god. After destroying nine people, at different times, the 'enormous lizard,' as they called it, was caught by a strong noose passed over the bough of a large tree, the other end of the rope being held at a distance by fourteen men, who lay concealed, while a daring old man offered himself as a bait to entice the brute to run into the snare.*

Mr. Mariner supposed that this alligator, or crocodile, had made its way from the East Indies; a curious instance of the manner in which occasional migrations take place. On an island in that neighbourhood, called Lotooma, Mariner heard of two enormous bones, not at all like any human bones, nor resembling those of a whale. The natives of the island have a tradition that they belonged to a giant, who was killed in former ages by the united attack of all the population.†

On the 16th of December indications of a westerly wind appeared; and for the next three days we were buffeted by a hard gale from south-west to south-east. This was the more annoying on account of the chronometer measurement, because it was accompanied by a sudden change of temperature, which I thought would alter their rates. During the twenty-four hours previous to this southerly gale commencing, we found the current setting northward, about a mile an hour; but after the

* A feat hardly surpassed by Mr. Waterton.—Mariner's Tonga Islands, vol. i. pp. 268, 269, 270, in Constable's Miscellany, vol. xiii.

† Ibid. vol. i. p. 262.

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hardest part of the gale was over, it set to the south-west, at about the same rate.

Both before and during these three days, I was struck by the precise similarity of the clouds, sky, peculiarities of wind, and weather, to what we had been accustomed to meet with off the coast of Patagonia: and I may here remark that, throughout the southern hemisphere, the weather, and the turn or succession of winds, as well as their nature and prognostications, are remarkably uniform.

On the 19th we made the northern hills of New Zealand; but tantalized still by adverse winds, all the next day was spent in beating to windward, and not till the 21st could we succeed in obtaining access to the Bay of Islands.

We were all a good deal disappointed by the view. After Otaheite, the northern part of New Zealand had, to our eyes, a very ordinary appearance.

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CHAPTER XXIV.

New Zealand—Bay of Islands—Kororareka—Fences—Flag—Paihia—Natives—Features—Tattow—Population—Colour—Manner—War-Canoes—Prospects—Mackintosh—Fern—Church—Resident—Vines—Village—Houses—Planks—Cooking—Church—Marae—First Mission—Settlers—Pomare—Marion—Cawa-Cawa—Meeting—Chiefs—Rats—Spirits—Wine—Nets—Burial—Divine Service—Singing—Causes of Disturbances—Reflections and Suggestions—Polynesian Interests—Resources for Ships in the Pacific.

DEC. 21. At daylight we were about four miles from Cape Brett, and nearly the same distance from Point Pococke; while in the north-west the Cavalle islands showed themselves indistinctly. A light easterly breeze enabled us to steer towards the Bay of Islands.—Few places are easier of access than this bay: excepting the Whale-rock, whose position is well ascertained, there are no hidden dangers: and within the line of the heads, there is little or no current deserving notice: outside that line, the current generally sets to the south-east about a mile an hour.

Compared with mountainous countries, the northern parts of New Zealand are not high; but they cannot be described as low land. Perhaps the expression, 'moderately high land,' may convey an idea of such as is more than two hundred, but less than twelve hundred feet above the level of the sea; which are the limits I have in view. In distant profile the land inclines too much to regular and convex outlines to be picturesque. It is only along the sea-coast that steep cliffs, and a more broken boundary, cause enough variety to please the eye of a lover of landscape. Approaching nearer, the interior of the country, varied by hill and valley, with an agreeable mixture of woodland and cleared ground, makes a favourable impression upon the mind, from the natural association of ideas of capability and cultivation; but whether it pleases the eye, as a picture, must depend probably as much upon the kind of scenery lately viewed, as upon preconceived ideas. With us the recent im-

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pressions caused by Otaheite, rendered the view of New Zealand, though novel, rather uninteresting.

Cape Brett is a bold promontory, higher than any neighbouring land. When first seen from a distant offing, while no other land is in sight, it makes like a quoin-shaped island. As the sea around is free from danger, it is an excellent landfall for shipping approaching this part of the coast. Detached from, but near the cape, is the rock, with a hole or archway through it, named by Cook, 'Piercy Islet.'

Point, or rather Cape Pococke, is a steep cliffy headland, of a dark colour, rather picturesque in its appearance: near it there is a conical rocky islet. Numerous islands, small and large, are scattered over the bay; an expanse of water really about ten miles square, though to the eye it appears much smaller, because so many islands intercept the view.

Near the middle of the west side of the bay is the opening of Kororareka Harbour, a secure but shallow port; better adapted to merchant shipping than to the use of men-of-war.

After passing Cape Pococke, and advancing about a mile, a small settlement appeared in the northern bight of the bay; and the English look of the houses was very gratifying to us. This, I found, was Tipuna, or Rangihoua, the place where the first settlement of white men was made upon the shores of New Zealand. On the farther side of Kororareka other houses were then seen—neat, and apparently comfortable dwellings, well situated under the lee of the western hills, while close by, on our right hand, a curious line of flat-topped black rocks, a few feet only above the water, reminded us of the remains of a great mole.

Within the line from Cape Pococke to Cape Brett there is not more than thirty fathoms of water; and every where, excepting close to the rocks, the bottom is soft and tenacious, so that an anchor may be let go in any part. We saw small straggling villages of native huts in many places, and around each of them a substantial fence of palisaded posts and rails. These fences, and the cultivated spots of ground which appear as you proceed up the bay, might give a more favourable idea of the

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native habits than they yet deserve; for the fences are fortifications—defences against intruding men, not cattle.

In a conspicuous solitary position, opposite to the entrance of Kororareka harbour, a single English house, without another building within a mile of it, nor any protection except that of a tall staff, on which waved the British Union-jack, presented a contrast to the fortified villages; and forcibly impressed one's mind with a conviction of the great influence already obtained over the formerly wild cannibals of New Zealand.

The entrance to the harbour is narrow, even to the eye, but it is still more confined by shoal water. In entering or leaving it, a ship ought to keep close to Kororareka Point: after rounding that point, at the distance of a cable's length, the sheltered part of the port is seen, looking like the mouth of a navigable river. On the western side, the native village of Kororareka, a straggling collection of low huts, strongly palisaded; on the eastern, three or four English houses, the head-quarters of the missionaries; on the rising ground, near the water, far up the harbour, several more houses and villages—gave an appearance of population and successful exertion as surprising as satisfactory. Near a detached house of European form, a large white ensign excited our curiosity; and we found it was the flag of New Zealand; differing only from the ensign of St. George in the upper 'canton,' next the staff, where, instead of a Union-jack, there is a red cross on a blue field; each quarter of the blue field being 'pierced' by a white star.

We anchored between Kororareka and Paihia (the missionary settlement): farther up the harbour were several whale-ships which had anchored there, I was told, in order to avoid the spirit-shops of Kororareka.

From this anchorage the view on all sides is pleasing. An appearance of fertility every where meets the eye; but there are no grand or very remarkable features. There is nothing in the outward character of the country corresponding to the ferocious sanguinary disposition of its aboriginal inhabitants. The British resident, some English settlers, and two of the

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native chiefs came on board during the afternoon; and in the evening I made acquaintance with Mr. Baker, a missionary residing at Paihia. The resident's boat was manned by young Zealanders, whose smooth faces, cropped hair, Scotch caps, and jackets and trowsers, were much approved of (perhaps hypocritically), by a chief whose long war-canoe was well-manned by athletic savages with half-naked figures, faces deeply-scarred —rather than tattowed—and long curly hair.

We were amused by finding that the Beagle had been mistaken for a ship of the (so called) Baron de Thierry. Her small size; the number of boats; and her hoisting a white ensign (thought to be that of New Zealand), so completely deceived them all, that one boat only approached reluctantly, after we had anchored, to reconnoitre; but as soon as it was known that the expected intruder had not arrived, visitors hastened on board. Had he made such an experiment, he would hardly have escaped with life, so inveterate and general was the feeling then existing against his sinister and absurd attempt. He would indeed have found himself in a nest of hornets.

In walking about the missionary establishment at Paihia, I was disappointed by seeing the natives so dirty, and their huts looking little better than pigstyes. Immediately round the dwellings of the missionaries I expected a better state of things; but I was told, that their numerous and increasing avocations engrossed all their time; and that the native population were slow in adopting habits, or even ideas, of cleanliness.

My first impression, upon seeing several New Zealanders in their native dress and dirtiness was, that they were a race intermediate between the Otaheitans and Fuegians; and I afterwards found that Mr. Stokes and others saw many precise resemblances to the Fuegians, while every one admitted their likeness to the Otaheitans. To me they all seem to be one and the same race of men, altered by climate, habits, and food; but descended from the same original stock.

Of a middle size, spare, but strong frame, and dark complexion, the New Zealander's outward appearance is much in his favour; hardiness and activity, as may be expected, he

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eminently possesses. The expression of his features indicates energy, quickness of apprehension, without much reflection; and a high degree of daring. Ferocity is a striking trait in the countenances of many among the older men, and it is increased considerably by the savage style in which their faces are disfigured, or, as they think, ornamented by lines cut in the skin with a blunt-edged iron tool, and stained black. These lines are certainly designed with as much taste, even elegance, as could possibly be exerted in such disfiguring devices. The expression which, it appears, is anxiously desired, is that of a demon-warrior. All their old ideas seem to have had reference to war. Well might the Spanish poet's description of the Araucanians have been applied to the New Zealanders in their former condition:—

> "Venus y Amor aqui no alcanzan parte,
> Solo domina el iracundo Marte!"

The lines upon the face are not, however, arbitrary marks, invented or increased at the caprice of individuals, or the fancy of the operator who inflicts the torture; they are heraldic ornaments, distinctions far more intelligible to the natives of New Zealand than our own armorial bearings are to many of us, in these unchivalric days. Young men have but few: slaves, born in bondage, or taken young, have scarcely any marks; but the older men, especially the more distinguished chiefs, are so covered with them that the natural expression of face is almost hidden under an ornamented mask. One object of the tattowing, is to prevent change of features after middle age. Some of the women, whom the missionaries endeavoured to persuade not to follow this practice, said, "Let us have a few lines on our lips, that they may not shrivel when we are old."

Every one has heard of, and many people have seen the war-dance. What exaggerated distortions of human features could be contrived more horrible than those they then display? What approach to demons could human beings make nearer than that which is made by the Zealanders when infuriating, maddening themselves for battle by their dance of death!

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NATIVE OF KING GEORGE SOUND

NEW ZEALANDER

NEW ZEALANDERS.

Published by Henry Colburn, Great Marlborough Street, 1836.

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The hair of a New Zealander is naturally luxuriant, though rather coarse; its rough, free curliness in an unadorned, almost untouched state, heightens that expression of untameable ferocity which is so repulsive in the older men, especially in those of inferior degree. Many of the young women are good-looking; and they dress their hair with some pains, and not a little oil.

Although cannibalism and infanticide have ceased in the northern parts of New Zealand, the aboriginal race is decreasing. The natives say frequently, 'The country is not for us; it is for the white men!' and they often remark upon their lessening numbers. Change of habits, European diseases, spirits, and the employment of many of their finest young men in whale-ships (an occupation which unhappily tends to their injury), combine to cause this diminution. Wearing more clothes (especially thick blankets), exposes them to sudden colds, which often end fatally. We were surprised at seeing almost every native wrapped up in a thick blanket, perhaps even in two or three blankets, while we were wearing thin clothing.

The countenances of some of the men (independent of the tattowing) are handsome, according to European ideas of line beauty. Regular, well-defined, and high features are often seen; but they are exceptions, rather than the usual characteristics. Generally speaking, the New Zealander has a retreating and narrow forehead—rather wide, however, at the base; a very prominent brow; deeply-sunk black eyes, small and ever restless; a small nose, rather hollow, in most cases, though occasionally straight or even aquiline, with full nostrils; the upper lip is short, but that and the lower are thick; the mouth rather wide; white and much blunted teeth; with a chin neither large nor small, but rather broad. Some have higher and better heads, and a less marked expansion of brow, nostrils, and lips; others, again, are the reverse: usually, their eyes are placed horizontally; but some are inclined, like those of the Chinese, though not remarkably; indeed not so much so as those of a Scotchman whom I met there. Among the women I noticed a general depression of the bridge of the nose, and a flat frontal region.

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Few engravings, or paintings, show the real expression, features, or even colour of the Polynesian tribes. They give us a half naked, perhaps tattowed* man or woman; but the countenance almost always proves the European habits of the artist. The features have a European cast, quite different from the original, and the colouring is generally unlike; especially in coloured engravings.

The general complexion of both women and men is a dark, coppery-brown; but it varies from the lightest hue of copper to a rich mahogany or chocolate, and in some cases almost to black. The natural colour of the skin is much altered by paint, dirt, and exposure. Before closing this slight description of the personal appearance of the Zealanders, I must allude to the remarkable shape of their teeth. In a white man the enamel usually covers all the tooth, whether front or double; but the teeth of a man of New Zealand are like those of the Fuegians, and at a first glance remind one of those of a horse. Either they are all worn down—canine, cutting-teeth, and grinders—to an uniform height, so that their interior texture is quite exposed, or they are of a peculiar structure.†

The New Zealanders' salutation has often been talked of as 'rubbing noses,' it is, in fact, touching, or crossing them; for one person gently presses the bridge of his nose across that of his friend. Mr. Darwin informed me that when a woman expects to be saluted by a person of consequence, in the 'nose pressing' manner, she sits down and makes a droll grunting noise, which is continued, at intervals, until the salute has been given.

The usual manner of the native is very inferior. Accustomed to a low, wretched dwelling, and to crouching in a canoe, his

* Amoco is the native word for the tattow marks.

† This apparent wearing away of the teeth is not found in the Zealanders alone. The Fuegians, Araucanians, and Society Islanders show it more or less, and it is very remarkable among the natives of New Holland. I have also seen some white men (Europeans) with similar teeth, but they were all elderly; whereas in some young savages I have noticed incisors shaped rather like those of a horse.

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habitual posture of rest is squatting on his hams, or upon the ground, with his knees up to his chin; hence, also, his limbs are rather inferior in their shape. But arouse his spirit, set him in motion, excite him to action, and the crouching, indolent being is suddenly changed into an active and animated demoniac. The Zealander is extremely proud; he will not endure the slightest insult. A blow, even in jest, must be returned!

Every one has seen or heard so much of their weapons and canoes, that it is almost superfluous to speak of them; yet, in examining one of their larger canoes—seventy feet in length, from three to four in width, and about three in depth—I was much interested by observing what trouble and pains had been taken in building and trying to ornament this, to them, first-rate vessel of war. Her lower body was formed out of the trunk of a single tree—the New Zealand kauri, or cowrie—the upper works by planks of the same wood; the stem and stern, raised and projecting, like those of the gallies of old, were carved and hideously disfigured, rather than ornamented, by red, distorted faces with protruding tongues and glaring mother-of-pearl eyes. Much carving of an entirely different and rather tasteful design* decorated the sides. Beneath the 'thwarts,' a wicker-work platform, extending from end to end, served to confine the ballast to its proper position, and to afford a place upon which the warriors could stand to use their weapons. From forty to eighty men can embark in such canoes. But their day is gone! In a few years, scarcely a war-canoe will be found in the northern district of New Zealand.†

Judging only from description, the largest canoes ever seen by the oldest of the present generation, must have been nearly ninety feet in length; formed out of one tree, with planks attached to the sides, about six or seven feet wide, and nearly as much in depth. Several old men agreed, at different times, in this account; but perhaps each of them was equally inclined to magnify the past.

* Arabesque, like the ornaments at Otaheite.

† North of latitude 38° S.

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New Zealand much requires assistance from the strong but humane arm of a powerful European government. Sensible treaties should be entered into by the head of an over-awing European force, and maintained by the show, not physical action, of that force until the natives see the wonderful effects of a changed system. Finding that their protectors sought to ameliorate their condition, and abolish all those practices which hunger, revenge, and ignorance probably caused, and alone keep up; that they neither made them slaves, nor took away land without fair purchase; and that they did no injury to their country, or to them, except in self-defence—even then reluctantly—would give the natives satisfaction and confidence, and might, in a few years, make New Zealand a powerful, and very productive country. I say powerful, because its inhabitants are very numerous, and have in themselves abundant energy, with moral, as well as physical materials; productive also, because the climate is favourable; the soil very rich; timber plentiful, and very superior; minerals are probably plentiful; flax is a staple article; corn and vines are doing well; and sheep produce good wool.

While our thoughts are directed to the natives of New Zealand, let us refer to what Sir James Mackintosh says of the former savages of our own island.

"B.C. 54.—At the time of Cæsar's landing, the island of Great Britain was inhabited by a multitude of tribes, of whom the Romans have preserved the names of more than forty. The number of such tribes living in a lawless independence, is alone a sufficient proof of their barbarism. Into the maritime provinces southward of the Thames, colonies probably recent from Belgic Gaul began to introduce tillage; they retained the names of their parent tribes on the continent; they far surpassed the rest in the arts and manners of civilized life. The inhabitants of the interior appear to have been more rude and more fierce than any neighbouring people. The greater part of them raised no corn; they subsisted on milk and flesh, and were clothed in the skins of the beasts whom they destroyed for food. They painted and punctured their bodies, that their

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aspect might be more horrible in war. The use of carriages in war is a singular instance of labour and skill among such a people. Their domestic life was little above promiscuous intercourse. Societies of men, generally composed of the nearest relations, had wives in common. The issue of this intercourse were held to belong to the man (if such there should be) who formed a separate and lasting connexion with their mother. Where that appropriation did not occur, no man is described as answerable for the care of the children."

Again, Sir James says—

"The Britons had a government rather occasional than constant, in which various political principles prevailed by turns. The power of eloquence, of valour, of experience, sometimes of beauty, over a multitude, for a time threw them into the appearance of a democracy. When their humour led them to follow the council of their elders, the community seemed to be aristocratic. The necessities of war, and the popularity of a fortunate commander, vested in him in times of peril a sort of monarchical power, limited by his own prudence, and the patience of his followers, rather than by laws, or even customs. Punishment sprung from revenge: it was sometimes inflicted to avenge the wrongs of others. It is an abuse of terms to bestow the name of a free government on such a state of society: men, in such circumstances, lived without restraint; but they lived without security. Human nature, in that state, is capable of occasional flashes of the highest virtues. Men not only scorn danger, and disregard privation, but even show rough sketches of ardent kindness, of faithful gratitude, of the most generous self-devotion. But the movements of their feelings are too irregular to be foreseen. Ferocious anger may, in a moment, destroy the most tender affection. Savages have no virtues on which it is possible to rely."

Speaking of missionaries, the same historian states, that—

"Our scanty information relating to the earliest period of Saxon rule, leaves it as dark as it is horrible. But Christianity brought with it some mitigation. A.D. 596. The arrival of

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Augustine in Kent, with forty other missionaries, sent by Gregory the Great to convert the Saxons, is described in picturesque and affecting language by Bede, the venerable historian of the Anglo-Saxon church. It cannot be doubted that the appearance of men who exposed themselves to a cruel death for the sake of teaching truth, and inspiring benevolence, could not have been altogether without effect among the most faithless and ruthless barbarians. Liberty of preaching what they conscientiously believed to be Divine truth, was the only boon for which they prayed."

22d. On the little island of Paihia, where our instruments were landed for observations, the remains of half-burned human bones were found: and as the dead are not burned in this country, they must have been the remains of a former meal. It was difficult to decide upon the time which had elapsed since that feast was made, by the appearance of the bones. They might have been covered by earth for some time, and only lately exposed; or they might have been the remains of a very modern feast, indulged in upon a little island to which it was not probable that a missionary, or any one who might give information to him, could approach unperceived.

We were much struck by the beautiful appearance of an evergreen tree, resembling an ilex, or a large myrtle, when seen from a distance; whose bright red flowers, in large clusters, upon the dark green foliage, gave an effect which I longed to see transferred to an English garden. This tree seemed to be common. After landing, the fern attracted more notice than any other vegetable production: every where in New Zealand this useful plant is found. Why useful? may be thought. Because it was one principal article of food, before the introduction of potatoes. Owing to its abundance, and to the edible, as well as tolerably nutritious, nature of its roots, no man can ever starve in New Zealand who is able to gather fern: but that it is not a pleasant food may be inferred from the fact that no native eats fern-roots when he can get potatoes. Where the fern grows thickly, and high, the soil is known to be

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rich: where it is small, and scarce, the land is not worth cultivating.*

Mr. Williams, the elder, formerly a lieutenant in the navy, was absent on an exploring and negociating expedition to the southern parts of the island. I much regretted having missed seeing him, as he was considered the leading person among the missionary body in New Zealand; and was said, by every one, to be thoroughly devoted to the great cause, in which he was one of the first, and most daring. I walked with Mr. Baker about the little village, or hamlet, of Paihia. A substantial stone building I thought must be the church; but was a good deal disappointed at being shown a small low edifice, as the place of worship; and hearing that the large stone house was the printing establishment. This I did not like; for I thought of the effect produced on ignorant minds by the magnificence of Roman Catholic churches. No doubt education overcomes superstitious ideas and observances; and the devotion of an enlightened man is not increased or diminished by the style, or by the decorations of a building: in him probably no building made by hands would excite such emotions as the starry temple of a cloudless sky. But ought he, therefore, to despise, or think lightly of those outward forms, and ceremonious observances, which influence ignorant people, who see without thinking; and are too much guided by that which makes a vivid impression. Would a little outward show do any harm among such ignorant human beings as the savages of New Zealand; or among Fuegians, and New Hollanders? And may one not expect that an intelligent native should notice that the 'House of God' is in every respect inferior to the other houses which they see erected by Christians?

Paihia is a pretty spot. The harbour of Kororareka lies in front; and an amphitheatre of verdant hills forms the back ground. But it must be hot during the summer, as it is in a hollow, facing the sun. A visit to Mr. J. Busby, the 'British

* Humboldt mentions fern-roots being used for food near the Orinoco.

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Resident,' at his house (protected by the flag, as I have already mentioned) occupied Mr. Darwin and myself some time. Like most of the missionary dwellings, it is a temporary boarded cottage, intended only for present purposes. Mr. Busby was taking great pains with his garden; and among other plants he anticipated that vines would flourish. Those at Waitangi (the name of his place) are favoured by climate, as well as by the superintendance of a person who so thoroughly understands their culture. At a future day not only New Zealand, but Van Diemen's Land, and all New Holland, will acknowledge the obligation conferred upon them by this gentleman, who made a long and troublesome journey through France and Spain solely for the purpose of collecting vines for Australia, his adopted country.

Mr. Busby's official occupations at New Zealand appeared to me of a very neutral character. An isolated individual, not having even the authority of a magistrate, encircled by savages, and by a most troublesome class of his own countrymen, I was not astonished at his anxiety to receive definite instructions, and substantial support; or at the numerous complaints continually made by the English settlers.

Afterwards we went to Kororareka. On a sandy level, narrowly bounded by a low range of hills, or rather rising grounds, stands the principal assemblage of houses in the island; or as the missionaries say, 'in the land'. I have said assemblage of houses, because it did not agree with my ideas of a town, a village, a hamlet, or even an Indian encampment. Near the beach were a few small cottages which had once been whitewashed. At the foot of the hills were two or three small houses of European build; but the remaining space of ground appeared to be covered by palings, and pig-styes. The temporary enclosures which are made in a market-place, for cattle, might give an idea of the appearance of these sadly wretched dwelling places. The palings, or palisades, are intended to be fortifications: they are high, sometimes eight or ten feet; and, almost encircling the whole, a stronger palisade is fixed, but so inefficiently that either strength, an axe, or fire, would ensure

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an entrance to resolute men. There is neither embankment nor ditch. Within the small square spaces, enclosed by the slighter palings, are the huts of the natives: the angular, low thatched roofs of which are scarcely set off from the ground by walls a foot or two in height. These roofs slope downwards, lengthwise as well as sideways; so that the front of the hut is the highest part. The upper point of the roof may be eight feet from the ground; the space of ground occupied, about ten square feet; seldom more, indeed usually less. Besides the door, through which a man cannot pass excepting upon his hands and knees, there is neither window, nor aperture of any kind. The New Zealand 'order of architecture,' is marked by two wide planks placed edgeways in front, joined together at the top by nails or pegs, and forming a wide angle, in which the space is filled up, excepting a door-way two feet square, with materials similar to those of the walls and roof, namely wicker work, or 'wattling,' covered by a thatching of broad flag leaves or rushes. The eaves of the roof project two or three feet beyond the front; so likewise do the side walls. In this sort of porch the family sit, eat, and, in the daytime, often sleep. At night most of them huddle together, within what, in every respect, deserves the name of a sty: even a Fuegian wigwam is far preferable, for as that is frequently left vacant during many successive weeks, heavy rains and a cold climate are antidotes to any particular accumulation of dirt. In a fine climate, surrounded by beautiful trees and luxuriant herbage, can one account for human nature degrading itself so much as to live in such a den? Is it not that the genuine, simple beauties of Creation are understood, and enjoyed, only in proportion as man becomes more refined, and as he differs more from his own species in what is falsely called a state of nature.

I was inquisitive about the large planks, generally painted red, which appeared in front of every house. The natives told me that such boards had always been made by their ancestors, before tools of any metal were seen in the land: they were from twelve to twenty feet in length, about two feet in breadth, and two inches thick: and they seemed to have been 'dubbed'

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down to a fair surface; but I am inclined to think that the wood is of a kind that splits easily into plank, like the alerse of southern Chile.* Being the evening meal time, some women, and male slaves, were removing the cinders from holes in the earth, whence steam was issuing profusely, under a shed, near the house I was examining. The shed was a light roof, upon upright poles, covering the cooking place—a few square yards of cinder-covered ground. Out of each hole dirty looking bunches of fish and leaves were raked with fingers and sticks. Hot stones were at the bottom of the hole, placed in the usual Polynesian and Chilote method. The fish had been wrapped in the leaves, but taking it out of the oven in such a manner had displaced the leaves, and substituted a coating of ashes and cinders. Potatoes, raked out of another hot hole, looked more eatable: but leaving the natives to their dirty food, we walked to the new church. A slightly built edifice of bricks, and light frame work, with an abundance of bad glass windows, gave me the idea of a small methodist meeting-house, or an anabaptist chapel, rather than an episcopal church. A good deal of money having been subscribed by residents, and visitors, specially for this church, it might be wished that a portion of it had been employed in obtaining a better design, and better materials, as it stands in a very conspicuous situation. To place a church in a stronghold of iniquity, such as Kororareka, the resort of the worst disposed inhabitants of New Zealand, native and foreign, was a daring experiment: yet notwithstanding the ill-will entertained towards the missionaries, by their 'spirit-selling' countrymen; by native chiefs, whose pandering trade was yearly lessened; and by the evil disposed of every description, no molestation had been offered, and not a plane of glass had been broken! neither had the church service been performed in vain to inattentive hearers.

Returning to the beach, we saw some of the fine canoes I have already mentioned: we then paid a formal visit to one of the chiefs; and for another, who was not at home, I

* Kauri? or some other pine?

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thought I could not do better than leave a present: his wife, or rather one of his wives, was pointed out to us, as the sister of the notorious Shunghi. 'Titore' was the absent chief's name. He was out in the country, with a hundred well-armed followers, cultivating, as we were told, his yam and potato grounds. We next saw a burying place, or rather a place where the dead are exposed, upon a raised platform, to the wind and sun. Wrapped in cloth of the country, the bodies are placed upon small square platforms of boards, which are fixed upon single central posts, ten feet high. Bushes were growing, unmolested, in the enclosure (or 'Marae'), no foot entering to tread them down. Among these thickets I saw several large boards standing upright like gravestones, some of which were painted red, and uncouthly carved. Returning to our boat, the chief whom we had visited presented me with a garment of the country manufacture: his assumed haughtiness was amusing, from being characteristic. Our evening was passed in very interesting conversation with Mr. W. Williams, and Mr. Baker;* the former had just arrived from Waimate, an agricultural settlement, lately established by the missionaries, in the interior.

Of the difficulties encountered and surmounted by the first missionaries in New Zealand full accounts have been lately published: the little we then heard strongly excited our curiosity. Mr. Marsden appeared to have been the originator, as well as the main instrument, in forwarding the great work.

On the 23d, I went with Mr. Baker to Tipuna, the place where the first missionaries, Mr. King and Mr. Kendal, established themselves in 1813. Mr. King was absent, but I saw his wife and son, who told me that he was travelling about among the natives, and would not return for several days; he was on horseback, his son said, but quite alone. Mrs. King described the former state of things which she had witnessed herself in strong terms; she could not look back to those days

* I learned that de Thierry was sometime resident in the King's-bench, and that his alleged purchase of land, in New Zealand, was a theme of ridicule among the aborigines.

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without shuddering. Being told in the evening, that "before morning their house would be in flames;" and that "stones were heating for the oven in which they themselves were to be cooked," was a quieting farewell, from a mob of angry natives, on more than one occasion. But Mr. King always found a trusty friend in a chief, whose name has been often noticed—'Waripoaka.' I met him near the house, in company with a young chief, whose sense of propriety was so delicate that he would not appear before Mrs. King, because he was not dressed 'well enough!' Waripoaka was satisfied with his own attire, and went with us. To my prejudiced eye, the dress of the young man, a mat, or mantle of the country, loosely wrapped around a fine figure, appeared far more suitable than the long-tailed old coat, thread-bare pantaloons, and worn-out hat, which utterly disguised and disfigured the old chief.

Mr. King's son talked of his sheep, and I found that though not more than eighteen or twenty, he was already a farmer, possessing land and a flock of sheep. Returning by a different route, we landed upon an island lately bought from the natives by two persons who had been masters of whale-ships.

This island, purchased for a trifling price, will become very valuable, as the trade to the Bay of Islands increases; and I regretted to see a spot of such future consequence in the hands of men, whose verbal attacks upon the missionaries, and illiberal aspersions of Mr. Busby's character, disgusted me so much that I had hardly patience to make the inquiries which were the object of my visit; or to wait while Mr. Baker told them of a plan which was in contemplation among the settlers, for the prevention, or at least restriction, of the sale of spirits.

Such men as these, strongly prejudiced, deaf to reason, and too often habitually vicious; run-away convicts, whose characters may be imagined; and democratic seceders from regular government, cause the principal difficulties against which honest, upright settlers, and the whole missionary body, have to contend. One of the men, whose share in the property of the island I have been regretting, was partly intoxicated while we were with him; but Waripoaka, who accompanied us, significantly warned me of his state as I entered the house.

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24th. I went with Mr. Baker to a scattered village, called Cawa-cawa. Leaving the ship early, we followed the windings of an estuary which forms Kororareka Harbour, until its shores contracted it to the limits of a fresh-water river. Three good houses on the eastern shore, lately built by respectable English settlers, attracted our notice in passing; and afterwards the 'Pah'* of Pomare,† a well-known chief, appeared like a cattle-enclosure upon a hill. Pomare is the man who killed and ate a part of his female slave, when Mr. Earle was there; he has still large possessions, and had larger, but has sold much for ammunition, muskets, and spirits. His honourable office at this time was that of supplying the numerous whale-ships which visited the harbour with his slaves; and he found such an employment of his female vassals answer better than the horrible one well described by Mr. Earle. Dismal alternative! On board each of the ships we passed there were many of these women; but before we notice the 'mote,' let us consider the great 'beam,'—think of what our own seaports were in times of war, and be charitable to the South Sea Islanders.

Pomare was heard to say that his son would be a greater man than himself: and the New Zealanders in general are impressed with the idea that their sons will be better, or greater men, than themselves.

The estuary, or arm of the sea, whose windings we were following, forms an excellent harbour for ships not larger than third-class frigates; or to speak in a more definite manner, for those which do not draw more than seventeen feet of water. On each side the land rises to five or six hundred feet, sheltering the anchorage without occasioning those violent squalls alternating with calms, that are found under the lee of very high land, over which strong wind is blowing. As far as I know, there are very few shoals or banks in the wide space which forms the inner harbour. A slight stream of current and

* Or Paa; by Cook called Hippah.

† This chief said that his father had adopted the name of 'Pomare,' because he had heard of a very distinguished warrior at Otaheite, who bore that appellation.

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tide runs outwards during about seven hours, and the tide sets inwards about five, though with still less strength. At times, the outward stream may run about two knots in the narrow places. Mr. Mair's house and shipping-yard, Mr. Clendon's establishment, and the pleasantly-situated house and garden of Mr. Wright gave an English aspect to the eastern side of the harbour; while boats passing and ships lying at anchor in an estuary, much resembling one in our own country, prevented the frequent occurrence of a thought, that we were near the Antipodes; and that on the western side of the harbour is the place where 'Marion' and so many of his crew were massacred, and afterwards eaten! That horrid catastrophe is now said to have been caused by mutual ignorance of language. The Frenchmen not understanding that the spot was tabooed, persisted in fishing there, and endeavoured to maintain their intrusion by force.

Canoes met and passed us as we proceeded. It was pleasant to witness the cordial greetings exchanged between most of their occupants and Mr. Baker. All these canoes were going to Kororareka, to sell their cargoes of firewood, potatoes, yams, or pigs. Here and there, by the water-side, we saw a house, or rather hut, with a patch of cleared and cultivated ground, a great pile of firewood, ready for sale, and perhaps a canoe close by, which the native owners were loading with the marketable produce of their land. When the estuary had diminished, and we found ourselves in a fresh-water river, there was much resemblance to parts of the river at Valdivia; but the amount of ground under cultivation, and the number of huts scattered over the face of the country and along the banks of the river, were less near Valdivia, exclusive of the town itself, than in this so lately a cannibal country.

Though on a small scale, the banks of this river are interesting and picturesque. On each side, the soil is extremely good on the low grounds, and the hills are well clothed with wood; they are not high, but approach the river rather closely in some places, so that the winding stream, spaces of level and partially cultivated land, and woody heights, are agreeably

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mingled, and formed a rapidly varying view as we proceeded.

Mr. Baker had been urged by the natives of Cawa-cawa to visit them, and endeavour to settle a dispute which had arisen with a neighbouring village, or rather tribe. He also wished to gain more advocates for the abolition of spirits; and I was glad to profit by the opportunity of seeing a little of the natives and their habits, in a place said to be Christianized, and uncontaminated by the spirit-sellers.

A few of our own countrymen were employing themselves as sawyers, on the banks of the river, near the village of Cawa-cawa; but neither their huts, their mode of living, nor their outward appearance, caused any feeling of good-will towards them on my part.

Having ascended the stream, as far as the boat could go, which was about four miles from the salt-water, we landed, and walked towards the village of Cawa-cawa, escorted by several elderly and a mob of young natives. Our way led through open underwood, maize-grounds, and damp swampy soil, in which I saw plenty of the plant called 'flax,' supposed, a few years since, to be very valuable, and now probably much undervalued. Across a stream the natives seemed delighted to carry us; indeed, I may say once for all, that at this village their whole behaviour was affable, friendly, and open, to a degree nearly approaching that of the merry Otaheitans.

Under the shade of a large tree, the inhabitants of the widely-scattered huts soon assembled. For me they brought a chair out of a cottage; but for themselves their native soil offered a sufficient place of rest. In all positions, half-enveloped in blankets or coarse country mattings, with their rough, curly hair protecting their heads from the sun's rays, and almost shading their tattowed faces, about a hundred men, women, and children surrounded their apparently most welcome friend 'Payka,' as they called Mr. Baker. Many fine forms and most expressive countenances were there. Such heads, indeed I may say, such a group for a painter! I had sufficient leisure to admire them; for it is etiquette in New Zealand to sit in silence

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during some minutes, previous to commencing any conversation. Engrossed by the fine, the grand heads of some of the old warriors, whose amply tattowed features had withstood the ravages of time more successfully than their once dark hair, and by the graceful figures of the younger women, I was sorry when the ceremonial silence was ended. By turns the principal men discussed with Mr. Baker (whose speaking appeared to be to the purpose, as well as fluent), the business for which they had assembled.

I could understand few words used, but the gestures of the natives were sufficiently expressive to give a general idea of their meaning. Mr. Baker's interpretation to me afterwards was to this effect:—"A neighbouring tribe has encroached upon the district which this tribe claim as hereditary property. These men prove their right to it by bringing forward several of their elders, who have at various times killed and eaten 'rats' upon it."

In other days, the war-club and the patoo-patoo—a sanguinary contest to determine whose should be the land and whose bodies should fill the ovens—would have been the unfailing mode of decision. "What would Mr. Baker recommend them to do, now that they had become Christians?" was their question. He recommended arbitration, each party to choose a 'wise man;' and if the two wise men disagreed, they should refer the question to the deliberation of the missionaries, at their next general meeting. He also promised to visit the other tribe, enquire into the case, and exert himself for the sake of both parties, who were equally his friends, and whose interest, as well as duty, it was to remain at peace.

By temporising, talking to each party, and inducing one to meet the other half way, Mr. Baker had no doubt of amicably arranging the affair.* Is it not extremely gratifying to find the missionaries thus appealed to, and acting as mediators and peacemakers?

The singular reason for laying claim to this land, appears less extraordinary when explained. Formerly there were no wild

* Before the Beagle sailed it was settled.

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quadrupeds, excepting rats, upon New Zealand: and while so destitute of animal food, a rat was considered 'game' by the natives; and no man would attempt to kill his neighbour's rats, or those which were found on his territory, without intending, or declaring war against him. Had not the rats, eaten by the older men of Cawa-cawa, belonged to them, the lawful or understood owners of the rats would long since have made war upon the people of Cawa-cawa. Rats having been there killed, and war not having been consequently declared, were irresistible arguments in the minds of those men, who never forgot, and who knew not how to forgive an injury.* Some of us are apt to think modern game laws harsh inventions, and the result of civilization. Yet if, in our own history, we look back seven hundred years, we find that human lives were then forfeited for those of beasts of the chase: and if we look at this country, which may be supposed two thousand years behind our own, in point of civilization, we find, that to kill a rat upon a neighbour's land, is an offence almost sufficient to cause a general war.

The precise manner in which territory is divided among these savages surprised me not a little: I thought land was but slightly valued by them. Though sold to Europeans for what we consider trifles, the sale is, to them, matter of high importance, in which every free man of the tribe ought to be consulted. Uncleared land is supposed to belong to the tribe, collectively. Cultivated spots, and houses, are private property, but cannot be sold, or given away, out of the tribe, without the consent of the whole community. This division of land among small tribes,† looks much like a comparatively late appropriation of the country. To make a purchase of land in New Zealand, in a manner which will ensure quiet and unquestioned possession, it is necessary to assemble all the tribe of

* In Mariner's Tonga Islands a full description is given of the manner in which the Friendly Islanders shot rats: as an amusement.

† There are several varieties of the human race in New Zealand; differing from one another as much as the lightest olive-coloured Otaheitan differs from the 'brown-black' New Hollander.

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owners, or as many as can come; a few absentees, of little consequence, not being thought about. The goods intended to be given, as an equivalent for the land, are then spread out for inspection; and if the contracting parties agree, their word is given, and their marks are perhaps put to a deed which they cannot read,* but whose purport they are told. The goods are forthwith carried away; each man appropriates what he chooses, and it often happens that the chief men of the tribe receive the smallest portion of the purchase goods.

One, among many objections alleged against the purchase of land, said to have been made by de Thierry, was, that he could not have bought land in New Zealand, while absent, because, in order to make a purchase valid, it is necessary to buy from the tribe, not from individuals.

Mr. Stokes was informed that when a tribe is utterly vanquished, the conqueror generously gives the survivors a grant of land, and even slaves. I do not see how to reconcile this act of generosity with the blood-thirsty warfare which has usually ended in indiscriminate slaughter, and cannibal feasts.

Satisfied, for the time, on the principal subject:—the much desired abolition of the use and importation of ardent spirits, was discussed. An old man, named 'Noah,' spoke to the tribe; and after alluding to the disgraceful and unfortunate events, caused by drinking, which had happened to their friends, and to neighbouring tribes, since the white men had introduced the vice of intoxication, old Noah ended a short but eloquent harangue, by saying, "expel the liquid fire." Noah is a Christian: his name was his own choice, when baptized, some years ago. The principal men, eight in number, signed, or made marks upon the paper, which contained the resolutions agreed to by acclamation. Noah wrote his name in a distinct hand: each of the others made marks resembling a small part of the tattowed lines upon their faces. One man imitated the mark upon the side of his nose; another that near his eye. Baked potatoes were afterwards brought to us; and a curious wine, of which I had not

* A few natives can now read and write.

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heard. It was dark coloured, and not unlike good elderberry wine. It is made from the small currant-like fruit of a shrub, which the settlers call 'native vine;' but the resemblance to a vine is about as evident as that of a common elderberry bush. The fruit grows in clusters, much like small elderberries in appearance, but it contains stony kernels, which are said to be unwholesome, if not poisonous. Women collect the juice by squeezing the bunches of fruit with their hands. I have heard that it is used after fermentation as well as in its pure juicy state, but some assert the contrary: it might then assuredly cause intoxication; I doubt, however, their often obtaining, or keeping, a sufficient quantity. It dyes the hands of the women and children who collect the juice, so deeply, that they cannot efface the stain for many days afterwards.

Instead of rubbing, or rather pressing, noses, these people have adopted the custom of shaking hands: every one expects to have a shake. Yet with all their asserted equality, and democratic ideas, there must be a considerable distinction of rank, and difference of occupation, among them; for I particularly noticed that two chief persons of this tribe, who rather resembled the higher class at Otaheite, had far less swarthy complexions, and less hardened extremities, than the others: one of them, considered by Mr. Baker to be the head of the tribe, was more like an Otaheitan 'Eri,' and less like the ordinary New Zealanders than any other native I saw, while at their island. From the meeting place under the large tree, we went to see a chapel which the natives were building, by their own free will and labour; and in our way we passed through yam and potato grounds, so neatly kept, that no gardener need have hesitated to commend them.* The intended chapel was a lightly framed building of wood, with a thatched roof. The natives seemed to be very proud of it, and were much gratified by our praises. Some large oxen, in a pen, were feeding on young branches, and leaves of trees, gathered for them by the

* Cook speaks in strong terms of the neatness and regularity of their cultivated grounds.

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natives, which they appeared to relish as much as hay: they were called 'booa-cow.'*

At the door of a house, or rather in the porch (before described), I saw a woman reading: she was sick, Mr. Baker told me, one of a long list of invalids, who frequently applied to the missionaries for advice and medicine. I looked at her book, it was the Gospel of St. Matthew, printed at Paihia, in the New Zealand language. Now, certainly, there was neither constraint, nor any thing savouring of outward show, in this woman's occupation, for my seeing her was sudden, and quite accidental, arising from my going out of the usual path to look at the oxen. Mr. Baker told me, that one of the most troublesome, though not the least gratifying duties, of the missionaries, was that of attempting to act as medical men. No regularly educated practitioner having at that time established himself in the land, every complaint was entrusted to the kind attention, and good will, but slight medical knowledge of the missionaries. We saw several nets for fishing placed in separate heaps, each upon a small platform, at the top of a post eight or ten feet in height: in a similar manner yams and potatoes are preserved from the rotting influence of the damp earth. The nets are made with the split leaves of the 'flax' plant, not merely with the fibres, and last for many years: both they and the food, thus exposed to the air, are thatched, like the houses, with the broad leaves of an iris-like rush, or flag, which grows abundantly by the river sides, and in marshy places. I was here informed, that after the bodies of the dead (which are exposed to the air, on platforms similar to those I have just mentioned), are thoroughly dried, the bones are carried away, and deposited in a secret burying place.

25th. Being Christmas-day, several of our party attended Divine service at Paihia, where Mr. Baker officiated. Very few natives were present; but all the respectable part of the

* Literally cow-pig. Before white men brought others, pigs were the only domestic animals known in Polynesia besides dogs:—and when a cow first appeared in a ship, she was called cow-booa, or booa-cow.

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English community had assembled. Instead of performing the whole service first in one language, and afterwards in the other, as at Otaheite, the two entire services were mixed, and the whole extended to such a length that had even the most eloquent divine occupied the pulpit, his hearers could scarcely have helped feeling fatigued. Mr. Baker appeared to be more fluent in the language of New Zealand, than in his own, a fortunate circumstance for the natives, though not for the English who attend his church. In the mere glimpse which I had of the missionary body at New Zealand, it appeared to me that they rather undervalued their white congregations. They say, "We are sent to the heathen, it is to their improvement that every effort should be directed." "This is true," may be replied; "but does not the example of respectable settlers, or visitors, assist the influence of missionaries?" Would not the natives take notice if foreigners whom they see in the land refused, generally speaking, to conform in their habits and conduct, to the principles so earnestly insisted upon by the missionaries? But unless Divine service is performed in a manner which will, at the very least, increase respect for it, and give rise to no feelings of slight towards those who, from the nature of their highly responsible office, are expected to perform it tolerably well—it does not seem likely that such as are only sojourners in the land, will be seen at the church as often as might be desirable; thus a part of their example, so beneficial to the great cause, will perhaps be lost.

A very correct musical ear seems to be as general among the people here, as among those of Otaheite. The responses of thirty natives, women and men, were made so simultaneously, and so perfectly in harmony, that I could no more distinguish the different voices, than I could those of a number of good choristers singing together. Their singing was equally melodious, yet neither I nor others were disposed to think it equal to that of Otaheite.

26th. Disputes between masters of whale ships and their crews, and between both these classes and the New Zealanders, obliged me to meddle, though very reluctantly, in their affairs.

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to show what anarchy has been caused in this country, by the partial, half measures, which have been taken, I will try to describe the state of things, at the Bay of Islands, as we found them.

I will not attempt to give the slightest sketch of events which had occurred anterior to the Beagle's visit, full and authentic details being accessible in other publications; farther than to say that the rumoured approach of de Thierry had stimulated Mr. Busby (holding the undefined office of British resident) to take measures adverse to such foreign intruders, by issuing a public announcement,* and by calling together the principal chiefs of tribes inhabiting the districts of New Zealand, north of the Thames, with a view of urging them to frame a sort of constitution,† which should have a steadying influence over their unwieldy democracy, and leave them less exposed to foreign intrusion.

Thus much had been done by words and on paper; the chiefs had departed, each to his perhaps distant home, and the efficiency of their authority, in a 'collective capacity' was yet to be discovered. No 'executive' had been organized; the former authorities—each chief in his own territory—hesitated to act as they had been accustomed, owing to a vague mystification of ideas, and uncertainty as to what they really had agreed upon, while the authority of Mr. Busby was absolutely nothing, not even that of a magistrate among his own countrymen; so of course he could have no power over the natives. To whom then were the daily squabbles of so mixed and turbulent a population, as that of the Bay of Islands and its vicinity, to be referred?

Late events had impressed the natives with such a high idea of King William's men-of-war, that even the little Beagle was respected by them, and, in consequence, appeals were made to me—by natives, by men of the United States of America,

* Appendix, No. 35.

† A copy of the constitution, or form of government, decided upon at a meeting of all the chiefs of the northern districts (excepting two or three of minor consequence), is in the Appendix, No. 36.

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and by British subjects; but, not then aware of the peculiarity of Mr. Busby's position, I referred them to him, under the idea that his office was of a consular nature, and therefore that I ought not to act in these cases, excepting as his supporter. Finding him unwilling to take any steps of an active kind, not deeming himself authorised to do so: and the aggrieved parties still asking for assistance, I referred them to the only real, though not nominal, authority, in the place, that of the missionaries. By the active assistance of Mr. Baker, the more serious quarrels were ended without bloodshed, and those of a more trifling nature, in which the natives were not concerned, were temporarily settled: but I doubt not that in a few days afterwards anarchy again prevailed.

To give an idea of the nature of some of these quarrels, and of the serious consequences they might entail, I will describe briefly two or three cases which were referred to me.

Pomare had been beaten while on board a whale ship, by some of her crew. No New Zealander will submit to be struck, but thus to treat a chief is unpardonable. Burning with indignation he maltreated the first Englishman whom he met on shore, and was concerting serious measures of revenge, when the master of the ship, and a number of his men, came to ask for assistance and protection.

Again; a chief, whose name I do not know, had been refused admittance on board a whale ship, where he had heard that one of his female slaves was living. He did not wish to injure her, or even take her away. His only motive, in asking admittance, was to satisfy himself that she was there. Highly affronted at the refusal, he spoke to me, (as he said) previously to collecting his warriors and attacking the ship.

Another case was unconnected with the natives, but tended to expose a fraudulent system, and to show the necessity of arming British authorities, in distant parts of the world, with a definite degree of control over the licentious, or ill-disposed portion of their own countrymen, who, in those remote regions, are disproportionably numerous, and now able to do pretty much what they please.

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A person who stated himself to be the master of an English whaler, lying in the harbour, came on board the Beagle, accompanied by a man said to be the third mate. The former complained of the mutinous state of his crew, who had ill treated this third mate, and then refused to work or obey any orders. Inquiry on board the whaler, showed that the crew had been ill-used, especially as to provisions: and that not only the nominal master, but the chief as well as the second mate were North Americans, (U.S.) The legal master, it appeared, was the so-called third mate, an Englishman. His name appeared in the ship's papers as master; that of the person who had been acting as master did not appear at all. But the acting master, who before me styled himself 'supercargo,' produced a power of attorney from the owners of the vessel,* which appeared to authorise him to control the proceedings of the vessel, as he thought proper; to displace the master and appoint another person in his stead, and in every way to act for the owners, as if he, the American, were sole owner. Nearly all the seamen were British subjects. How far his power of attorney might carry weight against the spirit and intent of the navigation laws, I had much doubt; but as it appeared to me that the owners in such cases, ought to know their own interest better than other persons could; and that in suiting their own interest they certainly would add their mite towards the general interest of their country; and as the supercargo had a circular letter from the Commander-in-chief on the West-India and North American station, asking for the assistance of any King's ship he might meet (with the view of encouraging the whale fishery out of Halifax); I refrained from doing what my first impulse prompted—putting an officer on board, and sending the ship to the nearest port (Sydney), in which correctly legal measures might be adopted, if necessary. Meanwhile as the British resident did not think himself authorised to interfere, and disorder, with 'club-law,' were prevailing and likely to continue, in the Rose, I went on board, accompanied by Lieutenant Sulivan and Mr. Bynoe.

* The 'Rose' of Halifax.

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After examining the provisions and all the ship's papers, I spoke to the crew (every man of whom wished to leave the vessel) and to the nominal master; obtained an assurance, in their hearing, that their future allowance of provisions should be unobjectionable, and, for the time, restored order. But I felt that the calm was unlikely to last, and two days afterwards fresh appeals were made, to which I could not attend, being in the act of leaving the port.*

The laws which regulate our merchant shipping, especially sealers and whalers, do not appear to extend a sufficient influence over the numerous vessels, which, with their often turbulent inmates, now range over the vast Pacific. For many years past, Great Britain and the United States have annually sent hundreds of large whale ships into the Pacific: during late years, Sydney has sent forth her ships, amounting at present in number to more than sixty, most of which are employed in whaling or trading in the Pacific: and be it remembered that their crews are not the most select seamen—the nature of many of them may easily be imagined—yet in all this immense expanse of ocean, little or no restraint except that of masters of vessels, on board their own ships, is imposed either upon Americans or British subjects! There is the nominal authority of a consul at the Sandwich, and Society Islands: and occasionally a man-of-war is seen at the least uncivilized places. But how inefficient is so widely separated, and so nominal a control? When ships of war visit the less frequented parts of the Pacific, they are too much in the dark, as to the state of things, to be able to effect a tenth part of what might be done, in equal time, by a ship employed solely on that ocean. In so peculiar a portion of the world as Polynesia, it takes some time to learn what has been taking place: and what ship of war has stayed long enough for her captain to lose the sensation of inexperience—which must embarrass him if called upon to decide and act, in cases where he really is about the most ignorant person (as regards the special case) of any one

* Afterwards (at Sydney) I heard that the men had all left the vessel, and were living among the natives.

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concerned with it? In consequence of that ignorance, he must inevitably be more or less guided by the advice of parties, of whose individual interest in the matter so short an acquaintance cannot give him a proper idea.

A great deal of prudence, and good management, is required in the commander of a man-of-war, who has any business of consequence to transact with the natives of Polynesia, or who has to deal with his own countrymen in that distant region. A single ship, assisted perhaps by tenders, might, if well commanded, do more good in a few years among the islands of the Pacific, than can now easily be imagined. But then she must be stationary; not that she should remain in one place—far from it—her wings should seldom rest; I mean only that she should stay in the Pacific during three or four years. In that time so much information might be gained, and so much diffused among the natives; such a system of vigilant inspection might be established, and so much respect for, and confidence in the British nation, be secured—that our future intercourse with Polynesia would, for a length of time, be rendered easier and infinitely more secure, as well as creditable.

The few ships of war which have remained during any length of time among the islands, have been occupied by exploring and surveying, to an extent that has interfered with the earnest consideration of other matters. But in a ship, employed as I have described, a surveyor might be embarked, who would have ample opportunities of increasing our knowledge of that ocean. And if a sensible man, whose natural ability had been improved by an education unattainable by sailors, could be tempted to bear the trials and losses of a long sea voyage, in a busily employed ship, how much might Science profit by the labours of three or four such years?

Having thus entered freely into ideas which I have so often dwelt upon that they are become familiar, I will venture to suggest the kind of ship which would do most, in my humble opinion, at the least ultimate expense consistent with efficiency. Moral influence over the minds of natives, as well as over wanderers from our own or other countries, is a pri-

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mary object, and that influence might be at once obtained by the mere presence of a large ship.

Compare the manner in which the natives of the Marquesas behaved to the Tagus and Briton frigates, with their hostility to vessels whose appearance did not overawe them. An outward show of overpowering force would often prevent a struggle, and probably loss of life, which, however justifiable, cannot too anxiously be avoided. From what I have seen and heard, I feel authorised to say that one ship of force, well-manned, and judiciously commanded, would effect more real good in the Pacific than half-a-dozen small vessels.

Frigates have already been seen among some of the islands of Polynesia, and heard of in the greater number. To send a ship of a lower class to establish a general influence over the Polynesians, and our own wandering countrymen, as well as for the purposes I have previously mentioned, would be to treat the business so lightly that, for the credit of our country, it would perhaps be better let alone; particularly as a frigate does occasionally go from the South American station, and a sloop from Australia, or the East-Indies. No European or American nation has now a duty to perform, or an interest to watch over, in the Pacific Ocean, equal to that of Great Britain. The North Americans are increasing their connections, and consequently their influence, rapidly. Russia has extended her arm over the Northern Pacific. France has sent her inquiring officers, and Roman Catholic missionaries* are sowing the seeds of differences, if not discord, among the islanders, in the Gambier Islands and elsewhere.

Independent of expense, what are the principal local objections to employing a frigate in such a duty? In the first place, among the islands there would be risk of getting ashore, increasing with the size of the ship:—in the second; it might be difficult to obtain supplies, and in the event of losing spars she might be obliged to return; perhaps to England:—in the third; to get ashore, in a ship drawing so much water, would

* Sent out immediately after the first circulation of Captain Beechey's interesting work.

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be a much more serious affair than a similar accident happening to a smaller vessel: and, by obliging her to return to England, or go to an East-Indian dockyard, would upset all plans and expose Polynesia to greater irregularities and less control than ever, until new arrangements could be made.

To the 'risk of getting ashore,' I answer: large ships are in general more efficiently officered and manned than small ones, and they are less likely to get into danger, because they are consequently more carefully managed. The Pacific is, technically speaking, a 'deep water' ocean: all its coral reefs are 'steep-to.' Sand or mud banks are unknown, except near the shores of continents, and even there they are rare, unless on the Japanese and Chinese shores. Small ships attempt to sail in intricate passages, and get ashore:—large vessels use warps, or await very favourable opportunities, and are not risked. Secondly: supplies may now be obtained in any quantity on the coast of South America, as well as in Australia; and fresh provisions can be obtained by regular, reasonable purchase, at the principal islands. New Zealand, Norfolk Island, the north-west coast of America and other places, are stocked with the finest spars: and lastly: a large ship, well provided, has the resources of a small dock-yard within herself.

An East-India trader of eight hundred tons, was hove down by her own crew, and the natives, at Otaheite. Cook laid his ship ashore for repair in Endeavour River, on the north-east coast of New Holland; where the rise and fall of tide is very great. Sydney is an excellent place for heaving down and repairing a ship of any size. Guayaquil has a great rise and fall of tide. Lima, or rather Callao,—and Coquimbo, are good places for a ship to refit in. But Sydney is superior to all as a rendezvous, and any repairs may be effected there.

Large ships are able to do all their own work, while small vessels are frequently obliged to ask for the help of their neighbours, when they get into difficulty, or want repairs. These considerations, however, should not prevent a frigate from having a good tender, for much risk would then be

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avoided: and although the large ship might be repairing, the knowledge that she was in the Pacific* would be quite sufficient, if she had only established such a character as that which was borne by many a British frigate during the last general war. Such a ship could detach efficient boats for surveying, or other purposes; she could carry animals, seeds, plants, and poultry, to those islands which have none; and by her countenance and protection, she could assist and encourage the missionaries in their all-important occupation.

* No accident need oblige her to quit that ocean. Many large ships are built there, and never leave its waters.

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CHAPTER XXV.

Waimate—Cultivation—Flax—Apteryx—Gardens—Missionaries—Farm—Barn—Mill—Grave of Shunghi—Horses—Kauri Pine—Keri-keri—Children—Waripoaka—La Favorite—Political condition—Relics—Images, or Amulets—Mats—Leave New Zealand—Remarks—Intercourse—Convicts—Effects of Missionary exertion—Irregular Settlements—Trade—Residents and Consuls—Missionary Embarrassments—Society's Lands—Discontent of Settlers—Purchase of Land—Influence of Missionaries—Their sphere of action.

28th. Accompanied by Mr. Baker, I set out to go to Waimate, a settlement formed by the missionaries with the view of introducing agriculture and mechanical arts among the natives, in addition to the truths of the Gospel. Entering one of the numerous creeks (Waitangi) by which the north-eastern shores of New Zealand are intersected, we went a little way in a boat, then landed and got on horseback.* Two natives, who had been waiting with the horses, ran by their side during the rest of the day with much ease, though we trotted or cantered rather fast. One of them even carried a bundle weighing about thirty pounds. The men did this by choice, for the sake of riding back from Keri-keri, a place we were afterwards to visit, and whence Mr. Baker and I would return by water. While running thus easily and cheerfully, by the side of our horses, they reminded me of men at Madeira; and still more of the Maltese, whom they both resembled in feature, figure, and colour. To see fern every where, was a remarkable peculiarity. In some places it grew thickly, and to the height of a man, in others it was scantily scattered. It is said to be an index to the quality of the soil, which is productive in proportion to the quantity of fern. After ascending the first low hills, I was a little disappointed by the uniform and unpicturesque appearance around me. A rather level or irregularly undulating country, in which extensive plains were more

* A few horses had been brought over from Sydney.

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remarkable than hills—every where verdant, in many places wooded, and intersected by numerous streams of water—pleased by its supposed capabilities, though not by the picturesqueness of its appearance. From seeing the remains of forest, or rather irregular-looking woods, in a variety of situations—at the summits of hills, as well as in the hollows of vallies; and from the prevalence of fern instead of grass, I was led to think that the whole land had once been thickly wooded, but that the natives had cleared away the trees by burning.

We passed by a native village, around which were many acres of well cultivated ground, with maize and potatoes in a thriving state. They were planted in little heaps of earth (like mole-hills), at exact distances, laid out by line. For planting the sweet potato (cumera), a kind of yam (taro), or the lately introduced potato, a wooden stake is used as a substitute for a spade, in preparing the ground. The natives acknowledge themselves much indebted to the white men for pigs and potatoes; but they speak angrily of the 'liquid fire'—and diseases which they brought. One old native also made a shrewd remark about certain seven-barrelled guns sent among them by some of our countrymen, even while others were preaching the gospel of peace, and trying to check their inclination to quarrel.

Abundance of the flax plant was growing on the low moist ground, and also on higher, apparently dry soil. I was told that the flax plant does not like a swamp, but thrives where the ground is rather moist. With leaves like those of an iris or large lily, whence the fibres are obtained which are 'called' flax, this plant has always been of great consequence to the natives. Those immense nets which are mentioned in the faithfully descriptive accounts of Cook, are made with the leaves split into long narrow shreds, not scraped or peeled. For the manufacture of smaller cordage and thread, the leaves are scraped by a shell, which removes the upper or green part and leaves the strong white fibres, that run longitudinally along the under side. With these fibres, in less or greater numbers, and twisted more or less, the New Zealand cordage has been made, which was so much liked at its first intro-

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duction, but is now said to be of a quality very inferior to that made with European, or even Chilian, hemp. The principal objection I have heard urged against the New Zealand rope is, that it does not endure frequent bending; not being sufficiently tenacious if used where its pliability is much tried. In sailor's language, 'it soon goes in the nip.' Perhaps this objection might be removed by a peculiar mode of treating the plant, or by another way of seasoning and preparing the fibres. Very fine mats for clothing are made with these fibres, which, when properly prepared, are of a fine silky texture, extremely durable, and capable of withstanding a great deal of washing and wear. I have one by me which has been in constant use sixteen years, and frequently washed. This being the case with respect to the mats, how does it happen that rope made by white men, of the very same material, has not been found to answer? Surely, it can only be because the material has not been properly treated by those who are, perhaps, little acquainted with its nature, with the best season for cutting it, and with other peculiarities probably well known to the natives. Do not many of our own handicraftsmen make a mystery of their art, and, in consequence, are not the secrets of most trades hidden to those who have not learned them, and cannot read?

An open-sided house, or rather shed, standing apart from the little village, I was told was a chapel, which the natives had lately built of their own accord, and without telling the missionaries of their intention: when it was completed they applied to Mr. Williams for a teacher.

A very fine-looking native passed us, whose air and manner of carrying his gun reminded me of an Albanian's. Every man now carries a gun or musket, who, a few years since, would have been armed with a war club, or patoopatoo, and a mieri.*

So accessible is the country between Waimate and the Bay of Islands, that, except across a few small ravines, which require log bridges, a cart might travel easily; though there was at this time no road: water conveyance also is every where at hand, so

* Or mearee (spear).

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intersected is the land by arms of the sea. Fresh water, in rivers, brooks, and springs, is plentiful, and never fails.

There is a rare and curious bird in New Zealand, which few persons have seen. It is shy, and seldom visible in the day-time: the natives are said to chase it by moonlight. It is of the bustard or emu kind, unable to fly, though provided with short wings; it is said to be more hairy than feathery, and about the size of a small emu.*

On rather a high plain, or very flat-topped hill, stands Waimate—the agricultural establishment of the Church Missionary Society. After so long an absence from every similar sight, and in New Zealand, the sudden appearance of three English houses, surrounded by outhouses, gardens, and cultivated fields, was striking and delightful; I looked at it as a fragment of Old England, small indeed, but apparently genuine. About twenty acres of land, judging only by eye, seemed to be cultivated. Corn was in full ear, and looked well. The buildings showed at a distance to greater advantage than on a nearer approach; because they are built in the form of gentlemen's cottages, but entirely of wood, and were then unfinished. There were also nice gardens, which had evidently profited by much industrious care, and knowledge of gardening: my hasty survey was however stopped by the approach of a person, whose appearance and manner showed that he was an essential actor in this English scene; and whose intelligent, kind, and truly respectable demeanor was of that description which at once excites esteem and goodwill. This was Mr. Davis, the superintendant of the farming establishment. He told me that Mr. Wm. Williams (the brother of Henry Williams) and Mr. Clarke, were gone to Hokianga, at the opposite side of the island, to attend the last hours of a young Wesleyan missionary.

I have hitherto spoken of missionaries in general terms, as if they formed a distinct and undivided class. That as a body they are distinct, in the scale of worldly divisions, is true; their self-devotion, their habits of life, peculiar education, and inces-

* This bird (Apteryx Australis) has lately been described by naturalists, therefore I say no more about it.

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sant anxiety, attach them to a class, of which the good, and therefore truly great Bishop Heber was one of the leading members. But of course they are separated, among themselves, by distinctions which are a natural result of more or less education and of early habits.

The Church Missionary Society have distinguished by the term 'missionary' only those educated, well-informed men who have taken holy orders, and they are styled 'reverend.' Those who are not in orders are termed 'catechists.' Without an idea of finding fault with the present conduct of any individual belonging to either of those two classes, it has occurred to others as well as to me, that a third class might be added advantageously, that of 'visiting' or 'inspecting missionaries.' A clergyman of Heber's character, embarked on board a man of war, might advise and assist those who are now too much on an equality to give free advice to one another, or readily to see the small defects from which no human beings or institutions ever can be free.

Human nature, tried during a long course of years, has seldom steered a uniformly steady course; and may not slight defects, if unnoticed, increase into real blemishes? Difficulties have arisen in New Zealand, as well as in other parts of the Pacific, unnoticed by many people, because, till lately, they were but little felt. These difficulties particularly interfere with the missionaries, and if not remedied by timely measures, will lead to continual embarrassment.

To return from this digression. Near the houses a number of sheep were grazing: plenty of fowls, geese, and pigs; some cattle and horses; and several calves and colts, added to the comfortable, farm-like appearance. We accompanied Mr. Davis into his house for a few minutes, walked over the garden and farm, looked at the farm-yard, barn, and mill, and returned to dinner. The house was well constructed of wood; and though unfinished had a remarkably clean and neat appearance. The compact manner in which the walls were boarded or wainscotted struck me particularly, from being such a contrast to the manner in which a South American carpenter would have con-

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structed a house of similar size. A little room, used by Mr. Davis, pleased me much; for, in addition to clever contrivances and good carpentry, it contained a collection of excellent books, and a frame on which an unfinished plan of the Society's farm bore testimony to the nature of the in-door occupations of our host. I did not expect to see much indication of reading, certainly none of drawing, in a newly-built house, standing in the midst of a tract of New Zealand, which two years previously was covered with fern.

In the garden, European vegetables seemed to thrive, and the farm-yard was quite English; a large barn, built entirely by natives, under Mr. Davis's direction; a blacksmith's shop; carts and farming implements, successively engaged our attention. In the barn, a surprising work for the New Zealanders, two natives were thrashing, and a winnowing machine was attended by a third. The mill and mill-dam were well worth examination, as good works of their kind, independent of the interest occasioned by their locality. An embankment (made entirely by natives) had changed the upper part of a small valley into a large pond; and on the middle of the pond-head, or embankment, stood the mill.

A powerful water-wheel, equal to the performance of far more work than the mill required, seemed to be easily turned by only a part of the stream admitted through the mill-dam or sluice. In answer to a remark upon the surplus power, Mr. Davis said that the Society contemplated erecting a thrashing machine, and that Mr. Coates* had encouraged him to anticipate its arrival. A thrashing-machine might be worked easily, in addition to the mill, and yet there would be power to spare.† When embanking the pond, an unfortunate accident occurred, which almost stopped the work: one of the natives, incautiously digging under an overhanging mass of earth, was smothered by its sudden fall. Superstitious and easily excited, the natives abandoned their allotted tasks, and not without

* Secretary to the Church Missionary Society.

† The Church Missionary Society have sent out the thrashing machine, and probably it is now in full operation.

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much difficulty could the missionaries induce them to resume their employment. When at last the mill was finished and in full operation, nothing could exceed the surprise and delight of the natives, especially those who had assisted in the work. They called it a 'ship of the land.' "Wonderful white men!" said they; "fire, water, earth, and air are made to work for them by their wisdom; while we can only command the labour of our own bodies!"

Many natives have visited Sydney; some have been round the world; and, of course, their ideas and descriptions have been imparted to their countrymen; but nothing, not even that, to a savage, awfully-mysterious object, a steam-vessel, has yet effaced their early-formed opinion, that a large ship of war is the greatest wonder of the world.

Returning from the mill, Mr. Davis showed me where Shunghi was buried. No monumental mark indicates the tabooed place in which the remains of the slaughter-loving cannibal were deposited; a few dark-leaved trees and some thickly-growing fern alone point out the spot.

While looking about, highly gratified by all we saw, we met Mr. W. Williams, who had just returned from his attendance upon the young Wesleyan before-mentioned. The sufferer had been released from painful illness by death.

A thriving young English oak, near Mr. Davis's house, augured well; for where English oaks succeed, many other useful trees will certainly grow. Several younger saplings, just fit for transplanting, occupied a part of Mr. Williams's well-stocked garden; and these interested me more than all the other plants and trees in the garden taken together. Englishmen one now meets every where; but a living, healthy, English oak was a sight too rare, near the Antipodes, to fail in exciting emotion.

I was much struck by the harmony and apparent happiness of those families whose cheerful hospitality I was enjoying. An air of honesty, and that evident tranquillity of mind which can only be the result of a clear conscience, offered a forcible contrast to the alleged gloom and selfishness of which some

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missionaries have been accused by those whose society was not, perhaps, even tolerable to them, because of their vicious habits and indulgences. It was also very gratifying to me to mark the lively interest taken by Mr. Williams, Mr. Davis, and Mr. Baker in every detail connected with the Fuegians, and our attempt to establish Richard Matthews in Tierra del Fuego. Again and again they recurred to the subject, and asked for more information; they would not hear of my calling the attempt 'a failure.' "It was the first step," said they, "and similar in its result to our first step in New Zealand. We failed at first; but, by God's blessing upon human exertions, we have at last succeeded far beyond our anticipations." Their anxiety about the South American aborigines generally; about the places where missionaries might have a chance of doing good; and about the state of the islands in the Pacific Ocean, gave me a distinct idea of the prevalence of true missionary spirit.

In the minds of Mr. Williams and his brother I should have expected high and generalizing ideas, similar in a great degree to those of the 'Apostle of the South'—the 'heroic Marsden,' as he has been most deservedly styled; but I was unprepared to find all the members of this missionary body anxious to hear about, and talk of Fuegians and other distant tribes of savages, rather than to draw attention to themselves, to their troubles, and ultimate success, or to their own interests.

At this interview it was fully decided that Richard Matthews should remain with his brother, a respectable young missionary mechanic, established at the northern end of the island, and lately married to Mr. Davis's daughter. Among many subjects of conversation we discussed the dress of the natives; and Mr. Williams assented fully to the inconvenience of their present awkward mode, and expressed an intention of trying to introduce something like the poncho and 'chilipā'* dress of South America. With sincere regret I took leave of the residents at Waimate. Instead of hours, I could have passed days

* The chilipā is a kind of loose breeches.

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with them, had other duties allowed of following my own inclination.

Riding across a valley close to Waimate, we passed some young horses of a good breed, though fitter for the saddle than for agricultural purposes. They were the produce of mares brought from Sydney. A picturesque wooden bridge, which had been thrown across the stream at the bottom of the valley, reminded me strongly of one well-known in England; and caused that rush of associated ideas sure to follow an unexpected meeting with the semblance of an object familiar in other days.

In a large wood I saw the noble cowrie (kauri) pine. The trunk of this gigantic offspring of New Zealand is in size and shape like an immense antique column. From the ground to the lower branches, more than ninety feet have been measured; and around the trunk, at a yard from the ground, more than forty feet; while thirty feet in circumference is not an uncommon size. But the upper portions are comparatively meagre, and utterly devoid of any of the beauties so remarkable in our English oaks, cedars, and firs. The woods of New Zealand have rather a naked appearance; for the branches seem inclined to grow upwards instead of spreading, or feathering.

Cantering along, across an open easy country, passable for wheel carriages, we soon approached Keri-keri. A deep ravine, into which a considerable stream falls over a precipice about a hundred feet in height, was pointed out to me as the limit of an arm of the sea which penetrates from the Bay of Islands. The waterfall is rather picturesque. Passing on over rounded hills covered with fern, I almost started at a thoroughly English scene suddenly exposed. In the valley beneath, a quiet little village; a church-like building of stone, with a clock on the tower; an English cutter at anchor, with her ensign flying, in the arm of the sea before-mentioned, close to the village; gardens full of flowers, surrounding the neatly-built and white-washed cottages; cattle grazing about the surrounding hills; and a whole school of little English children, hallooing and screaming to one another as they played in a

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field, quite transported me in imagination to the other side of the world. Recalled to the truth by our pedestrian companions asking us to stop for them, I enquired of Mr. Baker how long that respectable church had been built? and was disappointed to hear that the fancied church was a store-house. A small, low building, which he pointed out, was the chapel—it looked much more like a small school-house.

I was glad to see that our native companions took pains to dress themselves decently before they entered the village; as, while running along the road, they had carried their clothes in their hands; but of their own accord they put them on as soon as the houses were seen.

In the village of Keri-keri we found an English welcome, and an abundance of happy-looking, healthy children. Their parents seemed to bear the Church missionary character, open integrity, and the outward indications of a sincere wish to do that which is right. It may seem absurd to speak thus decidedly upon a hasty glance and first impression; but there is a talisman in a truly honest face, and a charm in the manner of one who 'thinketh no evil,' that to me is irresistible; and I have never yet found cause to think lightly of 'ten minutes sight.'

At about ten o'clock, Mr. Baker and I embarked in my boat, to return to Paihia. As we passed down a river-like arm of the sea by moonlight, but little idea of the country on either side could be formed. What I could distinguish was undulating, and rather low land. We were four hours on the water, though the boat moved fast with a fair wind.

I was glad to learn from all quarters that the natives are very fond of the white children. Mr. Davis told me, that his sons could engage the attention and assistance of natives a great deal more easily than he could himself. Speaking the native language more fluently may assist the young people in their intercourse; but they are liked chiefly because born in the land, and because of the naturally kind disposition of the New Zealanders. Many instances have proved that they are kind by nature, and that their feelings are keenly sensitive, as

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well as very strong. But there are opposing feelings, each powerful, in the same individuals; and upon education, habit, and the accidents of moments, depend their development and the ascendancy which either may obtain.

On the following day (29th), Waripoaka visited the Beagle; he was accompanied by a mixed assemblage of men, women, children, pigs, dogs, and fowls, all in one large canoe. His own appearance, a spare figure and tattowed face, ill-dressed in a shabby old suit of European clothes; and the disorderly group in his train, formed an unfavourable outward contrast to the warlike array of a heathen New Zealand chief. Waripoaka seemed to be very intelligent and unassuming; perhaps his manner to white men was too humble. It did not agree with pre-conceived ideas of an independent, haughty New Zealander, to see bows and awkward grimaces (intended for good manners) made by a man whose eye and aspect at once precluded the idea of any approach to refined habits.

During our stay at New Zealand we heard much of the zealous activity of the officers of 'La Favorite'—a French surveying ship—which had lately visited, and made a minute plan of the Bay of Islands. They must have examined every corner and ascended every hill, by the accounts we received; but neither natives nor English settlers seemed able to comprehend the principle which animated Captain La Place and the officers of La Favorite to take so much trouble in a foreign country for no good to themselves alone. I was able to explain this to some of them by instancing my own occupation on the shores of South America, and showing that nations acted upon grander principles than individuals. I was told that M. La Place had likewise examined, with much care, a considerable extent of the eastern sea-coasts of the northern large island (Eaheinomawe, or Yahinomaui).

The term Rangatira, Rangateeda, or Rangatida, has spread among all classes, excepting only the slaves, who are prisoners taken in war or their descendants. Every free Zealander now styles himself rangatira.

At Otaheite there is a very limited number of raatiras, as

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the secondary chiefs are there called; and each of those so styled is really a person possessing a considerable estate, and having influence over his neighbours. There can be little doubt that originally the words were alike; or rather there was but one word which expressed either 'freeman' or 'privileged person;' and that the first people of New Zealand were animated by the spirit of equality and apparent liberty, which is seen to prevail in most colonies. Is not this the natural spirit of an association of adventurers, whose objects are similar, whose origin, individually, as to birth and place in the parental society does not differ much—if it does, the difference is unnoticed when not upheld by accidental circumstances—and whose property is very similar?

Democratic, essentially democratic, is the present political state of the New Zealanders; and one cannot help pitying their short-sightedness in exposing themselves to the caprice and dissensions of the many who obtain temporary influence, and to the wars, harsh slavery—for in the heathen districts the life of a slave depends upon the caprice of his master—and dreadful consequences. But this shocking existence, so utterly repugnant to our ideas of happiness, excited and still excites the New Zealander to animal enjoyments, and a sort of pleasure resulting from the gratification of his horrible propensities, which is almost incomprehensible to us, however intelligible it may have been to our earlier ancestors. Do not let us entirely forget the painted savages who opposed Cæsar—or the sacrifices of the Druids!

Some of the Zealanders have amulets and other similar trifles hung around their necks. Small uncouth images, much like the Burmese or Chinese 'josses,' formed out of a very hard stone ('jade'?), are so highly prized by them that they are, generally speaking, very reluctant to part with any. I got one from the daughter of Shunghi, but could not obtain a second, though she had several. I was told that they value them as hereditary relics, as well as supposed charms. Many nations, even at the present day, put faith in relics, some more especially in such as have a word or words upon

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them, which it is supposed the evil spirit would not like to see or to hear, and therefore would avoid. Particular figures and shapes also are considered to be disagreeable to the author of evil and his agents.* Surely the New Zealanders must have tried thus to frighten Satan by their hideous images, and by the uncouth, horrible faces which they delight in making. The little images, or amulets of jade, are formed in a similar fashion!

These small idols, or talismans, seem to me to have been cut into the rude likeness of an ape, or a 'ribbed-nosed baboon.'† Yet, excepting the face, they resemble figures of Hindoo gods! What time and pains must have been bestowed in working such hard pieces of stone, unless indeed, a method of acting upon them by fire or chemistry was known; or that when first taken from the ground they were softer.‡

Besides the use which the natives make of the flax for clothing by day, a mat, coarsely woven of its fibres, is tied at night, or while it rains, round the neck, and forms a sort of thatch, under which the owner squats upon his heels, and, at a little distance, looks very like a bee-hive. The rough tuft of coarse and curly black hair, which shows at the top of the conical roof, does not at all injure the resemblance; and in this manner a great number of the natives pass their nights, especially if there is the least chance of a surprise or attack from an enemy. I was told that they sleep as well in this way as if they were lying down, but I doubt it much, and think that only a part of the whole number at any place, keep watch, or remain ready in this manner, while others sleep lying down, though frequently in the open air. A more watchful way of resting could not well be devised.

30th. Unpleasant discussions, on the local discordances I have already mentioned, obliged me to delay sailing for some hours: but at last I escaped, happy to disentangle myself from a maze of disagreeable questions, in which it was not

* Mosheim, in his edition of Cudworth's Intellectual System.—Encyc. Brit.

† The mandril, of Buffon. Apes were worshipped in India.—Ibid.

‡ It is still a matter of conjecture how the Peruvians worked in the very hard stone of which some of their ornaments were made.

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my proper business to interfere, though unavoidably I had become involved in them. By evening we had gained a good offing, and profited by it in the night, during a strong gale of wind from the eastward, with a lee current, setting to the north-west, about a knot an hour. When we sailed there was every appearance of a gale coming on, but all our necessary operations were completed, and to have stayed an hour longer in that place would have been far worse than passing some hours in a gale of wind at sea.

That the few notices here given of a small part of New Zealand are scanty and quite insufficient for those who seek general information, I am well aware: but the Beagle's stay was very short, and I have made it a principle in this narrative to restrict myself to writing what I or my companions collected on the spot: admitting a few quotations from other authorities, only where they seemed to illustrate or explain a particular subject, without requiring much space. To those interested about this important and rising country, I need hardly mention the volume of evidence taken before the House of Lords, as the latest,—and Cook's account as the earliest, —as well as best sources of information.

I will now endeavour to draw attention to a few of the difficulties against which missionaries have to contend, while anxiously labouring in their holy cause among Polynesian, Australian, and European infidels. It may be supposed that population and occasional intercourse had every where extended, even before the ever-memorable epoch, when the 'Victory' was steered by the daring Magalhaens across an unexplored ocean: but since that time, intercourse with Polynesia has so much increased, that the most interesting islanders—those of Otaheite and the Sandwich Islands—are already more civilized than the natives of some of the Spanish settlements in America.

The New Zealanders are improving; so likewise are the natives of many other islands, which have been visited by missionaries: but those islanders who have been altered only by the visits of whalers, sealers, and purveyors for Chinese epicures, have in no way profited. On the contrary, they have

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learned to show less respect to their own ordinances, and have been taught no others in stead. The most abandoned, profligate habits and ideas, have been encouraged by the latter classes of visitors. By their fire-arms, ammunition, and spirituous liquors,—exchanged every where for provisions, and for the gratification of their animal inclinations,—lamentable effects have been caused.

Some men-of-war have allowed an unrestrained intercourse with the natives, receiving them on board, and permitting them to remain, as is still usual among the whalers. Others have not admitted any on board, excepting visitors who were formally received, and did not remain. Such, for example, as the Queens of the Sandwich Isles or Otaheite, with their attendants. But although in that respect men-of-war may have to plead guilty, they are free from any charge of exciting mutual hostility between neighbours; of taking any part in hostilities which were being carried on between rival tribes at the times of their visits; or of acting in any manner which could be likely to lower Europeans in the estimation of the natives, or to excite a feeling of animosity against white men in general.

Stray, or rather escaped convicts, are the chief draw-back. Unrestrained by any religious, or even mere moral principle, those abandoned men have done vast injury, but have frequently fallen victims to the just indignation of the provoked islanders, whose hospitality they abused. Convicts are seldom brave, but usually unprincipled, designing, and cunning; can one then wonder at the natives of some South Sea islands taking an aversion to white people, if their only acquaintance with them has been through such characters, transported to Australia for life, in consequence of felony: who have again, perhaps, been banished from Australia to the doubly penal settlement of 'Norfolk Island;' and have thence escaped to wander through those countries in which they have the strongest hope of avoiding apprehension.

It is little known, and difficult to estimate, how much anarchy, tumult, and destruction of human life have been

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prevented by the presence and active exertions of missionaries, during the last twenty years, in which French, Russian, American, and English intercourse with the Pacific, has so much increased. Under the colours of the United States, and of our own country, more than five hundred sail of vessels have been annually employed in the Pacific, during late years. To obtain refreshments and supplies, such as I have mentioned, only those islands on which there are white or native missionaries, are considered safe for single merchant ships. But even while profiting by the influence of the missionaries, and assisted by them in their intercourse with the natives, men who belong to those very ships hesitate not, in many instances (but not in all), to ridicule the means by which the missionary has gained his influence—to encourage immorality, and the use of ardent spirits, and to seek for faults in a system, as well as in the behaviour of individuals according to that system, because it has a tendency to limit the indulgence and expose the impropriety of their own unrestrained misconduct. If the opponents of missionaries could be prejudiced so far as to allow no other good character to have been earned by those hardworking men, they can never deny them that of peace-makers.

Many sailors have left their ships, and settled for life, upon various islands. Though generally immoral, some of these men have established a character among the islanders, so very different from that of the convicts, that persons who understand the native descriptions are seldom deceived in their estimation of a man who, they hear, has recently settled in any place.

Some of these seamen have astonished the New Zealanders, and even men of the Feejee Islands, by hardy courage in warlike enterprises. One, known by the name of Charles, has been already mentioned as having distinguished himself so much by his activity and daring in wars with other islanders, that he was treated as a chief of very high rank, and allowed to have a hundred wives: while the greatest chieftains had from fifty to a hundred and fifty, according to their rank. There are now said to be upon the southern large island or

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middle island of New Zealand, settlements supposed to be formed by some two or three hundred abandoned characters, European, Australian, and American. These outcasts, of whom a proportion are convicts, have established a sort of system amongst themselves, in order to regulate their intercourse with the natives. I was told that they were living with native women, and, at that time, cultivated the soil; but, what will be the consequence of such a colony, if left to their own devices in that distant corner of the world? Yet, again, where could outcasts, whose state of exile (if they may be supposed to have good feelings) would be as insupportable to themselves as pitiable in the minds of others—where could such unhappy wretches be placed more appropriately than at the Antipodes? They should, however, be frequently watched, to check any approach to piratical preparations, as well as to give timely notice of such an intention.

Settlements of a different character are elsewhere forming, and the establishments of individuals are increasing in North New Zealand, at Otaheite, and in the Sandwich Islands. Between these establishments, small vessels are always in motion: and not trifling is the trade in oil (cocoa-nut oil), arrow-root, and sugar, between Otaheite and Sydney: in flax, spars, potatoes, and whale-oil, between New Zealand and Sydney; in sandal-wood, bicho-do-mar, nut-oil, pearl-oyster-shells, and curiosities (such as native arms, implements, and clothing) between other islands, and Australia, Tasmania,* the East-Indies, China, and South America.

Thus surrounded by those who are engaged in a commerce annually increasing; unavoidably involved in local dissensions; referred to on all occasions as interpreters or as peace-makers; and I may say, as the consular agents of white men of all nations;† it argues very favourably for the missionaries that they have as yet upheld the character of their sacred office, though sneered at by nominal friends, censured by enemies, and always struggling against opposition. I have said that at the Sandwich Islands there is a consul; on those islands

* Van Diemen's Land. † At Otaheite and Owyhee excepted.

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there are missionaries from the United States, but none from England. At Otaheite, also, there is now consular authority. At New Zealand there are two officers, holding the indefinite station of 'Resident.' One of these officers had a salary, but denied having any authority to act as a consular agent, or even as a magistrate. The other resident (who lived at Hokianga) was not in the receipt of any salary; his appointment having been given for the reasons stated in a letter from the Colonial Secretary at Sydney, dated 29th June 1835, of which a copy is inserted in the Appendix (No. 37), accompanied by extracts from an excellent letter addressed to Mr. Busby. (No. 38.)

Upon reading these statements, it will not be difficult to form an idea of some of the embarrassments of a secular nature, which perplex the missionaries, after having overcome all the primary dangers and difficulties of establishing themselves in savage—even cannibal countries. Although they are now able to assist their own countrymen, who have eagerly profited by their exertions,—settling in every direction upon those very lands to which access was obtained by their hardy, daring enthusiasm, and is preserved by the united efforts of the supporters of missionary societies, assisting and encouraging individual exertion,—their own strength is failing!

Embarrassments of many kinds are arising; one, jealousy of that influence which has enabled even those who are jealous to approach the spot upon which they now stand, and oppose the missionary as he exerts himself to suppress licentious habits and the use of ardent spirits. While assisting their early settlement, the missionaries were the best friends of those adventurers who sought a livelihood among the islands of the Pacific—in New Zealand especially. But when once established, ingratitude and utter want of reflection became too prevalent among the worst sort of settlers, whose only occupations were those of publicans and especial sinners. The few respectable settlers—men of character and property—such as Mr. Clendon and Mr. Mair at New Zealand, Mr. Bicknell and Mr. Henry (junior) at Otaheite, have acted—I rejoice to say—in the most honourable and praiseworthy man-

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ner. Their conduct deserves unanimous applause. To many it appears, that the respectable support and steady countenance of these upholders of the real character of Britons have, in a quiet, unpretending manner, much assisted the progress of the missionaries, and the spread of incipient civilization which must accompany the sacred truths of the gospel. If a few such men had not appeared upon that side of the world, how low might the character of Englishmen have fallen there. A few isolated missionaries would have been always opposed by numerous reprobates.

By such men as those who are jealous of the influence of the missionaries, an outcry has been raised against their "attempts to monopolize the lands." Said those men, "Why should a missionary be allowed to purchase so much land as to prevent people who come afterwards from obtaining an eligible piece of ground near a frequented port?" "Why should Mr. —— be allowed to try to prevent Waripoaka and his tribe from selling me that piece of ground, because he thinks that I shall sell spirits, or build a public-house? Have not the missionaries already monopolized the best land in the finest situations?"

In answer to this, lest the reader should think that the missionaries have been covetous, and have taken undue advantage of their influence (gained, it ought to be remembered, at the imminent risk of life, and when no ordinary men dared to stop in the land), I will explain — that a large extent of land in New Zealand was long ago purchased by the missionaries, on behalf of the Church Missionary Society: and that many of the outcriers supposed that land to be the private property of individuals. And I will ask for attention to the too little considered fact, that these unjustly blamed individuals have (by their engagements) divided that tie which once held them to a country whose inestimable value can only be fully felt by those who have long been wanderers in other lands. New Zealand, or Otaheite, or a less known island, is now their home; and there are around them a host of little children whose smiling healthy looks would interest even strangers in their behalf,

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whose country is that adopted by their parents, and to whom every good father would anxiously desire to leave a sufficient maintenance, such as his own honourable exertions could procure. Shall the missionaries be debarred from providing in a proper manner for the future welfare of their own children? If a missionary and a more recent settler are each in treaty for a particular piece of ground, and the former obtains it upon easier terms than the latter, is it not a natural consequence of the good-will entertained towards him by the natives; many of whom understand and appreciate his motives, and are themselves very fond of the little white children, considering them as belonging to their country? The missionaries have bought land, as opportunities offered; and they, of course, from their residence upon the spot, have had better opportunities than occasional visitors or late settlers.*

If anathemas, indulgences, or excommunications were in vogue among British missionaries, one might have a suspicion of undue influence; but as such engines of spiritual, or indeed temporal power, have not, as yet, travelled out of the coral circle of the Gambier islands, I think we need not impugn the characters of highly religious men, by puzzling ourselves to learn how protestant ministers—unassisted by artifice, supported by no temporal power, except that of public opinion, excited by their own good conduct — could have obtained so great an influence over tribes of New Zealanders, as to induce them to part with their paternal lands upon terms which the natives thought unfavourable, or less advantageous than those offered by other persons.

In opposition to such an idea as that of their eagerly grasping at territory, and using undue means to procure it, I know with certainty, that the Rev. Henry Williams, and his brother William, exerted all their real influence—that of advice—in pointing out the consequences which would result to

* After a purchase of land has been made by a settler (or immigrant, as the colonists say), he is considered to be under the protection of the chief of the tribe from whom the purchase was effected.

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some tribes who were inclined to part hastily with extensive tracts of valuable pine forests. The real value of those trees was explained to the natives; and they were shown distinctly how a careful management of such stores of spars would ensure a future property, and sufficient maintenance for the native children who would otherwise be deprived of their birthright. Did this show a desire to monopolize?

But I must hasten to a conclusion of the subject. When authorized agents of European or American governments assume active functions in New Zealand (where at present they are little more than cyphers), I hope they will have the good sense to ask for advice from the missionaries; who, no doubt, will duly remember, that, however they may have been called upon to act during emergencies, the duties of their office are, or ought to be, separated as much as possible from affairs of a secular nature. Neither in politics, nor in any kind of hostilities or dissensions, ought they to take a part, excepting as peace-makers, if an officer or authorized executive agent of government is within their reach.

Among many omissions which I am obliged to make in the subsequent chapter, are the following:—On the 7th of January, while more than two hundred miles from any known land, we saw a boatswain-bird and two white tern. To those who are interested about the distances to which birds fly from land, this remark may be worth notice: as some persons say that tern never fly far.

Mr. Chaffers obtained the jaw of a huge blue shark, at Hobart Town, which had been killed by the boat's crew of Mr. James Kelly's whaling vessel. The extreme length of the monster was thirty-seven feet. Its jaw is now in the United Service Museum.

About Van Diemen's Land, the barometer ranged higher than I had witnessed in the southern hemisphere.

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CHAPTER XXVI.

North Cape of New Zealand — Superstitions — Cook's great Lizard — Traditions — Currents — Thermometer — Sydney — Dr. Darwin — Drought — Aqueduct — Position — Disadvantages — Ill-acquired wealth of Convicts, or Emancipists — Hobart Town — Advantages of Van Diemen's Land — King George Sound — Natives — Dance — Keeling Islands — Tides — Soundings — Coral formations — Malays — Fish — Weather — Mauritius — Cape of Good Hope — St. Helena — Ascension — Bahia — Pernambuco — Cape Verde Islands — Azores — Arrive in England.

On the last day of this year (1835) we passed the north cape of New Zealand, and steered for Port Jackson. It has been said that the New Zealanders entertain vague ideas about the spirits of their dead hovering near this north cape. I had no opportunity of inquiring into this superstition, but as other authorities besides Cook mention it, no doubt there is some such belief among those who have not acquired different notions from foreigners To my mind it is interesting in two points of view; one, as showing their belief in a future state of existence; and the other, as indicating the quarter whence New Zealand was first peopled; for it appears to be an impression common to many savage nations, that their souls should go to the land of their ancestors. This is particularly remarkable among the South American aborigines. It is not easy to imagine any motive for the New Zealanders supposing that spirits hover about the North Cape, in preference to any other promontory of New Zealand, unless in connexion with the idea that from the point nearest to the country whence those people formerly migrated, the souls of the deceased would, after a time perhaps, depart to their permanent abode.

In taking leave of this interesting country I will refer to Cook once more, for a curious notice, given in his third voyage, respecting great lizards in New Zealand, which have not, so far as I am aware, been lately described, or even met with. 'Taweiharooa' gave an account of snakes and lizards of an enormous size: "he describes the latter as being eight feet in length,

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and as big round as a man's body. He said that they sometimes seize and devour men; that they burrow in the ground; and that they are killed by making fires at the mouths of the holes. We could not be mistaken as to the animal; for, with his own hand, he drew a very good representation of a lizard on a piece of paper; as also of a snake, in order to show what he meant."—(Cook's third Voyage, chap. VII.) Perhaps this huge kind of lizard has become extinct; but it is possible that it yet exists on the southern (or middle) island. In its burrowing we are reminded of the great lizard, or iguana, of the Galapagos Islands; but the assertion that it sometimes seizes men seems to refer to an alligator, or crocodile. Cook heard of it shortly after leaving Queen Charlotte Sound, from a native of the southern large island.* If such a reptile ever existed upon the northern island it must have been exterminated by the earliest aboriginal settlers, as they have now no tradition of any animals except dogs, pigs, rats, mice, and small lizards. Pigs and dogs, say the natives, were brought from the north, in canoes.

On New Year's day, while in sight of the islets called Three Kings, we passed through several tide 'races,' one of which was rather 'heavy,' and would have been impassable for a boat. These races moved towards the north while we could trace their progress. The temperature of the water fell six degrees after passing through the principal one. Next day, at noon, we found that during the past twenty-four hours we had been set as many miles southward (S.S.E.), and hence I am inclined to infer that we were influenced by regular tide-streams, rather than by currents setting always in one direction. To the succeeding day at noon (3d) we were set only seven miles, by the water, and that due east. Afterwards, in our passage to Port Jackson, we had alternately northerly and south-easterly currents of about ten miles a day, and it was easy to tell which current we were in, by the temperature of the sea:—while the stream set from the north, the water thermometer showed about 72°; but when the current

* At New Zealand the southern large island is usually called the Middle Island.

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was running from the southward, the temperature of the ocean, a foot below, as well as at, the surface,* was only 67°. I ought to have remarked elsewhere, if I have not already done so, that the thermometer may be used at sea to detect and trace currents; but little, if any, confidence can be placed in its indications as a guide to the approach of land. Icebergs may indeed affect it, but they will affect the temperature of the air probably sooner than that of the ocean.

Near midnight, on the 11th, we saw the red, revolving light of Sydney Light-house, and next day entered Port Jackson, and anchored in Sydney Cove. Much as I had heard of the progress and importance of this place, my astonishment was indeed great, when I saw a well-built city covering the country near the port. Not many days previously I had been reading the account of Governor Phillip's voyage to Botany Bay in 1787-8, and little did I think that, in forty-eight years from the first discovery of Port Jackson, a city, upon a large scale, could have arisen out of a wilderness so near our antipodes. In the account just mentioned it is stated that "from a piece of clay imported from Sydney Cove, Mr. Wedgwood caused a medallion to be modelled, representing Hope, encouraging Art and Labour, under the influence of Peace, to pursue the means of giving security and happiness to the infant settlement. The following lines, in allusion to this medallion, were written by Dr. Darwin."

"Where Sydney Cove her lucid bosom swells,
Courts her young navies and the storm repels,
High on a rock, amid the troubled air,
Hope stood sublime, and wav'd her golden hair;
Calm'd with her rosy smile the tossing deep,
And with sweet accents charm'd the winds to sleep;
To each wild plain, she stretch'd her snowy hand,
High-waving wood, and sea-encircled strand.
'Hear me,' she cried, 'ye rising realms! record
Time's opening scenes, and Truth's unerring word.—
There shall broad streets their stately walls extend,
The circus widen, and the crescent bend;

* For no difference could be detected, under ordinary circumstances.

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There ray'd from cities o'er the cultur'd land,
Shall bright canals, and solid roads expand.—
There the proud arch, Colossus-like, bestride
Yon glittering streams, and bound the chasing tide;
Embellish'd villas crown the landscape scene,
Farms wave with gold, and orchards blush between.—
There shall tall spires, and dome-capt towers ascend,
And piers and quays their massy structures blend;
While with each breeze approaching vessels glide,
And northern treasures dance on every tide!"
Here ceased the nymph—tumultuous echoes roar,
And Joy's loud voice was heard from shore to shore—
Her graceful steps descending press'd the plain;
And Peace, and Art, and Labour, join'd her train."

When I was at Sydney in 1836, all that was foretold in this allegory had come to pass, with one exception only, that of canals. It was always a country comparatively dry; and unfortunately the more wood is cleared away, the drier both climate and soil become, therefore it is unlikely that canals should ever be made there. This want of fresh water is the only drawback to the future prosperity of this mushroom city; which is now dependent upon a supply brought through iron pipes from a distance of several leagues. Mr. Busby, father of the resident at New Zealand, was the projector and executor of this aqueduct, but,—like many other really valuable things,—his useful work as ably planned as it was perseveringly carried on against uncommon difficulties, is but little appreciated, even by those who daily drink the pure water which it supplies.

It is difficult to believe that Sydney will continue to flourish in proportion to its rise. It has sprung into existence too suddenly. Convicts have forced its growth, even as a hot-bed forces plants, and premature decay may be expected from such early maturity. Other rising colonies have advantages in point of situation and climate, which the country about Sydney does not possess; and if our government establishment should be withdrawn, from that day the decline of the city would commence, because its natural advantages are not sufficient to enable it to compete with other places in those regions,

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excepting while fostered by the presence of regularly paid government officers, troops, and a large convict establishment.

There must be great difficulty in bringing up a family well in that country, in consequence of the demoralizing influence of convict servants, to which almost all children must be more or less exposed. Besides, literature is at a low ebb: most people are anxious about active farming, or commercial pursuits, which leave little leisure for reflection, or for reading more than those fritterers of the mind—daily newspapers and ephemeral trash. It was quite remarkable to see how few booksellers' shops there were in Sydney, and what a low class of books — with some exceptions — was to be found in them. These few exceptions were the works usually called 'standard,' which some persons who buy books, for show as furniture, rather than for real use, think it necessary to purchase. Another evil in the social system of Sydney and its vicinity, is the rancorous feeling which exists between the descendants of free settlers and the children of convicts. Fatal, indeed, would it be to the former, if the arm of power were removed; for their high principles and good feelings would be no match for the wiles and atrocities of such abandoned outcasts as are there congregrated, and almost rejoice in their iniquity. Money is gained by such people by any and every means, save those of honest industry. By selling spirits, frequently drugged—by theft—by receiving and selling stolen goods—by the wages of iniquity—and by exorbitant usury—fortunes have been amassed there in a few years which would make an honest man's hair stand on end. But do such men enjoy their wealth? Does it benefit them or their children? No. Their life is a miserable scene of anxiety, care, fear, and generally penuriousness; they die without a friend and without hope.

The Beagle sailed from Sydney on the 30th, and anchored off Hobart Town (or Hobarton) on the 5th of February. The change of scene was as striking as a view of Gibraltar or Madeira after leaving the Downs. Comparatively speaking, near Sydney all was light-coloured and level; while in Van Diemen's Land we almost thought ourselves in another Tierra

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del Fuego. But this was only a first impression, on a blustering wet day. Fields of ripe corn, dotted, as it were, about the hilly woodlands, told us that the climate must generally be favourable; and the number of red brick cottages, thickly scattered about, though apparently at random, proved an extent of population incompatible with an unproductive place.

During a few days' stay in Sullivan Cove, the chief anchorage, we had opportunities of going to some distance into the country, and seeing things which led me to think that there is a more solid foundation for future prosperity in Van Diemen's Land than can be found near Sydney. Natural advantages are greater; and likely to increase as the country is cleared and inhabited—because rain is now almost too plentiful, though corn ripens well and is of excellent quality. As a convict colony, it of course partakes of the evils I have mentioned; but it does so in a far less degree, partly because the convicts sent there were of a less profligate and more reclaimable class than those landed at Sydney, and partly because an excellent local government restrained the licentious, and encouraged the moral to a far greater extent than was, or perhaps could be effected among the more numerous and dispersed population of Sydney and its environs.

On the 17th, we sailed out of the picturesque Derwent, an arm of the sea extending inland many miles beyond Hobart Town, and thence worked our way southward round the Land of Van Diemen. We then steered westward, or as much so as the contrary winds would admit, until we made the land off King George Sound on the 6th of March; and a few hours afterwards moored in the principal anchorage, called Princess Royal Harbour; a wide but shallow place, with a very narrow entrance. The country round King George Sound has a dull, uniform aspect; there are no mountains or rivers;* few trees are visible; white, sandy patches; scrubby bushes; bare masses of granite; and a slightly undulating outline meet and disappoint the eye of a stranger.

* Unless a few brackish, indeed salt-water, brooks can be termed rivers.

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A few straggling houses, ill-placed in an exposed, cheerless situation, were seen by us as we entered the harbour; and had inclination been our guide, instead of duty, I certainly should have felt much disposed to 'put the helm up,' and make all sail away from such an uninviting place.

Next day, however, we found that appearances were worse than the reality; for behind a hill, which separates the harbour from the sound, a thick wood was discovered, where there were many trees of considerable size; and in the midst of this wood I found Sir Richard Spencer's house, much resembling a small but comfortable farm-house in England. This sort of isolated residence has a charm for some minds; but the loss of society, the numerous privations, and the vastly retrograde step necessarily taken in civilized existence by emigrating to perfectly new countries, are I think stronger objections to the plan than usually occur to persons who have not seen its consequences in actual operation.

At this time there were about thirty houses, or cottages, in the neighbourhood of the sound and harbour; some had small gardens; but, generally speaking, there was no appearance of agriculture, excepting immediately around Sir Richard's house, where a few fields had been cleared and cultivated in the midst of the wood.

There is an extraordinary degree of local magnetic attraction about this place. We could not ascertain the amount of variation with any degree of accuracy until our compasses were placed upon a sandy beach of considerable extent, near the sea. Wherever there was stone (a kind of granite) near the instruments, they were so much affected as to vary many degrees from the truth, and quite irregularly: those on board were not influenced, at least not more than a degree. We were also perplexed by the irregular and peculiar tides; but as they are mentioned elsewhere, I will refrain from farther remark on them here.

We had a good opportunity of seeing several of the aborigines; for not only were there unusual numbers of neighbouring natives then about the settlement, but a strange tribe,

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called 'Cocotu,' had lately arrived from a distance, and as the residents wished to conciliate them, a 'corobbery' was proposed, and Mr. Darwin ensured the compliance of all the savages by providing an immense mess of boiled rice, with sugar, for their entertainment.

About two hours after dark the affair began. Nearly all the settlers, and their visitors, had assembled on a level place just outside the village, while the native men belonging to both tribes were painting, or rather daubing and spotting their soot-coloured bodies with a white pigment, as they clustered round blazing fires. When all was ready —the fires burning brightly—the gloom at a little distance intense, by contrast, and the spectators collected together —a heavy tramp shook the ground, and a hundred prancing demon-like figures emerged from the darkness, brandishing their weapons, stamping together in exact accordance, and making hoarse guttural sounds at each exertion. It was a fiendish sight, almost too disagreeable to be interesting. What pains savage man takes—in all parts of the world where he is found—to degrade his nature; that beautiful combination which is capable of so much intelligence and noble exertion when civilized and educated. While watching the vagaries of these performers, I could not but think of our imprudence in putting ourselves so completely into their power: about thirty unarmed men being intermixed with a hundred armed natives. The dancers were all men; a short kangaroo-skin cloak was thrown about their hips, and white feathers were stuck round their heads: many were not painted, but those who were had similar figures on their breasts; some a cross, others something like a heart. Many had spears, and all had the 'throwing-stick'; and a kind of hatchet,* in a girdle round the waist. Much of the dancing was monotonous enough, after the first appearance, reminding me of persons working in a treadmill; but their imitation of snakes, and

* This hatchet is made of two pieces of stone, joined together by a lump of gum, almost as hard as the stone: it is used for notching trees, that the men may climb after opossums.

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kangaroos, in a kind of hunting dance, was exceedingly good and interesting. The whole exhibition lasted more than an hour, during most of which time upwards of a hundred savages were exerting themselves in jumping and stamping as if their lives depended on their energetic movements. There was a boy who appeared to be idiotic, or afflicted with a kind of fit; but the man who was holding him seemed to be quite unconcerned about his convulsive efforts, saying, "by and bye he would be a doctor" (as I was told by a resident who understood the language), which reminded me of what Falkner says of the Patagonians.* After the corobbery the natives collected round the house where the feast was preparing; and it will not be easy to forget the screams of delight that burst from old and young as they looked in at the door and saw the tub in which their rice was smoking. Before the food was distributed they were told to sit down, which they immediately did, in a circle round the house. They separated, of their own accord, into families, each little party lighting a small fire before them. Their behaviour, and patience, were very remarkable and pleasing. One family had a native dog, which in size, colour, and shape, was like a fox, excepting that the nose was not quite so sharp, nor the tail so bushy.

Most of the aborigines had rather good countenances, and well-formed heads, as compared with those about Sydney, or in Van Diemen's land. The lathy thinness of their persons, which seemed totally destitute of fat, and almost without flesh, is very remarkable. I have since seen some drawings of South African aborigines, executed under the critical eye of Doctor Andrew Smith, by the correct hand of Mr. Charles Bell, which are so like the natives who live near King George Sound in colour, as well as countenance, and extraordinary shape, that they might be taken for full-length portraits of the latter instead of Africans.

Many of these natives have features smaller and less marked than are usual among savages; but their foreheads are higher and more full: they are not tall, few exceeding five feet eight

* Page 163.

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inches in height: and the women are wretched objects. Some of the men had pieces of bone stuck through the cartilage of the nose, which, I heard, was to prevent their being killed by another tribe, who were seeking to revenge the death of one of their own party. I was told also, that when any death occurs in one tribe, the first individual of another that is encountered is sacrificed by the bereaved party, if strong enough; but I suspect my informant confused revenge for manslaughter with the strange story—that for every death in one tribe, however caused, a life must be taken from another. Should it be true, however, the scarcity of aboriginal population would have an explanation in addition to those which various writers have given. These natives bury their dead in a short grave; the body being laid on its side, with the knees drawn up to the chin.

During our stay at this place we caught plenty of fish, of twenty different kinds, with a seine; yet with such an abundant supply close at hand, the settlers were living principally on salt provisions.

Before quitting King George Sound I must add my slight testimony to the skill and accuracy with which Flinders laid down and described those parts of New Holland and Van Diemen's Land that I have seen. His accounts also of wind, weather, climate, currents, and tides, are excellent; and there are other points of information in his large work, useful to many, but especially to seamen, which would be well worth separating from the technicalities among which they are almost lost in the present cumbersome volumes.

March 13th. We sailed, and advanced towards Cape Leuwin, but it was the 18th before our little ship was sufficiently far westward of that promontory to steer for my next object, the Keeling Islands.

From the 27th to the 30th we had a severe gale of wind, when near the situation of those remote isles, and on the 31st were in much doubt whether they lay eastward or to the west of us. There was most reason to induce me to steer eastward—indeed I was about to give orders to that effect just as the sun was setting, (no land being seen from the mast-

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head, though the horizon was clear)—when a number of gannets flew past the ship towards the west. We steered directly after them, and early next morning (after making but little way during a fine night) saw the Keelings right ahead, about sixteen miles distant.

A long but broken line of cocoa-palm trees, and a heavy surf breaking upon a low white beach, nowhere rising many feet above the foaming water, was all we could discern till within five miles of the larger Keeling, (there are two distinct groups) and then we made out a number of low islets, nowhere more than thirty feet above the sea, covered with palm-trees, and encircling a large shallow lagoon.

We picked our way into Port Refuge (the only harbour), passing cautiously between patches of coral rock, clearly visible to an eye at the mast-head, and anchored in a safe, though not the best berth. An Englishman (Mr. Leisk) came on board, and, guided by him, we moved into a small but secure cove close to Direction Island.

Many reasons had induced me to select this group of coral islets for such an examination as our time and means would admit of; and, as the tides were to be an object of especial attention in a spot so favourably situated for observing them, a tide-guage was immediately placed. Its construction was then new, and, being found to answer, I will describe it briefly. Two poles were fixed upright, one on shore (above high water mark, and sheltered from wind), the other in the sea beyond the surf at low water. A block was fastened to the top of each pole, and a piece of well-stretched log-line 'rove' through them.* One end of the line was attached to a board that floated on the water; the other suspended a leaden weight, which traversed up and down the pole, on shore, as the float fell or rose with the tide. Simple as this contrivance was, and useful as we should have found it in many places where the surf or swell made it difficult to measure tides at night, without using a boat, I never thought of it till after we left King George Sound.

* A very small metal chain would be better, because a line, however stretched, will shrink after being wetted by rain, and give out again as it dries.

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Until the 12th every one was actively occupied; our boats were sent in all directions, though there was so much wind almost each day as materially to impede surveying. Soundings on the seaward sides of the islands could seldom be obtained; but two moderate days were eagerly taken advantage of to go round the whole group in a boat, and get the few deep soundings which are given in the plan.* The two principal islands (considering the whole southern group as one island,) lie north and south of each other, fifteen miles apart; and as soundings were obtained two miles north of the large island, it may be inferred, I think, that the sea is not so deep between the two as it is in other directions. Only a mile from the southern extreme of the South Keeling, I could get no bottom with more than a thousand fathoms of line.

The southern cluster of islets encircle a shallow lagoon, of an oval form, about nine miles long, and six wide. The islets are mere skeletons—little better than coral reefs, on which broken coral and dust have been driven by sea and wind till enough has been accumulated to afford place and nourishment for thousands of cocoa-palms. The outer edges of the islands are considerably higher than the inner, but nowhere exceed about thirty feet above the mean level of the sea. The lagoon is shallow, almost filled with branching corals and coral sand. The small northern island is about a mile in diameter; a strip of low coral land, almost surrounding a small lagoon, and thickly covered with cocoa-nut trees.

These lonely islands (also called Cocos,) were discovered in 1608-9 by Captain William Keeling, who was in the East India Company's service, and held a commission from King James I.† Little or no notice was taken of them from that

* This plan of the Keeling Islands will be found in the third (Mr. Darwin's) volume.

† Of these facts I was credibly informed, on the authority of the late Captain Horsburgh; and presumptive evidence of their reality is afforded by the following extract from the work of a well-known historian.

Extract from a Summary of Universal History, translated from the French of M. Anquetil, First Edition, page 50. London, 1800—

In the reign of Queen Elizabeth, a Venetian galley, deeply laden,

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time till 1823, when one Alexander Hare, a British subject, established himself and a small party of Malays, upon the

was driven on shore at the Isle of Wight. The sight of the riches it contained excited a desire of attempting to open a trade with Turkey, through which the merchandize of India was transported. The advantages arising from this Turkish trade to the Eastern merchants shewed that it might be rendered still more lucrative if it were carried on by a direct route. In order that no measures of prudence which seemed likely to ensure success to this grand enterprise might be omitted, the queen sent to explore the two routes already opened, that of the Cape of Good Hope, by Captain Stephens, in 1582, and that of the Strait of Magellan, in 1587. From the reports which they made, it was conceived impossible for England to appropriate to itself, by means of single ships, a part of that commerce, to the prejudice of two nations, jealous, and well established; and, that, while it employed all the exertions of industry, it would be necessary also to show a respectable force. These considerations, highly judicious, gave rise to the East India Company, which sent out its first adventure with a capital of £74,000, and four ships equipped from that sum. In 1601 the company was established under the auspices of the state, which granted it a charter of protection for a time limited.

Lancaster, who commanded this squadron, behaved like a private merchant, entered into a treaty of commerce with the King of Achen, and found means to establish a small factory, but not without experiencing some marks of displeasure from the Portuguese. He took on board a considerable quantity of pepper and other spices. His successful return encouraged the company to send out three ships under the command of Henry Middleton. The latter, however, began to assume a higher tone than that of a plain merchant. He found the Dutch and Portuguese engaged in war; not on their own account, as appeared, but as auxiliaries, the one of the King of Ternate, and the other of the King of Tidore. It seemed most advantageous to Middleton at that period to espouse the part of the Portuguese. The Dutch were incensed, and threw impediments in his way, which, however, did not prevent him from returning with a very rich cargo; but the company sent out another squadron under Edward Michael Bourne, who assumed with the Dutch that air of superiority which his force authorized, and threatened open hostilities in case they interrupted the English commerce. To support these threats, William Keeling arrived, in 1608, with a body of regular troops. The Dutch made no resistance, and even applied to the English to defend them against the inhabitants of Banda; but after this service they behaved with duplicity to their benefactors, and fettered their commerce: yet Keeling found means to return with a very rich cargo, and, what is remarkable, without the loss of a single man.

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Southern Keeling Island, which he thought a favourable place for commerce, and for maintaining a seraglio of Malay women, whom he confined to one island,—almost to one house.

In 1826, or within a year of that time, Mr. J. C. Ross, some time master of a merchant ship, took up his abode on the south-eastern islet of the group; and in a very short time Hare's Malay slaves, aggrieved by his harsh treatment of them, especially by his taking away the women, and shutting them up on an island which the Malay men might not approach, deserted in a body, and claimed protection from Mr. Ross. Hare then left the Keelings, and about a year afterwards was arrested in his lawless career by death, while establishing another harem at Batavia.

From that time Mr. Ross and the Malays lived peaceably, collecting cocoa-nut oil, turtle, tortoise-shell, and bicho do mar; and occasionally sailing to the Mauritius, Singapore, or Batavia, to dispose of them, and buy necessaries with their produce. Another Englishman, Mr. C. Leisk, who had served as mate of Mr. Ross's ship, lived with him, and they both had wives (English) and children, the whole party residing together in a large house of Malay build—just such a structure as one sees represented upon old japanned work. At the time of our visit Mr. Ross was absent on one of their trading excursions, and his deputy, Leisk, was left in charge of everything.

By some strange misconception, not intentional act of injustice, Mr. Ross had refused to give Hare's slaves their freedom, for fear that the executors of that man should demand their value from him; but he paid them each two rupees a week, in goods (at his own valuation), provided that they worked for him, both men and women, as he thought proper. Mr. Leisk told me this, and said that "many of the Malays were very discontented, and wanted to leave the island." "No wonder," thought I, "for they are still slaves, and only less ill used than they were by the man who purchased them."

These Malays were allowed to rear poultry, which they sometimes sold to shipping. They were also allowed to have the produce of a certain number of cocoa-nut trees, and might catch fish and turtle for their own use; but the sale of

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turtle to shipping, when they touched there, and the immense crops of cocoa-nuts which are produced annually on all the islets of the group were monopolized by Mr. Ross for his sole advantage. One daily task imposed upon the Malay women was to "husk" a hundred nuts, collected for them by the men, who extract a gallon of oil from every ten.

Another kind of oil, said to be very good, is derived from the fat tail of a large land-crab, which feeds on cocoa-nuts. About a pint and a half may be obtained from one crab. The manner in which these creatures—nearly the size of a large cray-fish—tap the nuts in order to get at their contents is curious. Numbers of windfall nuts, in a comparatively soft state, are always to be found lying about under the trees: a crab seizes one of these, and pegs away at the eyes (each nut has three eyes) with one of its claws, that is long and sharp, purposely, it would seem, until it opens a hole, through which the crab extracts the juice, and some of the solid part.

The manner of ascending tall palm-trees is similar to that described at Otaheite, and requires strength as well as agility: both which are also shown by these Malays in their chases after turtle among the shallows and coral 'thickets' of the lagoon, where they abound. A party of men go in a light boat and look for a fine turtle in some shallow place. Directly one is seen, they give chase in the boat, endeavouring to keep it in a shallow, and tolerably clear place, till it begins to be tired by its exertions to escape; then, watching a favourable moment, a man jumps out of the boat and seizes the turtle. Away it darts, with the man on its back grasping its neck until he can get an opportunity, by touching ground with his feet, to turn it over, and secure his prize. Only the more active men can succeed well in this sort of fishing.

Other unusual things were seen by us at this place, one or two of which I will mention. There are fish that live by feeding upon small branches of the coral, which grows in such profusion in the lagoon. One species of these fish is about two feet and a half long, of a beautiful green colour about the head and tail, with a hump on its head, and a bony kind of mouth,

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almost like that of a turtle, within which are two rows of saw-like teeth.—Mr. Stokes saw a dog, (bred on the island), catch three such fish in the course of a few hours by chasing them in shallow water, springing after them, almost as a kangaroo springs on land. Sometimes one would take shelter under a rock, when the dog would drive it out with his paw, and seize it with his mouth as it bolted.

Among the great variety of corals forming the walls around the immediately visible basement, and the under-water forests of the Keeling islands, there is more difference than between a lily of the valley and a gnarled oak. Some are fragile and delicate, of various colours, and just like vegetables to the eye, others are of a solid description, like petrified tropical plants; but all these grow within the outer reef, and chiefly in the lagoons.*

The wall, or outer reef, about which so much has been said and thought, by able men, without their having arrived at any definite conclusion, is solid and rock-like, with a smooth surface; and where the surf is most violent, there the coral is fullest of animated matter. I was anxious to ascertain if possible, to what depth the living coral extended, but my efforts were almost in vain, on account of a surf always violent, and because the outer wall is so solid that I could not detach pieces from it lower down than five fathoms. Small anchors, hooks, grappling irons, and chains were all tried—and one after another broken by the swell almost as soon as we 'hove a strain' upon them with a 'purchase' in our largest boats. Judging however, from impressions made upon a large lead, the end of which was widened, and covered with tallow hardened with lime, and from such small fragments as we could raise, I concluded that the coral was not alive at a depth exceeding seven fathoms below low water. But this subject has been, or will be, fully discussed by Mr. Darwin, therefore I need say no more.

* One kind of coral, while alive, stings human flesh painfully when touched by it. Another kind is so hard that it gives sparks when struck by steel.

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As if in speaking of these singular, though so small islands, —where crabs eat cocoa-nuts, fish eat coral, dogs catch fish, men ride on turtle, and shells are dangerous man-traps,*— any thing more were necessary to ensure the voyager's being treated like the old woman's son who talked to her about flying-fish,—it must yet be said that the greater part of the sea-fowl roost on branches, and that many rats make their nests at the top of high palm-trees.

Except sea-fowl and the domestic creatures† which have accompanied man to the Keelings, there is no bird or animal; but a kind of land-rail, which is numerous. Besides the palm there are upon the largest islets other trees, particularly a kind of teak, and some less valuable wood, from which a vessel was built.

Fresh water is not scarce on the larger islets of the group, but it is only to be got by digging wells in the coral foundation, covered as it is by vegetation. In these wells, about six feet deep, the water rises and falls as the tide of the ocean flows and ebbs; which I believe to be the case at most other coral islands where there is fresh water. It appears that the fresh water of heavy rains is held in the loose soil, (a mixture of coral, sand, and decayed vegetable substances,) and does not mix with the salt water which surrounds it, except at the edges of the land. The flowing tide pushes on every side, the mixed soil being very porous, and causes the fresh water to rise: when the tide falls the fresh water sinks also. A sponge full of fresh water placed gently in a basin of salt water, will not part with its contents for a length of time if left untouched. The water in the middle of the sponge will be found untainted by salt for many days; perhaps much longer, if tried.

A word about the inhabitants, and I leave the Keelings. No material difference was detected by me between the Malays on these islands, and the natives of Otaheite or New Zealand. I do not mean to assert that there were not numbers of men

* Chama gigantea. There is a large one in the United Service Museum.

† Rats and mice included; which swarm on those islands.

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at each of those islands to whom I could not trace resemblances (setting individual features aside,) at the Keelings; I merely say that there was not one individual among the two hundred Malays I saw there whom I could have distinguished from a Polynesian Islander, had I seen him in the Pacific.

Two boys attracted my notice particularly, because their colour was of a brighter red* than that of any South American or Polynesian whom I had seen, and upon enquiry I found that these two boys were sons of Alexander Hare and a Malay woman.

Excepting the two English families I have mentioned, all on the Keelings in 1836, were Mahometans. One of their number officiated as priest; but exclusive of an extreme dislike to pigs, they showed little outward attention to his injunctions. As no Christian minister had ever visited the place, and there was no immediate prospect of one coming there, I was asked to baptize the children of Mrs. Leisk. So unusual a demand occasioned some scruples on my part, but at last I complied, and performed the appointed service in Mr. Ross's house; where six children of various ages were christened in succession. This and other facts I have mentioned respecting these sequestered islands shew the necessity that exists for some inspecting influence being exercised at every place where British subjects are settled. A visit from a man of war, even once only in a year, is sufficient (merely in prospect) to keep bad characters in tolerable check, and would make known at head quarters the more urgent wants of the settlers.

In observing the sun's meridian altitude at this place, the sextants were used, which I have adverted to before (p. 396), and the latitude deduced from their results only differed two or three seconds from that obtained by stars, without using the additional glass: I forgot to say, in speaking of the Galapagos, how useful those instruments were there; enabling us to measure the sun's meridian altitude in an artificial horizon when nearly eighty degrees high. I would not say this in favour of

* Brighter by comparison; their colour was that of copper in its very reddest state—without any tinge of yellow.

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my own invention, if I did not feel certain that seamen will find it useful, and that somebody ought to tell them of it, for their own sake. (These sextants were made by Worthington.)

I was informed by the residents that between October and April, they are occasionally visited by severe gales of wind, at times almost hurricanes, so strong as to root up trees, strip the leaves off others, and unroof or blow down houses. These storms begin between south-east and south, and when they abate draw towards the west (by the south) there ending. For those who take interest in the course of storms I subjoin extracts from Mr. Ross's Journal given to me by Leisk.* Earthquakes have been felt several times, I was told by Mr. Leisk, but I could get only one extract from the Journal which mentioned a shock.†

On the 12th we sailed, carrying a good sea-stock of cocoanuts, pigs, poultry, pumpkins, and turtle. Maize and sugarcane might have been had, if wanted. We first went round the northern Keeling:—on this island, about a mile across and but a few feet above the ocean, two English vessels have been lost since 1825, and probably other ships met a similar fate

* "April 4th, 1835. Wind south, blowing very hard all day, with a hard cloudy sky. 5th. Blowing heavily from the same point; with rain. 6th. Wind S.E. still blowing heavily, with rain. 7th. Wind increasing, at midnight the tops of many trees blown off; trees falling, and roofs of houses suffering, wind still S.E. At two A.M. on the 8th wind south; several houses laid flat; excessive thunder and lightning, with torrents of rain. About three A.M. the storm abating, and drawing to the west; at four, moderate west wind. 9th. N.W. light breeze, clear weather; went with a party (Mr. Ross, Leisk, &c.) to South-East Bay (inside South-East Island), found the bay strewed with dead fish of all sorts and sizes, which we supposed to have been killed by the fresh water. Numbers of trees blown down every where, and the earth cut through in many places by the runs of rain-water." On the 26th of November 1835, a south-east gale increased almost to a hurricane, causing similar effects, though less in number, because it lasted only two hours, and then ended by shifting to the westward, and moderating.

† That notice says, "May 25, 1830, weather calm and sultry, light N.E. breeze: about 1·30 A.M. an earthquake, of a rocking description, was felt. It continued about three minutes, and made our wooden house reel and strain considerably."

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there in earlier years, when its existence was hardly known. We found the current setting towards the north-west, as I had been led to expect; but, from what I could observe, during our stay, as well as from oral information, I am led to believe that the current only sets strongly during about the last half of the flood tide, and the first half of the ebb; and that during the other six hours there is little or no current; as is the case off Cape Horn, and in many other places.*

Our passage to the Mauritius was slow, but in smooth water. Tropic birds, a few terns, and gannets were seen, at intervals, when passing the neighbourhood of the Chagos Islands, and at our approach to the island Rodriguez. We anchored in Port Louis, at the Mauritius, on the 29th of April: sailed thence on the 9th of May: passed near Madagascar—thence along the African shore—and anchored in Simon's Bay, at the Cape of Good Hope, on the 31st. From that well-known place we went to St. Helena, Ascension, Bahia, Pernambuco, the Cape Verde Islands, and the Azores; and anchored at Falmouth, on the 2d of October, after an absence of four years and nine months from England.

From Falmouth we went to Plymouth; and thence, calling at Portsmouth, to the Thames. On the 28th our anchor was let go at Greenwich; and, after the chronometer rates were ascertained, the Beagle dropped down to Woolwich, where she was paid off on the 17th of November.

Greenwich was the last station at which observations were made; and, singularly enough, Mr. Usborne and his companions came on board as we anchored there. Independent of the gratification of meeting them again, after so wide a separation, it may be supposed how my mind was relieved by his safe return from a very successful expedition, in which he had surveyed the whole coast of Peru, from Atacama to Guayaquil, without loss or accident. Although his own life was seriously risked on two or three occasions, by shots fired under misapprehension; I must not omit to mention that hostilities

* Varying from three parts, to one-quarter of a tide difference between the time of low water and the beginning of flood stream.

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were suspended for a whole day, at Arica, between the land-forces and an attacking squadron, in order that Mr. Usborne might carry on his operations. Throughout the survey of the Peruvian coast, the cordial assistance of Mr. Wilson, Chargé d'affaires at Lima, was found to be of paramount consequence.

I would now speak of the steady support and unvarying help which I received from the officers of the Beagle: but where all did so much, and all contributed so materially to the gatherings of the voyage, it is unnecessary to particularise, farther than by saying that Mr. Stokes's services hold the first place in my own estimation.

In this long voyage, rather exceeding that of Vancouver, fatal disease was unknown, except in the lamented case of the purser, and in that mentioned at Rio de Janeiro; neither of which had the least reference to the particular service on which the Beagle was employed: and it is perhaps remarkable, that while the Beagle was in commission, between February 1829 and November 1836, no serious illness, brought on or contracted while on service, happened on board; neither did any accident of consequence occur in the ship; nor did any man ever fall overboard during all that time.

The freedom from illness must be attributed, under Providence, to active employment, good clothing, and wholesome food,* in healthy, though sometimes disagreeable climates: and our immunity from accident† during exposure to a variety of risks, especially in boats, I attribute, referring to visible causes, to the care, attention, and vigilance of the excellent officers whose able assistance was not valued by me more than their sincere friendship.

* See Appendix, No. 48.

† Excepting that mentioned in vol. i. p. 445.

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CHAPTER XXVII.

REMARKS ON THE EARLY MIGRATIONS OF THE HUMAN RACE.

HAVING ended my narrative of the Beagle's voyage, I might lay down the pen: but there are some reflections, arising out of circumstances witnessed by myself, and enquiries since made respecting them, that I feel anxious to lay before those who take interest in such subjects; and who will detect fallacies which I, in a purblind search after truth, may have overlooked.

A few of these reflections bear on the origin and migration of the human race: and, deeply feeling the difficulty of the subject, as well as my comparative ignorance and inability, I would beg that my remarks may be viewed solely as those of a sailor who writes for the younger members of his profession —not as the scheme of a theorist.

Before mentioning the particular facts which have fallen under my own observation, and made most impression on me, in connexion with this subject, it may be well to defend myself from any imputation of indulging hastily formed or capricious ideas, by saying that from boyhood I have always taken interest in observing the various countenances, heads, shapes, sizes, colours, and other peculiarities of the human race; especially of those varieties in which education has not masked the mind, by teaching man to restrain or conceal his emotions. The result of this attention to outward tokens, occasionally retained more distinctly in my recollection by sketches, has been a conviction that external form, especially of the head and features, is exceedingly dependent upon mind; and that as the human being is more or less educated, accustomed to better or worse

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habits, more or less obliged to think and act for himself; so will his external appearance vary for better or worse, and become, in a great degree, the index of his mental quality. This power of mind over matter exists in each individual, who besides may receive from his parents, outward peculiarities, and general inclinations, but in a modified degree: since the child partakes of the nature of both father and mother, (perhaps even, slightly, of that of a foster mother, if one is employed). That such hereditary peculiarities are not to be quickly or easily altered, every one will admit; but that they may be gradually changed, and in a few generations altogether obliterated, by pains being taken with successive children, many facts have been published which seem to prove incontrovertibly. This ought to give great encouragement to the exertions of parents in educating their children,* since exterior expression, if not feature, as well as the infinitely more important result, actual character, may depend so much upon training the mind aright. Supposing this to be the case, it is not surprising to find savages so very different from civilized men in outward feature, as well as in mind; or to see them, where civilization has not been known, precisely in the same condition now, as that in which we learn they were several centuries ago.

Some years since I read a long article in the "Dictionnaire Classique" under the head of "Homme," which described a great many distinct races of men—at least thirteen: and at the same time I saw a map which professed to show the geographical distribution of those several distinct races. Almost the first spot which my eye rested on was Tierra del Fuego, coloured black, to indicate that its inhabitants were black; and upon reference to the "Dictionnaire Classique" I found

* Not in overburthening their tender minds with the contents of books, or over exciting them with a whirl of ideas calculated to rouse even the listless spoiled child of fortune from his apathetic indifference—but in a wholesome mixture of general education, bodily as well as mental, adapted to their years, and calculated to prepare them, in their respective stations, for doing their duty happily to their Maker, and to their fellow-men.

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that the Fuegians were there described as being black, like the natives of Van Diemen's Land. This mistake, so extraordinary considering the numerous voyagers who have seen the natives of Tierra del Fuego during the last three hundred years, stimulated me to inquire further into the data upon which that division of the human family into separate 'races' was founded. The more I have sought, the more evidence has appeared to demonstrate the erroneous nature of such a view; and the probability, nay certainty, that all men are of one blood.

In the course of years spent in various quarters of the world, I have had opportunities of leisurely considering people from all the principal countries. I have read much of what has been written, during late years, on the subject of their resemblance, or difference; and the conclusion to which I have been obliged to come is—that there is far less difference between most nations, or tribes (selecting any two for the comparison), than exists between two individuals who might be chosen out of either one of those nations or tribes; colour and hair alone excepted.

In the city of Lima there are now at least twenty-three distinct varieties of the human race, which are not only recognised and well known in that capital, but have been carefully enumerated and described by Stevenson, in the following table. All these varieties have arisen from the intermarriages of three, the Spaniard, the aboriginal Peruvian, and the negro: and among their descendants almost any coloured skin, or kind of hair, may be matched. It may be observed that although negro and white produce the zambo, which is a dark copper; and although it may be inferred from the table that zambo and some lighter variety would produce a lighter shade of copper-colour —there is still the long black hair, and scarcity of beard, observed in most American aborigines, to be accounted for. This peculiarity, however, may be derived from white and negro: and I think it would not be difficult to show that every variety of hair and colour might be produced from these two originals only.

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CASTES arising from the mixture of European, Indian, and Negro.

Father.	Mother.	Child.	Colour, &c.
European	European	Creole	White.
Creole	Creole	Creole	White.
White	Indian	Mestiso	$\frac{6}{8}$ white, $\frac{2}{8}$ Indian, fair.
Indian	White	Mestiso	$\frac{4}{8}$ white, $\frac{4}{8}$ Indian.
White	Mestiso	Creole	White, often very fair.
Mestiso	White	Creole	White, rather sallow.
Mestiso	Mestiso	Creole	Sallow, often light hair.
White	Negro	Mulatto	$\frac{7}{8}$ white, $\frac{1}{8}$ negro, often fair.
Negro	White	Zambo	$\frac{4}{8}$ white, $\frac{4}{8}$ negro, dark copper.
White	Mulatto	Quarteron	$\frac{6}{8}$ white, $\frac{2}{8}$ negro, fair.
Mulatto	White	Mulatto	$\frac{5}{8}$ white, $\frac{3}{8}$ negro, tawny.
White	Quarteron	Quinteron	$\frac{7}{8}$ white, $\frac{1}{8}$ negro, very fair.
Quarteron	White	Quarteron	$\frac{6}{8}$ white, $\frac{2}{8}$ negro, tawny.
White	Quinteron	Creole	White, light eyes, fair hair.
Negro	Indian	Chino	$\frac{4}{8}$ negro, $\frac{4}{8}$ Indian, dark.
Indian	Negro	Chino	$\frac{2}{8}$ negro, $\frac{6}{8}$ Indian.
Negro	Mulatto	Zambo	$\frac{5}{8}$ negro, $\frac{3}{8}$ white.
Mulatto	Negro	Zambo	$\frac{5}{8}$ negro, $\frac{4}{8}$ white.
Negro	Zambo	Zambo	$\frac{15}{16}$ negro, $\frac{1}{16}$ white.
Zambo	Negro	Zambo	$\frac{7}{8}$ negro, $\frac{1}{8}$ white.
Negro	Chino	Zambo Chino	$\frac{15}{16}$ negro, $\frac{1}{16}$ Indian.
Chino	Negro	Zambo Chino	$\frac{7}{8}$ negro, $\frac{1}{8}$ Indian.
Negro	Negro	Negro	Black.

Colours are classed according to appearances: a child receives more of the colour of the father than of the mother.*

* Stevenson's South America, vol i. p. 286.

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That colour is not alone dependant upon, or caused by climate, however much it may be altered by exposure to sun and wind, or by seclusion, no person can doubt who has at all attended to the subject, and read the opinions of men who have made it their study: but that its various hues may be derived from intermarriage, without any change of climate, this table goes far to prove.*

Having seen how all the varieties of colour may be produced from white, red, and black, we pause, because at fault, and so we should remain, did we rely on our own unassisted reason. But, turning to the Bible, we find in the history of those by whom the earth was peopled, after the flood, a curse pronounced on Ham and his descendants; and it is curious that the name Ham should mean "heat—brown—scorched," while that of Cush his son, means "black:" that Japheth should imply "handsome," and that Shem, from whose line our Saviour was descended, should mean "name—renown—he who is put or placed." I cannot myself read this explanation of Cush, and the denunciation "Cursed be Canaan—a servant of servants shall he be unto his brethren," without believing that Cush was a negro, and that from the intermarriages of his descendants with those of Shem and Japheth, came hosts of mulatto, copper, or dark-coloured men who peopled a great part of Asia, Polynesia, America, parts of Africa, and part of Australia. According to this view the black descendants of Cush overspread part of Africa, Australia, and Van Diemen's Land, New Guinea, and portions of other islands: while white families, children of Japheth and Shem, spread over Asia Minor, the Caucasian district, great part of Northern Asia, and the whole of Europe.

We read, in another place, that Abraham gave gifts to the sons of his concubines, and sent them away eastward from Canaan, unto the east country: many years before this separation, Ishmael, the son of Hagar, an Egyptian slave belonging to Abraham, was established in the country next to the

* It did not, however, satisfy me as to the production of a bright red copper colour; but of that I afterwards saw an excellent example at the Keeling Islands. See page 636.

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eastward of Canaan; and as his descendants were "not to be numbered for multitude," it follows that those of some of the sons above mentioned must have migrated to a great distance.* It is likely that some of Abraham's bond-women were either black or mulatto, being descendants of Ham; perhaps of Cush: and it is hardly possible that Hagar should not have been dark, even black, considering her parentage;† in which case Ishmael would have been copper-coloured, or mulatto,‡ and some, if not all of Abraham's sons by concubines, would have been of those colours. If this be assuming too much, there can be no doubt that in the next generation Esau, or Edom, was a red man, and that his descendants, the numerous Edomites, or Idumeans, were also red: now as Esau married the daughter of Ishmael, we have, in this case, distinct evidence of the origin of a race of red, or copper-coloured men. Had the common colour of the human race been at that time red, Esau's colour would not have been remarked: had it been black, Cush would have been no distinctive appellation. It must then have been originally fair, as no colours are mentioned in the Scripture, with reference to the human race, except fair, red, and black.

A rapid increase of flocks and herds, as well as population; a consequent diminution of vegetable food; jealousies and disputes between the children of bond-women and those of the free, and the comparative indifference of fathers to the offspring of their slaves, must have stimulated migration in every direction; and, when once begun, no doubt the love of novelty, and desire of finding countries still better than those yet explored, increased, and eventually perpetuated that passion for wandering which we see to this day in the Arab, the migratory Malay, the roving Tartar, and the ever-restless South American Indian.

* See Genesis, Chap. xiii. for evidence of the necessity there was to emigrate in those early times. † Herodotus, lib. ii.

‡ The Arabs, next to the Jews the most marked people on earth, who have preserved their genealogies in an unbroken line, assert that they are descended from Ishmael; their colour is the same as that of the Malays, the Polynesian islanders, and the Americans.

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Climate, habits, and food operate to cause a considerable change in the form and size, though their permanent effect on the colour of the human race is slight. The effect of climate, considered alone, may be seen in the descendants of English families settled in some parts of North America, in Australia, or Van Diemen's Land; countries where neither habits nor food differ much from those of England. We see there that our sturdy thick-set labourer's son becomes a tall lathy youth, though perhaps none of his family while in England exceeded the middle height: and not only does the form alter, but the gait and voice acquire peculiarities which mark the American born, the Australian, or the Tasmanian. Exposure to cold, wet, and wind, together with but little walking exercise, shortens the legs, and increases the stoutness of body, as may be seen in the Fuegian, the Esquimaux, and the Laplander, —in fishermen, sailors, coachmen, and others; but, activity on foot, warmth, and a fine climate, have contrary effects, which may be shown by the youth above mentioned, by the African Negro, by the Indian, by the South Sea Islander, and others. Habits require little notice, for we can hardly look around us without seeing many instances of faculties or forms altered in one way or other, by exercise or the want of it, or by certain customs: porters, smiths, dancers, grooms, jockeys, are remarkable instances. That food is a material agent in affecting the human form I think no one can doubt; and when all three combine to cause alterations, how considerable must be the change effected. That colour may be altered a little by seclusion and particular diet, or by exposure to wind and sun, need not be remarked, except for the purpose of adding that a change so caused is not permanent, or transmitted to children, like peculiarity of form. The Otaheitans used to shut themselves up for a month at a time, and eat only particular food, in order to become fairer; yet their descendants are as dark at this day as their fathers were when Wallis first discovered them in 1786.

I will now endeavour to point out those lines of communication across the oceans which appear to me, as a seaman, the

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most likely to have been followed by the earliest wanderers. Of overland routes I say nothing, because where land extends, in the vicinity of water, there is no obstacle sufficient to prevent the migration of animals, as well as men; neither need I notice intervals of sea which can easily be crossed.

Wandering eastward, from Asia Minor, roving tribes may have begun to people Eastern Asia and the Indian Archipelago, while other parties were exploring Africa; and while the sons of Japhet were advancing northward, and towards the west. A slight acquaintance with ancient history informs us at how early a period extensive commerce was carried on by ships,—to Britain in the west, and to the Indian Archipelago in the east; before which time it is obvious that those extreme regions must have been tolerably well peopled: but it is not possible that they could have been so without the employment of ships, boats, canoes, or rafts. The earliest explorers of unknown lands must have been naturally enterprising, and habitually disposed to wander. Children brought up under such instructors as their migratory parents, always eager to seek for new countries, would increase their roving inclinations; and as long as another region could be found, doubtless they would try to explore it, partly from a ruling passion and habit, partly for the sake of procuring food with greater ease, and partly in consequence of feuds among themselves, which, in such a state of society, must end in the defeat and expulsion, if not subjugation or destruction of the weaker party. Add to these motives, those which I mentioned in a previous page, consequent upon intermarriage between various castes or colours, the desire of independence, or the love of wealth,* and more than enough reasons appear to account for the early dispersion of the human race, provided they possessed the means of migration.

That in the early ages large trees were more abundant near the water side in many countries than they now are, appears indisputable; but even as we see them in many uncivilized though inhabited countries, how numerous are huge trunks, out

* Real wealth—not money, its symbol and equivalent now.

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of which canoes might be formed, with fire, with stones, and with shells. Considering the abundance of trees once standing in places, perhaps easy of access, whence the hand of man may have long since cleared them away, and the quantity of animal,* as well as vegetable food which may have abounded where then there had been no arch-destroyer, — how easy, comparatively speaking, may it have been, in those early ages, to fell, hollow out, and launch great trunks of trees, which, secured two and two, and covered over, would form excellent vessels. Like the double canoes of modern Polynesians, they might have carried a platform, above the reach of common waves, on which families and their provisions could voyage in security. Neither refined art nor any tool would have been required in the construction : with fire to hollow and to divide, stones, shells, and bones would have sufficed for so simple a work, and thus enabled the least informed savages to make seaworthy and even burthensome vessels.

Unlike some modern canoes, however, these primitive vessels would have been capable of sailing only before the wind, or nearly so, and would therefore have been almost at the disposal of every breeze, when once at sea. Hence, in attempting to follow their course, we must attentively consider prevailing winds, and by no means omit to regard currents, of which the first sailors could have known nothing, and which must have caused the mis-direction, if not loss, of many early adventurers.

In alluding to easily constructed rafts, and double canoes, I do not for an instant dream of excluding better vessels, which no doubt, were soon constructed after men began to roam by sea ;† but I wish to show, so far as I am able, how readily means of transport were accessible to the first wanderers.

* For proofs of the extraordinarily rapid manner in which animals multiply when comparatively unmolested by man, we need only turn to South America.

† The Piragua now used at Chilóe, and by the savages of the Chonos Archipelago, exactly resembles in every minute detail the Maseulah boat of Madras. Its ' sacho,' or wooden anchor with a stone in the middle, is precisely like that used in Chinese and Japanese Junks: but doubtless these coincidences may be accidental.

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I must pause for a moment to explain why I consider these explorers as savages, although they were spoken of before as descendants of Abraham and his countrymen, who were civilized. Let us suppose, for illustration, that a party of men and women left Asia Minor in a civilized state. Before they had wandered far, no writing materials or clothes would have remained (had they even possessed them), and their children would have been taught only to provide for daily wants, food, and perhaps some substitute for clothes, such as skins. Their grand-children would have been in a still worse condition as to information or traces of civilization, and each succeeding generation would have fallen lower in the scale, until they became savages in the fullest sense of the word; from which degraded condition they would not rise a step by their own exertions; so long as they received no assistance, no glimmerings of intelligence, from others who had branched off from the main trunk at a much later period, and had means of preserving more knowledge. The degree of degradation would depend upon climate, disposition, description and quantity of food, recollection of origin and traditions, keeping up old observances, and intercourse with other families, tribes, or nations, among whom more traces of their common origin and descent might have been preserved. Were a dozen men and women now cast away upon unknown land—supposing that not one of the party could read or write—that there was no substance with which they could clothe themselves except the skins of animals—that the climate was variable—that they had neither tools nor arms—that the extent of habitable land admitted of their wandering—that it had no other human inhabitants, and that it should be visited by none for the space of some hundred years after the arrival of this party,—in what state would their descendants be found by the next adventurers who might land on the shores of that country?

India, China, Mexico, Peru, regions separated from the central seat of population, but advanced in civilization at the earliest period of their history with which we are acquainted, preserve traditional accounts of superior men who arrived

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there, and first began to improve the condition of their people, but we are not told whence those men came. No one, however, can read about those countries, as well as Tartary, Japan, and Polynesia, without being struck by the traces of Hebrew ceremonies and rites, by the evidences of the worship of Baal, or by remains of Arkite observances, scattered through the more populous, if not through all the nations upon earth.

That man could have been first created in an infant, or a savage state, appears to my apprehension impossible; (for a moment taking a view of the case, unaided by Scripture;) because—if an infant—who nursed, who fed, who protected him till able to subsist alone? and, if a savage, he would have been utterly helpless. Destitute of the instinct possessed by brutes,—with organs inexperienced (however perfect), and with a mind absolutely vacant; neither his eye, his ear, his hand, nor his foot would have been available, and after a few hours of apathetic existence he must have perished. The only idea I can reconcile to reason is that man was created perfect in body, perfect in mind, and knowing by inspiration enough for the part he had to perform;—such a being it would be worse than folly to call savage.

Have we a shadow of ground for thinking that wild animals or plants have improved since their creation? Can any reasonable man believe that the first of a race, species, or kind, was the most inferior? Then how for a moment could false philosophers, and those who have been led away by their writings, imagine that there were separate beginnings of savage races, at different times, and in different places? Yet I may answer this question myself; for until I had thought much on the subject, and had seen nearly every variety of the human race, I had no reason to give in opposition to doubts excited by such sceptical works, except a conviction that the Bible was true, that in all ages men had erred, and that sooner or later the truth of every statement contained in that record would be proved.

To return to the lines and means of communication:—

Following the various routes of population into the Indian

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Archipelago, to Japan, to Kamschatka, and to Australia, we are stopped by the vast Pacific—except at one point, Kamschatka, and there, by the Aleutian isles, is an easy road to America. Now it is not probable that intercourse should have been begun by water, between various points on those extensive shores, (reaching from 60°, N. lat., to 40°, S. lat.), without numerous accidents happening, such as vessels, boats, canoes, or rafts being carried out of sight of land by storms; when, ignorant how to steer as their crews must have been, they were driven before the wind till they reached some unknown land, or were engulfed in ocean.

Many such vessels, out of the numbers which must have been tempest-tost among currents and dangers of every kind incident to navigation, may have failed in finding land before their store of provision was consumed, and their crews reduced to the horrible necessity of feeding upon human flesh. When once the natural antipathy to cannibalism was overcome, recurrence to similar food would have been less revolting on other occasions; especially if, excited by rage or animosity, and deprived of animal food, men had accustomed themselves to anticipate satisfying their hunger by the flesh of a miserable slave, or even of a late friend whom accident had estranged and turned into a blood-thirsty enemy.

Looking over a modern chart of the Pacific we see a multitude of islands scattered, like stars over the sky, from the Indian archipelago to Salas y Gomez;* whence to Mas-a-fuera, on the South American coast, the distance is not fourteen hundred miles; and to the main land itself, about eighteen hundred. It is possible that other islands may have existed, but we now find a comparatively short distance between Easter Island and South America; besides favouring circumstances of wind and weather which lead me to believe that a line of population went in that direction. It is not impossible that vessels should have crossed from New Zealand to South America, running always before the fresh westerly winds so prevalent southward of 38°; neither is it at all unlikely, on the

* Near Easter Island.

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contrary it is highly probable, that Chinese or Japanese Junks were driven to the Sandwich Islands; perhaps across to the North American coast.

Between the tropics in the Pacific an easterly trade wind is found during more than half the year; but it is not generally known (except by readers of voyages) that from November to March there is much west wind, rain, and occasional tempest, between the vicinity of the equator, and about fifteen degrees south. This westerly monsoon, for such in fact it is, sometimes is steadily regular, and at others interrupted by calms, storms,* or heavy rains. The eastern limit to which it usually reaches is about 110° W. long., but there is reason to suppose, that it extends at times, irregularly, to the Galapagos Islands, if not to the adjacent continent, when Guayaquil is suffering from heavy torrents of rain. While the sun is far south, this westerly monsoon extends to the tropic of Capricorn, between the meridians of 150° E. and 120° W. longitude. At other times of the year the tropical regions of the Pacific are refreshed by pleasant easterly winds, varying in moderate strength, and in their direction from the northward or southward of east.

Beyond the region of tropical or trade winds, an almost continual succession of westerly winds is found to prevail. In those middle latitudes easterly winds sometimes blow; but their amount is not more than one-fifth that of the west winds, throughout the year.

In the Southern Atlantic and Southern Indian ocean similar winds prevail, between the parallels of 30° and 60°. Instances in profusion may be found in narratives of voyages, where very small vessels, boats, or canoes, have made long passages across an open ocean, or have passed months in ignorance of their geographical situation, enduring the most dreadful privations. In the event of a float, whether raft, canoe, or rudely constructed vessel, being carried out of sight

* During these storms, which begin very suddenly, not only vessels are driven out of their course, but birds, insects, and seeds are carried to great distances.

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of land by current or wind, or by both, and taken into a steady trade, or lasting westerly wind, it would be impossible for her to struggle against it for many days; she must eventually run before it as the last expedient, with the hope, often forlorn, of falling in with some land to leeward.

When we reflect on the tedious coasting voyages undertaken formerly, even in historical times; and on the quantities of provision embarked for those long passages; may we not infer that the earliest explorers would take as much food with them as their rafts or vessels could carry; and therefore, that if driven out to sea, they were capable, in some instances at least, of holding out for a considerable length of time without having recourse to the last alternative.

If a vessel were drifted from Easter Island* by a north-west wind (occasional in July, August, or September,) she would be carried towards the coast of Chile; she might be drifted directly there, or she might be driven eastward for a time, and then, in consequence of wind changing, drifted towards the north; so that it would be uncertain whether Chile, Peru, the Galapagos Islands, Mexico, or the wide ocean would receive the lost wanderers. It is also possible that a vessel may have been driven to South America from the neighbourhood of New Zealand; but this does not appear nearly so probable as the former conjecture. That the Araucanians about Valdivia originally arrived in that country by water, from the west, is I think indicated by what is stated in page 400 of this volume.

But while man was thus spreading eastward across the Pacific, are we to suppose that no vessel was ever blown off the coast of Africa, or that of Spain, and drifted by easterly winds across the Atlantic? How easy is the voyage, before a steady trade wind, from the Canary or Cape Verde Islands to the West Indies or Brazil; from the west coast of Africa to the

* At Easter Island in 1722, Roggewein found idolaters and fire-worshippers, and he says that one of the chief idols was called Dago. In 1774, people differently disposed, were found there by Cook; the idols still remained, but no traces were observed of fire-worship.

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east coast of America. Tradition in Brazil says that such arrivals took place there, and certainly there is a resemblance in some points between the Patagonians and what history states of the Guanches.

Let us now turn to the Negro population, descendants of Cush. Spreading to the south and west, they may have overrun extensive regions in Africa, but by no means to the exclusion of the mixed varieties of men, who also explored and colonized that continent, chiefly towards the northern and central regions. From the coast opposite Madagascar a party of negroes might have embarked to cross the Mosambique Channel, or they might have been driven off by a storm while coasting along near Algoa Bay, in which cases the current, always setting south-westward along that coast, would have hurried them into the region of strong westerly winds, by which they must have been carried, if their vessel and provisions held out, to the coast of New Holland, or to Van Diemen's Land. Now it is worth notice that the men of the south-western quarter of Australia are exceedingly like some of those who frequent the countries near Algoa Bay—and that the native dances and superstitions are very similar; while the aborigines of Van Diemen's Land, though of like colour, are shorter, stouter, and have coarser features; differences which might be expected to result from living in a wetter, windier, and colder climate. That other negroes arrived on the northern shores of Australia, brought there as slaves by red men, or making their escape from Asiatic masters, is probable: and from one or other source, if not from each, the black men in Australia and Van Diemen's Land may have been derived. That red men must have landed in Australia, we now know by the notices of late travellers, and their presence accounts for the colour observable in many of the so-called blacks, whose actual hue, when washed, is a deep brown—next to black, certainly, but with a perceptible red tinge. They are nearly the variety which would be produced by the intermarriage of a Negro and a Chino (see table, page 643,) called Zambo-chino in Lima: but there are gradations of colour, as might be expected, and va-

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rieties of hair; some being more or less woolly, others frizzled, almost like that of a mulatto.*

The occasional peculiarities of outward form, on which so much stress has been laid, to the prejudice of the Hottentots especially, are considered by able anatomists whom I have consulted to be of no more real consequence than that existing in a six-fingered family. On their authority it may be shown that such occasional deviations from ordinary conformation, which are sometimes continued in particular families, and therefore might be found in a whole tribe who were originally but one family, in no degree constitute distinct species. From them we learn also that all varieties of the human race are alike in their anatomical structure, and that intermarriage between any two varieties whatever is productive of a prolific offspring.

Considerable stress has been laid on language as a means of tracing affinities or descents; but with great deference for the

* Of the natives of Van Diemen's Land Cook remarks that their hair differed in texture from that of the natives of New South Wales, being in Adventure Bay as woolly as that of any native of Guinea, while that of the aborigines of New South Wales was naturally long and black, though cropped short.—Cook's Voyage, 1769-71.

Bligh says that the aborigines of Van Diemen's Land are black, and that their hair, "which resembled the wool of the Caffres," was separated into shreds, and powdered with red ochre. They were generally slender, tolerably well made, kept their shoulders back, and upon their prominent chests several had marks raised in the skin.—Bligh's Voyage—Adventure Bay, 1788-1792.

Flinders saw only one native of this country, but his appearance much resembled that of the inhabitants of New South Wales. He had also marks raised upon the skin, and his face was blackened, and hair ruddled, as is sometimes practised by them. The hair was either cropped close, or naturally short, but it had not the appearance of being woolly.

In Marion's voyage a skirmish with the natives of Van Diemen's Land took place, after relating which, the writer says, "on entering among the trees they found a dying savage. This man was a little more than five feet seven inches in height, (French measure). His breast was marked like those of the Mosambique Caffres, and his skin appeared as black; but, on washing off the soot and dirt, his natural colour appeared to have a reddish tinge."

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learned men who have devoted so much time to following its intricate traces, I would ask whether, when a language was not written, or in any manner fixed, it was not liable to vary continually as fresh separations of families into tribes occurred; and whether therefore it is possible to do more than classify unwritten languages, following some few traces of resemblance which may occasionally be marked, and detecting the root, though not the branch? In such an interesting pursuit, however, every sign, even the faintest, is valuable;—but only men of deep research and extensive learning can advantageously pursue this method of inquiry into the migrations and early history of our race.

I believe it will be found that the remarks I have ventured to make in the preceding pages, are by no means at variance with most of their deductions; and I much regret that our opportunities of collecting words, and modes of expression, were not such as to enable me to add many to their collections.

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CHAPTER XXVIII.

A VERY FEW REMARKS WITH REFERENCE TO THE DELUGE.

To account for offering a few remarks on a subject so important and difficult as that of the Deluge, I beg to say that reflections, arising out of facts witnessed during the Beagle's voyage, have occasioned them; and, as results of that expedition, it has appeared to me that they are neither irrelevant to the narrative, nor likely to be altogether uninteresting to young men in the navy.

I suffered much anxiety in former years from a disposition to doubt, if not disbelieve, the inspired History written by Moses. I knew so little of that record, or of the intimate manner in which the Old Testament is connected with the New, that I fancied some events there related might be mythological or fabulous, while I sincerely believed the truth of others; a wavering between opinions, which could only be productive of an unsettled, and therefore unhappy, state of mind. Some young men, I am well aware, are in a similar condition, while many others are content to set aside all reflection, and do as the world does; or rather, as those do among whom they generally live. Natural affection and respect for good parents, relations, and elders, never can lead a young man astray; but there is, perhaps, no guide more fallible or dangerous than the common custom of those inexperienced persons who associate together, chiefly for lack of fixed occupation; and whose principal object is to drive away self-examination, or prolonged thought, by a continual succession of idle amusement, or vivid excitement.

Wholesome and necessary as amusement and recreation are, both for mind and body, every one knows how insipid, even painful their excess becomes; and external evidence shows but

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too plainly where the happiness, the blessings, and the comfort men might enjoy, have by themselves been slighted, or destroyed, from forgetting the line between using, and abusing; and by turning a deaf ear to the reflection that they are but 'tenants at will.'

Much of my own uneasiness was caused by reading works written by men of Voltaire's school; and by those of geologists who contradict, by implication, if not in plain terms, the authenticity of the Scriptures; before I had any acquaintance with the volume which they so incautiously impugn. For geology, as a useful branch of science,* I have as high a respect as for any other young branch of the tree of knowledge, which has yet to undergo the trial of experience; and no doubt exists in my own breast that every such additional branch, if proved by time to be sound and healthy, will contribute its share of nourishment and vigour to the tree which sprung from an immortal root. For men who, like myself formerly, are willingly ignorant of the Bible, and doubt its divine inspiration, I can only have one feeling—sincere sorrow.

Few have time, as well as inclination, to go far into both sides of any question; but truth can hardly be drawn out of the well unless some exertion be made, in examining each argument, or in selecting a well-tried and experienced guide. It is idle to say, as I have heard asserted, that such works as those above-mentioned do little harm; experience proves the contrary; of which I am made painfully aware, not only by my own conscience, but by conversation with friends.

While led away by sceptical ideas, and knowing extremely little of the Bible, one of my remarks to a friend, on crossing vast plains composed of rolled stones bedded in diluvial detritus some hundred feet in depth, was "this could never have been effected by a forty days' flood,"—an expression plainly indicative of the turn of mind, and ignorance of Scripture. I was quite willing to disbelieve what I thought to be the Mosaic account, upon the evidence of a hasty glance, though knowing next to

* By which word I mean 'Knowledge,' in its most comprehensive signification.

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nothing of the record I doubted:—and I mention this particularly, because I have conversed with persons fond of geology, yet knowing no more of the Bible than I knew at that time. Thus much I feel it necessary to say, in accounting for my own approach to a subject in which all men feel deeply interested; and which has therefore been so well treated of, that these remarks would be useless, were it not that they may reach the eyes of young sailors, who have not always access to works of authority.

The Mosaic account of the Creation is so intimately connected with that of the Deluge that I must ask my young reader (whom alone I presume to address on this subject) to turn to the first chapter of Genesis, and refer to a few verses with me. We soon find a remarkable fact, which shows to my mind that the knowledge of Moses was super-human: his declaration in an early age that light was created before the sun and moon, which must till then have appeared to be the sources of light. In the fourth verse it is stated that "God divided the light from the darkness." This may have been effected by a rotation of the earth on its axis, turning each side in succession to the light; otherwise, had the earth remained stationary, light must have been destroyed to admit darkness, and there must have been repeated creations of light. The light was called day—"and the evening and the morning were the first day." Of course there could have been no morning previous to the creation of light; and the first portion of time, consonant to our present expressions, would have been that which elapsed between light and darkness, or evening. The length of a day being determined by the rotation of the earth on its axis; turning round once, so as to make an evening and a morning to each spot on the globe; the time occupied by that rotation is a natural object of interest. In the 12th verse it is said that grass, herbs, and trees, were brought forth; in the 14th and 16th, that lights were made to divide the day from the night; and that the greater light was to rule the day. It is known that neither trees, herbs, nor grass can exist long without the light and heat of the sun, therefore the

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rotation of the earth between the third day, when vegetation was produced, and the fourth, could not have been very different, in velocity, from its present rotation. Some men, of rare abilities, have thought that the "days" of creation were indefinite periods, notwithstanding the statement in verse 14, which affirms that the lights in the firmament of heaven were to divide the day from the night; and to "be for signs, and for seasons, and for days, and years." In this one verse do we not see that the day was less than a year (signs and seasons, days and years); for had the day there meant been more than a year would not the words have been differently placed, namely —signs and seasons, years and days? Can we think that day means one space of time in the former part, and another space of time in the latter part of that one verse? Another indication that the word day, used in the first chapter of Genesis, does not mean a period much, if at all, longer than our present day, is—that it is spoken of as alternating with night. Although the word day is used in other chapters of the Bible, even so soon as the 4th verse of the 2d chapter of Genesis, to express a period, or space of time longer than our present day, the word night is never so applied:—hence, as the earth turns uniformly on its axis, and, so far as we can reason from analogy, must have turned uniformly, while turning at all, the word night in the 5th verse interprets the length of a day.

Some have laid stress upon the declaration that a thousand years are with the Lord as one day:—but what is the context? * To lengthen the day to a thousand years, on account of this and a similar expression, is not more reasonable than it would be to reduce it to a night-watch. What is a watch in the night when passed?—next to nothing:—so are a thousand years with the Almighty. These considerations tend to show how, without Chaldee or Hebrew learning, a man, with a common English education, may convince himself of a fact which has lately been so much controverted.†

* "A thousand years in thy sight are but as yesterday when it is past, and as a watch in the night."—Ps. xc. ver. 4.

† I may, however, here remark to my young sailor friends, that the Jews,

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Partly referring to such indefinite periods as we have been discussing,—and partly to reasoning unaided by revelation,—some geologists have said that there were successive creations, at intervals of vast duration. They have imagined an age in which only the 'so-called' lowest orders of animated creatures existed,* an age of fishes, an age of reptiles, an age of mammalia, and an age in which man appeared: statements which have obtained much attention. Fossil fishes and shell mollusca† have been found in coal measures, and in subjacent formations:—how could this have happened if vegetables had been produced first; then swept away and converted into coal, and that afterwards the lower orders of animals had appeared? We know that the fossil plants of the coal formations are similar in structure to vegetables now growing on the earth, which cannot flourish without warmth, and the light of the sun. Vegetation was produced on the third day, the sun on the fourth. If the third day was an age, how was the vegetable world nourished? But anomalies such as these appear to be endless in most geological theories: I will leave them for the present and continue my course.

Jews, who perform their worship in Hebrew, and are naturally at least as much interested in the Old Testament as any people, use and prefer our authorised English translation.

* In classing one order of creatures above or below others, we may perhaps consider them as they appear to our apprehension, in comparison with others, but we must beware of thinking them more or less imperfect. Every creature is perfectly adapted to the condition and locality for which it is designed, and absolutely perfect (speaking generally). Some that are intended to live in the dark; or some that are to exist under pressure; may at first sight appear to us imperfect; perhaps shapeless, unsightly objects: but, after examination into their natural history, our hasty remark is succeeded by expressions of astonishment at such wonderful arrangements of Providence as are shewn—even in the most shapeless sea slug.

Multitudes of creatures exist now, especially in the sea, quite as apparently imperfect as those of the so called lowest order of animated creation, whose impressions are found in solid rocks. There may also be animals in deep waters that could not exist except under pressure.

† Rhind, Keith, Lyell, &c.

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In the 16th verse it is said that "God made two great lights; the greater light to rule the day, the lesser light to rule the night: the stars also;" that is, he made the stars also.

It is not stated here that the Almighty made all the stars at that time; nor can I, after consulting very able men, find any passage of such an import. That all the stars dependant upon, or connected with, our solar system, namely, the planets and their satellites, were then created, seems to be evident from the fact of their revolving round our sun; but farther than this, it is not thought necessary (may we not presume) for man to know; therefore it is not revealed to us. In the ancient book of Job, the creation of the world is thus alluded to. "Who laid the corner stone thereof, when the morning stars sang together, and all the sons of God shouted for joy."* But the earth was finished, and vegetation produced, before the creation of stars mentioned in Gen. i. 16; therefore, unless the 'corner-stone' alludes to man, it may be inferred that there were stars in existence besides those made on the fourth day. Of course, the 'singing of the stars' is a figurative expression; but as we do not meet with any similar metaphor in the Bible, unconnected with some object that we know exists; we may infer that stars existed when the allegorical, or mystical corner-stone was thus laid.†

In verses 29 and 30, the food for man and beast is mentioned, and with reference to the Deluge this should be borne in mind. It may be said that the teeth of some animals are so formed as to be fit only for grazing, or browzing; that beasts of prey have teeth adapted to tearing and gnawing; and that man requires meat; but we must remember that dogs and wild beasts thrive upon a vegetable diet, and that some men never touch meat, even in the present state of the world: very

* Job. xxxviii. 6, 7.

† Much must depend upon the limit attached to the meaning of the word Heaven in the 1st Chapter of Genesis, and Heavens in the 2nd; viewed in connection with verses 1, 6, 7, 8, 9, 14, 15, 17, and 20 of Chap. i.; 1, 4, of Chap. ii.; verses 5, 7, 10, 13 of 2 Peter iii.; and very many other passages; not omitting the Lord's prayer.

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different probably from its condition before the flood, as may be concluded from the inferior duration of human life.

The 2d and 3d verses of chap. ii. recall to mind the wonderful fact that the seventh day has been a marked division of time from the earliest period of historical record.*

It is now well known that all nations, and almost all tribes of the human race, preserve traditions of a great flood in which nearly all men were destroyed :† and it is also established as a fact, that nearly all parts of the earth, hitherto examined, bear witness to their having been at some time covered by the ocean. Instead of ascribing these effects to the universal deluge, many geologists say that the earth is in a continual, though gradual state of change; that in consequence of this general mobility, places now far above the sea were once beneath it; that districts, or countries, may have been inundated in one quarter, and other regions elsewhere, but that an universal deluge never could have happened. This is implied plainly enough, if not asserted, in several geological works.

In the Beagle's examination of the southern parts of South America, I had opportunities of observing immense tracts of land composed, solely, of fossil shells, bones, and an earth which looked like dried sandy mud :—extensive ranges of country where no solid rock could be found, only rolled or shingle stones, embedded to a great depth in earth, exactly like that described above ;—and a wide district, at least fifty miles across, covered with lava of which the surface was nearly horizontal. (San José, San Julian, Santa Cruz.)

I brought to England many specimens of these shells, which, although taken from within a few feet of the surface of the land, were found to have been pressed together, crushed, and penetrated by mud, in a manner that never could have been caused by the weight of earth then lying above them, because, though solid, it could neither have mashed the shells, nor worked into their inmost recesses. It seems evident to me

* We find it ordained in Gen. ii. 3; alluded to by Noah, chap. viii. ver. 10, 12; and afterwards observed regularly, down to the present time.

† Sharon Turner, Harcourt, &c.

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that those shells have undergone enormous pressure beneath an ocean, when they were surrounded with mud.* But previous to such pressure, the shells must have grown naturally somewhere:—certainly not at the bottom of an ocean; because they are shells of a comparatively delicate structure which are

* On this subject, the pressure of an ocean, Mr. Lyell remarks, (Elements of Geology, 1838, pp. 7, 8, 9.) "When sand and mud sink to the bottom of a deep sea the particles are not pressed down by the enormous weight of the incumbent ocean; for the water, which becomes mingled with the sand and mud, resists pressure with a force equal to that of the column of fluid above." "Nevertheless if the materials of a stratum remain in a yielding state, and do not set or solidify, they will be gradually squeezed down by the weight of other materials successively heaped upon them, just as soft clay or loose sand on which a house is built may give way. By such downward pressure particles of clay, sand, and marl may become packed into a smaller space, and be made to cohere together permanently."

"But the action of heat at various depths is probably the most powerful of all causes in hardening sedimentary strata."

In reflecting upon these passages it appears to me that Mr. Lyell has supposed what may not always take place in a deep sea, namely—that sand and mud sink to the bottom.

Whenever particles of sand and mud are at the bottom, they must be lower than contiguous particles of water, or they could not be at the bottom; therefore those particles of sand and mud have water above, while resting upon some other substance below. Pressure there can be none, excepting of some earthy particles upon others, while the specific gravity of the sand and mud exceeds that of the displaced fluid. But, if the depth of water be increased, and its specific gravity at the bottom augmented, the sand and mud at the bottom must rise, if they do not cohere together, and to the surface on which they lie; in which case the increasing weight and density of water would tend to compress and make them cohere still more.

The smaller kinds of sea shells are very little heavier than sea water. This would prevent their being carried by the action of the sea to great depths, even if it were possible for them to be so rolled over rocks, sand, or mud, in which they would stick, or be buried, before they had been moved many miles from the place where they grew. These two considerations may help to account for the fact that seamen do not find impressions of shells, on the 'arming' of the lead, when sounding in very deep water, at a considerable distance from any shore where they grow. Sea-shells, I need hardly remark, grow only in comparatively shallow water.

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usually found within a few feet of low water; some at least of the number being identical with living species.

If the square miles of solid land in which those myriads of shells are now embedded, had been upheaved (as geologists say), either gradually, or rapidly, shells could not be found there in their present confused and compressed state. Had the land sunk down many thousand feet with shells upon it, they might have been covered with mud, and on being afterwards upheaved again they would have appeared embedded regularly where they grew, in a matrix which, with the pressure of a superincumbent ocean, might have flattened and penetrated them: but they would not have been torn away from their roots, rolled, broken, mashed, and mixed in endless confusion, similarly to those now in my possession.

There is also another consideration: geologists who contend for the central heat of the earth assert that substances subjected to great pressure under the sea become altered: hence, in conformity with their theory, these shells could not have been long buried under a deep ocean, and afterwards raised in their pristine state. So little changed are these shells, except in form, that they appear as if they had been heaped

water. The specific gravity of oyster shell, when dead, is about twice that of sea-water (2092,1028). Most other shells are much lighter, and but few at all heavier than the oyster.

Before ending this note I must remark that the horizontal movement of water near the bottom, though gentle, may tend to press together and smooth any loose sand, mud that sinks, oazy clay, or fragments of shells, before many of their particles travel far. Water in rapid motion is known to hold sand as well as mud in suspension, but not shells, unless the current is very strong. To such a constant agitation of the sea, oscillating gently with each tide, we may perhaps ascribe the comparatively level and smoothened state of the bed of the ocean, where it has hitherto been sounded. Excepting near irregular, rocky land, one finds, generally speaking, no ravines, no vallies, no abrupt transitions in the bottom of the sea. For miles together there is an almost equal or gradually altering depth of water: and little similarity can be traced between the contour of the bed of a sea and the neighbouring dry land, until you are near the shore, where the sea acts differently, and irregular bottom is as frequent as it is usually dangerous for shipping.

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together and squeezed in mud within a few years from the present time.

One remarkable place, easy of access, where any person can inspect these shelly remains, is Port San Julian. There, cliffs, from ten to a hundred feet high, are composed of nothing but such earth and fossils; and as those dug from the very tops of the cliffs are just as much compressed as those at any other part, it follows that they were acted upon by an immense weight not now existing. From this one simple fact may be deduced the conclusions—that Patagonia was once under the sea; that the sea grew deeper over the land in a tumultuous manner, rushing to and fro, tearing up and heaping together shells which once grew regularly or in beds: that the depth of water afterwards became so great as to squeeze or mass the earth and shells together by its enormous pressure; and that after being so forced down, the cohesion of the mass became sufficient to resist the separating power of other waves, during the subsidence of that ocean which had overwhelmed the land. If it be shewn that Patagonia was under a deep sea, not in consequence of the land having sunk, but because of the water having risen, it will follow as a necessary consequence that every other portion of the globe must have been flooded to a nearly equal height, at the same time; since the tendency to equilibrium in fluids would prevent any one part of an ocean from rising much above any other part, unless sustained at a greater elevation by external force; such as the attraction of the moon, or sun; or a strong wind; or momentum derived from their agency. Hence therefore, if Patagonia was covered to a great depth, all the world was covered to a great depth; and from those shells alone my own mind is convinced, (independent of the Scripture) that this earth has undergone an universal deluge.

The immense fields of lava, spoken of in a preceding page (633), and which to an ordinary observer appear to be horizontal, are spread almost evenly over such an extent of country, that the only probable conclusion seems to be, that the lava was ejected while a deep sea covered the earth, and

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that tidal oscillations,* combined with immense pressure, spread and smoothed it, while in a rapidly cooling though viscous state, over the surface of the land.

The vast quantity of shingle, or rounded stones of all sizes, may be accounted for in a manner unconnected with that of water acting upon a shore; though doubtless a great proportion of the shingle we see has been rounded in that manner. Melted stone, thrown out of a volcano, and propelled through water with great velocity, might be rounded and cooled as shot are when dropped into water from a tower. In modern volcanoes we observe that some matter is thrown into the air, while other, and the greater quantity, runs over the edges of a crater, overflowing the adjacent tracts of land.

Proceeding to the west coast of South America, we find that near Concepcion there are beds of marine shells at a great height above the level of the sea. These, say geologists, were once under the ocean, but, in consequence of the gradual upheaval of the land, are now far above it. They are closely compressed together, and some are broken, though of a very solid and durable nature; and being near the surface of the land are covered with only a thin stratum of earth. They are massed together in a manner totally different from any in which they could have grown, therefore the argument used in Patagonia is again applicable here. But in addition to this, there is another fact deserving attention: namely, that there are similar beds of similar shells, (identical with living species) about, or rather below the level of the present ocean, and at some distance from it.†

In crossing the Cordillera of the Andes Mr. Darwin found petrified trees, embedded in sandstone, six or seven thousand feet above the level of the sea: and at twelve or thirteen thousand feet above the sea-level he found fossil sea-shells, limestone, sandstone, and a conglomerate in which were pebbles of the "rock with shells." Above the sandstone in which the petrified trees were found, is "a great bed, apparently about one thousand feet thick, of black augitic lava; and over this there

* See remarks on tides in the Appendix. † Pages 421, 2, 3.

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are at least five grand alternations of such rocks, and aqueous sedimentary deposits, amounting in thickness to several thousand feet."* These wonderful alternations of the consequences of fire and flood, are, to me, indubitable proofs of that tremendous catastrophe which alone could have caused them;—of that awful combination of water and volcanic agency which is shadowed forth to our minds by the expression "the fountains of the great deep were broken up, and the windows of heaven were opened."

The upheaval of the island of Santa Maria has been quoted by geologists, from my statement; and it will be interesting to learn whether that island has remained at its new elevation, or whether, like the shore at Talcahuano,† it has sunk down again. If the coast in that neighbourhood has been gradually rising, it is strange that old Penco Castle should still stand so low (p. 421).

In Mr. Lyell's Elements of Geology,‡ he mentions Mr. Darwin having found, near Callao, "at the altitude of eighty-five feet above the sea, pieces of cotton thread, plaited rush, and the head of a stalk of Indian corn, all of which had evidently been imbedded with the shells" (marine). "At the same height on the neighbouring mainland, he found other signs corroborating the opinion that the ancient bed of the sea had there also been uplifted eighty-five feet, since the region was first peopled by the Peruvian race." The neighbourhood of Lima has suffered from immense waves caused by earthquakes, and the relics found among the shells may have been scattered by one of those waves. The bed of shells may have been disturbed by the earthquake and its consequences, the ground may have been rent, and afterwards closed again, or the opening may have been filled up by loose earth and anything lying on it, as has taken place at Concepcion. That the country near Callao, or Lima, has not been upheaved, to any sensible amount, since the last great earthquake, which was accompanied by a wave that

* Mr. Darwin's letters to Professor Henslow: printed for the Cambridge Philosophical Society—1835.

† See pages 420-1. ‡ 1838, pp. 295-6.

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swept over and destroyed Callao, is evident from the present position of a pillar erected soon after that event to mark the place to which the waves advanced inland.* This pillar now stands so low, that waves, such as those which ruined Talcahuano, would inevitably reach its base; again destroying the whole of Callao, still situated on a flat, very few feet above the sea, near where old Callao stood.

I have now mentioned the principal facts connected with the Beagle's voyage, which I am desirous of noticing with reference to the Deluge. Want of space prevents my adding others: I have hardly room left to lay before my young readers some general considerations, arising partly out of these facts, which I hope may interest—perhaps be useful to them.

When one thinks of the Deluge, questions arise, such as "where did the water come from to make the flood; and where did it go to after the many months it is said to have covered the earth?" To the first the simplest answer is "from the place whence the earth and its oceans came:"—the whole being greater than its part, it may be inferred that the source which supplied the whole could easily supply an inferior part:—and, to the second question,—"part turned into earth, by combination with metallic bases; part absorbed by, and now held in the earth; and part evaporated."† We know nothing of the state of the earth, or atmosphere surrounding it, before the Flood; therefore it is idle and unphilosophical to reason on it, without a fact to rely on. We do not know whether it moved in the same orbit; or turned on its axis in a precisely similar manner;—whether it had then huge masses of ice near the poles;—or whether the moon was nearer to it, or farther off. Believers in the Bible know, however, that the life of man was very much longer than it now is, a singular fact, which seems to indicate some difference in atmosphere, or food, or in some other physical influence. It is not so probable that the constitution of man was very different (because we see that human peculiarities are transmitted from father to son), as it is to suppose that there was a difference in the region where he existed.

* In 1746.

† Electricity may have acted a prominent part in these changes.

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It is easy to settle such speculations by the reflection—"It was the will of Him who is Almighty;" but as in most cases we see that secondary causes are employed to work out His will, we may imagine that the extraordinary prolongation of man's existence was effected by such means.

Connected with these questions respecting the additional quantity of water is the reflection that the amount must have been very great. This may be placed in another light. Sir John Herschel says,* "On a globe of sixteen inches in diameter such a mountain (five miles high) would be represented by a protuberance of no more than one hundredth part of an inch, which is about the thickness of ordinary drawing paper. Now as there is no entire continent, or even any very extensive tract of land, known, whose general elevation above the sea is any thing like half this quantity, it follows, that if we would construct a correct model of our earth, with its seas, continents, and mountains, on a globe sixteen inches in diameter, the whole of the land, with the exception of a few prominent points and ridges, must be comprised on it within the thickness of thin writing paper; and the highest hills would be represented by the smallest visible grains of sand."—Such being the case, a coat of varnish would represent the diluvial addition of water; and how small an addition to the mass does it appear!

Let us now refer briefly to the recorded account of the Flood. Without recapitulating dates and events, I will at once advert to the ark:—an immense vessel,† constructed of very durable wood,‡ and well stored with vegetable provision for all that it contained. Some cavillers have objected to the heterogeneous mixture of animals embarked; on the ground that they could not have been assembled; and would have destroyed one another. We may reply: He who made, could surely manage. But, without direct miraculous interposition (though we should never forget that man is a miracle, that this world is a miracle, that the universe is a miracle), imagine the effect that would be produced on the animal creation by the approach of such a war

* Treatise on Astronomy, Cabinet Cyclopædia, page 22.

† Sharon Turner, Harcourt, Burnett, &c.

‡ Some of our English ships have lasted more than a century.

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of elements. Do we not now find animals terrified by an earthquake—birds shunning the scene of violence,—dogs running out of a town,* and rats forsaking a sinking ship? What overcoming terror would possess the animated beings on an island, if it were found to be rapidly sinking while worse than tropical torrents, aggregated water-spouts, thunder and lightning, earthquakes and volcanic eruptions united to dismay, if not to paralyse, the stoutest human heart: yet such probably would be but a faint similitude of the real deluge. Those who have themselves witnessed the war of elements, in some regions of our globe, are perhaps more able to conceive an idea, however inadequate, of such a time, than persons who have scarcely travelled beyond Europe, or made more than ordinary sea voyages. Happily for man, hurricanes or typhoons occur but rarely: earthquakes, on a great scale; their overwhelming waves; and devastating eruptions of volcanoes, still less often. That the approach of a general calamity would have affected animals, what we now see leads us to infer, and that many would have fled to the ark, is only in accordance with the wonderful instinct they are gifted with for self-preservation. Proud man would, in all probability, have despised the huge construction of Noah, and laughed to scorn the idea that the mountains could be covered, even when he saw the waters rising. Thither, in his moral blindness, he would have fled, with numbers of animals that were excluded from the ark, or did not go to it; for we do not see all animals, even of one kind, equally instinctive. As the creatures approached the ark, might it not have been easy to admit some, perhaps the young and the small, while the old and the large were excluded?† As we do

* Concepcion and Talcahuano, pp. 403, 5.

† The small number of enormous animals that have existed since the Deluge, may be a consequence of this shutting out of all but a very few. We are not told how many creatures died in the ark; some of those least useful to man may have gone: but, even if none died, the few that quitted the ark could hardly have long withstood the rapid increase of enemies, unless their increase had been proportionably quick. Whether Job had himself seen, or only heard of, the leviathan and the behemoth, does not appear; but that those monsters were the megalosaurus and the iguanadon

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not know what was the connection or partition of land, before the deluge; how the creatures were distributed; or, what was the difference of climate between one region and another; we cannot say that any particular kind could not have been near the ark because of crossing the sea, or having far to travel.

There is abundant proof that animals have changed their habits, shape, coat, colour, or size, in consequence of migration, or transportation to different climates; therefore we cannot tell, from what is now seen, what alterations have taken place since their second dispersion.

Many able men* have pointed out how water penetrating to metallic bases, may cause volcanic eruptions; how matter thrown up, and materials torn or washed off the earth may have combined, mechanically as well as chemically; how gases may have assisted the transformations: how creatures may have been instantaneously overwhelmed, or gradually entombed; how lime may have been one among many powerful agents; how seeds, and spawn, and the germs of insects may have been preserved; and why, among such multitudes of fossil remains as we now find, only in a few places are there remains of man incontrovertibly fossil.†

don there seems to be little doubt (Burnett, p. 67.) Excepting the serpent in Africa, which opposed the passage of Regulus and a Roman army, I am not aware whether profane history mentions any well-authenticated instance of such enormous reptiles; but I cannot look at our representations of dragons, wyverns, griffins, &c. without thinking that, at least, tradition must have handed down the memory of some such monsters; even if a stray one here and there did not actually live in the earlier historical ages: pterodactyles, plesiosauri, ichthyosauri, &c. are too like them, in general figure, to admit of this idea being treated as altogether chimerical. Tradition, no doubt exaggerated by imagination, may have handed down the fact of such creatures having once existed: indeed the casual finding of a skeleton might confirm reports, if not originate them.

* Davy, Sharon Turner, Fairholme, Burnett, Granville Penn, Sumner, Young, Rhind, Lyell, Cockburn, &c.

† These fossil remains of man are not only mixed with those of animals, or fish; but in some cases they are buried at a distance beneath fossil bones of animals.—See Fairholme on the Mosaic Deluge, pp. 41—52; Miers's Chile, vol. i. p. 455, &c.

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Still there are some points but lightly touched, or unnoticed, by any person whose works bearing particularly on this subject I have yet seen. One is the rapidity with which certain substances combine under water, and form stone; such, for instance,* as those used in Roman cement:—another is the possibility of fragile substances, such as shells, small creatures, leaves, corallines, branches, &c., being enveloped in a muddy matrix, while floating at various depths, according to their specific gravities; and the precipitation (chemically speaking) or consolidation, or simple deposition of such cohering masses.†

The similarity of coal to asphalte inclines one to suspect an identity of origin; and that coal, in a fluid state, enveloped quantities of vegetable matter—was for some time agitated by the continual tides and tidal currents of the diluvial ocean, and afterwards hardened by cooling, by pressure, or by chemical change; if not by all three. We find the impressions of leaves, stems, and branches—and even large woody trunks embedded in coal: but that the matrix, in which the leaves were enveloped and subjected to pressure, was not triturated vegetable matter is probable, because the casts of delicate vegetable substances found in it show few, if any, signs of friction or maceration. The impressions are as beautifully perfect as those of shells in fossils where the shell itself has disappeared. Might we not as well say that limestone was formed out of decomposed or pulverised shells, as assert that coal was formed out of the luxuriant herbage, the ferns and the palms, of a former state of the world?

Asphalte is at first buoyant; that trees and other vegetable productions are so I need not remark; but coal sinks in water, and asphalte may be altered chemically so as to sink like coal. Experiments on the asphalte of the famous lake at Trinidad have proved that there is so very close an analogy between that substance and coal, that a gas, exactly resembling coal gas, and

* Lyell, Elements of Geology, 1838, p. 75-6.

† The simplest experiments with pulverised, or numerous minute substances in water, shew that they attract one another mutually, and then cohere.

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burning equally well; a bituminous oil; a substance like coal-tar; and a residuum, similar to coke; result from its distillation.

Electricity may have been a powerful agent in crystallization; in the rapid deposition of strata;* in the formation of mineral veins;† in earthquakes and volcanoes; in the formation or decomposition of water; and in other ways of which we are yet, and perhaps ever shall be, totally ignorant.

Successive strata may have been rapidly deposited by tidal oscillations and currents, aiding chemical or mechanical combinations.

The depth to which bodies would sink in an ocean several miles deep has not been proved, and there is reason to think that it is much less than people generally imagine. An eminent man has said that a knowledge of "the depression of the bed of the ocean below the surface, over all its extent, is attainable (with whatever difficulty and however slowly) by direct sounding;"‡ and, in consequence of a conversation on this subject with him in 1836, he wrote to me, suggesting a mode which might be tried. I consulted with a friend as to the possibility of success, and his letter,§ taken in connection with the facts

* Crosse. † Fox.

‡ Treatise on Astronomy, by Sir John Herschel—Cabinet Cyclopædia—page 154.

§ "I return Sir John Herschel's letter on deep-sea sounding. Anything from him is sure to be interesting and instructive; but there is a circumstance unnoticed in his communication which might obstruct the descent of a sounding apparatus to very great depth.

"Mr. Perkins found that at a depth of only 3,000 feet, sea-water was compressed 1-27th of its bulk at the surface. (Libʸ. of Useful Knowledge, vol. 1. Art. Hydrostatics.) Hydrostatic pressure has usually been estimated from depth alone, assuming that the density of the fluid was uniform; such, however, cannot be the case in an elastic fluid like water, for at great depths, being in a compressed state, it is more dense than at the surface.

"In estimating the amount of hydrostatic pressure at great depths, we should know the vertical height of the column and mean density of the fluid; and since density increases with depth, by reason of superincumbent pressure, the water at great depths must be enormously compressed, and,

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related by Scoresby;* with what has been found by those who have sounded to great depths; and with my own practical experience in sounding—has induced me to think that man never will reach the lowest depths of the deepest oceans by any method his ingenuity may contrive;—because the water increases in density with the depth, in a ratio perhaps more than arithmetical. Every seaman knows that in sounding at great depths very heavy leads must be used with ordinary lines, or very thin lines with ordinary leads; the object being the same—that of overcoming the augmenting buoyancy of the line by a weight unusually heavy. But line, such as is used for sounding, is not buoyant at the surface of the sea; a coil of it thrown overboard sinks directly. Then what is it that causes any weight attached to a sounding-line to sink slower and more slowly,

and, consequently, in a very dense state. Let us now inquire how increasing density (from compression alone) might affect an apparatus sent down by a weight, in order to reach the bottom, presuming that the solids composing the float and sinker were incompressible, and retained their form and magnitude during the operation.

"Let bees'-wax be a float, and cast-iron a sinker, and let each, for illustration, be one cubic foot in dimensions. Let it be possible that at some depth water may be compressed into one-fourth of its bulk at the surface, and still retain the properties of a fluid; let it also be granted that a solid will swim if specifically lighter than the contiguous fluid, and sink if heavier than an equal volume of the fluid. The specific gravity of bees'-wax is stated to be 964; that of cast iron, 7248; and that of sea-water at the surface, 1028: hence the buoyancy of wax immersed in sea-water at the surface, may be called 64, and the tendency of cast-iron to sink, from the same surface, 6220. Deducting 64, we have 6156 as the whole tendency of the mass (wax attached to iron) to sink from the surface. Let us now suppose that the machine has attained a depth where the water is compressed into a four-fold density, represented by 4112 for a cubic foot; and we have 3148 for the tendency of the wax to float, but only 3136 for the tendency of the iron to sink: and the inclination to ascend rather than descend, might be represented by 12. Thus we see that an apparatus may not be certain of arriving at the bottom of an ocean: as in an opposite manner, a balloon may not reach the highest regions of the atmosphere. Either machine could only attain a position where there would be no tendency either to descend or ascend.

Plymouth, 24th Feb. 1837. "WILLIAM WALKER."

* Scoresby's Arctic Regions.

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after the first few hundred fathoms, the deeper it penetrates; if not the increased resistance to sinking, found by the weight and line? "Friction, caused by passing through the water," I may be told. Can that friction be compared with the augmented tendency to sink that would be given by the continually increasing weight of line, if the water did not increase in density?

The pressure of the column of water over any weight, after it has been sunk some hundred fathoms, is shown by the time and exertion required to haul it up again. The operation of sounding in very deep water, with any considerable weight, occupies several hours, and a great number of men. That water is elastic has been proved by Canton's experiments as well as others: but there are familiar illustrations of this fact visible in ricochet shot, in 'ducks and drakes,' in the splashing of water, and in the rebounding of rain-drops from water. Being elastic, and the lower strata being under enormous pressure, it follows that those strata of water must be more dense than the body above them. No one doubts that the lower regions of the atmosphere are denser than the higher; yet air is but a rarer and much more elastic fluid than water. That which takes place in air, to a great extent, may be expected to occur in a very diminished degree with water. If it were not so, why should stones be blown up, casks violently burst, or rocks suddenly torn asunder by the application of the principle usually described as the hydrostatic paradox? If the water were not highly compressed before the explosion takes place, would there not be a gradual yielding, a tearing asunder by degrees, instead of a sudden and violent bursting?

The object of this digression is to show that although bodies which are not buoyant may sink to a considerable depth, it does not follow that they must sink to the bottom. Each separate thing may sink a certain distance, in proportion to its specific gravity, and there remain. The greatest depths ever reached by heavy weights, attached to lines, do not exceed a mile and a-half; a small distance, probably, compared with the depth of the diluvial flood.

Although metals, stone, rock, or coal may have sunk deeply in

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the waters, other substances, such as earth, mud, bones, animal and human remains, &c., may have been held at various depths until decomposed by water; or combined and consolidated by volcanic gases, or electric currents. In this manner the preservation of delicate corallines, shells, skeletons of animals, &c., may be accounted for. Suspended in water, surrounded by earth in a dissolved state, combined by chemical agency, deposited on land, and consolidated by pressure, by volcanic or by latent heat, they may have become fossils. Thick skinned animals may have floated longest, because their hides would have buoyed them up for a greater length of time,* hence their remains should be found near, or upon the surface of the ground, in some cases water-worn, in others uninjured, according as they had been strewed among shingle, or deposited in a yielding mass. That bones were not rolled about much among the stones in which they are found,† is evident from the fact that bones, if so rolled among them, would soon be ground to powder. It is clear that, however much the bones may have been water-worn before deposition on land, both they, and the adjacent shingle, must have been deposited there nearly about the same time.

Tripoli stone, and other substances composed chiefly, if not entirely, of microscopic insects, may have been formed by the accumulation and cohesion of myriads of such minute creatures, swept together off the land, like swarms of locusts, aggregated by the rolling of the waves, agglutinated, deposited on the land, and afterwards heavily compressed. Or they may have been insects bred in water; such as those which Mr. Darwin calculated to amount to "one hundred thousand in a square inch of surface;" while the sea was streaked with them for a great distance.‡ Microscopic objects such as these may have been killed by some gas rising from a volcano beneath; then drawn together by mutual attraction, rolled over and

* When 'blown' after putrefaction began.

† Those, for instance, of Blanco Bay, p. 112.

‡ Darwin's Letters to Professor Henslow, printed for private distribution among the members of the Cambridge Philosophical Society: in 1835.

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over, and landed among other recent compositions. In what other way could such a mass of these animalcules be heaped together?

There are also effects of existing causes which authors have only mentioned by name, in reference to the Deluge, without explaining that the effects alluded to would have been enormously increased at that time;—I mean the tides.—In the Appendix to this volume is a short statement of the manner in which tides may act—upon the principles of the ocean oscillating in its bed; and of tides being caused, partly by the water being elevated by the moon and sun, partly by a westward momentum given to it by their attraction, and partly by the oscillation caused by the return of the fluid after being elevated. If this globe were covered with water to the height of a few miles above the present level of the ocean, three more particular effects would take place: an enormous pressure upon the previously existing ocean, and on all low land; a diminished gravity in the uppermost waters, resulting from their removal from the earth's centre; and immense tides, in consequence of the increased depth of the mass, the diminished weight of the upper fluid, and the augmentation of the moon's attraction. As the waters increased on the earth, the tides would also increase, and vast waves would rush against the sides of the mountains, stripping off all lighter covering, and blowing up,* or tearing down, enormous masses of rock. Similar effects would take place as the diluvial ocean decreased, until it became bounded by its proper limits. Such oscillations I conceive to be alluded to by the words "going and returning,"† and by the expression, "they go up by the mountains; they go down by the valleys;"‡ which exactly describes the rushing of enormous waves against high land. When a wave strikes against a rock, it dashes up every projection that opposes it; but—its impetus at an end—down the water runs

* By the extraordinary power, or principle, called the hydrostatic paradox.

† Gen. viii., v. 5, marginal translation.

‡ Psalm civ. ver. 8.

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again through cavities and hollows: such, on a grand scale, would be the effect of a diluvial wave urged against a mountain side.

In such a war of waters, earth, and fire; a buoyant, closed-in vessel—without masts, rudder, or external 'hamper' to hold wind, or catch a sea—might have floated uninjured; and the fewer openings, of any description, in her cover, or sides, the better for her security. Seeing nothing of the conflict around might have diminished the excessive terror which must have been felt by those that were within, except the confiding Chief. We do not find that the largest or highest 'swell' injures a good 'sea-boat,' when in deep water, and far from land: the foaming 'breakers' alone destroy. But, after all, such conjectures as these are vain, we cannot now know how far miraculous interposition extended—how far secondary causes were employed.

The landing of the ark on a mountain of middle height appears remarkable; because the climate of the highest, on which we might naturally suppose the ark rested, did we not know to the contrary, might have been insupportable during the time that Noah waited for the recess of the waters.* Reasoning from existing circumstances, the temperature of the surface of the ocean would have been nearly that of the contiguous air: but after the waters had receded, high mountain tops would have gradually acquired their present frozen state.

Here the reflection arises—when did icebergs begin to appear? Was not the climate equable and temperate all over the world for some time after the Deluge, in consequence of the slow drying and warming of tropical regions, and gradual formation of ice near the poles? Such a condition of climate would have favoured the distribution of animals. Those who oppose

* The Deluge began in the six hundredth year of Noah's life, in the second month, and seventeenth day of the month (Gen. vii. 11),; and Noah quitted the ark in the six hundred and first year, in the second month, and twenty-seventh day of the month (Gen. viii. 14), making a period of twelve months and ten days. Noah waited in the ark nearly five months after it grounded on Ararat.

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the idea that animals migrated to various quarters of the globe, surely do not reflect that the swallow, the wild swan, the wild goose, the wild horse, the Norway rat, and numerous other creatures, now migrate periodically in search of food or a better climate. Similar instinct may have taught animals to wander then, till they reached the places suited to them;* and there the same instinct would retain them. Want of proper food, or climate; or the attacks of enemies,† may have destroyed stragglers who did not migrate; therefore, when we find no kangaroos in Europe, it is no proof that kangaroos did not once exist there. Elks are now found in North America—we know they were formerly in Europe—is that race here now? During the first few hundred years after the flood, extraordinary changes may have taken place in the geography of the world, in consequence of the drying and altering of various portions; also from the effects of volcanic eruptions and earthquakes, occasioned perhaps by electric action on newly-exposed land, as well as by other causes. Many places, now islands, may have been united to a continent for a considerable period after the deluge; much land may have sunk down, much may have risen up, in various parts of the world. Such changes are said to be going on even now, though on a small scale (Lyell, Darwin, &c.); what may they not have been during the first few centuries after the flood? Volcanic eruptions, such as those of the Galapagos, Andes, Etna, Auvergne, Indian Islands, &c., were then perhaps in such activity as they have never shown since.

What the division in the earth was, in the days of Peleg, does not distinctly appear: but it could only have been a separation from the true faith; a partition of territory among men; or some mighty convulsion, some rending or contraction,

* We see abundant evidence that either living creatures are adapted to particular climates and localities, or that climates and localities are adapted to particular creatures; which latter, it has been proved by many authors, are altered by any material change of the former.

† It should be remembered, that man was allowed to eat flesh after the flood. Gen. ix. ver. 3.

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as it were, of the earth, which was so general as to have occasioned a marked and unqualified record, as of an event well known to all.

Many philosophers think that the world has a central region of surpassing heat, and that the greater part of the interior of the globe is in a state of incandescence, if not of fusion. That small portion which they call the crust of the earth is supposed to be the only cooled part; and they differ merely as to the degree of fluidity in the central region. I take it for granted that they have duly estimated the moon's tendency to cause tides in a fluid mass, within her influence:—if there were no crust, of course she would cause such an effect, but a well hardened case, we must suppose, can resist any such movement in the central fluid mass. Upon the principle of the arch, it would be easier to imagine resistance to pressure from without than from within; but the case or crust of our globe must be so solid that it neither yields nor vibrates to an internal expansive force.

This theory, however, is unsupported by any satisfactory evidence. Men of character and attainments have advocated it, although resting on conjecture: but when we look back along the roll of history, and discover so few philosophers who have not greatly erred, although famed in their day, it is natural to pause, and not acquiesce hastily in mere human assertion unsubstantiated by proof. Boring the ground, or examining the temperature of the bottom of a deep mine, affords no estimate for that of the central regions:—Sir John Herschel says,* that "the deepest mine existing does not penetrate half a mile below the surface; a scratch or pin-hole duly representing it on the surface of such a globe, (sixteen inches in diameter), would be imperceptible without a magnifier." As our globe is about eight thousand miles in diameter, and external influence may be supposed to penetrate some distance, we can draw but unsatisfactory conclusions from experiments at depths not nearly so great even as that to which

* Treatise on Astronomy; Cabinet Cyclopædia, p. 22, Art. 30.

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the ocean descends, and made chiefly in temperate or cold climates.

Having no pretension to more knowledge than any observant seaman may acquire in the course of a few years active employment afloat, it would be as vain as presumptuous in me, were I to offer any conjecture about the central mass of the earth. Perhaps, at a future day, when the nature of aerolites; the agency of electricity; and of electric communication through the superficial, if not through the interior regions of the globe, are better known, other opinions, respecting this wonderful world which we inhabit, may be formed by philosophers.

I have now fulfilled my intention of endeavouring to be useful, in however small a degree, to young persons of my own profession. If the few remarks laid before them, in this and the preceding chapter, at all increase their interest in the subjects spoken of; and tend, even in the least, to warn them against assenting hastily to new theories—while they induce a closer examination into the Record of truth—my object in writing them will be fully attained.

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ADDENDA.

In the eighth chapter of this volume, I have omitted to mention that there are meetings held among the Patagonians which might be termed 'courts of justice!'

One such meeting was described to me by an eye-witness:—'Capitan Chico' presided at it, on horseback: he was the only person mounted. The older men of the tribe sat in a ring, upon the ground, as judges (or rather as a council, or as a jury). Within the circle were four prisoners, and twelve witnesses. The trial lasted a whole day: but my informant did not see or hear the result.

The same individual told me that the Patagonians often played at a game like hockey.

These things, among others, call to mind Molina's account of the Araucanians, which some think much exaggerated. Disorganised, dispirited, and exceedingly diminished in numbers, the Araucanians, as we now see them, are scarcely to be compared to those of Ercilla's poem, who are also described by many authors besides Molina.

END OF VOL. II.

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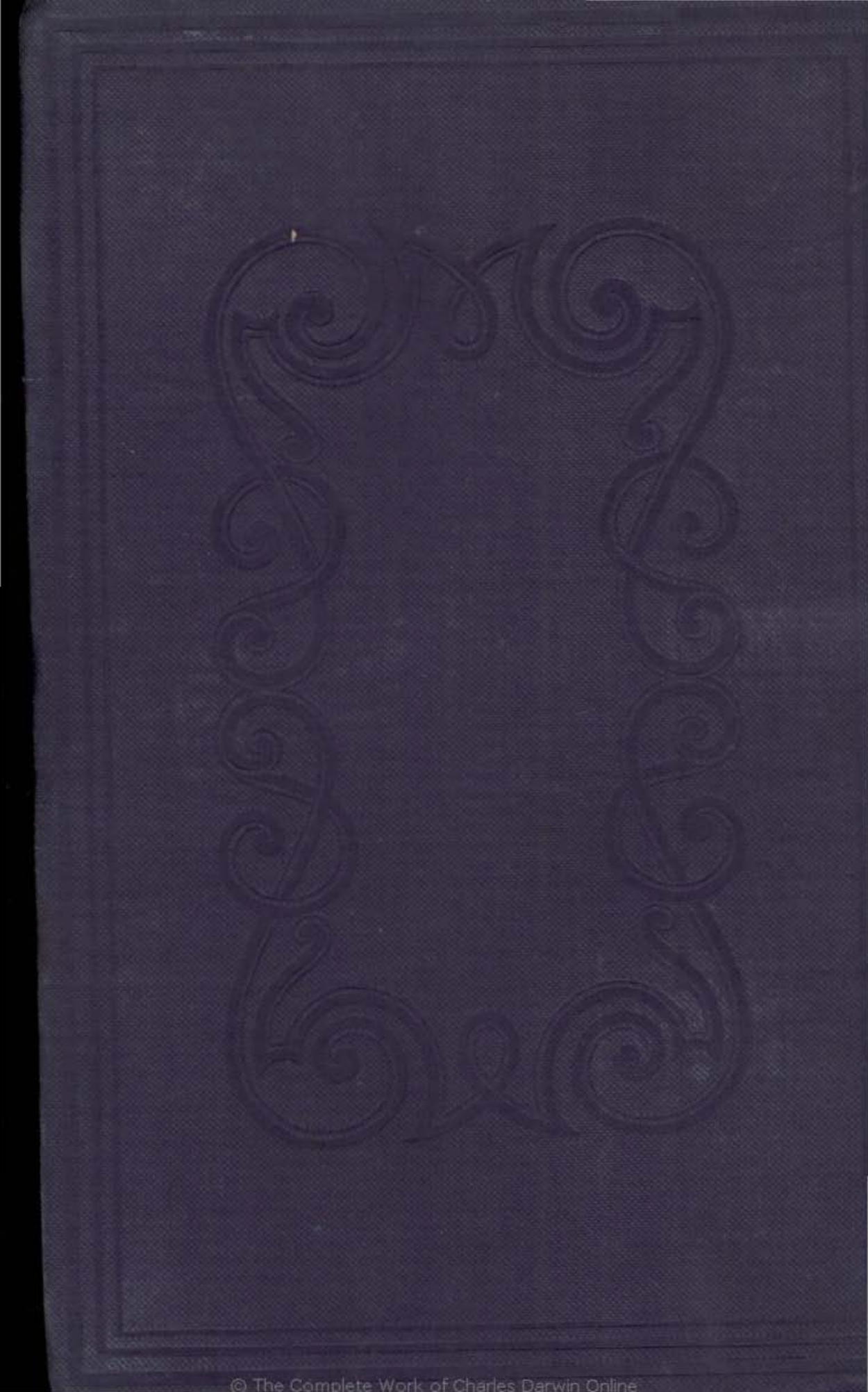
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PART OF
TIERRA DEL FUEGO
from
H.M.S. Beagle
1834
Note. Staten Land from H.M.S. Chanticleer and part of the Strait of Magellaens from H.M.S. Adventure.
This is a partially wooded country, hills of moderate height alternating with extensive valleys.
It is high water in the Strait of Le Maire at five but the flood tide continues to run northward until about six P.M. on the day of new moon. The flood tide is much stronger than the Ebb along all this Coast and it sets from the Westward: but Northward of Staten Island, and the Strait of Le Maire, the flood tide runs North-westward.
Although five and six are the average times, the tides vary much; being sometimes nearly an hour earlier, & sometimes as much later; on the day of full or new moon.
Longitude West from Greenwich
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BETWEEN

THE YEARS 1826 AND 1836,

DESCRIBING THEIR

EXAMINATION OF THE SOUTHERN SHORES

OF

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TO

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MEMORANDUM.

The greater number of the articles in this Appendix are placed as required for reference while reading the volume to which they belong (vol. ii.); and the arrangement, or rather non-arrangement, of the rest, depended upon circumstances which I could not alter; though quite aware how disorderly the group of documents would appear.

If they should ever require to be reprinted, or even if a part should demand further attention from me, it will be easy to dispose them differently.

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65, line 4, of figures, *for* 0.15, *read* 2 15.
85, line 1, *for* 00″ *read* 36″; line 2 (of figures), *for* 30″ *read* 51″; line 3, *for* 14″ *read* 21″; and line 4, *for* 22″ *read* 36″.

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ABSTRACT

OF

METEOROLOGICAL JOURNAL.

Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.
November, 1831.					Inches.	Inches.	°	°	°	Lat. Long.
5	9 A.M.					29·60	53			Baths, Devonport.
6	..					29·40	52			..
8	..					29·80	51			..
10	..					29·4	49			..
11	..					30·5	49			..
12	..					30·4	53			..
13	..					30·2	52			..
14	..					30·6	51			..
15	..					30·2	51			On board the Beagle*
16	..					29·9	48			..
17	..					29·9	47			..
18	..					29·8	46			..
19	..					29·9	47			..
22	..					29·95	54			..
23	..					30.05	58			..
24	..					30·06	60			..
25	..					29·98	61			..
26	..					30·03	61			..
27	..					30·05	59			..
December.										
1	..					30·26	55			Barn Pool
2	..					30·4	56			..
3	..					30·17	57			..
5	..					29·9	62			..
6	..					29·7	61			..
7	..					29·3	60			..
8	..					29·4	60			..
9	..					29·5	61			..
9	2·30 P.M.					29·45				..
10	9 A.M.					29·63	63			..
12	..					29·2	61			..
14	..					29·8	63			..
18	..					29·6	58			..
19	10 A.M.					29·8	57	46		..
..	Noon					29·85		48		..
..	3 P.M.					29·9		48		..
27	6 ..	E.	5	g d	30·66	30·54	47	46		At sea, lost sight of Eddystone
..	8 ..		5	c g	30·70	30·52	48	47		
..	10 ..		5	c g	30·73	30·53	49	47		
..	Midt.	S.E.	4	c g q	30·63	30·51	51	48		
28	2 A.M.	..	5	b p	30·62	30·52	50	48		
..	4 ..	S.E. by S.	5	b p	30·65	30·52	50	48		
..	6 ..				30·69	30·46	47	46		
..	8 ..		4	b v	30·66	30·50	50	47		
..	10 ..	S.E.	5	b c y	30·69	30·51	49	48		
..	Noon		5	b c y	30·65	30·51	49	48		48·6 N. 6·47 W.
..	2 P.M.	S.E. by S.	4	c	30·67	30·49	49	48		
..	4 ..		4	o g	30·63	30·47	49	48		
..	6 ..		5	o g	30·64	30·44	50	49		
..	8 ..		5	c	30·62	30·48	50	48		

* Beagle at sea 15th, returned next morning.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
					Inches.	Inches.	°	°	°	Lat.	Long.
December.											
28	10 P.M.	S.E.	5	c o	30·60	30·48	50	48			
..	Midt.	..	5	c o	30·58	30·44	50	49			
29	2 A.M.	..	5	c o	30·58	30·40	50	48			
..	4 ..	..	5	c o	30·51	30·37	50	49			
..	6 ..	..	5	c o g	30·55	30·40	50	48			
..	8 ..	S.E. by E.	5	c o g	30·54	30·33	50	50			
..	10 ..	..	5	c p	30·53	30·38	52	51	54		
..	Noon	..	5	c o	30·50	30·26	53	51		45·32 N.	9·30 W.
..	2 P.M.	S.S.E.	5	c	30·50	30·31	53	51			
..	4 ..	..	5	b c	30·46	30·29	53	51	54		
..	6 ..	..	5	o g	30·42	30·27	54	50			
..	8 ..	..	5	b c	30·40	30·29	52	51			
..	10 ..	..	5	b c q	30·40	30·24	52	51			
..	Midt.	..	5	b c q	30·36	30·23	52	52			
30	2 A.M.	..	5	c q	30·35	30·24	53	51			
..	4 ..	..	5	c q	30·32	30·21	53	51			
..	6 ..	E.	5	b c	30·32	30·21	53	50		At sea.	
..	8 ..	..	5	b c	30·32	30·21	53	52		..	
..	10 ..	..	5	c q	30·35	30·20	56	53	54 56*	..	
..	Noon	S.E.	5	c p	30·32	30·17	55	53		43·00 N.	12·01 W.
31	..	N.E. by E.	5	b c v	30·32	30·24	58	56	57 58	40·39	13·39
January, 1832.											
1	Noon	E.N.E.	2	b c v	30·40	30·32	61	57	60 59	38·24	15·03
2	..	N.W.	6	b c	30·20	30·00	61	59	60	37·29	15·32
..	4 P.M.	N.N.W.	8	m o q	30·11	30·00	58	56	59		
..	Midt.	..	7	g p l	30·22	30·03	59	56			
3	Noon	N.	6	b c q	30·40	30·25	60	59	62 65†	34·38	16·37
4	..	W.N.W.	6	b c q	30·30	30·14	66	65	66	32·58	16·07
5	..	N.W. by N.	4	b c v	30·48	30·38	66	64	68	29·54	16·11
6	..	W.	2	b c v	30·40	30·35	67	66	68	28·28	Off Santa Cruz.
7	..	S.W. by W.	1	b c	30·40	30·34	69	67	68	Santa Cruz. N. 61 W. 12 m.	
8	..	N.E.	2	b c	30·46	30·39	73	69	68	26·45 N.	16·40 W.
9	..	S.S.E.	5	b c v	30·40	30·38	68	67	69 70	25·05	18·18
10	..	S.E.	4	b v	30·20	30·25	71	69·5	70	22·51	20·00
11	..	N.W. by N.	4	b c	30·24	30·17	71	70	71	21·55	20·22
12	..	N.N.W.	2	o l t	30·23	30·17	70	69	69	20·29	21 16
13	..	E.	2	b m	30·18	30·19	73	71·5	71	19·18	22·00
14	..	..	4	b	30·22	30·16	74	71	71	17·30	23·28
15	..	..	5	b m	30·16	30·14	71	70	72 73	15·23	23·46
16	..	..	2	b c m	30·20	30·18	72	71	73 72·5	15·05	23·23
17	..	N N.E.	5	b c	30·21	30·20	75·5	73·5	72	Port Praya.	
18	..	E. by N.	4	b c q	30·20	30·23	77	75	72·5	..	
19	6 A.M.	N. by E.	4	b c	30·24	30·23	70	68		..	
..	Noon	..	5	b c	30·22	30·22	78	75·5	72·5	..	
20	..	E. by N.	5	b c	30·22	30·28	78	76	72·5	..	
21	..	N.E.	2	b c v	30·20	30·24	80	79	72·5	..	
22	..	N.E by E.	4	b c	30·30	30·27	80	76	73 72·5	..	
23	..	..	4	b c	30·30	30·30	78	76	72·5	..	

* Temperature of water was taken at 10 A.M. and 4 P.M. from this date.

† Black case thermometer used for temperature of water from this date.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
					Inches.	Inches.	°	°	°	Lat.	Long.
JANUARY, 1832.											
24	Noon.	N E.	5	b c q	30·29	30·31	78	76	71·5 72	Port Praya.	
25	..	..	4	b c q	30·29	30·29	73	73	72	..	
26	..	..	5	b c q	30·24	30·21	73	73	71 72	..	
27	..	..	5	b c q	30·15	30·17	73	72	71·5 72	..	
28	..	..	2	c g q	30·15	30·18	73	71	71	..	
29	..	E.	2	b c q	30·11	30·14	76	74	71·5 72	..	
30	..	..	4	b c	30·16	30·18	75	77	72	..	
31	..	..	2	b c	30·18	30·25	79	80	72	..	
FEBRUARY.											
1	Noon	N.N.E.	5	b c q	30·15	30·24	82	79	72 71·5	..	
2	..	N.	4	o c q p m	30·30	30·32	74	72	71	..	
3	..	N.E.	5	b c q	30·26	30·22	76	75	72	..	
4	6 A.M.	..	5	b c q	30·19	30·20	72	71			
..	Noon	..			30·20	30·21	76	75	72	..	
..	6 P.M.	..	4	b c l	30·20	30·20	75	73			
5	Noon	N.N.E.	4	b c q m	30·19	30·19	73	76	71·5 72	..	
6	..	N.E.	5	b q	30·19	30·22	77	76	72	..	
7	..	..	5	b m q	30·16	30·20	77	76	72	..	
8	..	..	4	b q	30·11	30·15	77	76	72 72·5	Sailed 3 P.M.	
9	..	E.N.E.	4	b c	30·12	30·14	78	77	73·5 74	13·33 N.	25·05 W.
10	..	N.E. by E.	4	b v	30·10	30·14	76	74	75·5 76	11·52	26·34
11	..	E.	4	b c	30·04	30·08	78	77	78 79	9·23	26·46
12	..	..	5	o	30·04	30·06	80	79	80 80·5	6·34	27·32
13	..	..	4	b c	30·00	30·04	83	81	81·5	4·03	27·21
14	..	S.E.	2	o g	30·02	30·07	78	77	82 81·5	2·43	27·50
15	..	S.E. by E.	4	b c v	30·03	30·04	82	82	81	1·15	28.50
16	..	S.E.	1	b c	30·06	30·11	83	82	81 82	Isl. St. Paul N. 71 E. 1½ m.	
17	..	E.S.E.	2	b c	30·09	30·15	82	81	82	0·14 s.	30·08 W.
18	..	S.E.	2	b c q v	30·15	30·19	82	83	81·5	1·30	30·49
19	..	S.E. by E.	4	b c v	30·13	30·21	81	80	81·5 82	3·11	31·47
20	..	S.E.ly	4	b c v	30·12	30·16	83	82	82	Fernando Noronha.	
21	..	..	2	b c	30·14	30·17	84	84	82 83	3·17 S.	32·06 W.
22	..	N.E. by N.	2	b c	30·06	30·13	84	83	82 82·5	4·06	32·03
23	..	E.	1	b c	30·07	30·14	84	83	83 82·5	5·29	32·01
24	..	..	5	b c q	30·03	30·07	82	81	82·5	7·25	31·55
25	..	E.S.E.	4	b c	30·06	30·14	80	80·5	82·5	9·38	32·25
26	..	E. by N.	2	o g	30·10	30·15	81	80	82	11·26	34·01
27	..	E.S.E.	4	b c q	30·10	30·12	83	82	81·5 82	12·41	36·20
28	..	..	4	b c v	30·18	30·23	83	82	81 82	Bahia.	
29	..	S.E.	2	b c q	30·47	30·24	78	78	81	..	

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
March, 1832.					Inches.	Inches.	°	°	°	Lat.	Long.
1	Noon.	W.	2	r	30·25	30·28	76	75		Bahia.	
2	..	S.	2	c o	30·26	30·28	78	76		..	
3	..	S.E.	2	o c q r	30·26	30·28	78	74		..	
4	..	N.N.E.	4	b c	30·19	30·29	83	82		..	
5	..	VBLE.	4	b c	30·17	30·22	83	82		..	
6	..	S.E.	4	b c	30·18	30·20	85	83		..	
7	..	..	4	b c q	30·14	30·20	83	82		..	
8	..	..	4	b c	30·14	30·18	82	80		..	
9	..	..	2	b c	30·12	30·19	83	81		..	
10	..	N.	4	b c q	30·14	30·21	82	81		..	
11	..	S.E.	4	b c	30·23	30·26	83	81		..	
12	..	..	2	b c	30·13	30·17	79	77		..	
13	..	..	4	b c q	30·11	30·19	82	80		..	
14	..	..	4	b c v	30·10	30·20	82	80		..	
15	..	N.	4	c o	30·14	30·21	80	74		..	
16	..	S.E.	4	b c	30·19	30·20	83·25	80·5	81 82	13·06 s.	Off Bahia.
17	..	..	4	b c	30·20	30·25	83	82		Bahia Harbour.	
18	..	..	4	b c	30·20	30·22	82	81	83	..	
19	..	VBLE.	2	b c p	30·18	30·18	81	80	82	13·40 s.	38·31 w.
20	..	S.E.	1	b c v	30·12	30·20	84	83	82 82·5	13·29	38·25
21	..	N.N.E.	1	b c	30·19	30·22	84	82	82·25 83	14·20	38·07
22	..	N.E. by N.	4	b c	30·22	30·23	82	81	82 81·5	15·21	37·20
23	..	E.	1	b c	30·18	30·20	83	81·5	81 82	16·28	36·44
24	..	VBLE.	4	b c	30·15	30·18	83	81	81·5 82	17·12	36·19
25	..	..	5	b c	30·14	30·18	84	82·5	81·5 82	18·17	35·34
26	..	S.E. by S.	4	b c	30·19	30·18	83	85	82	18·06	37·04
27	..	E	2	b c	30·25	30·26	83	84	81 81·5	17·43	37.15
28	..	N.N.E.	4	b c	30·24	30·22	84	83	80	18·09	38·22
29	..	E.	4	b c q p	30·28	30·28	83	82	78	Off the Abrolhos Isl.	
30	..	E. by N.	2	b c	30·32	30·30	82	80·5	78	..	
31	..	E.S.E.	4	b c	30·39	30·37	82	81	81·5	19·52 s.	38·36 w.
April.											
1	..	N. by E.	4	b c g q	30·34	30·32	80	78	80 80·5	22·13	38·57
2	..	E.N.E.	4	b c p	30·35	30·32	79	77	80*	23·22	40·53
3	..	E.S.E.	2	b c	30·34	30·34	78	79	75* 76	23·18	42·37
4	..	VBLE.	2	b c	30·32	30·32	82	82	76	Standing into Rio Harbour.	
5	..	..	1	b c	30·27	30·27	80	79	76·5 76	Rio de Janeiro.	
6	..	—	0	b c	30·28	30·20	79	82	76 77	..	
7	..	..	0	b c	30·20	30·20	80	78	76 77·5	..	
8	..	N.E.	2	b c	30·27	30·26	84	83	78	..	
9	..	N.N.E.	1	b c	30·26	30·24	85	82	78	..	
10	..	..	4	b c	30·20	30·22	80	78	77 76	..	
11	..	N.	1	b c m	30·23	30·23	83	85	76 78	..	

* Temp. of water at 10 A.M. 3d April, 5 degrees lower than 4 P.M. 2d April.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
April, 1832.					Inches.	Inches.	°	°	°	Lat.	Long.
12	Noon.	s.	2	b c	30·26	30·24	80	78	76 77	Rio de Janeiro.	
13	..	s.w.	2	b c	30·30	30·30	76	75	75 75·5	..	
14	..		1	b c o m	30·34	30·31	76	75	76 75·5	..	
15	..	n.w.ly.	1	c o g	30·30	30·30	76	74	76	..	
16	..	s.e.	1	b c	30·34	30·26	73	73	75 75·5	..	
17	..	n.e.	1	b c	30·30	30·28	74	72	74·5 75	..	
18	..	s.	2	b c	30·32	30·28	77	76	76	..	
19	..	s.e.	1	b c	30·32	30·25	76	75	76	..	
20	..	n.w.	2	b c	30·17	30·16	76	75	76	..	
21	..	s.e.	1	b c	30·20	30·18	78	77	77	..	
22	..	vble.	2	o g r	30·33	30·29	70	69	75 74·5	..	
23	..	w.	2	b c	30·43	30·35	68	67	73 74	..	
24	..	s. by w.	2	b c p	30·36	30·38	70	69	74	..	
25	..	s.e.	2	b c	30·37	30·26	70	68	75	..	
26	..	s.	2	b c	30·36	30.32	73	72	75 75·5	..	
27	..	n.	2	b c	30·30	30·27	75	73		..	
28	..	s.e.	2	b c	30·25	30·20	76	75		..	
29	8 a.m.		2	b c	30·26	30·23	74	73		..	
..	4 p.m.	s.	2	b c	30·28	30·24	78	77		..	
30	Noon.	w.n.w.	1	b c	30·37	30·34	78	77		..	
May.											
1	..	s.	1	b c p	30·38	30·36	80	79		..	
2	..	—	0	b c	30·38	30·31	78	77		..	
3	..	s.	2	b c	30·20	30·19	79	77		..	
4	..	n.e.	2	b c	30·15	30·14	83	82		..	
5	..	s.	2	o g p	30·35	30·28	73	73		..	
6	..	n.e.	1	c g	30·37	30·32	76	75		..	
7	..	..	2	b c	30·27	30·24	78	77		..	
8	..	s.w.	1	c o p	30·32	30·26	76	76		..	
9	..	..	2	b c	30·33	30·30	73	72		..	
10	..	n.e.	2	b c	30·46	30·38	67	76	74·5	..	
11	..	s.w.	4	b c	30·35	30·33	74	72	74·5	22·52 s.	41·47 w.
12	..	w.s.w.	5	b c	30.32	30·23	74	73	77 78	20·16	39·47
13	..	w.n.w.	3	b c	30·24	30·27	77	76	78	18·29	38·59
14	..	s.s.w.	4	b c	30·31	30·30	77	76	79 79·5	16·55	38·45
15	..	e.s.e.	6	c o q p	30·32	30·26	80	78	80·5	14·23	38·32
16	..	e.	4	b c o	30·30	30·29	80	79		Bahia.	
17	..	s.e.	2	b c	30·33	30·28	82	81		..	
18	..	..	4	b c	30·32	30·30	81	82		..	
19	..	..	2	b c q	30·30	30·29	80	79		..	
20	..	..	2	b c q p	30·28	30·28	81	80		..	
21	..	s.	2	c o r	30·26	30·26	76	74		..	
22	..	w.	2	b c	30·26	30·23	78	77		..	
23	..	e.s.e.	4	b c	30·28	30·26	81	80		..	
24	..	vble.	1	b c o	30·28	30·25	78	76		13·43 s.	38.27 w.
25	..	e. by s.	4	b c	30·27	30·25	79	78		15·10	38·26
26	..	n.w. by n.	4	b c	30·23	30·22	80	79		17·00	38·20
27	..	s. by e.	2	b c	30·23	30·21	77	75·50		19·18	38·16

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
					Inches.	Inches.	°	°	°	Lat.	Long.
May, 1832.											
28	Noon.	s. by w.	5	q p r	30·33	30·27	75	70	76·5 76	19·40 s.	38·31 w.
29	..	E.S.E.	1	c o p	30·37	30·35	73	71	77 76·5	19.47	38·31
30	..	N.E.	2	o g r	30·38	30·32	72	70	76·5 76	20·10	38·31
31	..	N.N.E.	4	c o	30·32	30·28	76	74	77	21·03	39·59
June.											
1	..	VBLE.	4	b c	30·29	30·21	75	74	77·5	23·04	40·31
2	..	..	1	b v	30·30	30·28	75	73	74 75	22·56	41·17
3	..	S.E.	1	b c	30·36	30·27	75	76	73·5	23·05	42·41
4	..	N.	1	b c	30·25	30·20	76	75		Rio de Janeiro.	
5	..	—	0	b c	30·32	30·26	75	75		..	
6	..	S.	2	b c	30·27	30·35	81	79		..	
7	..	S.E.	2	b c	30·58	30·50	78	79		..	
8	..	—	0	b c	30·58	30·52	75	85		..	
9	..	S.E.	2	b c	30·56	30·51	76	80		..	
10	..	..	2	b c	30·58	30·50	73	73		..	
11	..	S.E.	1	b c	30·48	30·44	75	75		..	
12	..	N.E.	2	b c	30·52	30·44	75	75		..	
13	..	W.N.W.	2	b c	30·58	30·50	73	72		..	
14	..	—	0	b c	30·36	30·44	76	78		..	
15	..	S.	1	b v	30·52	30·47	74	76		..	
16	..	..	2	b c	30·45	30·35	71	76		..	
17	..	N.w.byw.	2	b c	30·47	30·40	69	70		..	
18	..	—	0	b c	30·40	30·38	74	73		..	
19	..	S.	2	b	30·42	30·30	71	82		..	
20	..		2	b c	30·48	30·38	73	85		..	
21	..	N.	2	b c	30·47	30·39	73	76		..	
22	..	N.E.	2	b c v	30·32	30·25	72	71		..	
23	..	N.	2	b	30·30	30·25	72	71		..	
24	..	—	0	b c	30·38	30·33	76	74		..	
25	..	VBLE.	1	b c	30·50	30·42	75	74		..	
26	..	N.N.W.	2	c m	30·51	30·46	73	72		..	
27	..	VBLE.	1	b c	30·48	30·41	74	74		..	
28	..	—	0	b c v	30·44	30·41	75	75		..	
29	..	N.N.W.	2	b c	30·50	30·45	76	76		..	
30	..	N.E.	1	b c	30·51	30·48	75	82·5		..	
July.											
1	..	S.E.	1	b c	30·50	30·44	74	75		..	
2	..	N.E.	2	b c	30·49	30·40	72	73		..	
3	..	S.S.E.	1	b c	30·43	30·33	70	70		..	
4	..	S.E.	2	b v	30·30	30·30	76	75		..	
5	..	N.	4	b m	30·34	30·28	73	73		Running out of Rio Harbour.	
6	..	S.W.	2	b c m	30·40	30·33	73	71	70·5 74·5	23·22 s.	43·11 w.
7	..	S.w.by s.	2	c o p	30·51	30·41	70	68	72·5 73	23·38	43·23
8	..	VBLE.	2	b c	30·49	30·40	72	69	72 72·5	24·09	43·01
9	..	W.N.W.	1	c o	30·49	30·36	70	68	73 73·5	24·17	43·35
10	..	S.S.W.	4	b c q	30·38	30·32	70	69	74·5	25·01	42·47
11	..	—	0	b c	30·26	30·16	72	70	75	26·01	42·57
12	..	VBLE.	2	b c	30·39	30·28	70	69	73 72·5	26·39	44·08
13	..	S.	2	b c	30·44	30·36	69	68	72·5	27·08	45·44

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
					Inches.	Inches.	°	°	°	Lat.	Long.
July, 1832.									72		
14	Noon.	E.N.E.	2	b c	30·46	30·38	71	70	72·5	27·20 s.	46·22 w.
15	..	W.N.W.	5	c g r	30·22	30·11	69	67	71	29·48	47·50
16	2 A.M.	S.W.	7	b c g	30·06	30·20	66	64			
..	Noon.	..	4	c o p q	30·32	30·13	64	62	70·5 68·5	30·12	48·03
17	..	N.N.E.	2	b c	30·45	30·35	68	67	68·5 69·5	30·00	48·18
18	..	N.N.W.	6	q	30·39	30·26	69	66·5	71 70·5	31·37	49·17
19	..	—	0	b c	30·38	30·27	68	66	69·5 68·5	33·16	50·10
20	..	S.	4	b c	30·39	30·25	62	59	61·5 61·0	33·47	50·59
21	..		2	b c m	30·33	30·19	63	61·5	59·5 56·5	34·15	52·17
22*	..	VBLE.	4	c o g r	30·20	30·05	60	58	56·5	34·59	53·19
23	..	..	4	o g	30·33	30·12	53	51	56	Cape Sta. Maria. N.42 E.11m.	
24	..	..	4	b c	30·50	30·28	54	52	56	.. N.½E.15m	
25	..	E.	4	b c	30·50	30·30	55	55	56 56·5		
26	..	S.	2	b c	30·46	30·28	57	56	56 58	Monte Video.	
27	..	—	0	b c	30·35	30·23	56	55·5		..	
28	..		4	b c	30·36	30·16	54	53		..	
29	..	E. by S.	5	r	30·56	30·52	51	48		..	
30	..	E.	2	b c	30·60	30·53	55	53·5		..	
31	..	N.E.	2	b c	30·56	30·40	59	57		..	
August.											
1	..	N.	4	b c	30·45	30·27	58	59	56·5 58·5	Off Atalaya Church.	
2	..	N.E.	4	b c	30·32	30·16	61	60	58	Off Buenos Ayres.	
3	..	N.N.W.	5	b c	30·28	30·14	62	60·5	57	Off Point Indio.	
4	..	N.	2	b c	30·28	30·16	66	64		Monte Video.	
5	..	..	4	b c	30·11	30·00	62	59		..	
6	..		2	b c	30·26	30·15	69	68		..	
7	..	S.	1	b c p	30·31	30·20	66	66		..	
8	..	E.	6	c o g h	30·30	30·10	57	54·5		..	
9	..	..	5	g o r	30·10	29·92	56	55		..	
10	..	S.E. by E.	2	o g m	30·29	30·10	58	56		..	
11	..	E.	2	c o h	30·29		57			..	
12	..	..	4	o g r	30·25		55			..	
13	..	..	5	c o g p	30·24		58			..	
14	8 A.M.	S.	1	b c m	30·15	30·01	58	57		..	
..	4 P.M.	..	2	b c	30·13	29·99	61			..	
15	Noon.		2	b c	30·34	30·14	57	56		..	
16	..	S.W.	4	c o r	30·28	30·08	61	60		..	
17	..	..	5	b c q	30·57	30·31	50	47		..	
18	..	S.S.W.	5	b c q	30·64	30·38	47	46		..	
19	..	N.N.W.	5	b c q	30·52	30·27	53	52·5		..	
20	..	N.W. by W.	4	b v	30·53	30·30	57	54·5	54·5 53·5	35·31 s.	56·52 w.
21	..	N.N.W.	2	b c	30·54	30·33	56	58	54·5 56·0	35·27	56·59
22	..	N.W. by N.	4	b c	30·36	30·19	57	55·5	54 56	36·23	56·36

* Thunder and lightning early in the morning.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
					Inches.	Inches.	°	°	°	Lat.	Long.
August, 1832.											
23	Noon.		4	b c	30·34	30·14	58	55·5	53	37·08 s.	56·49 w.
24	..	N.N.E.	2	b c	30·34	30·23	55	55	53	37·26	56·58
25	..	N.W.	4	b c m	30·10	30·03	60	58	53 54	38·10	57·25
26	6 A.M.	N.E. by N.	2	b c m t l	30·08	29·91	54	54			
..	Noon.	E.	2	g m r o	30·00	29·88	55	53	53	38·28	57·58
..	6 P.M.	E.N.E.	4	c o m r	29·87	29·69	56	54			
27	4 A.M.	S.S.W.	7	g o c q r	29·88	29·68	52	51			
..	Noon.		6	b c	30·10	29·81	51	50	51 50	38·36	57·13
..	8 P.M.	S.	7	b c q	30·24	29·96	49	48			
28	Noon.	E.N.E.	4	g o m	30·43	30·14	52	51	52 52·5	38·27	57·54
29	..	VBLE.	2	c o g r	30·30	30·08	55	52	52 52·5	38·36	57·57
30	4 A.M.	..	1	o g r l	30·11	29.95	53	52			
..	Noon.	..		o g m					53 52·5	38·36	57·58
..	8 P.M.	S.	4	o g r	30·04	29·84	52	51			
31	Noon.	S.W.	5	b c q	30·18	29·96	52	51	52	38·39	58·42
September.											
1	Noon.	S.W.	4	b c	30·52	30·27	52	51	52	38·44	58·35
2	2 A.M.	N. by W.	5	b c	30·50	30·27	48	47			
..	Noon.	N.W.	9	b c	30·32	30·12	59	56	52	38·51	59·13
..	10 P.M.		4	b c q	30.27	30·08	59	53			
3	Noon.	S.E.	4	o g m	30·43	30·17	51	50	51·5	38·53	60·10
4	..	E.	4	o g	30·72	30·42	48	47	50	39·10	61·00
5	..	N.E.	4	o g	30·55	30·30	50	49	50	39·12	61·12
6	..	..	4	o g	30·30	30·10	58	57	51 51·5	Off Blanco Bay.	
7	..	E.S.E.	4	o g m	30·17	29·97	53	51·5	52 52·5	Blanco Bay.	
8	..	S.S.W.	4	b c	30·02	29·84	55	55	52 52·5	..	
9	..	W.	2	o g p	30·13	29·94	54	50·5	51·5 52	..	
10	..	..	2	b c	30·23	30·00	53	53	52 52·5	..	
11	..	N.W.	4	o g q	30·28	30·09	55	55	52 52·5	..	
12	..	..	1	c g	30·29	30·09	55	55	52	..	
13	..	S.E.	5	b	30·47	30·26	54	54·5	52 52·5	..	
14	..	—	0	b c	30·35	30·20	56	56	52	..	
15	..	S.W.	4	c o	30·30	30·11	55	54	52·5 53	..	
16	..		1	b v	30·52	30·37	53	54·5	52·5 53	..	
17	..	N.	4	b c	30·60	30·38	55	54	52 53	..	
18	..	W.N.W.	4	b c	30·44	30·24	61·5	60	52·5 54·5	..	
19	..	N.W.	4	b c m	30·18	30·08	68	67	54·5 56·5	..	
20	..	N.	2	b c	30·07	29·96	67	70	55 56	..	
21	..	W.S.W.	4	b c q	30·08	30·03	60	63	55 56·5	..	
22	..	S.S.W.	2	o g	30·26	30·10	64	65	57	..	

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
					Inches.	Inches.	°	°	°	Lat. S.	Long. W.
September, 1832											
23	Noon.	s.wly.		b v	30·44	30·26	58	57	56·5	Blanco Bay.	
24	..	N.N.E.	5	b c q	30·32	30·15	61	61·5	56 56·5	..	
25	6 A.M.	S.S.W.	1	o g		29·90	59·5*	59			
..	Noon.	W.	2	b c q	30.10	29·99	65	64	56·5	..	
..	6 P.M.		2	b c	30·08	29·96	60	60			
26	Noon.	N.W.	4	c o	30·27	30·11	58	57	56 56·5	..	
27	..	W.	2	b c	30·25	30·12	61	61	56·5	..	
28	..	N.W.	2	b c	30·03	29·90	62	62	56·5	..	
29	..	E. b. S.	4	c o m	30·46	30·24	55	53	55 54		
30	..	N.E.	5	b c	30·48	30·21	55	61	54·5	Off Blanco Bay.	
October.											
1	Noon.	—	0	q r l t	30·09	29·85	57	55	54·5 56	..	
..	2 P.M.	VBLE.	2	b c g	29·90	29·72	56	55			
..	Midt.	N.W.b.W.	2	c m l	29·86	29·74	57	56			
2	Noon.	S.W.b.W.	6	m d r	29·99	29·77	58·5	56·5	56	Off Point Hermoso.	
3	6 A.M.	S.S.E.	7	o q	30·44	30·22	49	47		..	
..	Noon.	S.E.	4	b c q	30·61	30·26	50	48	53·5 54	..	
4	..	N.N.W.	5	b c q	29·95	29·89	57	56	54 54·5	..	
5	..	VBLE.	1	b c v	30·16	30·00	57	56·5	54·5 56·5		
6	6 A.M.	N.W.	5	b c m	29·94	29·80	58	56			
..	6 P.M.		4	b c l t	29·77	29·67	67	66	57 58	Blanco Bay.	
7	Noon.	W.	5	b c	30·02	29·93	64	62·5	57·5 57	..	
8	..	S.S.W.	4	b c	30·56	30·38	55	54	57 57·5	..	
9	..	N.	4	b c	30·41	30·29	63	61	58	..	
10	6 A.M.		6	b c q	29·97	29·82	59	57			
..	Noon.	E.N.E.	2	b c	29·99	29·90	65	64	58	..	
11	..	W. b. N.	2	b c	30·06	29·92	60	59	58	..	
12	..		2	b c v	30·16	30·08	61	59·5		..	
13	..	S.S.E.	5	b c q	30·57	30·34	53	51·5		..	
14	..	S. b. W.	4	b c q	30·70	30·44	49	48		..	
15	..		4	b c		30·51	52	45		..	
16	..	—	0	b v		30·45	53	54		..	
17	..	N.	2	b c v	30·32	30·34	62	61·5	56·5 57	..	
18	..	W.N.W.	1	b c	30·26	30·25	66	70	57·5 58	Off Blanco Bay.	
19	..	E.b. N.	1	b c	30·16	30·17	63	62	58·5 58	Off Mount Hermoso.	
20	..	N.	1	b c	30·14	30·16	60	60	55·5 58	39·34	59·37
21	..	N.E.b.E.	4	c o g q	30·03	30·03	57	59	56	39·20	59·02
..	4 P.M.	N.E.	4	o g r t l	29·98	29·96	56	55·5			
22	Noon.		2	c o g	29·88	29·89	56	55·5	52·5 53	39·49	58·24
23	..	N.W.	2	f	30·18	30·13	54	52·5	53 56	38·51	57·10
24	..	N.E.	4	c m	30·22	30·16	55	56	56 56·5	38·11	56·56

* 25th Septr. there was much lightning early in the morning and late at night.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
							°	°	°	Lat. S.	Long. W.
October, 1832.											
25	Noon.	s. b. e.	5	b v	30·19	30·18	58	59	58·5 61	36·18	56·22
26	..	e.s.e.	2	c	30·36	30·36	60	58·5	61·5	Monte Video.	
27	..		4	b c	30·21	30·25	63	61·5		..	
28	..		4	b c	30·03	30·11	65	62		..	
29	..	w.s.w.	4	b c q r	30·05	30·07	62	56·5		..	
30	..	..	5	b v m	30·08	30·10	63	62	62 62·5	..	
31	..	n.n.w.	4	b c v	30·15	30·20	67	65	63 64·5	35·22	Pt. Piedras.
November.											
1	Noon.	w. b. n.	1	b c	30·05	30·13	69	67·5	67 68·5	35·47	Off Ensenada.
2	..		4	b c	30·02	30·05	71	70	71	Off Buenos Ayres.	
..	6 p.m.	n.n.e.	5	o g r q l t	30·00	30·06	67	65·5			
3	2 a.m.	e.n.e.	4	g r l	30·00	30·04	65	64			
..	Noon.	n.e.	6	c g q	30·01	30·08	68	64		..	
4	..	..	4	c o	29·95	30·06	71·5	69·5		..	
5	..	..	4	b c v	29·91	30·04	74	74		..	
6	6 a.m.	e.n.e.	4	c g q	29·86	29·95	69	69		..	
..	Midt.	vble.	5	o g r t l	29·76	29·86	68	66·5		..	
7	Noon.	w.n.w.	1	c g	29·78	29·94	73	71		..	
8	..	n.w.b.w.	2	b c	29·81	29·95	71	69		..	
9	..	s.w.	1	b c	29·95	30·12	72·5	70		..	
..	6 p.m.		2	o g q r l t	29·92	30·07	69	68			
10	Noon.	s.s.w.	4	b c g	29·28	30·30	62	60		..	
11	..	s s.e.		b c	29·37	30·38	57	56·5	67·5 69	34·41	57·45
12	..	n.e. b. n.	4	b c	29·38	30·44	64	63	68·5 68	34·45	57·28
13	..	e.	4	b c	29·41	30·45	64	64·5	64·5	35·08	56·35
..	6 p.m.	vble.	7	b c q	30·33	30·34	64	63·5			
14	Noon.		5	b c	30·20	30·28	66	64	64 64·5	Monte Video.	
15	..	e.s.e.	2	b c	30·03	30·16	72	68·5		..	
16	..	s.w.	4	b c	30·02	30·09	67	65		..	
17	..	..	5	c g q	30·04	30·05	60	57·5		..	
18	..	s.s.w.	4	b c	29·99	30·04	63·5	60		..	
19	..	s.s.e.	1	b c	29·90	30·05	60	67		..	
20	..	s.e.b.e.	2	b c	29·98	30·12	70	68		..	
21	..		1	b c v	30·15	30·28	70	67·5		..	
22	..	s.e.	2	b c v	30·25	30·31	67·5	65		..	
23	..	s.	1	b c v	30·14	30·28	70	68·5		..	
24	2 p.m.	e.	4	b c v	30·03	30·22	74	73·5		..	
25	Noon.	n.w.b. n.	2	b c	29·90	30·19	76	75		..	
26	..	s.w.	4	b c	29·70	29·98	80	78		..	
..	Midt.	s.e.	6	o g q l	29·62	30·00	73	72	79		
27	Noon.	..	4	o g	29·90	30·00	62	61	73	..	
..	Midt.		4	b c q l	30·00	30·09	64	62	71		
28	Noon.	s.e. b. e.	4	b c v	30·10	30·18	64·5	64	70	34·52	
29	..	e.	1	b c v	30·22	30·35	66	64	69	35·25	56·08
30	..	n.	4	b v	30·09	30·18	66	67	61·5	37·42	56·18
December.											
1	Noon.	n.n.w.	4	b c	29·94	30·04	66	67	60 61	39·20	58·10
..	Midt.	..	6	o c g q l	29·78	29·92	64	63			
2	Noon.	s.e.	5	b c q	29·87	29·96	62	61	60·5 60	40·03	59·43
3	..	s. b. w.	1	b v	29·92	30·04	65	65	64·5	40·22	61·48

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
December, 1832.					Inches.	Inches.	°	°	°	Lat. S.	Long. W.
4	Noon.	W.N.W.	4	b c v	29·70	30.00	77	75	64·5 66	40·48	62·06
5	..	S. b. W.	4	b c	29·70	29·81	64	63·5	61 62·5	42·16	61·26
6	..	W.S.W.	2	b c	29·67	29·73	65	64	61·5	42·54	61·20
7	..	VBLE.	4	b c v	29·72	29·80	64	61	60 60·5	43·34	61·22
8	..	W. b. N.	4	b c m	29·88	29.92	62	60	58·5	44·52	62·01
9	..	W.	5	b c	29·68	29·82	61	60·5	56·5 57	46·17	63·22
10	..	N.W.	5	b c	29·52	29·53	61	57	54 55	48·21	64·02
11	..	S.W.b.W.	6	b c m q	29·12	29·05	54	52·5	51 49·5	51·03	65·05
..	Midt.	W.S.W.	7	b c	29·41	29·30	47	46			
12	Noon.	..	7	b c q	29·59	29·48	47	46·5	49	50·36	65·28
13	..	S. b. W.	5	b c q	29·92	29·79	48	46	49 50	50·32	65·48
14	..	S.W.	1	b c	29·40	29·40	55	54	48 50·5	51·58	66·53
15	..	VBLE.	2	b m	29·51	29·47	46	45	45·5 47	53·01	67·18
16	..	N.W.	4	b c	29·62	29·65	49	49	48	53·47	Cape Peñas, S.22 E.3 m.
17	..		5	b c q	29·18	29·10	54	54	48·5 48	54·34	Off Cape San Vicente.
..	Midt.	S.	6	c o g q	29·28	29·32	44				
18	Noon.	S.E.	4	b c o g	29·50	29·36	49	46	47·5 46·5	Good Success Bay.	
19	..	S.W.	4	b c q	29·92	29·84	53·5	51·5	47 48	..	
20	..	W.	2	b c	29·81	29·75	58	56	48·5 49	..	
21	..	S.E.	4	b c	29·99	29·91	49	49	48	55·00	Off Valentyn Bay.
22	..	N.W.	4	b c	29·86	29·77	53	51	48 48·5	55·51	
..	10 P.M.	W.	7	b c g r q	29·72	29·62	49	47			
23	Noon.	..	5	o g q r	29·66	29·54	47	45	46·5	56·27	68·00
24	..	S.W.	5	b c g	29·70	29·60	47	46·5	47·5	San Martin Cove.	
25	..	..	4	b c	29·71	29·62	54	51	48	..	
..	Midt.	..	7	b c q	29·48	29·46	52	51		..	
26	Noon.	S.	2	c g q	29·59	29·49	47	45·5	47	..	
27	..	W.	2	o c m	29·72	29·59	47·5	45	47	..	
28	..	W.S.W.	4	c g q	29·94	29·81	45	43	46·5	..	
29	..	..	4	o g q p	29·56	29·47	48·5	47	47 47·5	..	
30	4 A.M.	S.	6	o q	29·34	29·22	47	45·5		..	
..	Noon.		1	o d	29·65	29·53	44	42	47 47·5	..	
31	..	W.	4	c o g	29·50	29·41	50	47	48·5 48	Cape Spencer, N.5 m.	
January, 1833.											
1	..	VBLE.	5	c o q	29·52	29·38	47	46	47 48	Off Diego Ramirez.	
2	..	W.	7	b c q	29·30	29·20	47	46	47	..	
3	..	S.W.	1	o c g	29·32	29·16	43	44	42 43·5	57·03	69·16
4	..	W.	2	c o	29·38	29·23	45	44	44 43·5	56·48	69·32

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
January, 1833.					Inches.	Inches.	°	°	°	Lat. S.	Long. W.
5	Noon.	W.	4	b c q p	29·56	29·41	44	45·5	45 48·5	56·22	69·34
6	..	..	6	o c g q	29·80	29·64	50	48	49 45·5	56·15	69·23
7	..	W.N.W.	2	c o m	29·44	29·32	48	46	45·5 46·5	56·42	70·57
..	Midt.	..	8	b c q p	29·26	29·12	46	45			
8	2 A.M.	N.E.	10	c g q h p	29·25	29·07	42	43			
..	Noon.	W.N.W.	7	b c q	29·41	29·26	46	45·5	44·5 44	57·06	71·31
9	6 A.M.	..	7	c o q g	29·46	29·28	44	43			
..	Noon.		5	b c	29·56	29·36	45·5	44·5	44	57·18	71·07
10	8 A.M.	N.W.	8	o g q	29·23	29·08	45	44			
..	Noon.			b c m q	29·38	29·25	47	46	46	56·37	71·09
..	4 P.M.	W. b. s.	8	b c q	29·44	29·29	45	44·5	45·5		
11	Noon.	S.W.	7	b c q p	29·44	29·26	47	45·5	48	55·47	70·08
..	Midt.	W. b. s.	8	b c q p	29·58	29·43	45	43·5			
12	2 A.M.	..	7	b c q	29·58	29·42	45	44			
..	4 ..	..	6	b c q	29·58	29·42	46	44·5			
..	6 ..	..	7	o g r q	29·57	29·40	46	45			
..	8 ..	..	7	o g q r	29·52	29·37	46	45			
..	10 ..		8	c o g q	29·49	29·29	46	45	47·5		
..	Noon.		7	c o r g u	29·44	29·26	47	45		56·09	69·20
..	2 P.M.	N.W.	8	c o q r	29·32	29·14	48	46·5			
..	4 ..		10	c o q r	29·26	29·14	47	46	46·5		
..	6 ..		7	c o q r	29·26	29·10	47	46			
..	8 ..		7	c o q r	29·23	29·04	47	46			
..	10 ..		10	b c q	29·16	29·04	46	45			
..	Midt.		10	b c q	29·16	29·04	47	46			
13	2 A.M.		11	o g q h r	29·14	29·00	47	46			
..	4 ..		11	o g q p	29·14	28·98	47	46			
..	6 ..	W.S.W.	10	o g q p	29·17	28·91	47	45			
..	8 ..		10	o p g q	29·20	29·00	46	45			
..	10 ..		11	o c g q r	29·25	29·04	46	44	48		
..	Noon.		11	o c g q p	29·30	29·14	46	44		56·20	69·10
..	2 P.M.		11	b c p	29·37	29·14	47	46			
..	4 ..		11	b c p q h	29·40	29·24	47	46	47·5		
..	6 ..		8	b c q p h	29·40	29·28	47	46			
..	8 ..	S.W.	6	b c q	29·40	29·20	47	46			
14	4 A.M.	N. b. E.	2	b c	29·06	28·97	47	45·5			
..	8 ..	W.S.W.	6	b c q	28·93	28·89	54	52·5			
..	Noon.		10	b c q	28·89	28·90	55	53·5	48·5	Windhond Bay.	
..	4 P.M.	S.W.	8	b c q p	29·14	29·12	48	47	48·5		
..	8 ..		4	b c q p	29·34	29·24	46	45			
15	Noon.	..	6	b c q p	29·74	29·66	52	50·5	48·5 50	Goree Road.	
16	..	N.W.b.W.	4	b c	29·78	29·74	56·5	55	51·5 50	..	
17	..	S.W.	6	b c q p	30·06	29·96	49	46·5	50	..	
18	..	S.	1	b c	29·57	29·54	55	53	49 49·5	..	
19	..		7	b c		29·60	50	47·5	48·5 49·5	..	
20	..		5	b c q		29·87	48	45·5		..	
21	..	S.W.	1	c m p		29·84	53·5	51·5	50 50·5	..	
22	..	N.N.W.	5	b c		29·74	68	63·5	52 54	..	
23	..	S.W.	1	b c		29·50	62	60·5	50·5 54	..	

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.
					Inches.	Inches.	°	°	°	Lat. S. Long. W.
January, 1833.										
24	Noon.	S.	2	c m q d		29·70	52·5	51	51 50·5	Goree Road.
25	..	N.W.	2	b c p		29·80	52·5	50·5	50·5 51·5	..
26	..	S.W.	5	b c		30·18	54	53	51 52	..
27	..	N.W.	4	b c		30·15	62·5	59	52 55·5	..
28	..	S.E.	2	b c		30·00	60	59·5	53·5 55·5	..
29	..	N.	1	c o q		29·88	67	64	53·5 55·5	..
30	..	..	2	c m		29·52	62	59·5	53·5 55·5	..
31	..	N.W.	5	b c		29·52	62	59·5	53 55	..
February.										
1	Noon.	S.S.W.	4	c g r		29·46	54	52·5	52 52·5	..
2	..	N.W.	5	b c q		29·33	61	58	52·5	..
3	..	..	4	b c		29·17	61	57·5	51 52	..
4	..	S.S.W.	5	b c		29·44	53	51·5	50·5 51·5	..
5	..	—	0	b c r		29·57	50	47	51·5 51	..
6	..	N.N.E.	2	c g r		29·35	51·5	49·5	51 51·5	..
7	..	W.	4	b c q		29·38	61·5	59·5	51·5 52	..
8	..	S.W.	5	b c p	29·40	29·36	48·5	46	51·5 51	..
9	..	..	5	c q		29·44	52·5	49·5	50·5	..
10	..	N.W.	2	o g r	29·17	29·18	55	54	50·5 52	Windhond Bay.
11	..	S.W.	5	b c q	29·09	29·07	51	48·5	49·5 50	Nassau Bay.
12	..	S. b. W.	4	b c q	29·38	29·34	50	48	49 50	Packsaddle Bay.
13	..	N. b. E.	1	b c	29·63	29·62	52·5	50	50 50·5	..
14	..	VBLE.	1	b c	29·62	29·62	53·5	51·5	51	..
15	..		4	c m p d	29·50	29·46	50	48	50 50·5	..
16	..	—	0	c g	29·73	29·68	49·5	47·5	50·5	..
17	..	N.E.	2	b c g	29·98	29·94	53	50·5	50·5 51	..
18	8 A.M.	VBLE.	1	b c o	29·67	29·59	54	54		Gretton Bay.
..	4 P.M.	S.S.W.	5	b c o	29·76	29·76	51	52	51·5 51	..
19	Noon.	W. b. N.	1	b c	29·80	29·81	56·5	53·5	51 52	..
20	..	W.	5	b c q p	29·62	29·55	45	43·5	49·5 50	..
21	2 A.M.	S.W.	5	o q p h	29·60	29·57	40	38·5		..
..	Noon.	..	7	b c q p	29·58	29·58	46	44	50 49·5	Oglander Bay.
22	..	..	4	b c p	29·55	29·56	53·5	52	49·5 50·5	Good Success Bay.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
										Lat. S.	Long. W.
February, 1833.					Inches.	Inches.	°	°	°		
23	Noon.	W.S.W.	4	o g p	29·48	29·46	54	51	50 50·5	Good Success Bay.	
24	..	..	1	c g	29·50	29·50	53	50·5	50	..	
25	..	S.S.W.	6	b c q	29·22	29·23	52·5	50·5	50	..	
26	..		5	b c	29·36	29·27	50	49	48 47	54·15	64·27
27	2 P.M.		1	b c	29·75	29·70	44	43	46 47	53·18	63·20
28	Noon.	W.b.S.	5	b c q p	29·31	29·20	49	48	46 46·5	53·20	58·34
March.											
1	..	S.S.W.	4	b c o	29·46	29·45	46	46		Berkeley Sound.	
2	..	S. b. W.	4	c o q p	29·19	29·16	51	47·5	50·5	..	
3	..	W. b. S.	4	c g q	29·19	29·22	56	53·5	51	..	
4	..	W.	4	b c	29·56	29·61	53	51	50·5	..	
5	..		6	b c q	29·57	29·60	54	52	50	..	
6	..	S.W.	5	b c q	29·95	29·93	48·5	46·5	49·5	..	
7	..	W.	4	c g q	29·81	29·81	51·5	48·5	49·5 50	..	
8	6 A.M.	S.E. b. E.	4	c r	29·01	29·00	46	43·5		..	
..	Noon.	S.S.E.	6	c q m r	29·18	29·15	47	43·5	49 48	..	
9	..		4	b c q p	29·51	29·55	48	47		..	
10	8 A.M.	W.b. S.	4	b c q p	28·84	28·85	41	40		..	
..	Noon.	S.S.W.	6	b c q p s	29·00	28·86	41	38	47	..	
..	6 P.M.	S.	11	b c q h	29·09	29·06	40	37·5		..	
11	Noon.	W.	6	c q	29·58	29·56	46·5	45	47·5	..	
12	..	S.W.b. S.	2	b c	29·65	29·64	51·5	48·5	47·5	..	
13	..	N.	1	b c	29·79	29·76	52·5	50·5	48 48·5	..	
14	..	W.b.N.	4	c g q	29·13	29·22	57·5	55	49·5 50	..	
15	..		2	b c	29·10	29·22	61	58	50 50·5	..	
16	6 A.M.	W.S.W.	4	b v	29·56	29·54	43	42·5		..	
..	Noon.	W.b. S.	9	b c q	29·49	29·54	54	52	49·5	..	
..	6 P.M.	..	6	b c q	29·52	29·56	52	50·5		..	
17	Noon.	W.S.W.	5	b c	29·71	29·76	55·5	52·5	49·5	..	
18	2 A.M.		6	c t l r							
..	Noon.	N.W. b. N.	6	b c m q	29·01	29·06	53·5	51·5	50 49·5	..	
19	..	W. b. S.	5	b c	29·16	29·16	53	50·5	49·5	..	
..	Midt.		4	b c	28·64	28·72	47	46		..	
20	2 A.M.	S.S.W.	9	b c q r d	28·86	28·86	41	40		..	
..	Noon.	S.W.	6	b c q	29·26	29·21	46	43·5	48 48·5	..	
21	..	—	0	b c	29·58	29·55	47·5	45·5	48·5 49·5	..	
22	..	E. b. S.	4	c g r	29·74	29·71	46	43	48	..	
23	..	S.S.W.	5	b c g	29·96	29·93	47·5	46	48	..	
24	..	W.	4	b c	30·15	30·15	49	47	48	..	
25	..	N.	2	c g	29·73	29·75	50	49	48·5 49	..	
26	..	W.b. S.	5	b c q	29·41	29·43	50	48	48	..	
27	..	S.S.E.	1	b c	29·48	29·48	46	44·5	47·5	..	
28	..	W.b. S.	5	b c	29·46	29·45	45·5	44	47 47·5	..	
29	..	..	4	b c p	29·38	29·39	48·5	47	48 47·5	..	

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
					Inches.	Inches.	°	°	°	Lat. S.	Long. W.
March, 1833.										Berkeley Sound.	
30	Noon.	W.S.W.	6	b c q h	29·32	29·28	43·5	41	46·5		
31	..	S.W.b.W.	6	b c q	29·40	29·27	43	40·5	46·5	..	
April.											
1	Noon.	S.W.	4	b c	29·95	29·82	45	43	46	..	
2	..	W. b. S.	2	b c	30·00	29·93	46	44	46 46·5	..	
3	..	..	2	b c	29·85	29·74	46·5	45	46·5	..	
4	..	S. b. W.	4	o g p h	30·04	29·92	41	39	45	..	
5	..	S. b. E.	5	b c	30·20	30·07	44·5	43	45	..	
6	..	S. b. W.	4	b c q p r h	30·28	30·15	44	42·5	46	..	
7	..	N.E.	5	c o q	29·90	29·75	45	43	47	50·28	59·10
..	6 P.M.	..	12	c q t	29·32	29·20	42	40			
..	Midt.		4	c o p r	28·20	28·90	44	44			
8	4 A.M.	S.E.	8	c o q	28·06	28·94	45	42			
..	8 ..	..	4	c o g q	28·26	28·48	43	42			
..	10 ..	..	9	b c q	28·29	28·60	46	45			
..	Noon.	..	7	b c q	28·73	28·50	45	42		49·04	59·55
..	2 P.M.	..	10	o c q	28·86	28·76	46	42			
..	4 ..		8	o c q	28·90	28·74	45	42			
..	8 ..	S.W.	6	c o	29·60	28·96	43	41			
9	Noon.	S.E.	4	b c p	30·36	30·24	45	43	48 50	47·12	61·36
10	..	W.S.W.	1	b c v	30·62	30·54	51	48·5	53 54·5	45·15	62·50
11	8 A.M.		7	o c g q	30·27	30·17	54	53			
..	Noon.	N.N.W.	5	b c	30·12	30·02	56	54	54	44·59	63·01
..	8 P.M.	N.W.	4	b c	29·98	29·94	55	55	54·5		
12	Noon.	S.E.	6	c o p	30·22	30·12	53	51	56·5 57·5	43·01	62·20
13	..	VBLE.	4	c o	30·28	30·22	55	53	58 60	River Negro.	
14	..	N.E.	4	b c	30·30	30·22	56	54	59 59·5	41·08	62·37
15	..	..	2	b c	30·17	30·14	57	56	58·5 61	41·16	62·52
16	..	VBLE.	5	b c	30·41	30·38	54	53	59	41·58	64·33
17	..	N.	1	b c	30·23	30·20	58	55	59·5	42·23	64·19
18	..	N.W.	4	b c	30·20	30·18	60	60	60 60·5	41·46	62·32
19	..	..	5	b c	29·92	29·96	63	62	60 60·5	41·19	63·38
..	Midt.	N.W.b.N.	6	b c q	29·73	29·73	65	65			
20	4 A.M.		8	c o g q l	29·70	29·65	65	62			
..	Noon.	S.W.b.W.	6	b v	29·76	29·70	65	64	60·5 60	40·41	60·34
21	..	N.N.W.	4	b c m	30·03	30·03	61	61	57·5 57	39·33	58·15
22	..	N.W.	4	b c m	29·72	29·70	63	62	58·5 59·5	37·49	58·11
23	..	W.	4	c o	29·94	29·92	62	60	58·5	37·56	56·20
24	10 A.M.	N.E.	6	c o g t l r	29·80	29·78	64	62			
..	Noon.		5	c g r	29·68	29·68	63	61		36·56	55·36
..	2 P.M.	N.E. b.E.	8	o c r p q	29·56	29·60	64	62	61·5		
..	10 ..	—	0	o g l t r	29·56	29·64	65	63			
25	4 A.M.	..	0	o g l p	29·64	29·70	64	62			
..	Noon.	VBLE.	4	c o	29·82	29·82	63	60	60 63·5	37·07	55·27

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.
					Inches.	Inches.	°	°	°	Lat. S. Long. W.
April, 1833.										
26	Noon.		4	o c	30·21	30·15	61	57	64 62	Monte Video.
27	..	S.S.E.	5	o c q	30·34	30·32	57·5	55·5	61·5 61	..
28	..		4	b c	30·45	30·43	60	58	64	Maldonado.
29	..	N.N.E.	4	c g r	30·35	30·37	66	64	64·5 64	..
30	..	S.S.E.	4	c o	30·19	30·20	65	64	63·5	..
May.										
1	..	N.	1	b c	30·18	30·21	69	67·5	64·5 65·5	..
2	..	N.N.E.	1	b c g	30·12	30·16	67·5	65	65 64·5	..
3	8 A.M.	N.	2	b c o l t	30·06	30·10	68	65		..
..	Noon.	VBLE.	1	b c p o t	30·05	30·12	71	68·5	63·5	Monte Video.
..	6 P.M.		0	c o p l	30·05	30·11	67	64·5		..
4	Noon.	N.N.W.	5	b c	29·95	30·02	76	72·5	65	..
5	..	..	5	b c	29·90	29·93	77	75		..
6	..	N.	5	c q r l t	29·78	29·87	70	67	64·5	..
7	2 A.M.	S.S.E.	8	o c q p g	29·97	29·97	62	60·5		..
..	Noon.	S.E.b.S.	5	b c g q	30·29	30·26	63	61	63·5 63	..
8	..	S. b. E.	4	b c	30·48	30·47	58·5	56·5	62	..
9	..		4	b c	30·44	30·44	58	56		..
10	..	S. b. W.	4	b c	30·32	30·32	58	56	60	..
11	..	W.N.W.	2	b c g	30·33	30·31	58	58·5	58·5	..
12	..	N.W.	4	b c	30·15	30·14	59	60		..
13	..	VBLE.	1	b c	30·13	30·19	63·5	67		..
14	..	N.E. b. E.	4	c g	30·04	30·05	64	62	58·5	..
..	6 P.M.	..	5	o c q l	29·91	29·97	63	61·5		..
15	Noon.	N.N.E.	2	b c p	29·48	29·57	65·5	63·5	59·5	..
..	6 P.M.	N.N.W.	6	c q r l	29·45	29·52	63	61	62	..
16	Noon.	S.W.b.W.	5	b c q	29·82	29·79	59·5	58	60	..
17	..	S.E. b. S.	1	b c g	30·09	30·07	59	57·5	59 59·5	..
18	..	S.W.	4	c o	30·14	30·12	61	59	61	Maldonado.
19	..	W.S.W.	4	b v	30·32	30·32	60	58	60	
20	..	N.N.W.	4	b c v	30·32	30·32	64	62·5	58·5 60·5	
21	..	N.	5	b c	30·40	30·37	67	65	58·5 60·5	Monte Video.
22	..	..	2	b c	30·34	30·37	69	65·5	60·5 63	..
23	..	N.E.	4	b c m	30·33	30·39	64	62	61 62·5	
24	..	..	4	b c v	30·38	30·42	67	65·5	62 64	Maldonado.
25	..	N.b.W.	2	b c	30·29	30·34	70·5	68	65 65·5	..
26	..	N.N.W.	5	b c	30·19	30·26	72	70·5	65 65·5	..
27	..	N.W.	4	b c	30·20	30·23	73	70	65 66	..
28	..	S.	1	b c	30·17	30·23	67	67·5		..
29	6 A.M.	N.	5	c g t l r	29·96	30·04	63	61		..
..	Noon.	N.W.	2	c g	29·93	29·98	65	62		..
..	6 P.M.	W.S.W.	2	c g d	29·97	30·03	64	62·5	64·5	
30	Noon.	S.E.b.E.	7	b c q g	30·13	30·15	63	61·5	63	..

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.
May, 1833.					Inches.	Inches.	°	°	°	Lat. S. Long. W.
30	6 P.M.	E.	7	b c q	30·14	30·18	62	60·5		Maldonado.
31	Noon.	E.b. N.	6	o c m	30·17	30·21	65	63		..
June.										
1	6 A.M.	N.E.b. E.	10	o c m q	29·94	30·01	62	61	64	
..	Noon.	N.E.	9	o c q w m	29·90	29·95	65	63	64	..
..	6 P.M.	N.E. b. N.	4	c g r	29·81	29·89	65	63	64·5	
2	6 A.M.	S.W. b. S.	8	c g q r	29·94	29·95	58·5	55·5		
..	Noon.	S.W. b. W.	6	b c g	30·02	30·03	61	59	63·5	..
..	6 P.M.	W. b. S.	5	b c	30·10	30·10	59	58		
3	Noon.	W.	2	b c	30·22	30·24	62	69	62·5	..
4	..	E.	5	c g	30·22	30·24	61	59·5	61 61·5	..
5	..	S.E. b.E.	5	o g q r	29·94	29·95	58	56·5	62·5	..
6	..	S.S.E.	6	o g q m	29·84	29·86	61	59·5	62·5	..
..	8 P.M.	..	7	o g q d	29·88	29·92	59	58		
7	Noon.	W. b. S.	4	b c	29 97	29·98	60	60	60·5	..
8	..	W.	2	b c	30·06	30·08	59	58	59 59·5	..
9	..	N.W.	2	o g	29·72	29·74	56	54	58	..
..	2 P.M.	..	2	c g	29·66	29·68	57	56	59	
10	8 A.M.	W.	11	b c q	29·86	29·84	50·5	50		
..	Noon.	W. b. S.	10	b c q	29·96	29·94	53	51·5	56·5	..
..	4 P.M.	W.S.W.	10	o c g q	30·04	30·01	54	52·5		
11	Noon.	W.	1	b c	30·32	30·28	49	51	56·5	..
12	..	N.N.E.	2	b c	29·96	29·96	53·5	53	55·5	..
..	Midt.	W.	4	b c l	30·09	30·03	58	56	56	
13	Noon.	S.W.	4	b c m	30·21	30·20	60	58·5	56 56·5	..
14	..	N.	1	b v	30·32	30·32	60	60	56	..
15	..	N.N.E.	2	o g	29·90	29·92	61	59	59	..
16	..	S.W.	5	b c q	30·21	30·21	55	54	56·5 56	..
17	..	E.S.E.	1	b c	30·44	30·43	52	51	56·5 55	..
18	..	N.W.	4	b c	30·34	30·29	54	52	54	..
19	..	..	4	b c	30·25	30·22	59	58	53 54	..
20	..	..	2	b c	30·19	30·20	69	66	54·5	..
21	..	W. b. S.	1	b c v	30·32	30·32	61	61	54·5 55·5	..
22	..	N.	2	b c v	30·30	30·31	72	67·5		..
23	..	..	2	c o p	30·23	30·25	60	58	54·5	..
24	..	N.N.W.	5	b c	30·04	30·08	70	69	58	..
25	..	S.	2	o c q p	30·02	30·14	62	60	56·5	..
26	..	N.	2	b c g	29·98	30·02	60	59		..
27	..	W. b. N.	5	b c q	30·16	30·16	54	57	54·5 56	..
28	..	W.N.W.	4	b c	30·10	30·12	60	58		..
29	..	VBLE.	2	b c q	29·88	29·95	60	60	55 55·5	..
30	..	S.S.E.	4	o g	30·06	30·09	54	53	54·5 54	..
July.										
1	..	S.S.E.	6	o q g	30·17	30·14	54	52	54·5	..
2	..	S.	4	b c	30·33	30·34	52	51	53·5	..
3	..	S.E.	2	g c	30·48	30·46	54	53	52·5	
4	10 A.M.	S.W.	2	o r	30·34	30·43	48	47	51·5 52	..

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Day.	Hour.	Winds	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
July, 1833.					Inches.	Inches.	°	°	°	Lat. S.	Long. W.
5	Noon.	S.W.	5	b c	30·35	30·31	50	48	51 52·5	Maldonado.	
6	8 A.M.	..	2	b c g	30·40	30·36	47	46	51	..	
7	Noon.	S.E.	4	o c p	30·27	30·27	53	51	51	..	
8	..	..	5	b c	30·46	30·44	51	50	51	..	
9	..	..	5	o g	30·36	30·32	50	48	49·5 49		
10	8 A.M.	S.	5	o g q d	30·30	30·26	47	45·5		Monte Video.	
11	Noon.	S.W.	5	o c g	30·26	30·22	48	47·5	47·5	..	
12	..	W. b. S.	5	b c v	30·44	30·40	48	47		..	
13	..	W.N.W.	4	b c v	30·42	30·40	53	55	46·5	..	
14	..	N.W. b.W.	5	b c	30·29	30·30	54	55	49 50·5	Maldonado.	
15	..	W.N.W.	4	b c	30·16	30·20	58	60	49·5	..	
16	6 A.M.	N.	1	b c	30·10	30·15	50	49	51 52	..	
17	8 ..	S.E.	4	b c m	30·28	30·32	51	50	50·5	..	
18	Noon.	S.W.	1	c f	30·12	30·14	58	57·5	52	..	
19	..	E.	1	b f f	30·25	30·30	51	50	50 50·5	34·55	54·29
20	..	N.	5	b c	30·15	30·16	55·5	55	50	35·14	53·17
21	..	N E.	4	b m	29·97	30·03	56	56	52 54·5	34·56	
22	..	N.	4	b c q	29·82	30·90	62	61	53 54·5	Maldonado.	
..	Midt.	N.E.	4	b c q l	29·58	30·74	64	63			
23	Noon.	W.	5	o g q p	29·64	30·68	56	54·5	52·5	..	
24	..	N.	4	b c	30·02	30·05	55	53	52	..	
25	..	S.	4	o g d m	29·95	29·95	53	51	51 51·5	35·28	
..	6 P.M.	S.S.W.	7	b q p	30·04	30·01	52	51·5			
26	Noon.	..	4	b c	30·39	30·39	50	49·5	51	35·33	
27	..	W. b. N.	4	b c q	30·34	30·35	49	48	46·5 45·5	35·57	
28	..	N.W.	4	b c	30·29	30·24	48	47	44·5 45	38·09	
29	..	W.	4	b c	30·06	30·01	48·5	48	45 46	39·54	
30	..	N. b. W.	5	b c q	29·88	29·80	49	48·5	46 45·5	40·55	
..	8 P.M.	S. b. W.	7	b c q	29·98	29·89	46	45			
31	Noon.	VBLE.	1	b c	30·21	30·18	48	50	45·5	40·56	
August.											
1	Noon.	N.W. b. N.	7	b c q m	29·86	29·82	50	48	48·5 50	41·19	
2	..	W. b. S.	2	b c	30·10	30·10	54	53·5	51·5 52	41·24	
3	..	N.E. b. N.	4	b c	30·12	30·11	54	53	49·5 50	Off River Negro.	
4	..	N.W.	2	b c	29·93	29·93	52	50·5	49		
5	..	S.			30·18	30·12	52	50	46 48·5	41·02	
6	..	—	0	b c	30·28	30·30	52	51	48·5 49	40·21	
7	..	E. b. N.	2	b c	30·25	30·30	51	49	47·5 48·5	40·08	
8	..	W.N.W.	4	b c	29·98	30·02	53	51·5	51	41·18	
9	..	S.	4	o c g	30·08	30·08	48	48	52 51	41·14	

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
August 1833.					Inches.	Inches.	°	°	°	Lat. S.	Long. W.
10	10 A.M.	S.W.	1	o g	30·04	30·01	44	43	51 51·5	Off Port San Antonio	
11	Noon.	S.S.E.	4	b c	30·10	30·10	47	46	51 51·5		
12	..	N.W.	4	b c	30·10	30·10	47	48	50·5 48	41 12	
13	..	E. b. N.	4	b c	30·08	30·12	47	46·5	48·5 50	Off River Negro.	
14	..	N.N.W.	6	o g q p	29·67	29·65	49	48·5	50	42·10	63·00
15	..	S.E. b. E.	6	o g r	29·72	29·67	47	46	50	41·40	61·58
16	..	N.W. b. N.	4	b c	29·93	29·83	47	46·5	50	41·27	Off River Negro
17	8 A.M.	S.S.W.	9	o g q m	29·68	29·63	49	47·5	49·5		
..	Noon.	S.	6	o g q p	29·84	29·82	49	48	49		
18	..	N.N.W.	5	o g r	30·07	30·03	45	43	49·5		
19	..	N.	2	o g	29·76	29·76	50	50	49		
20	..	W.	2	b c	29·83	29·82	50	49·5	49·5	41·08	
21	..	N.W. b.W.	5	b c q	29·94	29·90	53	51·5		39·54	
22	..	W.S.W.	2	c g	29·96	29·95	50	49	49·5 49	39·03	
23	8 A.M.	S. b. E.	4	o c r	30·00	30·04	48	47	48		
24	Noon.	S.W.	4	b c	30·27	30·26	48	47	47 49·5	Standing up Blanco Bay.	
25	..	N.W.	6	b c q	30·15	30·14	51	50	48 49	Blanco Bay.	
26	..	S.S.W.	5	b c q	30·08	30·11	52	51	48·5	..	
27	..	E.S.E.	1	b c	30·41	30·46	52	51	48·5	..	
28	..	W.N.W.	4	b c m	30·10	30·19	57	55	49 48	..	
29	..	N.W.	5	b c m	29·90	30·08	58	57		..	
30	..	W.N.W.	2	b c	29·92	30·01	60	59		..	
31	..	N.	2	b c m	29·97	30·04	61	63·5		..	
September.											
1	Noon.	—	0	b c	30·12	30·18	57	77	50	..	
2	..	W.S.W.	5	b c	29·98	30·04	52	56	50	..	
3	8 A.M.	..	4	b v	30·23	30·24	45	44	49·5 49	..	
4	Noon.	W. b. N.	4	b q	29·97	30·10	63	67	50 52	..	
5	..	S.S.E.	4	b c m	30·37	30·45	55	63	51·5	..	
6	..	N.W. b. W.	5	b c q	30·22	30·19	54	53	50 50·5	..	
7	..	W.N.W.	5	b m	29·71	29·77	57	57	50·5	39·11	
..	8 P.M.	N.N.W.	2	o c	29·56	29·51	57	55			
8	8 A.M.	S.S.W.	6	b q	29·94	29·98	50	49			
..	Noon.	S.	6	b q	30·03	30·08	51	50	49·5	39·30	Off Brightman Inlet.
..	4 P.M.	..	9	b c q m	30·24	30·19	53	48	49·5		
9	Noon.	W. b. S.	4	b c	30·22	30·24	50	48	49 50	40·00	
10	4 A.M.	N.	5	b q	29·95	30·04	48	49			
..	Noon.	N. b. W.	7	c g q m	29·95	29·95	49	48·5	49·5 50	39·53	
11	4 A.M.	N.N.W.	5	b q	29·81	29·87	50	48			
..	Noon.	..			29·90	29·96	54	55	50·5 51	40·15	
12	..		4	o c	30·01	30·03	48	48		40·12	
13	..	N. b. E.	1	b c	30·04	29·93	54	52.5	47·5	39·45	

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
										Lat. S.	Long. W.
September, 1833.					Inches.	Inches.	°	°	°		
14	Noon.	S.S.W.	5	o g t	29·69	29·72	50	48	48 48·5	39·05	
..	Midt.		6	o c q m	29·96	30·06	52	49			
15	Noon.	S.	4	b c m	30·10	30·17	53	52	51 54	36·42	
16	..	E.S.E.	4	b c	30·12	30·18	55	53·5	56·5 56	Monte Video.	
17	..	S.E. b. E.	5	b c q	30·02	30·12	55	56	56 55·5	..	
18	..	..	6	c q m	30·04	30·13	56	55	54·5 54		
19	..	..	7	c m q r	30·00	30·00	54	53·5	53·5		
..	Midt.	E.S.E.	9	o g q r	29·81	29·96	55	54		Maldonado.	
20	4 A.M.	S.E. b. E.	6	o g q r m	29·77	29·90	55	54			
..	Noon.	S.W.		b c q	29·83	29·96	57	56·5	53·5 54·5	..	
21	..		4	b c q	30·04	30·15	56	56	55·5		
22	..	N.W.b.N.	4	b c g	29·93	30·11	64	65	56·5	Monte Video.	
23	10 A.M.		5	b c	29·71	29·96	71	71	58* 59	..	
24	2 A.M.	E.N.E.	6	b c g l	29·85	30·02	58	58			
..	Noon.	E.S.E.	5	c g q	29·88	29·93	57	57	55 54	36·27	
25	..	E.b.N.	1	b c v	30·00	30·07	56	57	54 54·5	36·29	56·26
26	..	S. b. W.	5	b c	30·12	30·17	51	51	50·5 51·5	37·37	57·03
27	..	N.W.	2	b m	30·07	30·11	58	57	50·5 52	38·05	57·19
28	..	S.S.E.	6	b c m	30·17	30·21	52	48	50·5 52·5	37·46	56·58
29	..	N.E.	2	b c	30·44	30·49	52	51	53 54		
30	10 A.M.	N. b. E.	4	b c q	30·30	30·36	53	52	54·5 57	36·14	56·42
October.											
1	Noon.	N.E.	4	b c	29·96	30·03	61	62	57	Off Sanborombon Bay.	
2	4 A.M.	S.E.	6	c o l t q	29·50	29·66	60	59	58	..	
..	Noon.	..	5	c g	29·65	29·73	59	58	57·5 58·5	..	
3	..	S.S.E.	6	b c m	30·06	30·16	55	54	58 57·5		
4	..	E.	5	c o q	29·96	30·10	60	58	57·5 58	Monte Video.	
5	..	S.W.	4	c g m	29·82	30·94	58	57	57·5 58	..	
6	..	W.S.W.	4	b c	29·94	30·14	60	60	57·5	Maldonado.	
7	..	W.	1	b c	30·00	30·20	63	61·5	56·5	..	
8	..	E	4	b c	30·07	30·20	59	58	57·5 57	..	
9	..	VBLE.	2	c g	29·72	29·88	61	60	57·5	..	
..	10 P.M.	S.E.	1	o g t l	29·56	29·82	62	60			
10	Noon.	S.W. b. W.	1	o r	29·66	29·84	57	56·5	56·5	..	
11	..	E.	2	o c	29·96	29·05	60	59	56·5 57·5	..	
12	10 A.M.	E.S.E.	4	b c m	29·96	29·14	66	68	58·5	..	

* Temperature of water taken at 9 A.M. and 6 P.M. from this date.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.
October, 1833.					Inches.	Inches.	°	°	°	Lat. S. Long. W.
13	Noon.	—	0	o r	30·14	29·24	52	51	56·5 56	Maldonado.
14	..	S.E.	5	b c	30·16	29·30	59		56·5	..
15	..	E.	4	b c q	30·24	29·40	59	57	57 57·5	..
16	8 A.M.	E.N.E.	5	b c q	30·16	29·30	60	59	57 55	..
17	10 A.M.	W.N.W.	2	o g r t l	29·65	29·87	58	57	54	..
18	Noon.	W.S.W.	4	b c	29·76	29·91	61	58·5	54 54·5	..
19	..	E.	1	b c	29·90	30·12	67	65·5	56·5 62	..
20	..	S. b. W.	4	o c	29·98	30·16	62	61	59 61·5	
21	..	S.S.E.	4	b c	30·24	30·36	61	60	61 62	
22	10 A.M.	N.E.	2	b c	30·19	30·31	59	57	61·5 62	Monte Video.
23	Noon	W.S.W.	2	b c	29·91	30·20	67	67	63·5	..
24	..	N.E.	4	b c q		30·10	74	73	64·5 67	..
25	..		5	o g q	29·49	29·80	70	70	62	..
..	4 P.M.	N.W.	4	o g q l t	29·19	29·58	74	73		
..	5 ..	W.N.W.	9	g r q l t						
26	Noon	S.S.W.	4	b c	29·72	29·96	68	68	65	..
27	..	E.N.E.	5	b c g	29·92	30·18	67	62		..
28	..	S.W.	5	b c q	29·54	29·81	67	67		..
29	..	..	5	b c q	29·98	30·10	56	56		..
30	..	S.E.	1	b c	30·15	30·36	61	61		..
31	10 A.M.	E.N.E. E.	5	b c q	30·01	30·21	61	60	60·5	..
..	8 P.M.	E.N.E.	6	c q p	29·77	29·99	58	57		
November.										
1	Noon.	E.S.E.	2	c g m	29·81	30·01	60	60		..
2	..	S.	1	b c	29·86	30.06	63	62		..
3	..	S.E.	4	b c	30·14	30·27	58	58		..
4	..	S.S.W.	1	b c m	30·14	30·40	63	62		..
5	..	N.N.E.	4	b v	29·94	30·24	66			..
6	..	S.W.	4	b c m	29·59	29·94	71	70		..
7	..	E.S.E.	5	o c m	29·87	30·12	65	64		..
8	..	E.	5	o m q p	29·85	30·05	64	63		..
9	..	S.E.	2	b c m	29·75	30·02	62	62		..
10	..	E.N.E.	4	b m	29·80	30·09	68	67		..
11	..	S.E.	2	b c v	29·80	30·15	69	71		..
12	..	N.E.	5	b c m q	29·70	30·04	72	70		..
..	10 P.M.	—	0	o c r t l	29·64	30·00	68	67		
13	6 A.M.	N.E.	4	o c r t l	29·51	29·81	66	64		
..	Noon.	W. b. S.	4	b c q	29·50	29·82	70	70		..
14	..	E. b. S.	2	b c m	29·77	30·07	67	66		..
15	..	W.	4	b c q m	29·78	30·13	70	70		..
16	..	S.W.	1	b c m	29·93	30·33	73	72		..
17	..	W.	4	b c m	29·61	30·08	79	79		..
18	..	S.E.	2	b c m	29·87	30·25	70	69		..
19	..	N.N.W.	1	b m*	30·28	30·28	72	71		..
20	..	N.	4	b c m	30·10	30·16	75	75		..
21	..	S.	5	b c m q	30·29	30·24	67	66		..
22	..	S.E. b. S.	1	b c m	30·46	30·40	66	65		..

* 10 A.M. 19th, set Sympr. by Barom.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
November, 1833.					Inches.	Inches.	°	°	°	Lat. S.	Long. W.
23	10 A.M.	N.N.E.	4	b c m q	30·37	30·37	71	71			
24	Noon.	S.	2	b c m	30·11	30·23	78	78			
25	..	N.W.	5	b c m q	29·86	30·10	85	84			
26	10 A.M.	S.W.	2	b c m	29·90	30·06	81	80			
..	Midt.	VBLE.	7	o g q r l t	29·94	30·01	72	73			
27	6 A.M.	E.	6	o c q r l	29·98	30·00	68	67		Monte Video.	
..	Noon.	N.N.E.	4	b c	29·86	30·00	77	75		..	
28	..	E.S.E.	4	o m	29·79	29·94	78	77		..	
..	4 P.M.	E. b S.	4	o g t p	29·76	29·89	73	72		..	
29	2 A.M.	S.W.	2	q o r l t	29·82	29·93	71	70		..	
..	Noon.	S.	4	b c q	30·05	30·08	72	71		..	
30	..	S.S.E.	2	b c m	30·20	30·26	71	70		..	
December.											
1	8 A.M.	N.	2	b c m q	30·15	30·15	69	67		..	
2	Noon.	W.	5	b c q	29·91	30·04	77	76		..	
3	..	N.N.W.	2	o c q m	29·90	30·04	76	75		..	
4	..	S.	4	m	30·05	30·09	72	70		..	
5	..	N.	1	b m	30·08	30·20	75	74		..	
6	..	N.W.	2	b c m g	29·99	30·06	75	75			
7	..	W.	4	b c m	29·85	30·01	77	76		35·28	56·32
8	2 A.M.	S.	1	b c g t l	29·57	29·78	76	74			
..	Noon.	VBLE.	2	b c m	29·54	29·64	74	73		36·46	56·25
..	10 P.M.	S. b. E.	7	b c g m l	29·80	29·70	61	60			
9	Noon.	S.E.	5	o r q	29·88	29·74	58	56		37·12	56·09
10	4 A.M.	..	5	o c m r l	29·83	29·67	54	55			
..	Noon.	S.S.W.	4	b c	29·83	29·70	59	60		37·10	56·36
11	4 A.M.	W. b. N.	8	b c g l	29·85	29·74	56	55			
..	Noon.		7	b c	30·05	29·85	60	58·5		37·56	56·49
12	..	W.	1	b c m	30·28	30·19	63	62		37·49	
13	..	E.N.E.	4	b c	30·24	30·15	62	61		39·02	57·13
14	..	W.	2	b c m	29·84	29·74	60	59		41·15	58·24
15	..	..	4	b c m	29·92	29·82	59	58	54 50	42·13	58·38
16	..		4	o c q	29·66	29·46	53	52	48·5 51	43·27	59·23
17	..	S. b. W.	4	b c	29·73	29·53	54	53	48·5 51·5	43·29	59·28
18	..	VBLE.	4	b c q	30·05	29·83	49	47	50·5	43·31	59·48
19	..	W.	4	b m	30·28	30·00	56·5	55	53·5	43·18	60·00
20	..	N.W.	4	b c q	30·10	29·90	57	57	53 54	44·12	60·46
21	..	E.S.E.	4	b c q	30·39	30·20	55	54	54 53·5	45·13	62·52
22	..	N.W.	4	b c m	30·23	30·05	57	56	53 52	46·31	64·05
23	..	E.	2	b c m	30·12	30·03	57	58	50 52·5	47·38	65·29
24	..	S.S.E.	4	b c	30·12	30·04	69	68	53 55	Port Desire.	
25	..	N.E.	4	b c	30·13	30·06	62	61·5	53·5	..	
26	..	S.	7	b c q m	29·78	29·73	64	63	54	..	
..	4 P.M.	S.S.E.	10	b c q m	29·88	29·78	57	56	53·5	..	
27	Noon.	S.	7	b c q	30·19	30·02	52	52	53·5	..	
..	2 P.M.	..	8	b c q	30·16	30·04	54	54		..	
28	Noon.	W.	4	o g	30·20	30·10	55		53	..	
29	..	E.N.E.	5	b c	30·30	30·13	58	57	53·5	..	
30	..	N.N.E.	4	o c	30·17	30·07	58	58	53·5 53	..	
31	8 A.M.	N.E.	4	o c	30·00	29·98	55	54	53·5	..	

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
					Inches.	Inches.	°	°	°	Lat. S.	Lat. W.
January, 1834.											
1	Noon.	S.S.E.	6	o g q	30·18	30·00	53	52	52·5	Port Desire.	
2	..	S.E.	4	b c	30·40	30·20	54	53	52·5	..	
3	..	W.	2	b c	30·62	30·38	57	54	52	..	
4	..	N.E.	4	b c	30·15	30·05	61	60	53	..	
5	..	N.	2	b f	29·74	29·76	64	63·5	51 51·5		
6	..	VBLE.	1	b c m	29·36	29·52	62	61	50·5 51	48·37	66·01
7	..	S.W.	4	b c m	29·81	29·79	64	63	51·5 53	48·46	
8	..	..	5	b m	29·88	29·88	69	68	53 50·5	48·17	66·44
9	..	W.N.W.	4	b c m q	29·63	29·69	72	71	52 54·5	Off Port St. Julian.	
10	..	W. b. N.	4	b c m q	29·76	29·81	73	72	54·5	Port St. Julian.	
11	8 A.M.	W.	8	b c q	29·62	29·62	67	71	55		
..	..	W.S.W.	4	b c q	29·59	29·67	70	72	55·5	..	
12	..	N.E.	4	b c m	29·86	29·83	63	62	55 56·5	..	
13	..	N.W.	4	c q m	29·54	29·51	63	62	56	..	
..	8 P.M.	S.E.	2	c m q p t l	29·64	29·65	60	59			
14	Noon.	E.	4	b c q m	29·76	29·76	59	57	57	..	
15	..	S. b. W.	6	o c p	29·72	29·70	58	57	56	..	
..	4 P.M.	S.	9	b c q	29·56	29·56	61	61			
16	Noon.	..	8	c q m p	29·92	29·82	59	58	55	..	
17	..	E.	2	o m	29·96	29·88	61	61·5	55	..	
18	..	N.N.E.	6	o m r q	29·90	29·76	53	52	54·5 54	..	
19	..	S.E.	4	c o q	30·02	29·85	52	51	52·5 51·5		
20	..	E.S.E.	4	b c	29·88	29·78	57	56	52·5 54·5	Off Port Desire.	
21	10 A.M.	W.N.W.	4	b c	29·93	29·88	64	63	55	Port Desire.	
22	Noon.	W.	4	b c q m	29·76	29·80	68	67	56 55·5		
23	..	W. b. N.	5	b c	29·52	29·55	69	67	55	48·20	
..	Midt.	W. b. S.	7	b c m q	29·79	29·74	56	55	53		
24	Noon.	W.	4	b c	30·04	29·94	55	54	52·5 53·5	49·37	66·03
25	..	N.N.W.	4	b c o	29·79	29·71	58	56	51·5 52·5	51·16	67·19
26	..	N.	4	b c	29·40	29·44	67	65·5	53		
..	10 P.M.	S.W.	7	o c g q p	29·37	29·30	57	56			
27	Noon.	W.N.W.	7	b c q	29·42	29·35	61	61	53	Possession Bay.	
..	4 P.M.	W.S.W.	10	b c q	29·50	29·46	60	59			
28	10 A.M.	..	8	b c q	29·76	29·66	57	59	52·5	First Narrow.	
..	Noon.	S. b W.	5	b c q	29·80	29·70	57	56	52·5		
29	..	W.S.W.	6 10	b c q	29·64	29·48	56	55	52·5		
..	6 P.M.	S.W.	8	b c q	29·68	29·60	57	56	51	Gregory Bay.	
30	Noon.	W.S.W.	4	b c q	29·82	29·70	53	52	50·5 49·5	Second Narrow.	
31	..	E. b. S.	4	b c m	29·74	29·64	52	51	50 50·5	Shoal Harbour.	
February.											
1	Noon.	N.W.	1	o c	29·88	29·80	59	57·5	49·5 50·5	Off Cape Negro.	
2	..	N.	2	b c m	29·76	29·76	59	59	51·5 50	Port Famine.	

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.
					Inches.	Inches.	°	°	°	Lat. S. Long. W.
February, 1834.									50	
3	Noon.	N.	4	o g p	29·61	29·51	57	56	49·5	Port Famine.
									48·5	
*4	..	W.S.W.	5	b c q	29·54	29·44	56	56	49	..
									48	
									48	
5	..	S.	1	c m p	29·68	29·63	53	51·½	48·5	..
									48	
									48	
6	..	S.S.W.	6	b c q	30·17	30·04	53·5	52·5	49·5	..
									50	
									47·5	
7	..	N.	1	b c	30·34	30·25	53	54	49·5	..
									51·5	
									50·5	
8	..	E.N.E.	2	c m r	29·98	29·88	54	51·5	51	..
									51	
									49·5	
9	..	N.	2	b c m p	29·93	29·84	55	53	50	..
									53	
									48·5	
10	..	S.E.	2	b c	30·16	30·04	55	54	53·5	..
									51·5	
									50·5	
11	..	..	1	b c m	30·01	29·96	57	56	51·5	
									51·5	
									50·5	
12	..		1	b c	29·94	29·84	58	57·5	53·0	Second Narrow.
									53·5	
									52·5	
13	..	S.W.	5	b c q	29·97	29·88	58	60	54	First Narrow.
									53·5	
									53	
14	..	N. b. E.	4	b c m	30·13	30·04	58	57	54	52·33
									53	
15	..	N.E.	4	b c m	29·52	29·48	57·5	56·5	55	52·33
..	4 P.M.	N.W.	4	o g q r t l	29·50	29·50	58	56	52·5	
									52·5	
16	Noon.	N.N.E.	4	b c	29·46	29·38	56	56	52	52·47
..	Midt.	S.W.	6	b c q	29·60	29·52	50	48	54·5	
									53·5	
17	Noon.		5	c o q	29·62	29·54	54	53	53	Off San Sebastian Bay.
..	10 P.M.	N.N.W.	7	b c g	29·20	29·32	54	53·5	53·5	
									53·5	
									53	
18	Noon.	W. b. S.	5	b c	29·24	29·36	55	53·5	52	..
									52·5	
									51·5	
19	..	N.N.E.	2	b c	29·41	29·30	54	53	53·5	54·01
									51·5	
									49·5	
20	..	S.S.E.	5	b c q	29·90	29·69	46	44	49·5	
									50·5	
									49	
21	..	S.	5	b c q	30·04	29·88	48	46	49·5	San Vicente Bay.
									49	

* Temperature of water taken from this at 8 A.M., 1·30, and 7 P.M.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
					Inches.	Inches.	°	°	°	Lat. S.	Long. W.
February, 1834.									49		
22	Noon.	s.s.w.	5	b c q p	30·23	30·01	47	46	45·5	Strait Le Maire.	
									47·5		
									46·5		
23	..	N.W.	4	o c	30·16	30·02	50	48	46·5		
									46		
									50·5		
24	..	N.N.W.	4	b c p	29·86	29·72	52	51	50·5		
									50·5		
									49·5		
25	..	W.S.W.	5	o c q p	29·85	29·74	50	49	49·5	Off Wollaston Island.	
..	Midt.	S.W.	6	o c q r	29·56	29·51	49	47	50		
									49		
26	Noon.	..	10	c q p	29·60	29·49	47	42	49	..	
									48		
									48·5		
27	..	..	7	b c q p	29·86	29·70	47	46	49·5		
									49		
									49*		
28	..	VBLE.	2	o c d	30·00	29·90	54	53	50·5		
									50		
March.											
									50*		
1	Noon.	W.S.W.	2	b c	29·90	29·83	58	54	51	Cove in Beagle Channel.	
									50·5		
									50		
2	..	VBLE.	1	b c m	29·57	29·52	57	55	52·5	Beagle Channel.	
									51		
									48·5		
3	..	S.W.	2	b c	29·50	29·30	51	49	48·5	..	
									48		
									47·5		
4	..	W.	4	b c	29·52	29·38	49·5	50·5	48	..	
									48		
5	..	N.W.	1	b c v	29·72	29·66	53	55	47·5	Off Woollya.	
									51		
									51		
6	..	..	2	o c q	29·52	29·50	59	58·5	51·5	.	
									50 5		
									49		
7	..	S.E.	6	o c q p	30·16	29·96	45	43·5	48·5		
									48·5		
									46·5		
8†	..	N.W.	4	o c	30·18	30·01	46	45	48	54·26	
									44·5		
									46·5		
9	..	S.W.b.S.	6	b m	29·82	29·70	51	50	48	52·58	59·17
									49		
..	8 P.M.	S.W.	10	b c m q	29·85	29·64	49	48			
10	2 A.M.	..	10	b c q	29·80	29·58	46	45			
									48·5		
..	Noon.	S.W. b.W.	4	b c	29·76	29·63	51	52	50·5	Berkeley Sound.	
									50·5		
									51		
11	..	S.b.W.	5	b c q	29·70	29·60	53	51·5	51·5	..	
									51		

* Compared Water Thermometer with Registering ditto Feb. 28th, Noon, R.T. 55·5, W.T. 54·5.
March 1st, Noon. R.T. 58·5, W.T. 7·5.

† From 8th March, Temperature of Water taken at 9 A.M., 1·30, and 6 P.M.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
March, 1834.					Inches.	Inches.	°	°	°	Lat. S.	Long. W.
									51·5		
12	Noon.	w. b. n.	5	b c m q	29·62	29·57	58	57	52·5	Berkeley Sound.	
									51·5		
									51·5		
13	..	w.	5	b c	29·46	29·46	60·5		52·5	Port Louis.	
									51·5		
..	6 p.m.	s.s.w.	5	c m q r	29·52	29·40	52	49			
14	Noon.	s.w.	5	b c q p	29·81	29·70	48	46·5	50·5	..	
									50·5		
15	..	w. b. s.	6	c m q r	29·44	29·35	48·5	46	50·5	..	
									50		
									49		
16	..	..	6	b c q	29·63	29·52	49	47	49·5	..	
									49		
									48		
17	..	s.s.w.	6	b c q p	29·66	29·50	44	41·5	47·5	..	
									47		
18	..	s.	1	c m d q	29·68	29·54	44	43	47	..	
19	..	s.s.w.	4	c q p	29·77	29·62	47	45	47	..	
20	6 a.m.	w.n.w.	6	c m q r	29·57	29·46	47	45			
									47·5		
..	Noon.	s. b. w.	8	b c q	29·59	29·47	49	47	47	..	
..	6 p.m.	s.s.w.	9	b c q	29·64	29·51	43	42	46·5		
21	6 a.m.	s.w.	9	b c q p	29·57	29·43	43	41	45·5		
..	Noon.	s.s.w.	10	b c q	29·59	29·45	44	42·5	46	..	
..	6 p.m.	s. b. w.	8	b c q p	29·64	29·47	40	38	45·5		
22	6 a.m.		7	c o q p	29·97	29·83	42	39	45	..	
..	Noon.	s.s.e.	4	b c q	30·16	29·99	45	43·5	45·5	..	
									45		
23	..	w. b. s.	4	b c g	30·35	30·23	43	47	44·5		
									46·5		
24	..	n.w. b. w.	5	c m	30·16	30·05	50	49	47	..	
									47		
									46·5		
25	..	n.n.w.	2	c g	29·98	29·90	51	49	47	..	
									47		
									47		
26	..	e.	1	b c g	29·92	29·34	53	51	47·5	..	
									47·5		
									47·5		
27	..	n.e.	1	c g	29·97	29·92	52	51	48	..	
									47·5		
									47		
28	..	w.s.w.	2	b c	29·94	29·85	54	53	48	..	
									48		
29	..	n.w.	2	b c g	30·03	29·93	50	49	46·5	..	
									48		
30	..	s.s.w.	2	b c	29·66	29·60	53	50·5	48	..	
									48·5		
31	..	—	0	b c	29·80	29·70	52	50·5	47	..	
									48·5		
April.											
									47·5		
1	Noon.	n.w. b. w.	4	b c g	29·74	29·65	51·5	49·5	48·5	..	
									48		
2	6 a.m.	n.n.w.	7	c q r	29·15	29·09	48·5	46	47·5	..	
..	Noon.	w.	4	b c q p	29·06	28·97	48	44·5	47·5		
..	9 p.m.	s.w.	1	c r	28·90	28·84	43·5	41	47		
3	6 a.m.	s.b. w.	11	c q r	29·35	29·05	43	42·5		..	

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
										Lat. S.	Long. W.
April, 1834.					Inches.	Inches.	°	°	°		
3	Noon.	S.S.W.	8	o c q p	29·52	29·37	41	39·5	46·5		
									45·5		
..	6 P.M.	s. b. w.	10	c q p	29·58	29·49	40	38	45	Port Louis.	
4	6 A.M.	..	6	c g	29·93	29·67	37	36·5	43·5		
..	Noon.	S.S.W.	6	c g q o	29·93	29·73	41·5	39·5	44·5	..	
..	6 P.M.	s. b. w.	4	b c q g	29·98	29·82	40	39	44		
5	6 A.M.	S.W.	5	c q	30·07	29·90	40	39	44		
..	Noon.	S.S.W.	8	c q	30·08	29·95	47	45·5	45·5	..	
..	Midt.	S.W.	4	o c	30·09	29·98	45	44			
									46		
6	Noon.	W.N.W.	6	o c g	29·86	29·74	49	48	47	Berkeley Sound.	
									47·5		
7	6 A.M.	W.	2	b f	29·50	29·38	45	44	46·5	..	
..	Noon.	W.S.W.	4	b c m	29·55	29·55	53	52	47·5	..	
8	6 A.M.	S.W.	9	b c q	29·86	29·70	47	45	46		
..	Noon.	S.S.W.	7	b c q p	30·03	29·83	47	46	45	50·02	58·08
									44·5		
9	..	N.N.W.	4	b c	30·15	29·98	48	47	45·5	49·14	59·55
									46		
10	..	N.W.	5	b c q	29·49	29·38	50	49	47	50·06	63·29
									47·5		
11	..	W.S.W.	4	b c	29·77	29·67	52	51	47·5	50·10	64·09
									48		
									47·5		
12	..	W.N.W.	2	b c m	29·99	29·98	51	50	47·5	49·46	65·05
									48		
13	10 A.M.	N.	9	b c q	29·54	29·50	55	55	47·5		
..	Noon.	..	7	b c q	29·67	29·60	54	53	49		
..	Midt.	N.N.W.	5	b q	29·68	29·72	51	50	49·5	River.	
									49	Santa Cruz.	
14	Noon.	W.	7	b c	29·68	29·69	59	59	48		
									49·5	..	
									48·5		
15	..	W.b.S.	4	c g	29·77	29·77	58½	53	47·5		
									49	..	
16	..	—	0	b c	30·16	30.02	47·5	47·5	48·5		
									48·5	..	
17	..	S.	4	b c m	29·83	29·77	46	45	47·5	..	
									47		
18	..	S.S.E.	4	b c q	30·03	29·92	47	45	46	..	
									47		
19	..	S.	1	b c g	30·34	30·19	47	46	46·5	..	
									46		
20	..	N.N.W.	1	b c m	30·33	30·22	45		45·5		
									47·5	..	
									46·5		
21	..	—	0	b c m	30·33	30·21	48	46	45		
									47	..	
									47		
22	..	VBLE.	1	b c q	30·09	30·07	59·5		46·5		
									48·5	..	
									48·5		

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
					Inches.	Inches.	°	°	°	Lat. S.	Long. W.
April, 1834.									48*		
23	Noon.	W.S.W.	2	b c q	30·11	30·02	55·5*	53	48·5	Santa Cruz.	
									47·5	River.	
									46		
24	..	W.	4	b c	30·12	30·04	53	51	48	..	
									47·5		
									46·5		
25	..	W. b. N.	1	b c m	30·09	30·03	55½	53	48·5	..	
									48·5		
									46·5		
26	..	N.N.W.	1	b c	30·00	29·93	53	51	48·5	..	
									49		
27	..	W.	1	c g	29·93	29·89	52	52	46·5	..	
									48		
28	..	—	0	b m	29·62	29·66	57·5	53·5	48·5	..	
									46		
29	..	W. b. N.	4	b c q	29·55	29·52	52	51	47·5	..	
									48		
									45·5		
30	..	S.W.b.W.	6	b c q	29·45	29·39	52·5	50·5	47	..	
									47		
May.											
									46		
1	..	N.W.	1	b c	29·36	29·33	52	53	47·5	..	
									47		
..	9 P.M.	W.	6	b c q	29·42	29·39	47	45			
									45·5		
2	Noon.	S.W.	2	c g m	29·60	29·53	49	47	46·5	..	
									46·5		
									44·5		
3	..	N.W.	1	b c g	29·70	29·63	50	49	46	..	
									46·5		
4	..	S.W.	9	b c q	30·01	29·93	48	46	44	..	
									45·5		
..	3 P.M.	..	10	b c q	30·05	29·98	50·5	48·5	45·5		
5	6 A.M.	S.W.b.W.	6	b c q	30·16	30·07	44	42	44		
..	Noon.	S.W.	10	b c q	30·07	30·08	57		46	..	
..	6 P.M.	..	8	b c q	30·07	30·07	52	50	45·5		
									45		
6	Noon.	..	5	b c q	30·07	30·07	57·5		46	..	
									46		
									45		
7	..	..	8	b c q	29·96	29·91	54		46	..	
									46		
..	6 P.M.	E.S.E.	7	c q r	30·03	29·98	43	40			
									42·5		
8	Noon.	S.W.b.W.	1	b c	30·41	30·30	44	42	44·5	..	
									44		
									42		
9	..	N.W.	4	b m	30·45	30·34	44	41	45	..	
									43·5		
10	..	S.E.	2	b m	30·36	30·31	49	48	42	..	
11	..	W.	4	b c m	30·24	30·16	44	43		..	
									44·5		
12	..	N.	4	c g	†29·67	29·79	51	49	46·5		
									46·5		

* From 23d April, Temperature of Water taken at 9 A.M., 1·30, and 5 P.M.

† 12th May, changed Sympr.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
May, 1834.					Inches	Inches	°	°	°	Lat. S.	Long. W.
13	6 A.M.	S.W.	7	b c q	29·69	29·65	44	42	45		
..	Noon.	S.W. b. W.	7	o q p	29·65	29·65	44	43	45·5	51·48	64·58
14	4 A.M.	VBLE.	5	o c q p h	29·49	29·45	39	38	45 43·5		
..	Noon.	S. b. W.	5	b c q	29·50	29·47	39	38	44 43·5	52·08	64·28
15	..	S.S.W.	5	o g q p	29·25	29·27	43	42	46 46	52·28	66·47
..	6 P.M.	S.S.E.	7	b c q	29·47	29·50	43	42	46		
..	Midt.	S.	9	b q	29·60	29·58	45	43			
16	Noon.	W.	5	o c q	29·69	29·69	44	43	45·5 44·5 45	52·17	Off Cape Virgins.
17	..	S.S.E.	4	b c	29·55	29·58	44	43	44·5 44 45		..
18	..	W.	4	b c m	29·72	29·65	45	43	45 44·5 44	52·27	66·35
19	..	E.S.E.	1	o g m	29·19	29·38	49	47	44 43 41		
20	..	S.	4	o m f	29·24	29·32	46	45	46 45 45·5		
21	..	S.W.	5	b c q	29·72	29·74	45	44	45·5 45 44·5		
22	..	N.W.	4	b c	29·85	29·89	47	46	45 45·5 43·5	52·28	
23	..	W.S.W.	4	b c	29·68	29·70	44	43	45 44·5 43·5		
24	..	S.W.	5	b c q	29·81	29·82	43	42	42·5 42·5		
25	..	..	5	b c	29·78	29·74	44	42	43 42·5	First Narrow.	
..	Midt.	W.S.W.	7 8	c o q	29·36	29·40	42	41			
26	Noon.	..	7	o c g q	29·53	29·52	41	40	41 41·5		
..	6 P.M.	S.W.	8	b c q	29·56	29·57	38	37	41·5		
27	6 A.M.	S.W. b. S.	9	b c q	29·68	29·67	37	36	40·5		
..	Noon.		6	b c q	29·82	29·80	39	38	41·5		
..	6 P.M.	..	7	b c	29·78	29·76	40	39	40·5 39		
28	Noon.	S.	5	b c q	30·08	30·10	38	37	40·5 41		
29	..	N.	5	o g m	30·20	30·20	33	32	40 40	Gregory Bay.	
30	..	N.E.	6	o g q r	29·82	29·81	39	38	39 41·5 40		
31	..	N.	4	o c m	29·96	29·96	40	38	41 43 43	Off Cape Negro.	

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
June, 1834.					Inches.	Inches.	°	°	°	Lat. S.	Long. W.
1	Noon.	E.N.E.	4	o c r	29·53	29·61	41	39·5	43 42	Port Famine.	
2	..	W.	4	b c	29·58	29·65	49	45	38·5 43·5 42·5	..	
3	..	—	0	b c	29·64	29·88	44	43	42·5 40	..	
4	..	N.E. by E.	4	c m r	29·93	29·97	43	41·5	37·5 43 39	..	
5	..	—	0	g c d	29·75	29·74	41	39	38 39·5	..	
6	..	..	0	f m	29·74	29·69	41	39	38 37 39	..	
7	..	..	0	b c m	29·71	29·65	40	39	40·5 36·5 39	..	
8	9 A.M.	S.W.	2	b c	29·63	29·52	40·5	38·5	38 43·5	..	
9	Noon.	W.N.W.	4	c m q	29·34	29·35	43	43	44 45* 45	Magdalen Channel.	
..	6 P.M.	N.W.	4	b c q p l	29·38	29·27	41·5	40	45		
10	Noon.	N.E.	2	o c	29·34	29·29	43	42	45 45·5	Cockburn Channel.	
11	..	N.	5	o g m p	29·20	29·16	45	44	46·5 47·5 44·5		
12	..	W.S.W.	5	b c q	29·20	29·09	42·5	42·5	44 44	55·10	74·26
13	..	S.S.W.	4	b c q	29·60	29·49	41	40·5	44 44·5 45·5	53·14	77·12
14	..	VBLE.	4	b c q p	30·06	29·95	46·5	46	47 47·5 48·5	50·45	78·09
15	..	W.	4	o c q p	30·15	30·07	49	48	48·5 50·5 51	48·45	75·17
16	..	W.N.W.	6	b c q	29·98	29·93	50	49	49 49·5	48·51	77·34
17	..	VBLE.	1	o c m	30·17	30·10	53	48·5	49·5† 49	47·29	77·43
18	..	W.b.N.	1	o c q	29·98	29·87	56	55	50 50	46·53	78·59
19	..	N.b.W.	2	b c	30·02	29·97	51	50	50·5 49·5	46·01	78·54
20	..	N.	8	o c q p	29·98	29·90	52	51	50 51	45·30	78·54
21	..	S.W.b.W.	2	o c m	29·82	29·76	50	49	51 50·5	45·20	78·16
22	6 A.M.	N.W.	7	b c q	29·45	29·42	50	49	51·5		
..	Noon.	..	10	b c q	29·24	29·18	52	50	51	44·39	76·44
..	4 P.M.	N.	11	o q p	29·02	28·97	51	49			

* Taken carefully at 9·30 A.M. 9th June, because the ship passed through a meeting of tides between Cape Froward and Magdalen Channel.

† 16th, lost Water Thermometer overboard; and employed another agreeing with Six's Self Registering.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
June, 1834.					Inches.	Inches.	°	°	°	Lat. S.	Long. W.
22	Midt.	W.N.W.	9	b c q p	29·13	29·18	51	50	52		
23	Noon.	N.W.	5	b c q	29·52	29·49	53	52	52	44·29	76·13
24	..	N. b. W.	5	b c	29·68	29·67	53	52	51·5	44·20	76·16
25	..	N.W.	5	o c q	29·70	29·64	54	52·5	51·5	44·03	76·02
26	..	W.	2	o c m p	29·63	29·58	53	52	52	43·11	73·52
27	..	W.N.W.	5	b c q p	29·51	29·37	52	51·5	51	42·54	75·10
..	8 P.M.	N.W.	9	o c q p	29·48	29·35	51	50	51·5		
28	Noon.	S.W.	5	b c q	29·90	29·48	52	51·5	52	42·17	74·54
29	..	N.N.E.	5	o c q	29·77	29·69	50	49·5	52 50 50·5	St. Carlos, Isl. Chiloe.	
30	..	E.	1	o g r	29·40	29·37	50	49	50·5 50·5 49·5		..
July.									47·5		
1	..	W.	2	b c	29·99	29·92	50	46	49 48·5		..
2	..	W.S.W.	6	b c q	30·02	29·94	53	51	50·5 51 50·5		..
3	..	VBLE.	1	b c p	30·16	30·11	48·5	49	49·5		..
4	..	S.W.b.W.	4	b c q p	30·04	29·95	47	45	49 49·5 49		..
5	..	S.E.	2	b c	30·41	30·31	44	40	48 48		..
7	..	N.E. b. N.	5	o c	29·94	29·79	42	41	47·5 48 49		..
8	..	N.b.W.	5	c q p	29·76	29·70	52	50	49·5 49·5		..
9	..	N.W.	2	c m	29·52	29·49	54·5	53	50 50		..
10	..	N.N.W.	2	c m	29·68	29·64	54	53	51·5 49·5		..
11	..	N.N.E.	1	b c g p	29·76	29·70	52·5	51	51 51·5		..
12	..	N.	2	c g m	29·48	29·46	53	52	50·5 51 51		..
13	..	W.N.W.	5	b c	29·53	29·52	52	50	50 50·5 50		..
14	..	..	5	b c q	29·95	30·04	52	50	51 51 52		..
15	..	N.N.W.	5	b c q p	29·80	29·81	51	50	51·5 51·5 51	41·48	75·28
16	..	S.W.	4	b c	30·09	30·10	53	51·5	52 52·5 52	40·27	75·44

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
										Lat. S.	Long. W.
July, 1834.							°	°	°		
16	Midt.	N.	7	o c q r	29·96	30·06	50	48			
17	6 A.M.	W.N.W.	7	q r	29·76	29·86	55	53			
..	Noon.	W. b. N.	4	c q r	29·80	29·82	55	52	53	40·09	76·18
									53·5		
18	..	N.N.W.	4	b c q	29·87	29·95	54	53	54	38·23	75·29
									53·5		
									53·5		
19	..	W.N.W.	5	b c q	29·80	29·86	56	55	54	36·23	73·56
									54		
									54		
20	..	VBLE.	4	o c q p	29·93	29·99	55	52·5	55	34·21	73·04
									55·5		
21	..	W.N.W.	6	c q r	29·86	29·92	56	55	54·5	33·29	72·14
									54		
									54		
22	..	VBLE.	1	b c	30·11	30·15	54	53	55		
									55		
									53·5		
23	..	S.W.	2	b v	30·02	30·09	58	57	55	Valparaiso.	
									55		
									53·5		
24	..	S. b. E.	1	b c	30·15	30·19	56	54	55	..	
									54·5		
25	..	VBLE.	1	b c m	30·10	30·09	57	56		..	
26	..	S.	4	b c m	30·02	30·06	53	52		..	
27	..	..	2	b c	30·04	30·09	53	51·5		..	
28	..	N.N.W.	1	b c	29·91	29·96	51·5	48·5		..	
29	..	S.E.	1	b c	30·06	30·03	53	51		..	
30	..	W.S.W.	2	b c	29·93	29·96	53·5	50·5		..	
31	..	E.S.E.	1	c g r	30·38	30·10	54	52		..	
August.											
1	..	N. b. E.	1	b m	29·90	30·06	60			..	
2	..	—	0	b c m	29·84	29·88	60	59		..	
3	..		1	b c g	29·98	30·04	56	55		..	
4	..	N.	2	b c	29·89	30·99	56·5	52·5		..	
5	6 A.M.	E.N.E.	2	o g	29·94	30·95	52	50		..	
6	9 A.M.	—	0	b m	30·07	30·06	50	48		..	
7	Noon.	..	0	b m	29·85	29·98	57	53·5		..	
8	..	N.W.	1	b c	29·77	29·89	57	53·5		..	
9	..	N. b. W.	2	b c g	29·96	30·03	56	54		..	
10	..	—	0	b c	29·80	30·03	62			..	
11	..	..	0	c o g	30·08	30·14	57	56		..	
12	..	S.W.	2	b c	29·92	30·04	59	57		..	
13	..	—	0	c g	29·92	29·97	56	55		..	
14	..	N.W.	2	b c	30·03	30·10	58	57		..	
15	..	—	0	b c	29·94	30·06	60	56		..	
16	..	E.	1	c g	29·80	29·95	61·5	59·5		..	
17	..	S.S.E.	1	c g	29·70	29·83	62	59·5		..	
18	..			c g	29·76	29·85	56	56		..	
19	..	N.E.	1	o c m r	29·95	30·03	54	53		..	
20	..	—	0	c m	29·85	29·91	56	56		..	
21	..	N.W.	1	b c g	29·93	30·00	59	57		..	
22	..	W.S.W.	2	b c m	29·79	29·93	59	60		..	
23	..	N.N.W.	5	c o r	29·82	29·91	54	53·5		..	
24	..	..	4	b c	29·93	30·00	59			..	
25	..	N.W.	2	b c	30·04	30·12	58			..	
26	..	S.	5	b c	30·10	30·11	58	53·5		..	
27	..	S.S.W.	6	b c	29·89	30·01	55	52		..	
28	..	W.	5	b c	29·87	30·00	57	52·5		..	

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.
					Inches.	Inches.	°	°	°	Lat. S. Long. W.
August, 1834.										Valparaiso.
29	Noon.	W.	2	b c	29·92	30·08	57	54		..
30	..	..	4	b c o g	29·99	30·10	57	56		..
31	..	S.S.W.	4	b c	29·78	30·00	59·5	57		..
September.										
1	Noon.	—	0	b c m	29·61	29·85	60	58		..
2	..	E.	1	c o g	29·90	30·00	60	59·5		..
3	..	N.E.	1	b c	29·70	29·90	61	59		..
4	..	W.S.W.	2	c m	29·83	29·96	59	58		..
5	..	S.	4	b c g	29·87	29·99	58	55		..
6	..	..	4	b	29·80	30·00	63	58		..
7	..	N.E.	1	b c	29·72	29·98	60	58		..
8	..	S.W.	6	b c	29·81	30·00	58	55		..
9	..	N.	2	c g	29·85	29·97	58	56		..
10	..	..	4	c g	29·82	29·99	59·5	57·5		..
11	..	E.	4	c g r	29·88	29·94	48	48		..
12	..	N.N.W.	2	b c	30·25	30·32	55	53		..
13	..	W.S.W.	2	c p d	30·09	30·22	55	52·5		..
14	..	N.W.	1	b c v	29·75	30·01	62	57		..
15	..	—	0	b v	29·77	29·99	63	57·5		..
16	..	VBLE.	1	b m	29·68	29·96	63	59		..
17	9 A.M.	N.W.	1	b c m	29·77	29·97	58	55		..
18	Noon.	E.S.E.	1	b c	29·71	29·98	61	57		..
19	..	S.W.	4	b c	29·89	30·05	56·5	54		..
20	..	S S.W.	5	b c q	29·89	30·08	57	54·5		..
21	..	S.W.	6	b c q	29·90	30·11	59	57		..
22	..	S.S.E.	5	b c m	29·63	30·03	70	65		..
23	..	N.E.	2	b c m	29·63	29·89	60	59		..
24	..	W.N.W.	1	c g	29·62	29·88	58	58		..
25	..	N.W.	2	c g	29·60	29·87	61	58·5		..
26	..	N.	4	c g	29·77	29·96	58	56		..
27	..	S.W.	5	b c	29·79	30·04	61	57		..
28	..	W.S.W.	4	b c g	29·76	30·00	60	57		..
29	..	S.W.	4	b c q	29·77	29·99	58	55·5		..
30	..	W.N.W.	2	b c	29·62	29·92	66	62		..
October.										
1	Noon.	S.W.	4	b c	29·76	29·98	58	55·5		..
2	..	W.	4	b c	29·72	29·91	57	54		..
3	..	S.W.	5	b c	29·80	30·09	58	56·5		..
4	..	..	5	b c q	29·91	30·13	57	55		..
5	..	S.	5	b c	29·84	30·13	60	58		..
6	..	N.E.	2	b c	29·65	30·01	65	62		..
7	..	S.W.	4	o g	29·70	29·90	59	58		..
8	..	N.	1	c g	29·58	29·89	57	56		..
9	..	N.W.	2	b c g	29·72	29·97	60	59		..
10	..	S.W.	4	b c	29·69	30·00	64	61		..
11	6 A.M.	S.E.	1	b c	29·83	30·06	54	52·5		..
12	Noon.	S.S.W.	5	b c	29·75	30·11	65	60		..
13	..	S.W.	5	b c	29·57	29·99	65	61		..
14	..	S.S.W.	5	c g q	29·58	30·00	60	59·5		..
15	..	S.W.	5	b c q	29·77	30·12	61	60		
16	..	S.S.W.	4	b c q	29·64	30·12	65	63		
17	..	..	5	b c q	29·60	30·07	63	61·5		..
18	..	—	0	f	29·55	29·99	60	60		..
19	..	N.	1	b c	29·43	29·90	63	62		..
20	..	..	1	c g m	29·69	30·00	60	61		..
21	..	..	2	f w	29·66	29·97	59	60		..
22	..	..	2	c f	29·58	29·95	61	60		..
23	..	..	2	b c m	29·50	29·88	63	61		..
24	..	S.W.	2	c m	29·67	29·97	58	57		..

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
October, 1834.					Inches.	Inches.	°	°	°	Lat. S.	Long. W.
25	Noon.	S.S.W.	4	b c q	29·54	30.06	67	67		Valparaiso.	
26	..	VBLE.	1	b c m	29·42	29·96	70	68		..	
27	..	N.N.W.	1	b c	29·46	29·94	63	63·5		..	
28	..	N.	2	o c m f	29·63	29·97	61	60		..	
29	10 A.M.	N.W.	1	b c o	29·52	29·93	62	60		..	
30	Noon.	N.N.W.	2	b c m	29·56	29·96	64	63		..	
31	..	..	1	g d	29·68	29·96	56·5	56		..	
November.											
1	Noon.	S.W.	5	b c q	29·42	29·90	67	64		..	
2	..	W.	2	o f m	29·42	29·83	64	65		..	
3	10 A.M.	N.W.	2	o g	29·55	29·99	59	59		..	
4	Noon	S.W.	4	b c	29·63	30·07	63	61		..	
5	..	N.W.	2	b c v	29·44	29·95	65	65		..	
6	..	—	0		29·50	30·00	64	64		..	
7	..	S.W.	4	b c o	29·69	30·05	60	59		..	
8	8 A.M.	S.E.	2	o c g	29·67	30·07	61	60		..	
9	Noon.	VBLE.		c g	29·58	30·01	63	61		..	
									56·5		
10	..	S.W.	5	b	29·68	30·10	64	61	55	..	
									56·5		
11	6 A.M.	S.	7	b c q	29·72	30·14	58	58		..	
									58		
..	Noon	..	6	b c q	29·74	30·19	59	58	57	..	
									58·5		
									58·5		
12	..	S.S.E.	5	b c q	29·70	30·14	60	60	59·5	33·22	77·34
									59		
									58		
13	..	S.	4	b c q	29·66	30·04	61	60	59	33·43	76·20
									59·5		
14	..	S. b. W.	4	b m	29·60	30·03	61·5	60	58·5	31·16	76·08
									59·5		
									60·5		
15	..	W.ly.	2	b c	29·51	29·92	63	62	61	34·16	78·00
									61		
									59·5		
16	..	VBLE.	1	b c g	29·47	29·87	61	60	60	35·52	
									59		
17	..	S.S.E.	7	o g q m	29·42	29·84	55	54	58·5	36·51	77·34
									57·5		
									57·5		
18	..	N.b.W.	4	b c	29·48	29·85	59	58	58	37·40	78·00
									58		
									56·5		
19	..	E.N.E.	1	b c	29·62	30·00	58	57	57	39·51	78·02
									56·5		
									54·5		
20	..	S.E. b. E.	2	b c	*29·94	29·92	58·5	58	57·5	40·41	77·23
									56·5		
21	..	N.	4	b c q	29·87	29·81	60	59	55·5		
									56·5		
22	..	S.W.	5	o c q	29·98	29·85	52	49·5	56	San Carlos, Isl. Chiloe	
									55·5		
..	4 P.M.	..	7	b c q	30·08	29·98	54	55	55·5		
23	8 A.M.	..	1	b c	30·31	30·15	51	50	55	..	
									56·5		

* Index of Sympr. set four-tenths higher.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
November, 1834.					Inches.	Inches.	°	°	°	Lat. S.	Long. W.
24	4 A.M.	E.S.E.	1	b c	30·18	30·19	48	48	56 56·5	San Carlos, Isl. Chiloe	
25	Noon.	VBLE.	1	b c	30·05	30·03	58	58	56·5 56 58	..	
26*	..	S.	5	b c	30·26	30·25	55	54	53·5 55	41·42	Near
27	..	S.S.W.	7	b c q	30·15	30·12	54	55	54 54 54·5	41·41	the
..	Midt.	S.	8	o c q l	30·16	30·16	54	53	55·5		land.
28	Noon.	..	5	b c q	30·21	30·19	53·5	54	54·5	41·32	76·17
29	..	E.	2	b c	30·10	30·16	53	54	54 54	42·02	78·25
30	..	E.N.E.	4	c g q	29·94	29·88	54	54	53 53·5	43·25	77·38
December.									54·5		
1	Noon.	VBLE.	1	b c	29·82	29·97	61·5	62	55 57·5	44·26	76·38
2	..	N. b. W.	2	b c	30·03	30·05	60	59	56 57·5	44·29	75·30
3	..	N.N.W.	6	b c q p	29·83	29·	56	55	57 54 54·5	Chonos Islands.	
..	4 P.M.	N.E.	7	o c q p r	29·80	29·76	57	56	54·5		
4	Noon.	W.N.W.	7	b c q r	29·84	29·80	53·5	53	54 54	45·05	Close
5	..	S.W. b. W.	4	b c	30·06	30·00	58	58	53 54·5		to the
6	..	S.W.	5	b c p	30·20	30·23	55	54	54 53 51·5		shore.
7	..	S. b. W.	4	b c	30·24	30·23	55	55	51·5 51·5 52	San Pedro.	
8	..	W.	1	c g m	30·11	30·20	56	57	51·5 52	..	
9	..	N.	1	c g d	29·86	30·23	54		52·5	..	
10	..	N.E.	4	b c	29·99	30·21	58	57	52·5 53	..	
11	..	VBLE.	2	c g p	29·87	30·20	56	55	51 53·5	Near the land.	
12	..	W.N.W.	4	b c q	29·89	30·14	57	56	54·5 54 54·5	45·02	
13	..	W.	2	o c m	29·82	29·75	55	55	54 53 52·5	Vallenar Road.	
14	..	W.S.W.	8	b c q p	29·30	29·28	51	48	51·5 52	..	
..	4 P.M.	S.W.	10	b c q p	29·30	29·26	52	50	52	..	
15	Noon.	S.S.W.	7	b c q p	29·74	29·64	49	48	51·5 52·5 52·5	..	

* 26th November, Temperature of water from this day taken at 9 A.M. 1·30 and 7 P.M.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
December, 1834.					Inches.	Inches.	°	°	°	Lat. S.	Long. W.
16	Noon.	S.W.	5	b c q p h	29·74	29·69	51	50	52 52·5 52·5	Vallenar Road.	
17	..	S. b. W.	4	b c	29·90	29·79	51	50	52·5 54 53·5		
18	..	..	4	b c	29·94	29·90	52	52	53·5 53·5 53	45·12	
19	..	S.S.W.	2	b c	29·98	30·02	50·5	50	52 52·5 52·5	45·13	
20	..	S.W.	4	b c	29·77	29·75	51	51	53 53·5 54	46·55	
21	..	W.	4	c g p q	29·82	29·78	51	50	53·5 53·5 55	Port San Andres.	
22	..	S.E.	2	b c q	29·72	29·66	56	55	54 53	..	
23	..	W.	5	b c q f	29·97	29·94	50	49	53 53 53·5		
24	..	S.W.	5	b c g	29·55	29·55	55	55	53 54 54	Christmas Cove.	
25	..	VBLE.	2	b c q p	29·34	29·29	53	53	52·5 52·5 53	..	
26	..	N.W.	5	o c q	29·67	29·60	50	49	52·5 53 52·5	..	
27	..	VBLE.	2	b c q p	29·61	29·55	53	52	53 53 53	..	
28	..	W.S.W.	4	b c	29·76	29·70	51	50	53 53·5 52·5	46·26	
29	10 A.M.	S.W.	5	b c q p	29·80	29·82	48	47	53 52·5 53	46·02	
30	Noon.	N.W.	2	o c g	29·93	29·92	54	53	54 53·5 54	Off Ynchemo Island.	
31	..	VBLE.	1	c o	29·73	29·65	59	59	55 54·5 54	..	
January, 1835.											
1	Noon.	N.W.	5	c g q r	29·45	29·72	54	53	54 53·5 52·5	Patch Cove.	
2	..	VBLE	2	c g q p	29·65	29·73	53	51	54 52·5 52·5	..	
3	..	N.W.	5	o g q r	29·64	29·60	52	52	53 53 54	..	
4	..	W.N.W.	1	o c	29·73	29·76	56	55	54 53·5	..	
5	..	N.N.W.	4	o g r	29·84	29·84	55	55	53·5 53 53	Off Lemu Island.	
6	..	S. b. W.	4	b c	29·90	29·90	55	55			

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
January, 1835.					Inches.	Inches.	°	°	°	Lat. S.	Long. W.
7	Noon.	w. b. s.	2	b c	29·88	29·91	54	54	53*	43·48	
8	10 A.M.	N.	1	o c m r	29·76	29·87	58	57	55·5 54·5	Port Low.	
9	Noon.	W.N.W.	1	b c g	29·78	29·88	58	57	53·5 54	..	
10	..	N.W.	5	c g q r	29·47	29·85	57·5	56·5	54 54·5 55	..	
11	..	..	8	c g q p	29·52	29·85	58	56	54·5 53·5 53·5	..	
..	6 P.M.	..	8	c o m q r	29·24	29·82	54·5	53			
12	Noon.	S.W.	4	b c q p	29·75	29·82	56	55	53 53 52·5	..	
13	..	N.W.	6	c m q r	29·60	29·81	55	54	52 52·5 52	..	
14	..	S.W. b. s.	6	b c q	29·74	29·82	53	52	51·5 52 52	..	
15	..	S.W.	2	b c	30·02	29·96	56	56	51·5 52·5 53·5	..	
16	..	N.W.	4	c g	30·08	30·12	56	55	53 54·5 53	Off Huafo.	
17	..	—	0	b c g	29·90	30·04	60	61	52·5 54·5 56		
18	..	S.	4	b c m	29·79	29·95	65	62·5	55·5 58	San Carlos.	
19	..	S.W.	1	b c	29·98	30·00	60	59	54 53 59	Near the English Bank.	
20†	..	..	2	b c m	29·88	30·01	65	64	57·5 59·5 60·5	San Carlos.	
21	..	N.W.b.W.	4	c o r	29·70	30·01	60	59	59 58 57·5	..	
22	..	S.W.	5	b c	29·97	30·01	63	63	57 58·5	..	
23	..	W.S.W.	5	b c	29·84	30·02	65·5	68	58 57	..	
24	..	..	2	b c	29·78	30·01	65·5		58 59·5	..	
25	..	W. b. N.	2	b	29·70	30·03	65·5	66·5	59·5	..	
26	..	..	4	b m	29·70	30·00	67	66		..	
27	..	W.S.W.	4	b c	29·74	30·01	63	61		..	
28	..	N.W.	4	c g q	29·57	30·01	64	63	58·5 58·5	..	
29	..	W.N.W.	1	c g p	29·63	30·00	54	53	58	..	
30	..	W.S.W.	4	b c	30·07	30·01	61·5	62		..	
31	..	..	2	b c v	29·73	30·01	64	64·5		..	

* 7th, Water Thermometer broken; new one nearly 1° lower than the Standard.

† Jan. 20th, 2 A.M., observed an eruption of Osorno.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality. Lat. S.	Locality. Long. W.
					Inches.	Inches.	°	°	°		
February, 1835.											
1	Noon.	N.W.	4	b c	29·76	30·02	66			San Carlos.	
2	..	W.S.W.	5	b c g q	29·77	30·00	60·5	59·5			..
3	..	S.W.	4	g c p	29·82	30·01	55	53			..
									56		
4	..	..	4	o c p	29·77	30·02	53	50	52		..
									52		
									51		
5	..	S.S.W.	4	b c	29·62	30·02	53	53	54·5	41·23	Close
									51·5		
									53		
6	..	W.N.W.	2	b c	29·96	30·09	55	55	53	40·33	to the
									53·5		
									53		
7	..	N.N.E.	5	o q d	29·97	30·03	54	53	54·5		shore.
									57·5		
8	..	S.S.W.	1	b c m	29·82	30·06	59	58		40·11	
9	10 A.M.	E.	1	b c	29·85	30·05	61	60	59·5	Valdivia.	
									61·5		
10	Noon.	N.	4	b v	29·67	29·93	64	65			..
11	..	N.N.W.	2	b c	29·55	29·85	65	68			..
12	..	N.	5	b c	29·68	29·90	62·5	62·5			..
									61		
13	..	W.	2	b c	29·71	29·98	67	67	62·5		..
									63		
14	..	N.	5	b c	29·50	30·10	66	66			..
15	..	S.W.	2	c g p	29·60	30·09	63·5	64			..
16	..	N.	4	c g	29·58	29·80	62·5	63			..
17	..	N.N.W.	4	b c g	29·69	29·89	62	61			..
18	..	W. b. S.	2	c g	29·78	30·00	65	64			..
19	..	S.E.	4	b c	29·70	30·04	66	64			..
20*	6 A.M.	E	1	b c	29·70	29·99	60	59	59·5		..
..	Noon.	N. b. W.	5	b c	29·66	29·98	66	67	62·5		..
..	6 P.M.	VBLE.	4	b c q	29·59	29·92	66·5	66			..
									59·5		
21	Noon.	N.E.	1	b c	29·68	30·04	66	65	63		..
									59		
									53·5		
22	..	S.S.W.	4	b m	29·75	30·01	59	58	55·5		
									53·5	39·37	Near
									54·5		
23	..	S.	1	b c m	29·70	30·96	58	57	53·5	38·57	the
									55·5		
24	..	..	2	b c	29·72	30·95	58	58	54	38·45	land.
									54·5		
25	..	N.W.	4	o c f	29·74	30·93	57	58	56·5		
									56	38·17	Off Mocha.
									55		
26	..	N.	2	g q r	29·44	30·60	53	53	56		..
									56		
									56·5		
27	..	N.	4	b c	29·54	30·87	60	60	58·5		
									58	38·28	..
									57·5		
28	..	S.S.E.	1	b c r	29·59	30·17	61	59	57		
									58	38·18	..

* 20th February, 11·40 A.M., felt a severe shock of an earthquake.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
March, 1835.					Inches.	Inches.	°	°	°	Lat. S.	Long. W.
1	Noon.	N.N.W.	2	c m	29·60	30·17	66	65	58·5 58·5 57	Off Mocha.	
2	..	VBLE.	2	b c	29·67	30·17	62·5	63·5	57·5 59 59·5	37·59	Near the
*3	..	S.W.	4	b c g	29·78	30·17	65	63	60·5 62·5 60	37·32	land.
4	..	S.	5	b c	29·64	30·18	64	63	57·5 58	Concepcion Bay.	
5	..	..	5 7	b v q	29·59	30·18	69	69	57·5	..	
..	4 P.M.	S.S.W.	6	b q m	29·46	30·18	70	69			
6	Noon.	N.	2	b c	29·53	30·18	65	63		..	
7	..	N.N.W.	1		29·54	30·17	63	62	55·5 58 57	..	
8	..	S.	4	f	29·61	30·18	59	58	55·5 58 59·5	35·17	
9	..	VBLE.	1	m	29·64	30·18	61	60	59 61	33·54	72·34
10	2 A.M.	..	2	b c l t	29·56	30·18	62	61	60		
..	Noon.	N.W.	2	c g m	29·64	30·19	62	61	61 61	33·39	72·20
11	..	VBLE.	1	c o m	29·57	30·19	63	62	61 62	33·32	72·07
12	..	N.	1	o c d	29·53	30·18	62	61·5		Valparaiso.	
13	10 A.M.	S.S.W.	4	b c q	29·56	30·16	67	65		..	
14	Noon.	—	0	b v	29·40	30·18	70	69		..	
15	10 A.M.	S.W.	4	b v	29·33	30·17	70	66		..	
16	Noon.	—	0	c m	29·58	30·18	63	63		..	
17	..	..	0	b c m	29·44	30·18	65	64	55·5 59·5	..	
18	..	S.	5	b c	29·71	30·05	59	57	60·5 60 63	32·52	74·01
19	..	S.E. b. S.	6	b c	29·78	30·14	62	61	62·5 62·5 63	33·09	75·55
20	..	S S.E.	5	b c q	29·80	30·20	63	62	64 64 63	33·46	
21	..	..	6	b c q	29·70	30·08	64	63	62·5 63 63·5	33·49	77·00
22	..	..	5	o c g	29·67	30·04	64	63	64 64·5	34·11	79·03
23	..	..	5	b c q	29·80	30·	65	64	65 65	34·57	81·41
24	..	VBLE.	4	b c	29·75	30·10	65	64	65 64·5 63	35·13	79·53
25	..	..	4	b c	29·70	30·08	64	64	63·5 63	34·59	78·03

* 3d March, 10·26 A.M., felt a severe shock of an earthquake.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality. Lat. S.	Lat. W.
March, 1835.					Inches.	Inches.	°	°	°		
									60		
26	Noon.	S.E.	4	b c m	*30·19			61	62	35·38	76·15
									62		
									57·5		
27	..	S.	4	c m q	30·13			56	54	36·28	73·54
									56		
									53·5		
28	..	..	1	o c m	30·28			59	55	Concepcion Bay.	
									54		
29	..	VBLE.	4	b c q	30·17			62		..	
									52	Standing out of the	
30	..	S. S. W.	4	b c m	29·93			58	55·5	Bay of Concepcion.	
									52·5		
									53·5		
31	..	N.	5	b c m q	30·09			56	54		
April.											
									54		
1	Noon.	VBLE.	1	b c f	30·21			60	55	Island of St. Mary.	
									54·5		
2	..	..	1	b m	30·09			59	53	Concepcion Bay.	
									57·5		
3	..	S.	4	b c q	30·21			58		..	
4	..	..	4	b c m	30·12			61		..	
5	10 A.M.		4	b c	30·23			63		..	
6	Noon.	S.	2	b c m	30·14			65		..	
									54·5		
7	..	S.W.	2	b m	30·09			67	59·5	..	
									57		
									56		
8	..	N.	4	f	30·07			58	55·5		
									56·5		
									56		
9	..	N.E.	1	c m	30·22			55	56·5	South Harbour, in Santa Maria.	
									56		
									55·5		
10	..	..	1	b c m	30·22			58	56·5		
									53·5		
									56		
11	..	S.	1	b c m	30·22			59	56·5	Concepcion Bay.	
									56·5		
12	..	N.	1	b c	30·05			70		..	
13	..	—	0	b	30·10			59		..	
†14	10 A.M.	N.	4	f d	30·19	30·20		61		..	
15	..	S.	2	b c	30·20	30·24		57		..	
									57		
16	10 A.M.	..	2	b c	30·20	30·18		57	58	Tomé Bay.	
									57·5		
									54·5		
17	8 A.M.	—	0	c o	30·02	30·08		57	53·5	Coliumo Bay.	
									53·5		
									54		
18	9 ..	N. b. W.	5	c g	30·05	30·07		57	54	..	
									54·5		
									55		
19	9 ..	VBLE.	2	f	30·12	30·16		57	57	..	
									57		

* 25th March, P.M., set Sympr. five-tenths higher.

† From 14th April Cabin Thermometer used, which agreed with the Standard.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.
April, 1835.					Inches.	Inches.	°	°	°	Lat. S. Long. W.
									55·5	
20	8 A.M.	S.	2	b f	30·16	30·20		57	55·5	35·35
									53·5	
21	8 ..	—	0	b m	30·13	30·17		54	54	35·19 Off the River Maule.
									54·5	
									54·5	
22	Noon.	S.	4	b v	29·98	30·03		60	55·5	33·51
									57	
									58	
23	..	N.E.	2	o c	30·13	30·16		58	58·5	Off Valparaiso.
									58	
									56·5	
24	..	S.	4	b f	30·11	30·16		59	58	..
									57·5	
									58·5	
25	..	S.S.E.	2	o f	30·17	30·21		58	57·5	Off Horcon.
									58	
									57·5	
26	..	S.W.	1	o f	30·12	30·18		58	58	Horcon Bay.
									57	
27	..	S.W.	4	b c q	30·19	30·20		60	56	Port Papudo.
									55	
									55	
28	..	—	0	c g	30·21	30·23		54	55·5	..
									55·5	
									54	
29	..	S.S.W.	5	b c	30·20	30·25		59	55	Port Pichidanque.
									55	
									55·5	
30	..	S.	2	b m	30·13	30·17		59	56	Off Port Pichidanque.
									55	
May.										
									55	
1	Noon.	VBLE.	1	b c m	30·03	30·07		59	56	31·24
									58·5	
									59·5	
2	..	W.	1	c o m	30·12	30·19		59	59·5	Off Maytencillo.
									60	
									58	
3	..	S.W.	2	o g m	30·14	30·23		59	58·5	Off Lengua de Vaca.
									56·5	
									57·5	
4	..	S.	2	o c	30·18	30·24		58	58·5	Herradura.
									57·5	
									58	
5	..	..	2	c o	30·16	30·25		62	58	..
									57	
									56·5	
6	..	N.N.W.	2	b	30·13	30·17		59	58	..
									56·5	
7	..	N.W.	2	b	30·10	30·16		60		..
8	..	—	0	c o m	30·24	30·28		56		..
9	..	W.	4	b c	30·21	30·29		61		..
10*	..	W.S.W.	4	b c	30·23	30·29	56	54·5		..
11	..	..	2	b c	30·13	30·25	63			..
12	..	N.W.	4	c m	30·09	30·15	56	56		..
13	..	N.N.W.	4	c g	30·23	30·28	58	57		..

* From this date used deck Barom, with a correction added of 0·28, its average diff. from Cabin Barom.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality. Lat. S.	Long. W.
May, 1835.					Inches.	Inches.	°	°	°		
14	Noon.	N.N.E.	1	b c	30·21	30·30	63·5			Herradura.	
15	..	N.N.W.	1	b c g	30·16	30·27	64	65		..	
16	..	W.S.W.	4	b c	30·14	30·25	63	63		..	
17	8 A.M.	S.E.	1	c r	30·16	30·21	57	56			
18	Noon.	S.	5	b c v	30·14	30·26	65			..	
19	..	N.N.W.	2	b c v	30·06	30·14	58	57		..	
20	..	..	1	b c m	30·10	30·14	58	56		..	
21	..	N.W.	2	c m	30·06	30·15	57·5	56·5		..	
22	..	N.	1	c o m	30·09	30·13	57	57		..	
23	..	..	1	b c g	30·21	30·27	60	59		..	
24	..	S.W.	4	b c q	30·13	30·23	62	61		..	
25	..	—	0	c o d	30·20	30·24	57	56		..	
26	..	..	0	c g	30·26	30·28	59·5	58		..	
27	..	W.S.W.	4	b c v	30·10	30·31	63	59		..	
28	..	..	4	b c	30·03	30·26	61	60		..	
29	..	..	2	b c	30·16	30·15	60	59		..	
30	..	N.W.	4	b c	30·13	30·23	58			..	
31	..	W.N.W.	4	b c		30·23	61	59		..	
June.											
1	..	N.	2	c g w	30·16	30·26	57·5	57		..	
2	..	N.N.W.	4	b c	30·13	30·18	61	59·5		..	
3	..	S.W.	4	b c g	30·17	30·29	63	61·5		..	
4	..	N.N.W.	2	b c v	30·18	30·25	61			..	
5	..	—	0	c g	30·11	30·16	55·5	56		..	
6	9 A.M.	..	0	c o m	30·15	30·19	55	53·5	55·5	..	
7	Noon.	..	0	o m	*	30·25	58	56	56		
									57		
8	..	S.S.E.	5	b m q		30·45†	58	57	55·5	30·26	72·22
									56		
									60		
9	..	..	4	b c q		30·45	59	59	60	30·49	74·18
									58·5		
									61		
10	..	..	4	b c		30·46	61	61	62	31·11	75·44
									62		
									62		
11	..	S.	4	b c q		30·41	60	59	61·5	31·22	74·55
									58		
									58		
12	..	..	2	b c h		30·44	59	58	56·5	31·36	73·10
									57		
									56·5		
13	..	N.N.E.	4	o g m	30·54‡	30·47	56	56	55·5	Off Pichidanque.	
									55·5		
									56		
14	..	N.	4	o g	30·49	30·44	56	54	54	Valparaiso.	
									52·5		
15	..	—	0	c g	30·56	30·46	56	53·5	53·5	..	
16	..	N.	1	o m r	30·48	30·46	54·5	53		..	
17	..	S.E.	1	b c v	30·50	30·45	56			..	
18	..	N.	1	b c	30·56	30·44	59	58		..	
19	..	N.E.	1	c g	30·39	30·44	58	57		..	
20	..	N.W.	1	b c g	30·50	30·45	58·5	59		..	
21	..	—	0	b v	30·58	30·45	61	56		..	
22	..	N.N.W.	2	b c v	30·24	30·44	55·5	54·5		..	
23	6 A.M.	N.	8	b c g q	30·11	30·43	56	55		..	
	Noon.	N. b. W.	9	c g q	30·09	30·44	58·5	57·5		..	

* Symp. sent on board Schooner.

† Barometer tube loose: used it no more.

‡ New Sympr.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
										Lat. S.	Long. W.
June, 1835.					Inches.	Inches.	°	°	°		
23	6 P.M.	N.N.E.	9	c g q p	30·13			54		Valparaiso.	
24	4 A.M.	N.N.W.	6	o c q p l	30·18			55		..	
..	Noon.	N. b. W.	7	c g q	30·29			56		..	
..	9 P.M.	W.	1	b c q p l	30·45			52·5		..	
25	Noon.	W.S.W.	2	b c p	30·62			57		..	
26	..	VBLE.	1	b v	30·62						
27	..	N.	1	b c	30·50			57		..	
28	..	N.E.	1	c g	30·69			56·5	54 54·5	..	
29	..	W.	1	b	30·63		59		54 55·5	..	
30	..	S.	6	b c q	30·48	30·26*		60	58·5	30·17	73·23
July.											
1	..	..	4	o g q	30·38	30·17	61	57	59 58·5 58·5	27·41	71·39
2	..	—	0	o g m	30·30	30·12	61	58	58·5 58·5 58 58·5	Off Copiapó.	
3	8 A.M.	N.	4	b o	30·34	30·13	60	55·5	57·5 57·5	Copiapó.	
4	Noon.	—	0	c g	30·34	30·18	62		56·5 57 57	..	
5	..	S.S.W.	4	b c	30·37	30·18	60	57	56·5 57	..	
6	8 A.M.	S.	1	b c g	30·43	30·24	62·5	56	56·5 57 57	..	
7	2 P.M.	VBLE.	1	o g m	30·30	30·13	61·5	58·5	59·5 60	25·57	71·23
8	Noon.	—	0	o g m	30·28	30·14	62	59	60·5 60·5	25·32	71·29
9	..	VBLE.	1	o g	30·39	30·24	62	58	60·5 60·5 61	24·43	71·21
10	..	S. b. E.	4		30·44	30·31	63	60	61·5 62 62	23·18	71·26
11	..	S.E.b.S.	2	o c	30·30	30·18	64·5	61	62·5 62·5 61	20·49	70·54
12†	..	VBLE.	1	o g m	30·26	30·14	63·5	60	61 60·5 59·5	Off Iquique.	
13	..	S.	2	b c	30·29	30·18	64·5	62	59·5 60 59·5	Iquique.	
14	..	S.S.W.	4	b c	30·32	30·20	64·5	61	59·5 58	..	
15	..	VBLE.	2	o m	30·34	30·18	64	60	61 62·5 62·5	19·42	70·59
16	..	..	2	o m	30·32	30·22	65	62	62·5 62·5 61·5	18·47	72·19

* Cabin Barometer.

† July 12, 10·35 A.M., felt the shock of an earthquake.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
							°	°	°	Lat. S.	Long. W.
July, 1835.									63		
17	Noon.	S.	4		30·32	30·23	65·5	62	63	17·43	73·55
									62·5		
									62·5		
18	..	S.E.	4	b c	30·36	30·28	66	63	61·5	15·57	76·20
									60		
									60·5		
19	..	..	5	b c q p	30·31	30·18	65	61	59·5	12·55	77·19
									60		
									58·5		
20	..					30·20	65		60		Callao.
									58·5		
21	..	S.	4	b c g	30·28	30·21	64	62			..
22	..	W.	1	c g	30·31	30·24	65	63			..
23	..	—	0	b c g	30·26	30·21	64	62·5			..
24	..	S.	2	b c	30·25	30·20	64·5	61·5			..
25	..	..	4	c g	30·27	30·19	64	61			..
26	..	..	1	c g	30·25	30·18	64	61·5			..
27	..	W.	2	b c	30·28	30·21	64	63			..
28	..	S.	5	b c	30·30	30·21	65·5	62·5			..
29	..	S.S.E.	4	b c g	30·32	30·28	66	65			..
30	..	..	5	b c g	30·37	30·20	66	63·5			..
31	..	S.	4	b c g	30·25			62			..
August.											
1	..	W.N.W.	1	b c	30·21	30·18	66	63·5			..
2	..	S.S.E.	4	c g	30·21	30·17	66	63·5			..
3	..	W.S.W.	1	c g	30·25	30·18	65	60·5			..
4	..	W.	2	c g	30·24	30·17	65	62			..
5	..	S.	4	b c	30·26	30·21	64·5	65			..
6	..	..	5	b c	30·26	30·21	65·5	63·5			..
7	..	S.E.	4	b c g m	30·18	30·16	66	64	58·5		..
8	..	N.W.	2	b c	30·20	30·16	65	63			..
9	..	S.	2	b c g	30·23	30·20	65·5	62			..
10	..	S.S.E.	5	b c g	30·26			60·5			..
11	..	..	2	b c g	30·23	30·19	65	62			..
12	..	S.	4	b c g	30·00*	30·21	65·5	62			..
13	3 P.M.	W.	2	b c	29·96			65			..
14	Noon.	S.	4	b c	29·97			62			..
15	..	S.S.E.	4	b c g	29·97			61			..
16	..	..	4	b c g	29·96			64·5			..
17	..	S.	4	b c m	29·94			63			..
18	..	..	5	c g	29·90			62			..
19	..	W.	2	b c g	29·85	30·14†	63·5	63			..
20	..	..	4	b c	29·85			61·5			..
21	..	VBLE.	1	c g	29·81			65			..
22	..	W.S.W.	1	b c g	29·92			63			..
23	..	S	4	c m w	29·95			63			..
24	9 A.M.	S.S.E.	2	b c g m	30·02	30·25		59			..
25	Noon.	S.	4	b c	30·00			59			..
26	..	..	2	b c g	29·93			64			..
27	..	—	0	b c g	29·85			62			..
28	..	S.W.	2	b c g	29·85			61			..
29	..	S.	4	b c g	29·92			63			..
30	..	..	5	b c g	29·93			63			..
31	..	W.N.W.	2	b c g	29·89			62			..
September.											
1	Noon.	S.W.	2	b c g	29·87			63			..

* 12th August, changed Sympr. † 10 A.M.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
					Inches.	Inches.	°	°	°	Lat. S.	Long. W.
September, 1835.											
2	Noon.	s. b. w.	4	b c	29·89			63·5		Callao.	
3	..	s.	4	b c g	29·90			63		..	
4	9 A.M.	s.s.e.	4	b c g	29·96	30·20		61		..	
5	Noon.	..	4	b c g	29·89			61·5		..	
6	..	s.s.w.	4	b c g	29·96			63	57	..	
									57*		
7	..	s.s.e.	4	c g	30·03			61	57·5	..	
									58·5		
									60·5		
8	..	s.e.	5	o c	29·98			64	61·5	11·51	78·12
									60		
									61·5		
9	..	s.s.e.	4	o g m	29·90			64	62	9·58	79·42
									63·5		
									63·5		
10	10 A.M.	s.e.	2	o c	29·90	30·16		64·5	64	8·09	81·19
									63		
									64		
11	Noon.	s.s.e.	4	b c m	†29·17			64	64·5	6·52	83·19
									64·5		
									64		
12	..	s.e.	2	b c m	29·12			67	64·5	5·05	84·31
									64·5		
13	..	..	4	b c m	29·09			68·5	65·5	3·18	85·49
									66·5		
..	3 P.M.	..	4	b c m	29·03	30·07	70·5	67	66·5		
									65		
14	10 A.M.	..	4	b c m	29·12	30·18‡	70·5	67	66·5	1·53	88·13
									66		
15	..	s.	2		29·12	30·22	71	66	67·5	1·07	89·01
									68·5		
									67·5		
16	9 A.M.	s.s.e.	2	b c m		30·22	70·5		69·5	Off Barrington Isl.	
									67		
									69·5		
17	..	s. b.e.	2	c m p d	29·11	30·20	71	68·5	70·5	Stephens Bay, Chatham Island.	
									70·5		
									70·5		
18	..	s.s.e.	5	c o m q	30·09	30·23	72	70	70·5	..	
									70		
									68·5		
19	..	..	4	c g m	30·18	30·26	71·5	68·5	71·5	Working round the Island.	
									71·5		
									70·5		
20	..	..	4	b c	30·15	30·24	71·5	70	71		
									67·5		
21	..	vb le.	1	b c g	30·11	30·21	72	70·5	68	Stephens Bay.	
									68·5		
									68·5		
22	..	n.w.	2	b c	·	30·21	73		70	..	
									69·5		
									69		
23	10 ..	vble.	1	c g m	30·07	30·25	74	71	66·5	..	
									68·5		

* From Sept. 7th, Temperature of Water taken at 9 A.M., 1·30, and 6 P.M.

† Sept. 10th, changed Sympr.

‡ Sept. 14th, Barometer in cabin taken at 9 A.M. from this date.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.
										Lat. Long. W.
September, 1835					Inches.	Inches.	°	°	°	
									67	
24	10 A.M.	S.E.	4	o c	30·16	30.23	71·5	68	67·5	Off Charles Island.
									66	
25	9 ..	S.S.E.	4	c o g	30·13	30·23	71·5	69	65·5	Post-office Bay.
26	..	S.E.	4	b c q		30·23	72	72	65	..
..	3 P.M.	..	4	b c g q	29·99	30·15	73	71·5	64	
									64·5	
27	6 A.M.	..	4	b c g	30·15			65	63·5	Black Beach Road.
									63·5	
28	9 A.M.	S.S.E.	4	b c g	30·18	30·27	71·5	66·5	66·5	
29	..					30·22	70·5		62	Albemarle Island.
..	Noon.	S.E.	5	b c g p q	30·07			67	58·5	s.w. extremity.
..	3 P.M.	..	6	b c m q	29·97	30·10	70·5	70	63·5	..
									62	
30	Noon.	W.S.W.	2	o c g	30·10	30·19	70·5	66	63·5	Elizabeth Bay.
									65·5	
October.										
1	9 A.M.	VBLE.	1	b c m	30·13	30·22	70·5	67	63·5	Tagus Cove.
									65·5	
2	..	..	1	b c g m	30·13	30·22	71	67	62	
									67·5	..
									66	
3	10 ..	W.	2	b c m	30·10	30·21	71·5	67	63	
									66	Banks Bay.
									66	
4	..	S.E.	4	b c m q	30·14	30·22		68	67	
									69	Off Abingdon Island.
									68·5	
5	..	S.	4	c m d	30·07	30·23	71·5	67	68	
									67·5	..
									68·5	
6	..	S.E.	4	o h	30·10	30·21	71	69	67·5	Off Towers (or Douwes) Island.
									68·5	
									69	
7	..	S.	4	o c g	30·12	30·20	71	66·5	70·5	
									68·5	Off Bindloes Island.
									66·5	
8	9 ..					30·22	70	68	64·5	
									66	James Island.
									65·5	
9	..	—	0	b c	30·07	30·21	72	66	67	
									69	..
									67	
10	..	S.E.	4	o c	30·14	30·24	70·5	65	67	
									68·5	..
11	..	S.	4	o c p	30·12	30·25	72	67	69	
									66·5	Chatham Island.
12	..	S.S.E.	2	b c g m	30·09	30·22	72	69	68·5	
									69	..
									63·5	
13	..	S.	4	o m p d	30·06	30·20	72	67	71	
									70	..
									70	
14	..	S.S. .	4	o c q	30·08	30·21	72·5	68	70	
									68·5	Hood Island.
									69	
15	Noon.	S.	5	c g q m	30·04	30·17	72	69	66·5	
									65·5	Post-office Bay.
									64·5	

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
					Inches.	Inches.	°	°	°	Lat.	Long. W.
October, 1835.											
16	10 A.M.	S.E.	4	c m q	30·07	30·23	72·5	69	65 65·5	Post-office Bay.	
17	9 ..	S.	4	b c	30·10	30·22	72·5	67	68·5 68 66	Albemarle Island, East side.	
18	10 ..	S.E.	2	b c h	30·00	30·19	72	70	66 69 70·5	Off James Island Sugar-loaf.	
19	9 ..	VBLE.	4	b c m	30·98	30·16	73	69	68·5 72 73	Close to Abingdon Island.	
20	10 ..	S.	2	b c m	30·98	30·16	74·5	72	73 75 75	Off Wenman Islet.	
21	9 ..	..	4	o c q p	30·02	30·17	75	71	74·5 74·5 74	0·51 N.	93·03
22	10 ..	VBLE.	2	b c g p	30·04	30·19	74·5	70	71·5 70·5 66·5	0·23 N.	96·53
23	..	S.E.	1	o c p q	30·07	30·22	73	66	65 66 66	0·30 S.	99·04
24	..	..	4	o c q	30·04	30·18	72·5	68	66·5 67·5 67·5	1·47 S.	100·19
25	..	..	4	b c q	30·09	30·18	72·5	69	67·5 67·5 68	3·04 S.	102·15
26	9 ..	E.S.E.	4	b c	30·03	30·19	73	70	68·5 70 70	4·54	104·34
27	10 ..	E. b. N.	4	b c	29·99	30·18	73·5	72	70·5 70·5 71	6·32	107·00
28	..	..	4	b c	29·95	30·16	73·5	74	72 73·5 73·5	7·18	109 48
29	..	E.	4	b c	29·95	30·19	75	73	72·5 72·5 73	7·49	112·06
30	..	..	4	b c h	29·95	30·20	76	75	74·5 73·5 73·5	8·34	114·34
31	9 ..	..	4	b c q	29·99	30·22	76·5	73	74·5	9·26	117·39
November.											
1	10 A.M.	E. b. S.	5	b c q h	30·00	30·23	77	78	75·5 75·5	10·14	120·35
2	..	E.N.E.	4	b c	29·88	30·19	77·5	79	76·5 76 76	11·03	123·27
3	8 ..	N.E. b. E.	4	b c	29·89	30·19	78·5	77	76·5 76·5 76·5	11·39	125·36
4	10 ..	E.N.E.	5	b c	29·86	30·17	78·5	77	77 77	11·56	128·03
5	..	N.E.	4	b c q	29·84	30·15	80	79	77·5	12·44	130·42

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
					Inches.	Inches.	°	°	°	Lat. S.	Long. W.
November, 1835.									77·5		
6	10 A.M.	N.b.E.	4	b c q	29·86	30·17	80	77	78	13·26	132·49
									77·5		
									77·5		
7	Noon.	N.	4	b c	29·82	30·17	81	79	77·5	14·05	134·43
									76·5		
									77		
8	8 A.M.	N.N.E.	2	o g q t l r	29·92	30·19	80	74	77·5	14·24	136·51
									77·5		
									78		
9	10 ..	..	4	o c p	29·80	30·14	80	76	77	14·38	138·44
									77		
..	11 ..		6	q r							
									76·5		
10	10 ..	..	5	o c q p	29·84	30·10	78·5	73	77	15·13	139·54
									77		
									77		
11	..	N.b.E.	4	b c	29·85	30·14	79	76	77·5	15·24	141·26
									78		
									78		
12	..	E.N.E.	4	b c	29·86	30·20	80·5	78	78·5	15·23	143·22
									78·5		
13	2 A.M.	..	4	o q r l t	29·82			77	77·5		
..	10 ..	..	4	b c q	29·92	30·24	81	80	78	15·44	145·12
..	4 P.M.	E.	4	b c	29·83	30·16	81·5	78	77·5		
									77·5		
14	9 A.M.	E.b.N	4	b c m	29·93	30·23	81	77	77·5	16·46	147·47
									77		
15	10 ..	..	5	b c m	29·92	30·25	81	78	76·5	Matavai Bay.	
									77·5		
16*											
17	9 ..	E.	4	b c q	29·89	30·27	80·5	79		..	
18	..	VBLE.	2	b c g	29·92	30·22	80·5	75		..	
19	10 ..	S.E.	2	b c	29·82	30·19	81	81		Papawa Cove.	
									78		
20	..	N.E.	2	b c m	29·80	30·13	80	78	79	..	
									78·5		
21	..	VBLE.	1	o c g	29·78	30·15	80·5	76	76·5	Matavai Bay.	
22	..	..	1	o c m t	29·76	30·12	78·5	79	77·5	..	
23	..	..	1	o c	29·78	30·13	79	80		..	
24	..	E.b.N.	4	b c p	29·76	30·14	79	77		..	
25	..	S.E.	4	b c q	29·76	30·11	79	78		..	
									78·5		
26	..	S.W.	1	b c	29·70			78	78	Port Papiete.	
									77·5		
									77		
27	..	S.S.E.	4	b c m	29·71	30·07	81	77	78·5	17·14	150·31
									77·5		
									77·5		
28	..	S.	1	b v	29·69	30·09	80	77	79	17·17	152·15
									78		
									77·5		
29	..	E.b.N.	4	b c	29·67	30·07	80·5	80	78·5	17·25	153·24
									78·5		
									77·5		
30	..	N.E.	2	b c	29·70	30·05	81·5	80	79·5	17·54	155·00
									78·5		

* Called this day Tuesday 17th Nov.

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Day.	Hour.	Winds.	Force	Weather.	Sympr	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
					Inches.	Inches.	°	°	°	Lat. S.	Long. W.
December, 1835.									77·5		
1	10 A.M.	S.E.	2	b c	29·64	30·05	81·5	79	79	18·16	156·56
									78·5		
									78		
2	..	..	1	b c v	30·04*	30·10	81·5	77	80	18·35	158·13
									79·5		
									77·5		
3	..	..	4	b c	30·22	30·19	82	81	78·5	18·57	159·44
									78		
4	..	E.b. N.	4	b c g	30·28	30·18	81	78	77·5	20·00	162·29
									77		
5	..	N.E.	4	b c	30·19	30·16	81	77	78·5	21·00	164·55
									78·5		
									78		
6	..	N.E. b. E.	4	b c	30·20	30·19	82	79	77·5	22·02	167·00
									75·5		
									75·5		
7	..	E.	4	b c	30·26	30·20	81·5	78·5	75·5	22·58	169·39
									74·5		
									73		
8	..	..	5	o c p	30·30	30·18	80	74	73·5	23·56	172·00
									73		
									71·5		
9	..	E. b. N.	4	o c p	30·28	30·13	77·5	71	69·5	24·51	174·27
									69·5		
									72		
10	..	E.S.E.	6	b c	30·31	30·13	76·5	73	70·5	26·00	177·50
									69		
									68		
11	..	E. b. S.	4	b c	30·36	30·16	73	68·5	68·5	28·08	179·52
									68		
									67		
12	..	E.S.E.	1	b c	30·32	30·15	72·5	67	71·5	29·44	178·44
									69·5		
									68		
13	..	S.S.E.	5	b c	30·43	30·13	70·5	64	68·5	30·13	177·06
									69		
									65·5		
14	..	S.E.	2	b c q	30·55	30·29	69·5	66	66·5	31·46	175·42
									66·5		
									66		
15	..	E.S.E.	2	b c q	30·60	30·33	69·5	65	66·5	32·51	174·11
									66·5		
									66		
16	..	S.	4	b c	30·46	30·19	70	64	66	33·18	175·01
									65·5		
17	..	S.W.	7	b c q	30·27	29·92	67	61	64·5	34·20	175·36
..	4 P.M.	..	6	b c q	30·12	29·79	69	61·5	64		
									63·5		
									63		
18	10 A.M.	S. b. E.	7	b c q	30·37	29·94	67	57	63	34·26	174·57
									63·5		
19	2 ..	..	8	b c q	30·36			58			
									62·5		
..	10 ..	..	4	b c q	30·44	30·07	65·5	60	62·5	34·28	174·33
									63		

* 1st December, P.M., set Sympr. three tenths higher.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
					Inches.	Inches.	°	°	°	Lat. S.	Long. E.
December, 1835.									60·5		
20	Noon.	vble.	5	b c q	30·46	30·16	67	62	62·5	35·17	174·17
									61·5		
									62		
21	10 A.M.	—	0	b c m	30·60	30·30	68	66	63·5	Bay of Islands.	
									63	New Zealand.	
									61·5		
22	Noon	s.	1	b c m	30·61	30·35	68	69	65·5		..
									63·5		
23	..	N.N.E.	4	b c m	30·53			68	63·5		
									66·5		..
24	10 A.M.	N.	2	b c	30·50	30·27	70	67			..
25	..	vble.	1	o c r	30·53	30·27	70·5	66			..
26	Noon.	E.S.E.	2	b c m	30·63			65			..
27	10 A.M.	S.E.	4	b c	30·70	30·41	68	64			..
28	..	..	4	b c	30·69	30·45	68	64			..
29	Noon.	E.S.E.	4	b c q	30·60			65			..
30	10 A.M.	E.	4	b c	30·41	30·19	69	65	66		..
..	4 P.M.	E.N.E.	5	b c	30·32	30·06	69·5	62	65·5		
									63·5		
..	Midt.	N.E.	8	o q g r	30·10			63			
31	4 A.M.	..	10	o c q r	29·98			65	63		
..	10 ..	..	5	o c p	30·01	29·74	70·5	65	63·5	34·15	173·04
..	4 P.M.	..	1	o c p	30·00	29·75	72	65	63		
January, 1836.											
									64		
1	10 A.M.	N.	4	b c	30·20	29·95	70·5	65	58·5	Off Three Kings.	
									65		
									65·5		
2	4 P.M.	vble.	4	b c	30·04	29·85	71·5	67	64·5	34·21	170·02
									64		
									62·5		
3	10 A.M.	W.	4	b c	30·10	29·85	70·5	64	63·5	35·05	168·29
									64		
									63		
4	..	S.	5	b c q p	30·20	29·90	69	64	64·5	34·51	166·32
									64·5		
									65·5		
5	..	N.E.	1	o c	30·37	30·12	70	64	67·5	34·21	165·05
									67		
									66·5		
6	..	E.	1	b c	30·28	30·13	71	68	68	34·18	164·28
									67·5		
									67		
7	..	N.	2	b c	30·36	30·16	72·5	67	66·5	34·27	162·57
									69·5		
									70		
8	..	N.W.	5	b c q	30·20	30·06	73·5	72	67·5	35·10	160·21
									68·5		
									68·5		
9	Noon	S.	4	o c r	30·16	29·95	73	64	67	34·56	158·51
									67·5		
10	2 A.M.	..	8	b c q	30·22			63	68·5		
..	Noon.	..	6	b c q g	30·30	30·02	71	68	73	33·46	156·13
..	4 P.M.	S. b. E.	7	b c q	30·28	30·02	69·5	67	71·5		
									67·5		
11	10 A.M.	..	4	b c q	30·36	30·13	68	64	68	34·14	153·23
									68		

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality. Lat. S.	Long. W.
					Inches.	Inches.	°	°	°		
JANUARY, 1836.									68·5		
12	Noon.	E.	2	b c		29·99	71·5		70·5	Sydney Cove.	
									70·5		
13	9 A.M.	S.	1	c g t l p	30·19	30·04	71·5	63		..	
14	..	S.S.W.	2	c g p	30·20	30·03	72	64		..	
15	..	N.	2	b c g	29·87	29·79	73·5	70		..	
16	..	S.	2	b c	29·95	29·81	69	66		..	
17	..	W.S.W.	4	b c	30·01	29·84	68·5	65		..	
18	..	VBLE.	1	c g	30·21	30·08	71·5	69		..	
19	..	N.E.	1	c g	30·25	30·12	72	69		..	
20	..	..	1	b c	29·86	29·84	74	72		..	
21	..	VBLE.	1	b c g	29·83	29·80	75	72·5		..	..
22	..	E.N.E.	2	b c	30·15	30·06	76	72		..	
23	..	N.E.	5	b c g	30·37	30·22	73·5	72		..	
24	..	N.W.	2	b c	29·97	29·96	74	72		..	
25	..	S.E.	4	c g p d	30·40	30·16	72	63		..	
26	6 A.M.	S.S.W.	1	b c	30·56			58·5		..	
27	9 A.M.	N.N.W.	1	b c g	30·69	30·43	71·5	64		..	
28	..	W.N.W.	1	b c g p	30·63	30·41	71·5	63		..	
29	..	N.E. by E.	2	b c	30·37	30·25	72·5	67		..	
									71		
30	Noon.	N.E.	4	b c	30·21	30·16	74	70	70·5	Port Jackson.	
									69·5		
									68		
31	10 A.M.	N.	4	o m	30·24	30·18	73·5	70	68	36·32	151·17
									67·5		
FEBRUARY.											
1	10 A.M.	N.	6	o c u p	29·78	29·73	73	67	62·5		
..	Noon.	..	9		29·70	29·58	74·5	67	62	39·19	150·22
..	2 P.M.	N. b. E.	10	o c q m							
..	4 ..	N. b. W.	5	o c q m	29·75	29·61	74	65	59·5		
2	2 A.M.	W.N.W.	8	b c q	29·89			57	56·5		
									58		
..	10 ..	..	5	b c v	29·92	29·66	68	56	57·5	42·01	149·21
									57		
									57·5		
3	..	VBLE.	4	b c q	30·22	29·94	64	56	58	42·48	149·56
4	..	W.N.W.	4	b c q	*29·64	29·55	65	56	56·5		
..	4 P.M.	W.	5	b c q p	29·62	29·54	64·5	56	56·5	Van Diemen's Land.	
..	Midt.	W.N.W.	6	b c q l	29·72			50	57		
									56·5		
5	10 A.M.	W.	5	b c q p	29·76	29·65	63	51	57·5	Storm Bay.	
									57		
6	..	VBLE.	2	b c q	29·82	29·74	62	51		Hobart Town.	
7	9 A.M.	S.W.	4	b c g	30·25	30·14	62·5	53		..	
8	..	VBLE.	1	c g	30·52	30·41	62·5	56		..	
9	..	..	1	b c	30·55	30·47	64	60		..	
..	Noon.	S.E.	5	b c	30·52	30·46	64	63		..	
10	9 A.M.	N.E.	2	b c	30·49	30·42	63	58		..	
11	..	N.N.W.	4	b c	30·14	30·19	65·5	67		..	
12	..	S.E.	4	b c g m	30·09	30·08	68	63		..	
13	..	E.	1	b c g	29·97	30·03	66·5	64		..	
14	Noon.	N.N.W.	6	b c q	29·55	29·77	69	74		..	
..	4 P.M.	N.W. b. N.	7	b c q	29·47	29·71	69·5	76		..	
..	9 ..	S.E.	7	b c q l	29·67			69		..	

* Feb. 3, P.M., Sympr. set two tenths lower.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality	
					Inches.	Inches.	°	°	°	Lat. S.	Long. W.
February, 1836.										Hobart Town.	
15	9 A.M.	N.W. b N.	2	b c g	29·78	29·76	68	55·5			
16	..	N.W.	5	b c	30·00	30·01	66	61	57·5		..
									59·5		
									59		
17	..	..	2	c g p	30·11	30·08	67·5	59·5	59·5		..
									58·5		
									57·5		
18	10 A.M.	N.	4	b c	30·46	30·28	65	58	57·5	43·58	147·58
									56·5		
19	..	N.E. b N.	2	o d	29·86	29·89	66	59	56	44·07	145·14
..	4 P.M.	N.	4	o c p	29·86	29·85	67	56·5	54·5		
..	6 ..	S.	7	o c m p q	29·95			55			
									56		
20	10 A.M.	VBLE.	4	o c q	30·12	30·00	62·5	54	55	43·03	143·35
									55		
									53·5		
21	..	VBLE.	2	b c	30·32	30·16	62	51	54	42·55	142·03
									54		
22	..	E.	4	b c	30·37	30·26	62	54	54·5	42·29	139·46
									54·5		
23	..	N.E.	5	o g m	29·96	30·92	63·5	56	54	42·06	135·27
									53		
									52·5		
24	..	N.N.W.	4	o c u g	29·84	30·73	61·5	52	53·5	41·45	133·49
									54		
									53·5		
25	..	S.S.E.	1	b v	29·85	30·77	61·5	54	55	41·28	132·29
									55		
									53·5		
26	..	S S.W.	4	b c m	30·07	29·94	62	55·5	56·5	40·56	130·54
									56		
									55·5		
27	..	—	0	o c	30·22	30·14	62	56	55	40·34	129·01
									54·5		
									55·5		
28	..	VBLE.	6	o c d	30·05	30·00	62·5	56	56	40·12	127·05
									55·5		
									56·5		
29	..	..	1	o c p	29·92	29·88	61	50	56·5	39·38	125·29
									57·5		
March.											
									58		
1	..	VBLE.	4	o c	30·34	30·16	61	55	58	38·02	124·38
									58·5		
									57·5		
2	..	N.W. b. N.	4	b c	30·41	30·27	62	58	57	39·26	123·56
									57·5		
									59		
3	..	VBLE.	2	b c	30·45	30·36	63	59	59	38·03	123·20
									58·5		
									58·5		
4	..	..	1	o c g	30·36	30·33	64·5	60	59·5	37·39	122·57
									60·5		
									62		
5	..	N.N.E.	4	b c m	29·93	29·96	67	65	64	36·49	120·41
									63		
									63·5		
6	..	VBLE.	4	b c q	30·16	30·10	64·5	61·5	65·5	King George Sound.	
									66·5		

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
					Inches.	Inches.	°	°	°	Lat. S.	Long. E.
March, 1836.										King George Sound.	
7	10 A.M.	E.S.E.	5	b c	30·13	30·19	66·5	63·5	66·5		
8	9 ..	S.E.	4	b c	30·09	30·21	67	66			..
9	..		4	b c q	29·80	30·02	68·5	68			..
10	Noon.	W.N.W.	6	b c q	29·68	29·83	70	70			..
..	6 P.M.	W.S.W.	7	b c q	29·78			60			
11	9 A.M.	VBLE.	1	c g	29·93	29·99	70	63			..
12	..	W.N.W.	5	c g q p	30·19	30·12	67	53·5			..
									62·5		
13	..	S.W.	6	b c q p	30·18	30·16	65	59	62·5		..
									62·5		
									64		
14	..	S.	4		30·45	30·32	64·5	56	65		..
									65·5		
									64		
15	10 ..	VBLE.	2	b c q	30·48	30·37	66	58·5	62		..
									62		
									65·5*		
16	..	E.	2	b c	30·41	30·40	65·5	62	67·5	35·34	
									66·5		
									63·5		
17	..	N.E. b. N.	4	b v	30·13	30·20	67·5	65	68·5	35·02	114·00
									64		
									66		
18	..	VBLE.	1	b m	30·03	30·11	69·5	66	69·5	34·32	113·39
									68·5		
									66		
19	..	W. b. N.	4	b c q	30·14	30·17	70	65	66	32·43	112·58
									65·5		
									67·5		
20	..	S.	4	b c	30·27	30·29	69·5	64	68·5	30·34	111·14
									67·5		
									69		
21	..	S. b. E.	5	b c p	30·30	30·35	69·5	67	68·5	28·08	109·31
									71		
									72		
22	..	S.E. b. S.	5	b c q	30·18	30·30	72	71	72	25·38	107·27
									71·5		
									73·5		
23	..	S S.E.	5	b c	30·00	30·22	73·5	74	74	23·08	105·51
									73·5		
									73·5		
24	..	E.S.E.	4	b m	29·96	30·22	76·5	75	75·5	20·56	104·22
									75·5		
									75·5		
25	..	S.E.	4	b c	29·94	30·23	78	76	76	18·44	103·00
									76		
									76·5		
26	..	..	5	b c m	29·88	30·17	79	76	77·5	16·03	101·17
									78		
27	..	..	7	o c m q	29·75	30·07	80·5	77	79·5	13·22	99·07
..	4 P.M.	..	7	b c q	29·63	29·98	82	81	79·5		
									79		
28	10 A.M.	..	8	o c q p	29·70	29·98	82	75·5	78·5	12·28	97·49
..	4 P.M.	..	7	o c m q p	29·62	29·92	81	79			
29	10 A.M.	S.	7	o c m q	29·64	29·96	81	78	78·5		
..	Noon.	S.W.	6	o c m q p	29·61	29·88		78	79	12·25	97·31
..	8 P.M.	..	8	o c m q p	29·66			75	78·5		

* 16th March, 6 A.M., passed through a remarkable tide ripple, or meeting of waters.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
					Inches	Inches.	°	°	°	Lat. S.	Long. E.
March, 1836.									78·5		
30	10 A.M.	W.b.N.	4	o c q p	29·71	30·02	81·5	76	79	11·49	9·30
	..								78·5		
	..								78·5		
31	..	N.W.	4	b c	29·70	30·04	82	79	79	12·18	97·15
April.									79·5		
1	..	N.E.	2	b c	29·75	30·09	82·5	80	78·5	12·08	97·01
									80		
2	..	E.S.E.	1	b c m	29·78	30·15	82·5	81	79·5	Keeling Island.	
									82·5		
3	9 A.M.	..	4	b c	29·82	30·18	82	80			..
4	..	E.	4	b c	29·86	30·22	82·5	80			..
5	8 ..	E.b.s.	6	b c q	29·84	30·21	82	80	79·5		
..	Noon.	E.S.E.	6	b c q	29·81	30·20	82·5	81	80		..
..	6 P.M.	..	6	b c g q	29·78	30·15	82·5		79·5		
6	8 A.M.	..	7	b c q m	29·83	30·21	82	79	78·5		
..	Noon.	..	7	b c q m	29·83	30·21	82	80	79·5		..
..	6 P.M.	..	7	b c q m	29·81	30·18	82·5	79	79·5		
7	6 A.M.	..	8	b c q	29·87						
..	9 ..	..	7	b c q m	29·87	30·23	82	79			..
8	Noon.	S.E. b.E.	7	b c m q	29·81	30·23	82	80			..
9	9 A.M.	..	6	b c q m p	29·85	30·20	81·5	79			..
10	..	..	5	b c q m	29·84	30·18	81·5	78·5			..
11	Noon.	..	5	b c q m	29·80	30·17	81*	79			..
12	9 A.M.	..	5	b c g q p	29·82	30·16	80·5	78			..
									78·5		
13	10 ..	E.S.E.	4	b c	29·74	30·14	81·5	79	79	12·12	94.38
									79		
14	..	..	4	b c p	29·80	30·16	81	76	78·5	12·37	92·19
									78·5		
15	..	E. b. s.	4	b c	29·76	30·11	81	79	78·5	12·59	89·56
									79		
									79		
16	..	E.	2	b c m	29·72	30·11	82	80	79·5	13·23	87·41
									79·5		
									79		
17	..	E.S.E.	4	b c	29·76	30·12	81·5	78	79·5	14·04	85·44
									79		
									77·5		
18	..	E.	1	o q c p	29·84	30·10	82	74	78	14·37	83·07
									78		
									78·5		
19	..	S.E.	5	b c q	29·81	30·11	80	77	79	15·18	80·10
									78·5		
									78		
20	..	E.S.E.	5	b c	29·73	30·15	81·5	79	78·5	16·02	76·50
									78·5		
									78		
21	..	S.E.	5	oc p q	29·76	30·11	81·5	80	79·5	16·48	73·37
									79		
									77·5		
22	..	N.E.	2	b	29·75	30·16	82	79	79	17·28	71·36
									78·5		
23	..	E.b.N.	2	b c m	29·77	30·16	82·5	79	78·5	17·39	69·49
									78·5		
24	..	..	2	b c v	29·81	30·20	82·5	80	79·5	17·55	67·58
									79		

* April 11th, lost Self-registering Thermometer in sounding.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
					Inches.	Inches.	°	°	°	Lat. S.	Lat. E.
April, 1835.									79		
25	10 A.M.	S.	4	b c u g	29·82	30·18	82·5	79	78·5	18·18	66·39
									78·5		
									78·5		
26	..	..	4	b c	29·85	30·20	81	78	78·5	18·33	64·14
									78		
									78		
27	..	S.S.E.	2	b c	29·85	30·21	80·5	78	78·5	18·32	61·50
									78		
									78·5		
28	..	S.E.	2	b c	29·89	30·23	81	77	79	19·30	59·44
									78·5		
29	..	..	4	b c p q	29·88	30·23	81	78	78·5	Mauritius.	
									78		
30	9 ..	S.W.	2	b c p	29·84	30·16	79	76		Port Louis.	
..	Noon.	E.	4	b c	29·81	30·15		78		..	
May.											
1	9 A.M.	S.E.	5	b c	29·89	30·22	79·5	78		..	
2	..	S.E. b. E.	5	b c q	29·95	30·23	78·5	78		..	
3	Noon.	E.S.E.	2	b c	29·81	30·22	79·5	81		..	
4	9 A.M.	—	0	b c	29·89	30·23	79	77		..	
5	..	E.N.E.	2	b c	29·91	30·21	78	76		..	
6	..	S.E.	2	b c q	29·96	30·24	77·5	75		..	
7	..	..	2	b c	29·95	30·31	77·5	76		..	
8	..	S.S.E.	5	b c q	30·05	30·37	77·5	76		..	
9	..	S.E. b. S.	4	b c	30·06	30·39	77·5	75		..	
10	10 ..	S.E.	5	b c q p	30·12	30·38	78·5	74	77·5	20·15	55·08
									76		
11	..	..	5	b c q p	30·16	30·45	78	76	76	21·57	52·06
									76·5		
									76		
12	..	..	5	b c q	30·28	30·50	78	74	76·5	23·58	49·03
									76		
									75		
13	..	VBLE.	4	b c	30·31	30·53	77	73	76	26·07	46·07
									73·5		
									73·5		
14	..	E.N.E.	2	b c	30·13	30·37	76·5	74	74·5	27·31	42·40
									74		
									74·5		
15	..	VBLE.	1	b c	30·06	30·32	77·5	74	75·5	27·30	41·01
									75		
									73·5		
16	..	..	1	b c	30·10	30·34	76·5	71	74	27·22	40·06
									73·5		
									72		
17	..	E.	2	b c	30·17	30·44	76·5	71	72·5	27·50	37·52
									73·5		
									72·5		
18	..	S.E.	4	b c g	30·26	30·46	77·5	73	73	28·15	35·09
									72·5		
19	..	E.N.E.	5	b c m	30·27	30·47	76·5	73·5	73·5	30·21	32·44
									72·5		
20	..	N.E.	5	b c	30·14	30·34	77	72	73·5	32·28	29·43
									73·5		
21	..	S.W.	7	o c q	30·08	30·16	75	67	71·5	33·49	27·28
									70·5		
22	..	N.E.	4	b c	30·26	30·31	73	62	63·5	34·29	25·27
									63		

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
					Inches.	Inches.	°	°	°	Lat. S.	Long. E.
May, 1836.									63		
23	10 A.M.	N.N.E.	4	o c q	29·74	29·94	73	66	64	34·49	22·48
									63		
									62·5		
24	..	VBLE.	2	b c	30·12	30·21	72	63	63·5	34·43	22·41
									62·5		
									63		
25	..	N.W.b.W.	5	b c	30·20	30·26	68	61·5	62	35·29	21·58
									62·5		
			7								
26	..	N.W.	6	b c q	30·07	30·10	71	61	62	35·15	21·22
									61·5		
27	..		2	b c	30·14	30·20	68·5	62	62	35·06	20·24
									61		
									60		
28	..	S.W.	2	b	30·03	30·09	69	61	61·5	34·52	19·58
									61		
29	2 A.M.	N.W.	10	b c q l	29·73			60			
..	Noon.	..	9	o g q u	29·69	29·75	69	59	60·5	35·11	20·02
..	4 P.M.	..	10	b c q	29·68	29·78	68	58			
..	Midt.	W.	8	b c q	29·84			59			
30	10 A.M.	S.W.	5	b c q	30·16	30·14	67·5	60	60·5	35·12	19·42
									60		
31	..	VBLE.	2	b c r	30·35	30·36	67·5	57	61	Cape of Good Hope.	
June.											
1	9 A.M.		5	b c g	30·29	30·35	65·5	59		Simon Bay.	
2	..	—	0	b c	30·48	30·53	64·5	60		..	
3	..	S.S.E.	6	b c q	30·47	30·53	65	61		..	
4	..	—	0	b m		30·47	65	64		..	
5	..	..	0	b m		30·45	65			..	
6	..	VBLE	1	b c m	30·36	30·42	65	67		..	
7	Noon.	N.N.W.	6	b m q	30·10	30·37		75		..	
8	9 A.M.	W.	4	b c q	30·32	30·40	66·5	63		..	
9	..	S.S.E.	2	b c	30·45	30·51	64	57		..	
10	Noon.	N.W.	1	b c m	30·32			64		..	
11	..	E.	1	b c	30·09			63		..	
12	..	VBLE.	2	b c	30·16			60		..	
13	..	N.W.	4	b c q p	30·29			57		..	
14	..	N.N.W.	4	c o g q	30·25	30·33	63	60		..	
15	..	N.W.	4	b c m	30·12	30·22	63	60		..	
16	..	..	6	c o q r	30·00	30·08	63·5	57		..	
17	6 A.M.	S. b. E.	8	c g q p d	30·07	30·18	62·5	54	55·5	..	
..	Noon.	S.S.E.	5	b c q	30·24	30·33	62·5	56		..	
									55·5		
18	..	N.N.W.	4	b c	30·39	30·45	62·5	58	58·5	..	
									58·5		
19	10 A.M.	..	4	b c	30·15	30·20	63	57	58·5	34·57	17·08
									60·5		
20	6 ..	N.	9	o c q g	29·85			58			
									61·5		
..	10 ..	N.W.	9	b c q	29·92	29·93	65	58	59	34·57	16·55
..	4 P.M.	..	8	b c q	29·98	30·06	65·5	57	59·5		
									59·5		
21	10 A.M.	VBLE.	1	b c	30·36	30·38	65	59	60	33·35	16·55
									59·5		
									59·5		
22	..	..	2	b c m	30·30	30·35	65	58	60	32·47	17·12
									59·5		

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
					Inches.	Inches.	°	°	°	Lat. S.	Long. E.
June, 1836.									58·5		
23	10 A.M.	VBLE.	1	b c g	30·32	30·43	66	59·5	59·5	31·47	17·01
									59·5		
									59·5		
24	..	S.S.E.	2	b c m w	30·29	30·36	66·5	61	58·5	30·35	15·38
									59·5		
									60·5		
25	..	VBLE.	1	b c	30·24	30·34	67	60	60·5	29·18	13·44
									61		
									61		
26	..	S.	4	b c q	30·36	30·44	66	61	61·5	27·49	11·52
									61·5		
27	..	S.S.E.	5	o c g q	30·37	30·44	67	61	62·5	25·44	9·14
28	..	VBLE.	2	o c g	30·17	30·31	66	62	63·5	23·36	6·58
									65		
29	..	..	2	b c g	30·11	30·27	66·5	63	65·5	23·04	5·13
									65		
									65		
30	..	..	1	b c	30·17	30·45	68	65	66	21·59	4·49
July.									65·5		
1	..	..	2	o c	30·24	30·42	68·5	65	66	21·00	3·16
									66·5		
2	..	S.E.	4	o c g	30·16	30·39	69	67	67	19·58	1·19 E.
									67*		
3	..	VBLE.	2	o c q	30·14	30·37	69	65	67·5	18·56	0·24 W.
									67·3		
									67·3		
4	..	..	4	o c g q	30·14	30·33	69	65	68	18·14	2·04 W.
									68		
									68		
5	..	N.	1	b c	30·04	30·31	69·5	68	69	17·57	3·43 W.
									68·7		
									68·2		
6	..	VBLE.	2	b c	30·06	30·30	71	67·5	69	17·07	3·43
									68·5		
									68		
7	..	S.	4	o c	30·12	30·32	71·5	68	69	16·17	3·37
									68·5		
8	..	S.E.	4	b c q	30·15	30·42	72	69	68·5	St. Helena.	
									68·5		
9	9 ..	S.	4	b c q p d	30·15	30·39	71	67	68·5		..
10	Noon.	S.S.E.	4	b c q p	30·11	30·35	71	68			..
11	9 A.M.	..	4	b c g q p	30·11	30·39	71	67			..
12	..	S.E.	4	b c g p	30·13	30·39	71	66			..
13	..	..	2	b c q p		30·36		66			..
									68·5		
14	..	..	2	b c	30·10	30·36	70·5	67	68		..
									69·5		
15	10 ..	VBLE.	4	b c q p	30·02	30·26	71·5	65	70	14·11	7·53
									70		
									70·5		
16	..	S.	1	b c	29·90	30·20	72·5	68	71*	13·27	8·53
									71		
									72		
17	..	..	2	b c	29·97	30·28	73	72	72·5	12·17	10·15
									72·3		

* 3d and 16th, Temperature of water taken at night.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
					Inches.	Inches.	°	°	°	Lat. S.	Long. W.
July, 1835.									73		
18	10 A.M.	S.E.	4	b c	30·00	30·31	74	70	74	10·27	12·04
									74		
									75		
19	..	..	5	b c q p	29·94	30·29	76	73	75·3	8·11	
									75		
20	Noon.	..	6	b c q p	29·89	30·30	76·5	76		Ascension.	
21	9 A.M.	..	4	b c g q p	29·93	30·29	75·5	72		..	
22	..	..	4	b c q	29·92	30·28	76	74		..	
									75·3		
23	Noon.	..	5	b c q	29·89	30·30	77	75	75	..	
									75·5		
									75·5		
24	10 A.M.	S.S.E.	4	b c q	29·98	30·33	76·5	73	75·5	9·08	16·52
									75		
									74·5		
25	..	S.E.	4	b c q	29·96	30·31	76·5	73	75	10·28	19·35
									74·5		
									74		
26	..	..	5	b c q	29·96	30·30	77	74	74·5	11·17	22·43
									75		
									74		
27	..	..	5	b c q	29·96	30·31	77	72	74·5	11·47	26·13
									74·5		
28	9 ..	VBLE.	4	b c		30·32	77		75	12·05	29·05
									75·5		
29	10 ..	E.	2	b c m	29·89	30·27	77·5	73	75·5	12·19	31·33
									76		
30	..	..	4	b c	29·85	30·24	77·5	74	76·5	12·44	34·14
									76·5		
31	..	..	4	b c	29·87	30·29	78	76	76	12·51	36·31
August.											
1	..		4	b c	29·90	30·32	78·5	75	74·5		
2	9 ..	S.S.E.	4	b c	29·90	30·32	78·5	75		Bahia.	
3	..	S.W.	4	b c	29·95	30·34	77·5	73		..	
4	..					30·32	77·5			..	
5	Noon.	S.S.W.	2	b c	29·90	30·32	77·5	75		..	
									74		
6	..	S.W. b. W.	4	b c	29·88	30·30	77	73	75·5	..	
									75		
									74		
7	10 A.M.	VBLE.	4	b c q	29·94	30·31	77	74	75·5	13·02	38·15
									75·5		
8	..	..	2	o g	29·92	30·31	77	74	75·5	12·55	37·47
9	..	..	4	b c	29·90	30·32	78	76	75·5	12·53	37·23
									76		
10	..	S.E.	5	b c q	29·90	30·31	77·5	74	76·5	11·30	36·17
									76·5		
									76		
11	..	VBLE.	4	b c q	29·94	30·31	78	74	76	9·45	35·20
									75·5		
									75		
12	..	S.E.	4	o c m g q p	29·90	30·26	77·5	73	76	7·58	
									75·5		
13	Noon.	..	6	b c q	30·11*	30·30	78·5	75·5		Pernambuco, Inner Harbour.	

* Set Sympr. 0·26 higher, 12th August, P.M.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
August, 1836.					Inches.	Inches.	°	°	°	Lat.	Long. W.
14	9 A.M.	S.E.	4	b c	30·14	30·29	78	75	75·5 76·5 76·5	Pernambuco, in the Roads.	
15	..	..	4	b c	30·12	30·28	78	76	76 76·5 77	..	
16	10 ..	E.S.E.	5	b c g p r	30·10	30·24	78·5	74	75·5 76·5 76·5	..	
17	..	S.E.	4	b c g		30·22	78·5	76	76 76·5 76·5	..	
18	..	E.	5	b c q	30·06	30·25	79·5	77	76·5 77	6·53 s.	34·30
19	..	S.E.	5	b c q	30·10	30·26	80	76	76·5 76	4·22 s.	33·30
20	..	..	4	b c q	30·11	30·30	80	78	76·5 76	1·58 s.	31·57
21	..	..	4	b c	30·09	30·24	80	75	75·5 76 76·5	0·15 N.	30·41
22	..	..	4	b c	30·07	30·25	79	76	77·5 77	2·08	29·35
23	..	..	4	b c q	30·06	30·26	80	76	78 78·5 78·5	4·09	28·40
24	..	S. b. W.	2	b c	30·04	30·25	80·5	79	79 79·5	6·09	26·48
25	..	S.W.	2	b c	30·00	30·25	81	79	79 79 78·5	8·07	25·25
26	..	VBLE.	2	b c	30·00	30·20	82	77	78·5 79 79·5	9·57	24·18
27	..	..	2	b c m	29·86	30·14	82	80	79 81 80	10·40	23·42
28	2 A.M.	S.W.	10	o g q r	29·72			76			
..	10 ..	S.	2	o c	29·96	30·16	82	78	78·5 79·5	12·27	23·27
29	..	VBLE.	1	b c m	29·98	30·23	82	78	81 79·5	13·41	23·22
30	..	N. b. E.	2	b c m	30·00	30·24	82·5	78	78·5 79·3	14·20	23·05
31	9 ..	N.E.	4	b c q		30·23	80·5		79·2 77	Porto Praya.	
September.											
1	..	N.N.E.	4	b c	30·01	30·26	81	77	78 78·5	..	
2	..	N.E.	4	b c	30·04	30·28	81	78	78	..	
3	..	..	5	b c q	29·97	30·26	80·5	79		..	
4	..	..	4	b c q	29·94	30·22	81	79		..	
5	10 ..	..	5	b c	30·02	30·23	82	77	78·5	14·24	25·21

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
					Inches.	Inches.	°	°	°	Lat.N.	Long.W.
September, 1836.									78		
6	10 A.M.	N.E.	4	b c m q	30·22*	30·26	81	78	78	16·01	27·44
									77·5		
									77		
7	..	..	5	b c m	30·26	30·28	80	78	76·5	18·12	29·58
									76·5		
									76		
8	..	E.N.E.	5	b c	30·35	30·32	78·5	74	76·5	20·46	31·54
									76		
									75·5		
9	..	VBLE.	5	b c q p	30·39	30·32	77·5	73	76	23·07	32·25
									75·5		
									75		
10	..	E.N.E.	4	b c	30·39	30·36	77	76	75·2	25·41	34·34
									74·5		
									74		
11	..	E. b. N.	2	b c	30·39	30·38	76·5	73	74·5	27·52	35·47
									74·5		
									74·5		
12	..	W.N.W.	2	b c	30·32	30·31	77	73	75·5	28·42	35·17
									75		
									73·5		
13	..	N.E.	2	b c	30·34	30·27	77	72·5	75·5	29·59	36·23
									75		
14	..	S.E.	2	b c	30·32	30·29	77·5	76	74·5	30·37	36·23
									73·5		
15	..	S.W.	5	b c m	30·25	30·26	78·5	74	74	32·41	34·30
									74	..	..
									73·5		
16	..	S.S.W.	5	b c m	30·26	30·22	78·5	74	72·5	35·15	32·22
									71·5		
17	6 A.M.	S.	8	o m q g	30·16						
									71		
..	10 ..	..	6	b c q m	30·24	30·18	78	73	69·5	36·49	29·31
									70		
									69·5		
18	9 ..					30·26	77	73	70·5	38·03	27·39
									69·2		
19	10 ..	N.N.W.	2	b c	30·50	30·36	75	66	68·5		
20	..	S.W.	1	b c f	30·42	30·35	73·5	71		Angra Roads.	
21	..	VBLE.	1	o c n	30·40	30·35	74·5	72		..	
22	..	S.W.	4	o c r	30·42	30·31	75·5	72	68	..	
23	..	VBLE.	1	b c	30·60	30·48	75	70	70	37·58	
									69·5		
24	..	S.S.E.	4	b c	30·62	30·50	73	69	70·5	Off St. Michaels.	
									70		
25	..	S.	2	o c g	30·46	30·34	74	70	69	39·20	24·30
									68		
26	..	N.W.	2	b c	30·37	30·24	72	66	67·5	41·05	22·07
									66		
									65·5		
27	..	..	4	b c	30·52	30·32	68·5	63	65	42·28	19·32
									64·5		
28	..	W.	4	o c g d	30·36	30·16	69	67	64†	44·33	16·29
									64·5		
29	..	..	10	c g q p	29·88	29·54		59	61		

* 5th Sept., Noon, set Sympr. 0·17 higher.

† 27th Sept., P.M., broke Water Thermometer; used from this time Ivory (No. 25.)

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.	
					Inches.	Inches.	°	°	°	Lat. N.	Long. W.
September, 1836.											
29	10 A.M.	N.W.	9	b c q m	30·11	29·73	65·5	59	61·5	45·43	13·43
..	4 P.M.	N.	7	b c q	30·37	30·03	67·5	60	62		
30	10 A.M.	N.W.	2	b c q	30·46	30·17	65·5	58	60·5		
..	4 P.M.	VBLE.	2	o c q	30·38	30·06	66	59	61 60·5	46·31	11·41
..	Midt.	S.W.	8	g q p	30·00 *			60			
October.											
1	10 A.M.	N.W.	9	b c	29·58	29·52	67	61	59·5		
..	2 P.M.	..	10	b c q p	29·46				58·5	48·15	8·58
..	4 ..	..	9	b c q p	29·51	29·46	67·5	56	58·5		
2	10 A.M.	W.	5	b c q p	29·80	29·72	63	51	55 56·5		
..	9 P.M.	S.	5	b c q p	29·30	29·56	60	52		Falmouth.	
..	Midt.		11	o u g q	29·16	29·08		49			
3	10 A.M.	N.N.W.	4	b c q	29·64	29·69†	60·5	50	56·5	..	
..	6 P.M.	S.W.	4	b c q p	29·72	29·67	60·5	50			
4	9 A.M.	—	0	b		29·67	60	52			
..	Noon.	S.W.	2	b	29·76	29·71	59·5	54		..	
..	4 P.M.	N.W.	2	b	29·80	29·74	59·5	53	56·5		
5	9 A.M.	E.				30·02			55		
..	4 P.M.	S.	2	b c	30·18	30·06	59	56		Plymouth.	
6	9 A.M.	N.N.W.	2	b c m	29·97	30·04	59	53			
..	4 P.M.	W.S.W.	1	b c g	29·86	29·86	59	55		..	
7	9 A.M.	S.W.	5	b c q	29·58	29·59	59·5	55			
..	3 P.M.	S.S.E.	6	b c q	29·44	29·46	59·5	58		..	
8	9 A.M.	S.W.	2	b c	29·59	29·55	60	54		..	
..	3 P.M.	S.S.W.			29·59	29·55	59·5	57			
9	9 A.M.	W.	5	b c q	29·56	29·53	58	54		..	
10	9 ..	..	6	b c q p	29·47	29·44	59	55		..	
..	3 P.M.	W.S.W.	6	b c q p	29·50	29·50	59	56	56·5		
11	4 A.M.	S.W.	11	b c q	29·34			51			
..	9 A.M.	W.	2	b c g q	29·50	29·48	58·5	53		..	
..	3 P.M.	S.W.	4	b c p	29·54	29·52	58·5	55			
12	9 A.M.	W.S.W.	4	b c g q	29·76	29·73	58·5	54		..	
..	4 P.M.	S.S.E.	9	c g q r	29·42	29·42	59	53			
..	8 ..	W.S.W.	11	b c q p	29·08	29·13	59	55			
..	10 ..	..	10	b c q p	29·11	29·12	58·5	55			
13	10 A.M.	W.	5	b c q p	29·49	29·39	58	53		..	
..	3 P.M.	S.W.	4	b c q	29·51	29·49	57·5	56			
..	Midt.		9	b c q p							
14	9 A.M.	S.W.	4	b c	30·03	29·96	57	54		..	
..	3 P.M.	..	4	b c	30·08	30·03	58	57		..	
15	9 A.M.	S.S.W.	2	b c	30·00	29·96	57	55		..	
16	9 ..	S.E.	2	b c m	30·35	30·25	59	54		..	
..	3 P.M.	..	5	b c q	30·26	30·24	59	58			
17	9 A.M.	E.S.E.	4	b c q	30·27	30·23	60	60		..	
..	3 P.M.	S.E.	5	b c q	30·19	30·23	61	61			
18	9 A.M.	..	2	b c m	30·30	30·25	61	60	56·5		
..	Noon.	S.S.E. VBLE.	2	b c m	30·29	30·24		61	57		
..	4 P.M.	W.S.W.	1	b c m	30·28	30·26	61·5	60	57·2		
19	10 A.M.	N.N.W.	4	b c m	30·56	30·47	61	56	57·2		
..	4 P.M.	N.	2	b m	30·54	30·50	62	56	58·3 57·5	50·17	
20	10 A.M.	S.E.	2	b c m	30·70	30·60	61·5	57			
21	10 ..	..	4	b c m	30·63	30·46	60·5	53	57		

* 1st Oct., A.M., set Sympr. 0·27 lower.

† 3d Oct., 12·30 A.M., Barometer lowest 29·08.

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Day.	Hour.	Winds.	Force	Weather.	Sympr.	Barom.	Attd. Ther.	Temp. Air.	Temp. Water.	Locality.
October, 1836.							°	°	°	
21	3 P.M.	S.E.	5	b c m	30·56	30·44	59·5	53	57·5	
22	10 A.M.	..	2	b c m q	30·68	30·53	59·5		57·5	
..	3 P.M.	E	4	b c	30·68	30·54	59·5	53	56·5	
23	9 A.M.	N.	2	b m		30·55	59			
..	4 P.M.	VBLE.	2	b c m	30·66	30·52	58	51	57·5	
24	10 A.M.	—	0	b c m	30·62	30·53	58	54		Downs.
..	4 P.M.	N.W.	2	b f	30·63	30·50	59	55	56·5 57	
25	10 A.M.	..	4	b f	30·56	30·44	59·5	52	57	
..	4 P.M.	..	2	f m	30·50	30·37	59	52	55·5 54·5	
26	10 A.M.	N.W.b.N.	2	b m	30·	30·35	60			
..	4 P.M.	N.W.	1	o g m	30·36	30·28	60	51	54·5 54·5	
27	10 A.M.	W.	8	o c q	30·00	29·88	59	49	53·5	Thames.
..	6 P.M.	N.W.	6	b c q	30·25	30·04	57	41	53·5 52·5	
28	10 A.M.	..	4	b c q	30·26	30·11	56	40	52·5 51·5	
..	8 P.M.					30·02	55			Greenwich.
29	9 A.M.	N.b.E.	2	o g	29·87	29·69	53	35		
..	Noon.	N.N.E.	4	o g s	30·00			35		..
..	3 P.M.	N.b.E.	4	b c g	30·10	29·91	53	35		
30	9 A.M.					30·20	51·5			
..	Noon.	N.	1	b m	30·44			36		..
..	3 P.M.					30·22	51·5			
31	8 A.M.					30·28	52	32		
..	Noon.		1	b m	30·52			37		..
..	3 P.M.	..	1	b m	30·51	30·28	51·5	39		
November.										
1	9 A.M.	W.S.W.	1	b c g m	30·50	30·28	49·5			
..	Noon.	S.W.	2	c g m	30·48			38		..
..	3 P.M.	..	2	c g m	30·49	30·32	50	40		
2	9 A.M.	W.S.W.	1	b c g m	30·30	30·13	52	49		
..	Noon.	W.b.S.	2	c g m	30·23			52		..
3	9 A.M.	W.S.W.	1	b c g m	30·08	30·05	54	47		
..	Noon.	..	2	b c g m	30·01			51		
4	9 A.M.	W.	4	c g q m	29·87	29·78	54	45		
..	Noon.	..	4	c g q m	29·83			46		..
..	3 P.M.	..	4	c m p d	29·78	29·68	53·5	44		
5	9 A.M.	VBLE.	2	b c g q	29·43	29·36	53·5	45		
..	Noon.	W.N.W.	4	b c g q p	29·53			44		..
..	3 P.M.	..	5	b c q	29·63	29·47	53	45		
6	9 A.M.	W.S.W.	2	b c	29·82	29·66	52·5	37		..
..	3 P.M.	W.N.W.	4	b c q	29·87	29·66	51·5			Woolwich.
7	9 A.M.	..	2	b c m	29·99	29·82	52	35		
..	3 P.M.	N.W.	2	b c m	30·08	29·91	50·5	42		..
8	8 P.M.	S.W.	1	b c m	30·46	30·28	48	38		..
9	9 A.M.	..	2	b c g	30·38	30·18	48	45		..

While the Beagle was at Plymouth, in 1831, an excellent marine barometer, made by Jones, (with an iron cistern) was sent by water from the maker's hands. This instrument was suspended in my cabin, with the cistern at the level of the sea (excepting during the first eight months, when it was placed six feet higher), and by it all the barometrical observations recorded in this table were taken or corrected.

In 1836, while conveying the same barometer by land from Woolwich to London, it was seriously injured, and therefore, to give value to its indications while on board the Beagle, I annex some corresponding observations, made at the Royal Observatory, and at Somerset House.

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EXTRACT

FROM

THE REGISTERS OF THE STANDARD BAROMETERS OF THE ROYAL SOCIETY, AT SOMERSET HOUSE; AND OF THE ROYAL OBSERVATORY, AT GREENWICH.*

Day.	Hour.	R.S. Bar.	Attd. Ther.	R.O. Bar.	Day.	Hour.	R.S. Bar.	Attd. Ther.	R.O. Bar.
November, 1831					December, 1831.				
5	9 A.M.	29·520	47·6	29·40	1	9 A.M.	30·170	46·8	30·06
6	..	29·607	47·3	29·44	2	..	30·027	46·7	29·92
8	..	29·666	49·3	29·58	3	..	30·148	47·7	30·05
10	..	30·421	43.4	30·30	5	..	29·837	48·8	29·73
11	..	30·245	47·4	30·13	6	..	29·432	48·8	29·32
12	..	30·326	51·0	30·22	7	..	28·924	50·7	28·83
13	..	29·994	51·8		8	..	29·139	51·3	29·05
14	..	30·053	45·3	29·93	9	..	29·190	55·3	29·08
15	..	29·478	44·2	29·38	9	3 P.M.	29·206	56·3	29·13
16	..	29·312	41·4	29·21	10	9 A.M.	29·418	53·8	29·31
17	..	29·585	39·7	29·47	12	..	29·307	53·8	29·21
18	..	29·691	38·5	29·58	14	..	29·573	51·5	29·48
19	..	29·436	40·7	29·32	18	..	29·373	49·5	
22	..	29·850	48·8	29·75	19	..	29·567	46·7	29·46
23	..	29·966	52·7	29·87	19	3 P.M.	29·643	47·6	29·54
24	..	30·032	53·4	29·92	27	3 P.M.	30·418	40·0	30·32
25	..	29·960	54·3	29·85	28	9 A.M.	30·428	40·4	30·32
26	..	29·944	54·6	29·83	28	3 P.M.	30·392	42·7	30·27
27	..	30·321	46·7	30·20					
October, 1836.					October, 1836.				
7	9 A.M.	29·511	54·8	29·40	7	3 P.M.	29·423	56·7	29·31
8	..	29·386	56·0	29·29	8	..	29·390	58·6	29·26
10	..	29·219	54·4	29·11	10	..	29·322	58·9	29·20
11	..	29·247	57·9	29·14	11	..	29·388	60·0	29·28
13	..	29·140	57·5	29·02	13	..	29·333	59·5	29·16
14	..	29·782	56·4	29·68	14	..	29·717	59·2	29·80
16	..	30·229	54·7		16	..	30·212	57·8	
17	..	30·210	55·7	30·10	17	..	30·176	57·7	30·08
18	..	30·174	56.9	30·06	18	..	30·150	60·3	30·02
19	..	30·241	58·5	30·15	19	..	30·322	60·3	
21	..	30·332	52·2	30·22	21	..	30·305	55·5	30·20
22	..	30·398	51·2	30·29	22	..	30·382	53·9	30·28
23	..	30·408	49·3		23	..	30·378	52·2	
24	..	30·394	51·5	30·28	24	..	30·360	53·6	30·25
25	..	30·371	52·6	30·15	25	..	30·225	53·2	30·12
26	..	30·196	52·6	30·07	26	..	30·113	54·4	30·01
29	..	29·473	42·3	29·35	29	..	29·703	41·6	29·55
30	..	30·019	39·0		30	..	30·035	41·0	
31	..	30·089	37·3	29·97	31	..	30·009	40·0	29·97
November.					November.				
1	9 A.M.	30·099	37·6	29·97	1	3 P.M.	30·008	40·4	29·90
4	..	29·570	45·4	29·46	4	..	29·451	47·0	29·34
5	..	29·140	45·6	29·03	5	..	29·287	47·2	29·14
6	..	29·459	42·1		6	..	29·439	44·6	
7	..	29·631	40·0	29·52	7	..	29·722	42·8	29·60

* Royal Society Barometer about 95 feet, and Observatory Barometer about 156 feet above the mean level of the sea. The heights of the mercury are given as read off, without any correction or reduction.

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FIGURES USED TO DENOTE THE FORCE OF THE WIND.

0 Calm.

1 Light Air .....Or just sufficient to give steerage way.

2 Light Breeze .....
3 Gentle Breeze .....
4 Moderate Breeze ...
Or that in which a man-of war, with all sail set, and clean full, would go in smooth water from
1 to 2 knots.
3 to 4 knots.
5 to 6 knots.

5 Fresh Breeze .....
6 Strong Breeze .....
7 Moderate Gale .....
8 Fresh Gale .....
9 Strong Gale .....
Or that to which a well-conditioned man-of-war could just carry in chase, full and by
Royals, &c.
Single-reefed topsails and top-gall. sails.
Double-reefed topsails, jib, &c.
Treble-reefed topsails, &c.
Close-reefed topsails and courses.

10 Whole Gale .....Or that with which she could scarcely bear close-reefed main-topsail and reefed fore-sail.

11 Storm .....Or that which would reduce her to storm stay-sails.

12 Hurricane .....Or that which no canvass could withstand.

LETTERS DENOTING THE STATE OF THE WEATHER.

b Blue sky; (whether clear, or hazy atmosphere).
c Clouds; (detached passing clouds).
d Drizzling rain.
f Foggy——f Thick fog.
g Gloomy (dark weather).
h Hail.
l Lightning.
m Misty (hazy atmosphere).
o Overcast (or the whole sky covered with thick clouds).
p Passing (temporary showers).
q Squally.
r Rain (continued rain).
s Snow.
t Thunder.
u Ugly (threatening appearances).
v Visible (clear atmosphere).
w Wet dew.
. Under any letter, indicates an extraordinary degree.

By the combination of these letters, all the ordinary phenomena of the weather may be expressed with facility and brevity.

Examples:—Bcm, Blue sky, with passing clouds, and a hazy atmosphere.

Gv, Gloomy dark weather, but distant objects remarkably visible.

Qpdlt, Very hard squalls, with passing showers of drizzle, and accompanied by lightning with very heavy thunder.

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TABLE

OF

LATITUDE, LONGITUDE, AND VARIATION OF THE COMPASS,

ALSO

TIME OF SYZYGIAL HIGH WATER, RISE OF TIDE, AND DIRECTION OR SET OF FLOOD TIDE STREAM IN THE OFFING.

	Lat. North.	Long. West.	Var. West.	H. W.	R. & S.
ENGLAND.	° ′ ″	° ′ ″	° ′	h. m.	Feet.
Devonport—Clarence Baths—at high water mark, in the meridian of Government House	50 22 00	4 10 00	25 00	5 17	20 E.
Falmouth—Pendennis Castle	50 08 33	5 02 45	24 10	5 35	17 E.
AZORES ISLANDS.					
Tercêira—Mount Brazil—summit	38 38 35	27 13 00	24 19	2 30	6 W.
St. Michael's—St. Braz Castle	37 43 58	25 40 15	24 15	0 15	7 W.
CAPE VERDE ISLANDS.					
St. Jago—Port Praya—Quail Island, the west point (called also Gun Point)... ...	14 54 02	23 30 00	16 30 (15·16 in 1831)	Noon.	5 N.W.
St. Paul—Penêdo, or Peñado de San Pedro—summit	0 55 30	29 22 00	9 30		
BRAZIL.	SOUTH.				
Fernando de Noronha—Fort Concepçáõ ...	3 50 00	32 25 00	7 00	4 00	5 W.
Pernambuco—Fort Picáõ	8 3 35	34 51 30	5 54	4 23	6 N.
Bahia—Fort San Pedro...	12 59 20	38 30 45	4 18	3 30	8 S.
Bahia—in the offing...	13 00 00	38 20 00		4 30	6 S.
Abrolhos—Santa Barbara—E. summit ...	17 57 42	38 41 30	2 00	4 48	6 S.W.
			EAST.		
Rio de Janeiro—Villegagnon Islet—well ...	22 54 40	43 08 45	2 00	2 00	6 W.
Santa Catharina—Anhatomirim Islet—flag-staff	27 25 31	48 34 45	6 30		
PLATA.					
Buenos Ayres—landing-place (mole)	34 35 30	58 21 53	11 40		
Monte Video—Rat Island	34 53 20	56 13 15	12 40	about noon when at all regular.	Varble.
Gorriti—well at N.E. end	34 57 02	54 57 35	12 28		
Point Piedras—extremity of grassy part ...	35 26 50	57 05 11	12 30		..
River Sanborombon—entrance of...	35 41 40	57 18 45	12 30		
River Salado—entrance of	35 43 15	57 19 15	12 30		..
San Antonio, Cape—north extremity, above high water	36 18 30	56 45 51	13 00	Noon.	Varble.
PAMPA.					
Medano Chato—summit of	36 28 00	56 40 15			
Medano Silla—summit of	36 37 10	56 40 55			
Medanos Point—south-east summit	36 59 05	56 40 43	13 30	11 00	6 N.
Mar Chiquito—bar of	37 47 30	57 21 45			7 N.
Corrientes Cape—eastern summit	38 05 30	57 29 15	13 50	10 40	7 N.
Mogotes Point—south-east summit	38 10 36	57 30 35			
Ventana Mount—highest summit	38 11 45	61 56 18			
San Andres Point—south-east high cliff ...	38 17 20	57 39 05	14 00	10 00	8 N.E.
Hermeneg Point	38 22 40	57 51 45		9 55	
Gueguen River...	38 36 00	58 40 00			8 N.E.
Black Point—cliff summit	38 39 00	58 47 30	14 00	8 20	
Argentino Fort	38 43 50	62 14 41	15 20		
Nakedness Point—southern summit	38 49 40	59 36 55			
Wells—Anchorstock Hill—(Point Johnson)	38 56 55	61 58 30	15 00	5 51	12 W.

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	Lat. South.	Long. West.	Var. East.	H. W.	R. & S.
PAMPA—*continued.*	° ′ ″	° ′ ″	° ′	h. m.	Feet.
Asuncion Point	38 57 30	60 38 00		8 57	
Hermoso Mount—summit	38 58 50	61 39 45	14 50	5 8	12 W.S.W.
Zuraita Island—south extreme of	39 11 00	61 54 20	15 10	5 58	12 W. N.W
Ariadne Island—south extreme of	39 15 50	62 00 20	15 20	5 20	12
Labyrinth Head—summit	39 26 30	62 02 36	15 30	5 10	12
Colorado Head—one mile north of the entrance	39 50 30	62 05 30	15 40	3 40	11 N.
Colorado River—mouth	39 51 40	62 04 20	15 40	3 40	11 N.
Indian Head (Union Bay)	39 57 30	62 07 00	15 50	3 10	12
Snake Bank—south-east extreme of	40 27 00	61 54 30	16 30	2 30	12 N.
Rubia Point—summit of	40 36 10	62 08 40	16 30	2 15	12
Del Carmen Fort	40 48 15	62 58 06	17 00	1 15	11 N.W.
Raza Point—summit over extreme	40 52 10	62 18 15	17 00	Noon.	12
Leading Hill—summit	40 56 36	62 49 20			
Negro River—Main Point	41 2 00	62 45 10	17 40	11 0	14 N.E.
EASTERN PATAGONIA.					
Nipple Hill—summit of	40 40 00	64 50 15			
Direction Hill—summit of	40 48 00	65 10 10			
San Antonio Port—Point Villarino	40 49 00	64 53 55	17 40	10 40	28 N.
Fort Hill—centre of	41 06 30	65 10 30			
False Sisters—eastern summit	41 09 00	63 03 30			
Belen Bluff—s.w. cliff	41 09 00	63 55 30	17 40	10 50	18 E.
Bermeja Head—eastern summit	41 11 00	63 07 30			
Sierra Point—summit of	41 35 45	64 54 50			
Pozos Point—summit of cliffy extremity	41 40 30	64 54 00	17 50	9 30	24 N.
San Antonio Sierra—summit of	41 41 10	65 12 10			
Norte Point—cliffy extreme	42 03 00	63 47 40	17 50	10 0	20 N.W.
Entrance Point—east	42 14 05	64 21 45	17 45	10 0	25
San José, Port—Point San Quiroga—extreme	42 14 15	64 27 10			
Bajos Point	42 18 00	63 34 10			
Castro Point—rise over extremity	42 25 20	65 04 00			
Valdes Port—entrance	42 30 25	63 35 20	17 50	8 15	1 6 N.
Cantor Point	42 30 50	63 36 00			
Pyramid—near Pyramid Road	42 34 50	64 18 30	17 50	8 0	14
Ercules Point—eastern cliff	42 38 30	63 34 10			
Delgado Point—south-east cliff	42 46 15	63 36 30	17 50	7 50	12
Western Port—rocky point in	42 47 00	64 59 45	17 50	8 0	14
Lobos Peak	42 49 00	63 43 50			
Nuevo Head	42 53 00	64 07 30	17 50	7 20	
Nuevo Gulf—Point Ninfas—East Cliff	42 58 00	64 19 30	17 50	7 10	13 N.
Chupat River—middle of entrance	43 20 45	65 02 50	18 06	5 0	12 N.
Delfin Head—summit	43 31 00	65 12 06			
Lobos Head—summit	43 46 40	65 17 30	18 30	4 40	13 N.
Tombo Point—extreme	44 07 00	65 14 30			
Atlas Point—summit	44 11 40	65 15 30	18 50	4 10	14
Raza Cape—eastern summit	44 23 40	65 15 30			
Rock of Salaberria	44 25 00	65 07 20			
Santa Elena—Spanish Observatory	44 30 40	65 21 40	19 10	4 0	17 N.
San José Point—eastern summit	44 30 45	65 17 00			
Santa Elena, Port—south-west cove, Beagle's observatory (not the Spanish)	44 32 15	65 22 30	19 06	4 0	18 N.
San Fulgensio Point	44 32 30	65 22 00			
Blanca Islet	44 54 50	65 32 10	19 00	3 20	12
Dos Bahias Cape—summit over extreme	44 56 30	65 32 00	19 00	3 20	12 N.
Monte Mayor Mount	44 57 35	66 24 00			
Arce Island—summit near centre of	45 00 40	65 29 15			
South Cape—near Oven	45 03 50	65 41 15	19 00	3 0	14 N.E.
Leones Island—south-eastern summit	45 04 00	65 35 15		2 10	12

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EASTERN PATAGONIA—*continued.*	Lat. South.	Long. West.	Var. East.	H.W.	R. & S.
	° ′ ″	° ′ ″	° ′	h. m.	Feet.
Melo Port—Sugar-loaf Islet, near	45 04 10	65 47 40	19 20	3 40	15 N.E.
Raza Islet	45 06 10	65 24 30			
Medrano Rocks	45 10 00	65 53 30			
Malaspina Cove—South Point	45 10 10	66 31 50	19 30	2 50	16 N.
Aristazabal Cape—south-east pitch	45 12 45	66 31 10			
Matalinares Head	45 24 00	67 02 30			
Salamanca Peak	45 34 00	67 19 30			
Novales Ledge	45 43 10	67 17 20			
Cordova Head	45 46 00	67 21 40	19 40	1 20	20 N.
Tilly Road—Point Marques—eastern cliff	45 57 00	67 34 20	19 42	1 15	20 N.
Murphy Head	46 31 10	67 23 10	19 40	1 00	
Bauza Head—summit	46 41 20	67 10 30	20 00	1 00	18 N W.
Casamayor Cliff	46 52 00	66 56 40			
Nava Head	47 04 40	66 32 15			
Three Points Cape—north-east pitch	47 06 20	65 51 00	19 20	12 50	
Sugar-loaf, near Cape Three Points	47 17 20	65 56 20			
Blanco Cape—north-east summit	47 12 20	65 43 30	19 30	0 47	18 N.W.
Rivers Peak	47 29 45	65 58 50			
Desire Port—eastern islet	47 44 40	65 49 20	19 42	12 10	18½ N.
Desire Port—Spanish ruins	47 45 00	65 54 15	20 12	0 18	18 N.
Fresh-water islet, at the head of Port Desire (where the fresh water reaches)	47 49 30	66 22 50	20 20	Noon.	20
Penguin Island—mount at south end	47 55 35	65 42 00			
Sea Bear Bay, observatory on sandy beach at south side	47 57 15	65 45 40	20 50	12 45	20 N.
Shag Rock—centre	48 08 30	65 53 30			
Mount Video	48 13 40	66 25 50			
Watchman Cape—summit of Round Mount Islet	48 21 30	66 21 25	20 00	0 4	24 N.N.E.
Bellaco Rock—summit	48 29 20	66 12 15	21 00	Noon.	24
Look-out Point	48 35 30	66 53 20	21 00	11 30	25
Flat Islet—centre	48 43 00	67 01 00		0 13	N.N.E.
San Julian Port—Cape Curioso—south east point	49 10 45	67 37 00	21 00		N.N.E.
Wood Mount—summit	49 13 45	67 44 50	21 10		
Sholl Mount	49 14 00	67 48 00			
Desengaño—South Head—north-east extreme	49 14 30	67 36 10	21 00	10 45	30 N.N.E.
Sholl Point—monument	49 15 20	67 42 00	21 00	10 30	30
Franc? de Paulo Cape—extreme cliff	49 41 10	67 36 00			N.
Beagle Bluff—summit	49 55 10	68 33 00			
Weddell Bluff—summit	49 59 20	68 31 40			
FALKLAND ISLANDS.					
Adventure Sound—O.S. (Observ^{n} Spot)	52 12 20	59 04 30	19 30		
Albemarle Rock—Middle	52 14 30	60 24 42			
Barren Island—south-east extreme	52 24 36	59 42 22			
Beauchesne Island—north extreme	52 40 00	59 04 00			
Beauchesne Island—south extreme	52 41 00	59 05 00			
Berkeley Sound—entrance	51 35 00	57 50 00	19 00	5	6 N.W.
Bird Island—summit	52 10 45	60 55 12			
Bougainville Cape—North-east cliff	51 18 00	58 28 20			
Brisbane Mount—summit	51 29 50	57 55 20			
Bull Road—height near Point Porpoise	52 20 50	59 19 57			
Bull Road—O.S.	52 20 45	59 20 28	19 50		
Calm Head—summit	52 07 20	60 56 22			
Carcass Island—summit	51 16 50	60 35 30			
Carlos San Port—summit northward of	51 28 50	59 02 00			
Choiseul Sound—Pyramid Point	52 01 20	58 36 00		5 58	5 N.
Carysfort Cape—north-east cliff	51 25 40	57 51 00			

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FALKLAND ISLANDS—*continued.*	Lat. South.	Long. West.	Var. East.	H.W.	R. & S.
	° ′ ″	° ′ ″	° ′	h. m.	Feet.
Castle Rock—summit	52 12 25	60 48 22			
Cow Bay	51 27 00	57 49 00		5 25	8 N.N.W.
Dangerous Point—east extreme	52 01 35	58 20 47			
Dolphin Cape—north-west extreme	51 14 35	58 58 30			
Driftwood Point—Islet off	52 16 40	59 01 34			
Eagle Point, Nelson Head, near eastern extremity	51 32 50	57 47 00			
Eddystone Rock—centre	51 11 30	59 03 15			
Edgar Port, summit at south end of Entrance Ridge	52 06 15	60 16 12			
Edgar Port, summit over South Head	52 02 10	60 15 10			
Edgar Port—O.S.	52 03 15	60 16 16	20 00	7 15	5
Egmont Port—O.S.	51 21 26	60 04 04	19 35	8 20	8 w.
Egmont Port—Cay—western centre	51 13 05	60 03 10			
Elephant Cays—west extreme of western Cay	52 09 00	59 52 52			
Elephant Jason—summit	51 10 20	60 52 02			
Fanning Head—south-west summit	51 28 06	59 08 35			
Flat Jason—north-west extreme	51 06 30	60 55 20			
Fox Bay—eastern entrance—summit	52 00 50	60 00 52			
Frehel Cape—north cliff	51 23 16	58 14 00			
George Island—south-west cliff	52 24 00	59 48 12			
Gibraltar Rock—summit	51 19 45	60 47 02			
Grand Jason—summit	51 04 30	61 03 57			
Grantham Sound—summit of Islet north-west of	51 35 30	59 13 10			4
Harbours—Bay of—O.S.	52 12 00	59 22 00		5 44	8
Hope Point—near West Point Island—O.S.	51 20 51	60 40 14		9 18	
Horse Block Island	51 56 00	61 08 00			
Jason Cay (or East Cay)—north-west extreme	51 00 38	61 18 02			
Kelp Point—small height on	51 52 20	58 13 52			
Keppel Island—north-west cliff	51 18 45	60 03 00			
Keppel Island—west summit	51 19 15	60 02 20			
Lively Island—south-east extreme	52 06 15	58 25 02			
Long Island—small height near west end	52 14 40	58 59 42		6 0	5 w.
Louis Port—settlement, flagstaff at Government House	51 32 00	58 07 16	19 00		
Louis Port Creek—west side of the narrowest part	51 32 20	58 06 58			
Low Kelp Patch—middle	52 32 00	59 39 00			
Low Mount	51 38 20	57 49 30			
Macbride Head—north cliff	51 23 00	57 59 25			
Many-branch Harbour—summit over north point	51 31 05	59 20 30			
Mare Harbour—height over north-east side	51 54 35	58 27 37			
Mare Harbour—O.S.	51 54 11	58 30 08		7 15	8 w.
Meredith Cape—southern cliff	52 16 15	60 39 07			
Midway Rock	51 25 36	59 10 00			
New Island—highest summit	51 42 07	61 17 52			
New Island—Ship Islet, O.S.	51 43 10	61 16 59			
North Islet—summit of north cliff	51 39 15	61 14 36			
North Look-out Hill—summit	51 29 10	58 02 15			
North Fur Island—east extreme	51 08 15	60 44 10			
North Keppel Island—north extreme	51 13 30	59 55 55			
Orford Cape—west summit	51 59 45	61 06 22			
Passages Island—summit	51 34 55	60 46 58			
Pebble Island—cliff summit near north-west end	51 15 48	59 47 20			
Pembroke Cape—eastern extreme	51 41 30	57 41 45			
Pleasant Port—O.S.	51 48 55	58 11 26		7 19	5

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FALKLAND ISLANDS—*continued.*	Lat. South.	Long. West.	Var. East.	H.W.	R. & S.
	° ′ ″	° ′ ″	° ′	h. m.	Feet.
Poke Point—east extreme	51 36 25	59 23 25			
Porpoise Point—extreme	52 21 47	59 19 22	19 42	6 20	4 W.
Race Point Cliff—extreme	51 25 00	59 06 20			
Rodney Bluff—western summit	52 03 36	61 04 37			
Salvador San Port—O.S.	51 27 05	58 20 04		6 45	6 W.
Saunders Island—north-west summit	51 17 20	60 19 50			
Saunders Island—north-east point—extreme	51 18 55	60 05 07			
Sea Lion Island—west extreme	52 26 50	59 09 37			
Sea Lion Point—summit	51 21 47	58 21 00			
Sedge Island—north-west extreme	51 10 30	60 27 20			
Shag Rock	52 14 30	58 39 42			
Ship, or Coffin, Harbour — Ship Islet—south-west extreme	51 43 10	61 17 07	20 18	8 30	7 N.W.
Simon Mount — summit	51 38 05	58 28 50			
South Fur Islet—summit	51 15 50	60 51 52			
South Jason—summit	51 12 40	60 53 42			
Speedwell Island Harbour—O.S.	52 13 00	59 41 16			
Split Cape—extreme cliff	51 49 20	61 20 37			
Split Island—west summit	51 28 05	60 42 10			
Steeple Jason—steeple summit	51 04 00	61 09 37			
Steeple Jason—north-west summit	51 02 15	61 13 22			
Stephens Port—east entrance point—summit	52 11 50	60 42 27	20 24	7 45	7
Stephens Port—O.S.	52 11 15	60 40 53			
Swan Island—French Harbour—entrance ...	51 52 00	61 08 00		8 35	8 S.
Tamar Cape—north cliff summit	51 16 50	59 29 50			
Tamar Harbour—eastern head—extreme ...	51 20 32	59 25 42			
Uranie Rock, off Volunteer Point	51 31 45	57 41 00			
Usborne Mount	51 42 30	58 49 48			
Volunteer Point—eastern solid extreme ...	51 31 15	57 43 40			
West Point Island—summit over West Bluff	51 23 00	60 43 12			
West Cay—north-west extreme	50 59 47	61 27 30			
White Rock	51 17 15	60 53 52			
White Rock Point—north-east extreme cliff	51 24 23	59 12 22		7 17	7 W.
White Rock Harbour—south head	51 26 25	59 13 00			
White Rock Harbour—sharp peak	51 27 56	59 15 30			
White Rock Harbour—O.S.	51 26 00	59 16 38			
Wickham Heights—middle summit of ...	51 43 50	58 31 52		5 49	5 N.
William Port—O.S.	51 39 14	57 48 28			
William Mount	51 42 15	57 55 58			
Wreck Island—east extreme...	51 11 00	60 13 20			
SOUTH OF 50° (EXCLUSIVE OF FALKLANDS.)					
Admiralty Sound—bottom—Mount Hope ...	54 26 30	69 02 55	22 50		
Agnes Islands—summit of Western Isle ...	54 18 00	72 48 40			
Aguirre Bay—Kinnaird Point	54 57 05	65 47 00	22 50	4 20	8 N.E.
Ainsworth Harbour—projecting point west side	54 23 05	69 37 45			
Alikhoolip Cape—south extreme	55 11 50	70 49 00			
Anchor Bay—summit over anchorage	50 55 00	74 21 20	22 30	1 00	5
Ancon Sin Salida—Central Island, summit of	52 12 45	73 19 30	23 10	0 50	4 E.
Andres San—Sound—summit of Middle Kentish Isle	50 23 15	74 23 00	22 20		
Andres San—Sound—south-east extreme ...	50 33 00	73 42	22 25	1 30	6
Anna, Point Santa—extremity	53 37 50	70 55 00	23 00	0 07	6 N.
Anne St. Island—central summit...	53 06 30	73 16 30	23 30	4 00	5 E.
Anne St. Peak...	52 43 00	73 55 45			
Anthony, Cape St.—northern extreme cliff...	54 43 30	64 34 00			

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SOUTH OF 50°—*continued.*	Lat. South.	Long. West.	Var. East.	H.W.	R. & S.
	° ′ ″	° ′ ″	° ′	h. m.	Feet.
Antonio, San—summit over	53 54 40	71 50 30	23 40	Noon.	7 N.
Apostle Rocks—western large rock	52 46 15	74 47 50	23 50		
April Peak—summit	50 10 50	75 21 00			
Arenas Point—south extreme	53 09 10	68 12 10			
Astrea Island—summit	54 36 30	72 05 30	24 40	2 20	4 N.E.
Austin Point—north-east pitch	55 49 30	67 03 00			
Avalanche Point—extreme	54 56 00	69 13 20			
Aymond Mount—summit	52 07 10	69 32 10			
Bachelor River—entrance	53 33 00	72 19 15	24 06	1 40	5
Bachelor Peak	53 29 30	72 19 30			
Back Harbour—outer point	54 47 25	63 50 15			
Balthazar Point—extreme	51 38 05	74 00 30			
Barnevelt—north-east extreme	55 48 25	66 44 40	23 00	4 40	8 N.E.
Bartholomew San, Cape—south-west cliff ...	54 53 45	64 45 30	22 40	4 45	9 N.E.
Basalt Glen	50 11 00	70 11 00			
Bald Point, west extreme of cliff	53 34 40	67 39 30			
Bathurst Cape—summit	55 14 15	68 00 00			
Beagle Island—north-west summit	51 58 30	75 12 45			
Beaufoy Mount—summit	55 36 15	68 58 00	24 00	3 30	6
Bell Mount—summit	54 09 54	72 07 10			
Bell Mount Summit—Valentyn Bay	54 53 15	65 33 30			
Bessel Point—extremity...	52 00 40	73 46 40	23 00		
Benito Point—extreme	51 48 52	73 55 00			
Bennett Point—extremity	52 38 45	71 30 00	23 34	1 30	1 or 2
Between Point—west low rise	53 13 50	70 28 30			
Bivouac—Last Hill...	50 12 30	71 41 00			
Black Head—south-east point	55 33 45	69 20 30			
Boat Island—summit of (Diego Ramirez) ...	56 28 50	68 42 30			
Boqueron Mount—highest pinnacle	54 10 40	70 59 44			
Bougainville Cape—south-west summit ...	53 25 40	70 13 15			
Bougainville Cape—extremity	53 27 00	70 13 00	23 20	0 50	6
Bolton Island—northern summit	54 59 00	70 10 00			
Bougainville Sugar Loaf—summit	53 57 32	71 27 57			
Bowles Island—north summit	54 02 00	72 15 00	24 00	2 00	5
Brazo Ancho Point—eastern summit	50 08 55	74 41 45			
Brent Cove—point south-east of	54 50 20	64 22 50			
Brinkley Island—summit	51 58 45	73 43 00			
Brisbane Head—extreme summit...	55 39 00	68 57 00			
Broken Mount...	55 24 20	69 45 19	23 50		
Broken Cliff Peak	50 14 40	68 31 30	21 00	12 15	
Brother, Middle—north-east summit	54 42 35	65 29 50			
Buckland Mount (Staten Land)	54 46 18	64 20 45			
Buckland Mount—summit	54 26 00	70 22 30			
Bueno Puerto—west point	50 58 35	74 10 55	21 00	1 40	5 S.
Burney Mount—southern summit	52 20 00	73 26 00			
Button Island—south-east summit	55 05 00	68 07 30	23 45	2 40	6 S.
Bynoe Island—summit	54 19 00	72 12 44			
Camden Head—summit...	53 12 30	71 41 00			
Capstan Rocks—summit of largest	55 24 10	70 17 30			
Card Point—extremity	54 20 45	70 15 30			
Castle Hill	50 09 15	72 34 00			
Castlereagh Cape—summit	54 56 00	71 28 00	24 15	2 50	4 E.
Catherine Point, north-east extremity	52 32 00	68 44 10			
Catherine Isle, western point...	54 47 30	71 19 00	24 10	2 55	5 E.
Cayetano Peak...	53 53 04	72 09 40			
Ceres Island—summit	51 51 35	74 05 55			
Chalia Stream—junction with Santa Cruz ...	50 11 15	70 10 30	21 00		
Chancery Point, south-west pitch	52 52 00	74 40 30	24 00	1 40	5 S.E.
Charles Island—Wallis Mark	53 43 57	72 05 45			

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SOUTH OF 50°—*continued.*	Lat. South.	Long. West.	Var. East.	H. W.	R. & S.
	° ′ ″	° ′ ″	° ′	h. m.	Feet.
Charles Cape—pitch	53 15 00	72 20 00			
Cheer Cape—north-west pitch	51 41 00	74 18 45			
Childs Island—summit	53 21 30	73 51 00			
Clanricarde Point—south summit	50 11 30	74 35 30			
Clay Cliff Narrow—cliff summit	54 54 00	67 28 30	23 00	3 00	6 E.
Cliff Head—northern cliff	52 43 30	70 19 15			
College Rocks—south-west rock	53 37 20	73 58 00			
Colnett Cape—northern cliff	54 42 15	64 18 30	22 30	5 00	9 W.
Cone Point—summit	54 06 35	70 51 45			
Convent Hill—south	51 53 00	69 17 35			
Cook Port—Observatory Mark summit	54 45 16	64 02 45			
Cook Port—Observatory at south-west corner of	54 46 27	64 02 45	22 30	5 30	8 N.W.
Corona Island—summit	53 15 15	72 23 30			
Cortado Cape—extremity	52 49 37	74 26 40	23 40		
Cotesworth Island—Port William	53 10 00	74 34 00			
Coy Inlet—northern head	50 54 10	69 04 20	21 30	9 30	40 N.
Coy Inlet—height south side extreme	50 58 30	69 07 20	21 30	9 30	40 N.
Coy Inlet—south-east height	50 59 00	69 06 00			
Creole Point—extreme	54 06 00	72 12 30			
Crosstide Cape—extreme	53 33 00	72 26 30	23 35	1 40	5 E.
Cruz Mount—summit	53 40 45	72 04 00			
Cruz Santa Port—north point—south-east extreme	50 05 30	68 03 00	20 54	9 48	40 N.
Curious Peak—summit	54 19 35	70 12 15			
Cutter Cove—Jerome Channel	53 22 00	72 26 45		4 30	6 N.
Dampier Islands—southern summit	54 53 00	64 11 20			
Darwin Mount—summit	54 45 00	69 20 00			
Davies Gilbert Head—north summit	53 56 30	72 15 00			
Deceit Island—Cape Deceit—east extreme	55 54 40	67 02 25			
Deceit Islets—middle islet	55 56 10	66 59 00	23 30	4 30	8 E.
Deepwater Head—summit	53 38 00	73 44 00			
Deepwater Sound—O.S.	53 35 00	74 34 55	24 20	1 10	5 N.E.
Delgada Point—extreme	52 26 30	69 34 10			
Deseado Cape—peaked summit near	52 55 30	74 37 30			
Desolation Cape—southern summit	54 45 40	71 37 10	24 30	1 40	4 N.E.
Detached Islet—summit	54 53 20	64 30 00			
Devil Island—summit	54 58 30	69 04 50			
Diana Peak	52 08 00	74 48 00			
Diego San—Cape—east extreme	54 41 00	65 07 00	22 50	4 30	10 N.W.
Dinero Mount—summit	52 19 40	68 33 20			
Direction Hill—north	52 20 50	69 32 50			
Dislocation Harbour—O.S.	52 54 15	74 37 10	23 53	1 40	4 S.E.
Divide Cape—east extreme	54 59 10	69 07 00			
Dog-jaw Mountains—western summit	55 00 30	67 41 00			
Dog-jaw Mountains—eastern summit	55 02 20	67 32 00			
Donaldson Cape—extremity	51 06 10	74 20 15			
Doris Cove—O.S.	54 58 50	71 09 48	24 16	3 0	4 E.
Doris Peak—summit	54 59 20	71 11 40			
Dos-Hermanas—summit	53 57 45	71 25 15			
Duncan Rock—middle	51 22 40	75 28 20			
Dungeness Point—extremity	52 23 50	68 25 10	22 36	8 50	40 W.
Dutch Point—north extreme	55 29 00	67 39 30			
Dynevor Sound—north-eastern headland	53 22 00	73 35 00			
Dynevor Castle—summit	52 35 00	72 26 00			
Earnest Cape	52 10 52	73 18 30			
Eastern Peak—summit	50 00 15	75 13 20			
Elizabeth Island—north-east Bluff	52 49 10	70 37 15	23 50	0 05	7 N.E.
Elizabeth Head—Adventure Passage	54 56 30	70 54 00			

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SOUTH OF 50°—*continued.*	Lat. South.	Long. West.	Var. East.	H.W.	R. & S.
	° ′ ″	° ′ ″	° ′	h. m.	Feet.
Elvira Point—extremity...	53 49 12	72 03 55			
Emily Island—summit	55 29 30	69 35 00			
Enderby Island—centre	54 13 00	71 57 35			
Entrance Mount—summit of Santa Cruz Cliff	50 08 50	68 20 00	22 54		
Esperanza Island—south-west extreme ...	51 11 45	73 15 00			
Espinoza Cape—north-east extreme of cliff...	52 37 20	68 36 20			
Evangelists—Sugar Loaf Islet	52 24 18	75 06 40	24 00	1 00	5 E.
Evans Island—western summit	53 26 30	73 53 30			
Evouts—north-east head	55 33 00	66 45 00			
Expectation Bay—north islet	50 25 00	74 17 00			
Fairweather Cape	51 32 05	68 55 20	22 00	9 0	30 N.W.
Famine Port—Observatory	53 38 15	70 57 45	23 40	0 7	6 to 7
Felix Point—extremity	52 56 00	74 12 45			
Felipe, San—Bay of	52 35 00	69 49 00		9 40	30 S.
Felipe, San—Bay of	52 40 00	69 42 00		9 00	24 W.
Fifty Point—south-west summit	55 17 10	66 35 40	23 30	4 45	8 N.E.
Fincham Islands—summit of westernmost islet	53 44 15	73 45 30			
Fitton Mount—summit	54 47 45	64 23 00			
Fitz-Roy Passage—N.W. end O.S.	52 39 00	71 31 00	23 00	1 30	1 or 2
Flamsteed Cape—extremity rock	51 46 25	73 51 45			
Focus Island—summit	51 53 23	72 48 00			
Fortune Bay—rivulet mouth...	52 15 48	73 45 00	23 40	0 50	8 E.
Fortyfive Cape—extreme pitch	53 23 00	72 31 45	23 50	3 00	7 N.
Foster Mount—summit	55 50 30	67 32 50			
Friar Hill—southernmost summit	51 50 08	69 08 20			
Froward, Cape—summit of the Bluff	53 53 43	71 18 15	23 20	1 0	6 N.E.
Furies, East—largest rock	54 38 00	72 12 00	25 00	2 30	4 N.E.
Furies, West—largest rock	54 34 45	72 21 50	25 00	2 30	4 N.E.
Fury Peak—highest	54 25 40	72 19 20			
Gallant, Port—Wigwam Point	53 41 45	72 00 41	24 04	9 3	5 or 6 E.
Gallegos River—observatory mound	51 33 20	68 59 10	21 47	8 50	48 N.
Gallegos River—west head	51 38 45	69 42 40			
Gap Peak	53 55 00	69 39 50			
Gente grande, Point—north-west extremity	53 00 45	70 26 45	23 00		
George Point—extreme pitch	55 12 20	66 36 20			
George, Cape—Bluff summit	51 37 40	75 21 00			
Gidley Islet—summit	53 10 45	72 13 00	23 45	5 0	6 N.E.
Gloucester Cape—summit	54 05 18	73 29 15	24 30	1 30	5 S.E.
Good Success Bay—O.S.	54 48 02	65 14 00	22 48	4 3	9 N.
Good Success Bay—north head	54 47 00	65 11 30			
Good Success Bay—south head	54 48 45	65 12 20		4 15	9 N.
Good Success Cape—southern extreme ...	54 54 40	65 21 30			
Goodwin Mount—summit	54 19 30	70 51 00			
Goree Road—Station Islet	55 17 35	67 03 00	23 40	4 40	8 N.E.
Goree Road—Guanaco Point, extreme ...	55 19 00	67 10 00	23 30	4 00	8 N.E.
Gracia, N.S. de—south extremity of cliff ...	52 43 10	70 30 25			
Graham, Cape—south-east pitch	55 16 40	66 30 30			
Grant Bay—head south-west of	54 51 45	64 14 00			
Graves Mount—summit	53 45 00	70 37 30			
Gregory Bay	52 39 00	70 13 00	23 30	9 22	25 S.S.W.
Gregory Bay	52 39 00	70 13 00	23 30	10 22	15
Gregory Cape—extremity	52 39 00	70 13 40	23 30	9 38	12 S.S.W.
Gregory Range—south-west summit	53 34 30	70 22 50			
Guanaco Hill	50 02 00	69 03 00			
Guia Narrow—north extremity—nearly mid. channel	50 43 30	74 26 40	22 00	2 8	5 S
Hall Cape—south extreme	54 57 00	65 36 00			8 N.E.
Hall Point—extremity	52 49 45	71 25 54		4 00	4 N.

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SOUTH OF 50°—*continued.*	Lat. South.	Long. West.	Var. East.	H.W.	R. & S.
	° ′ ″	° ′ ″	° ′	h. m.	Feet.
Halfport Bay—point	53 11 40	73 18 45	23 40	2 00	6 E.
Hamond Island—south-west summit	55 18 45	70 06 30			
Hart Mount—summit	54 11 45	70 50 30			
Harvey Point—south-west extreme	55 18 25	67 26 20			
Hat Isle—summit	55 04 20	71 08 30	24 16	3 00	6 E.
Hately Point—south-east extreme	52 58 30	71 46 00			
Henry Port—observatory	50 00 18	75 18 55	20 50	Noon.	5 E.
Herschel Mount—summit	55 49 45	67 19 15			
Hewett Harbour—south point of	52 25 00	72 50 30			
Hobbler Hill	50 11 40	72 21 00			
Hole in Wall Point—south extreme	54 49 20	63 55 25			
Holland Cape—south-east extreme	53 48 33	71 39 25	23 50	10 40	6 E.
Hope Island—central extreme summit	55 32 30	69 39 50			
Hope Harbour—Hope Point extreme	54 07 30	73 07 00			
Horace Peaks—southern summit	54 43 00	71 57 25			
Horn Cape—summit	55 58 40	67 16 00	24 00	4 40	9 E.
Horn False Cape—south extreme	55 43 15	68 05 40	23 56	3 28	6 N.E.
Hyde Mount—summit	55 43 40	67 29 40			
Ignocentes Island—summit	50 31 55	74 46 30			
Ildefonso Isles—northern rock	55 49 00	69 28 00	24 10	3 20	6 E.
Ildefonso Isles—highest summit	55 52 30	69 18 30			
Ildefonso Isles—southern rock	55 53 30	69 17 00	24 10	3 20	6 E.
Indian Cove—south-east corner	55 30 20	69 05 00			
Indian Pass—first (Santa Cruz river)	50 08 00	69 11 00			
Indian Pass—second (Santa Cruz river)	50 12 20	71 36 20			
Inez Sta.—north cliff	54 07 00	67 07 50			
Inglefield Island—north extremity	53 04 20	71 53 14	23 56	4 00	6 N.E.
Inglefield Island—south extreme	53 06 10	71 53 00	23 56	4 00	6 N.E.
Inman Cape—cliff summit	53 18 30	74 19 15	24 00	2 00	4 S.E.
Ipswich Isles—southern summit	54 10 30	73 20 40			
Isabel Cape—summit	51 52 00	75 10 00			
Isabel Cape—west extreme	51 51 50	75 13 00			
Isidro, San, Cape	53 47 00	70 57 50	23 40	1 00	8
Isabella Island—O.S.	54 13 05	72 58 50	24 20	2 00	5
Isabella Isle—Murray Peak, northern summit	54 12 35	72 59 00			
Jane Mount—summit	55 31 10	69 05 00			
Jerdan Island—summit	55 49 05	67 29 00			
Jerome Channel—Jerome Point—summit	53 31 30	72 25 30	24 00	1 30	6 N.
Jerome, St., Point—south-east extreme	53 31 40	72 25 45			
Jesse Point	55 02 45	66 22 30			
John, St., Cape—north cliff	54 42 20	63 43 45	22 30	5 30	9 N.
John, St., Cape—east cliff	54 42 50	63 43 15	22 30	5 30	9 N.
Jonathan Mount—summit	55 21 50	70 00 00			
Joy Mount	52 39 20	73 47 00			
Juan, San, Point—south-west extremity	50 39 52	74 32 45			
Judge Rocks—westernmost	52 51 00	74 48 30	24 00	1 00	
Jupiter Rock	54 24 15	72 43 40			
Kater Peak	55 51 55	67 33 50			
Keel Point—Observatory true west of Shingle Point	50 06 45	68 23 30	20 54	9 48	40 N.
Kekhlao Cape—northern pitch	55 10 00	70 02 00			
Kempe Peaks—southern summit	54 23 30	72 30 10			
Kendall Cape—extremity	51 27 15	74 10 04			
Kennel Rocks—largest	54 17 30	73 02 00			
King Island—summit	54 22 38	71 17 00	23 50		7 E.
King Head—summit	53 13 30	72 01 00			
Latitude Bay—O.S.	53 18 40	74 15 44	23 56	2 05	4 S.E.
Labyrinth Islands—Jane Island, summit	54 19 10	71 00 20	28 50	0 30	6
Laura Harbour (basin)—O.S.	54 07 00	73 18 45	24 40	1 00	6

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SOUTH OF 50°—*continued.*	Lat. South.	Long. West.	Var. East.	H.W.	R & S.
	° ′ ″	° ′ ″	° ′	° ′	Feet.
Law Peaks—northernmost	52 53 00	74 33 00			
Leading Hill—summit	55 33 20	69 16 40			
Lennox Harbour—O.S.	55 17 00	66 49 00	23 40	4 40	8 N.E.
Lennox Road—Luff Islet—summit	55 18 40	66 44 45	23 40	4 40	8 N.
Lindell Rock	56 24 30	68 43 10			
Lion Mount—summit	50 20 00	68 49 30			
Longchase Cape—western pitch	54 45 40	71 04 00			
Lort Point—eastern pitch	55 40 30	67 59 00	23 30	4 30	7
Lucia, Santa—Cape—summit	51 30 00	75 29 00	22 00		
Magdalena Isle, Sta.—north-west cliff	52 54 15	70 35 25			
March Harbour—O.S.	55 22 35	69 59 34	24 04	3 10	6 E.
Martha, Santa—Island—summit	52 50 00	70 34 45	23 58		
Magalhaens Strait—eastern entrance—Observation for tide	52 26 00	68 57 00	22 30	8 56	45 W.S.W.
Magalhaens Strait—eastern entrance	52 26 00	69 00 00		8 47	S.W.
Magalhaens Strait—eastern entrance	52 32 00	68 59 00		7 40	S.S.W.
Magalhaens Strait—eastern entrance	52 31 00	68 42 00	22 00	8 37	42 W.
Magalhaens Strait—eastern entrance	52 22 00	68 39 00		8 13	39 S.S.W.
Magalhaens Strait—eastern entrance	52 14 00	69 06 00		8 24	W.S.W.
Magalhaens Strait—eastern entrance	52 15 00	69 24 00	22 40	8 46	35
Martens Peaks—highest	55 43 00	67 19 00			
Martin, St., Cove—O.S.	55 51 20	67 34 00	24 23	4 41	9 E.
Mary, St., Point—extremity	53 21 15	70 57 45	23 26		
Mateo, San, Point—extreme	51 23 50	74 04 00			
Maxwell Island—summit	55 47 30	67 30 45			
Maxwell Mount	53 47 10	72 15 00			
May Point—western extreme	55 22 20	70 09 30	24 10	3 00	6 E.
Medio Cape—north-east cliff	54 12 15	66 51 20			
Mercy (Misericordia, or Separation) Harbour—Bottle Island summit	52 44 58	74 39 14	23 48	1 10	6 E.
Meta Islet—central summit	52 29 15	72 55 40	23 00		
Michael Point—extremity	50 17 00	74 48 00			
Mid Bay Rocks—largest	53 50 10	73 35 10			
Middle Islet—summit	55 36 15	67 17 45			
Middle Cape—north-west cliff	54 48 20	64 45 20	22 00		7
Middle Cove, Wollaston Island—Observation Spot on beach	55 35 30	68 19 00	23 50	3 30	
Middle Hill	51 49 56	69 22 40			
Mitchell Cape—north-west pitch	55 57 30	68 14 00			
Monday Cape—extreme of	53 09 12	73 22 00			
Monmouth Cape—west head	53 20 30	70 27 45	23 00		
Monmouth Island—summit	53 41 45	72 11 45			
Moore Monument	51 39 30	72 52 40			7 E.
Morrion, El—summit	53 33 20	72 32 15	23 20		6 S.
Murray Narrow—Eddy Point	55 01 00	68 14 20	23 40	3 00	
Nassau Island—south-east point	53 50 23	71 04 30			6 E.
Nativity Cape—western pitch	55 27 30	69 48 30	24 00	3 00	
Negro Cape—south-west extreme cliff	52 56 40	70 49 00			
Newton Point—extreme of Windhond Bay	55 15 45	67 52 40			9 W.
Newyear Islands—north-eastern point	54 39 00	64 06 20	22 30	5 30	6 S.E.
Nicholson Rocks—south-western rock	55 03 00	71 23 20	24 20	3 0	
Nodales Peak	53 50 40	71 09 45			5 S.E.
Noir Island—O.S.	54 28 15	72 59 45	24 40	2 30	5 S.E.
Noir Island—Cape Noir—extreme	54 30 00	73 05 30	25 00	2 25	
Nombre Head—north-east cliff	52 39 00	68 34 50			5
North Cove—O.S.	54 24 25	72 18 10	24 30	2 30	
North Hill—summit	51 47 30	69 25 40			
Northern Rock (above water) off Diego Ramirez	56 24 40	68 43 00	24 30		

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SOUTH OF 50°—*continued.*	Lat. South.	Long. West.	Var. East.	H.W.	R. & S.
	° ′ ″	° ′ ″	° ′	h. m.	Feet.
Nose Peak—summit	53 52 30	70 05 20			
Notch Mountain—summit	55 04 30	70 30 30			
Notch Cape—extremity	53 25 00	72 48 55	23 40		
Observation Mount—summit	50 32 35	69 00 20			
Observation Mount—summit—on west coast	52 28 58	74 36 02	25 09	1 00	5 S.
Oeste Point—extremity	51 31 45	74 08 41			
Oracion and Isthmus Bays—Isthmus middle	52 10 00	73 40 00			
Orange Cape—north extremity	52 27 10	69 28 00	22 30	9 00	46 W.
Orange Peak	52 28 15	69 25 10			
Orange Bay—Burnt Island—summit	55 31 00	68 02 20	23 56		
Orange Bay—O.S.	55 30 50	68 05 17	23 56	3 30	5 N.
Orozco Table—south-east summit	54 40 40	65 59 45			
Oazy Harbour—head at west entrance	52 42 00	70 36 35	23 50	0 30	
Packsaddle Island—summit	55 23 50	68 04 20	23 50	3 30	6 N.
Parker Cape—western summit over	52 42 00	74 14 30			
Parry Harbour—north-west point	54 25 15	69 20 00			
Paulo, San, Cape—north-east cliff	54 16 20	66 40 05			
Paulo, San, Mount—northern summit	54 39 30	72 01 00			
Pecket Harbour—south summit	52 47 10	70 46 15	23 29	12 00	9
Peel Inlet—north-east extreme	50 38 00	73 36 30			
Peñas Cape—south-east cliff	53 51 30	67 33 20	22 00	6 42	12 N W.
Peñas Cape—offing near	54 08 00	66 53 00		6 27	12W. N. W.
Peter Mount	52 22 00	72 40 30			
Philip, St., Bay	52 35 00	69 49 00	22 40	9 40	30 S.W.
Philip, St., Bay	52 40 00	69 42 00	22 40	9 00	24
Philip, San, Mount—summit	53 36 25	71 00 00			
Phillip Cape—summit	52 44 20	73 56 44			
Phillips Rocks—largest, summit	55 14 10	70 57 00			
Picton Island—Cape Maria—south-east extreme	55 07 00	66 46 45			
Pillar Cape (or Pilar)—northern cliff	52 42 50	74 43 20	23 50	1 00	6 E.
Pillar Rock, at extremity	50 02 00	75 23 15	23 00		
Pinto Hills—eastern summit	52 23 00	72 20 00			
Pio, San, Cape—south pitch	55 03 15	66 30 30			
Playa Parda—Shelter Isle summit	53 18 45	73 01 30	23 45	1 08	6 E. S. E.
Policarpo Point—extreme	54 39 00	65 39 30			
Pond Mount	53 51 45	71 56 30			
Porpoise Point—north-east extremity	52 55 30	70 48 00	23 30	Noon.	8
Portland Bay—west point of islet	50 14 45	74 40 30			
Possession Cape—middle of cliff	52 17 00	68 56 20	22 40	8 40	40 W.
Possession Bay—western bank	52 19 00	69 20 00		8 19	42 S. S. W.
Providence Cape—south extreme	52 59 00	73 34 45	23 22		
Pyramid Hill—summit	54 27 00	71 07 40			
Preserve Islands—summit of west island	54 23 00	71 35 00			
Quarter Master Island—north point	52 56 00	70 22 35	23 20	Noon.	9 N.
Quoin Head—south extreme, summit	53 44 15	70 43 15	23 20	Noon.	9 E.
Quod Cape—extremity	53 32 10	72 33 25			
Ramirez Diego Islands—highest summit	56 28 50	68 42 30	24 30	4 00	6 E.
Red Hill	55 34 00	68 09 00			
Redbill Island—summit	50 05 30	74 48 00			
Rejoice Harbour—north point extreme	51 02 15	74 19 45			
Rees Cape—east pitch	55 05 00	67 01 00	23 20	4 00	8 E.
Renouard Island—summit	52 34 50	73 43 00			
Richardson Mount—summit	54 45 50	63 51 05			
Roca Partida—summit	50 45 00	75 02 00			
Rocky Point—extreme	54 57 45	65 46 00			
Roldans Bell—summit	53 57 40	71 47 15			
Roos de Cape—north-east pitch	55 34 20	67 20 00	23 45	3 30	7 E.
Rose Mount—Whittlebury Island	55 13 20	70 10 00			

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SOUTH OF 50°—*continued.*	Lat. South.	Long. West.	Var. East.	H.W.	R. & S.
	° ′ ″	° ′ ″	° ′	h. m.	Feet.
Round Cape (or Redondo Cape)—summit ...	50 51 00	69 04 50	21 30	9 30	40 N.
Rowlett Cape—extreme	54 14 45	70 08 15			
Rowley Cape—south-west pitch	54 55 00	67 00 00			
Ragged Point—extreme south	55 39 10	69 05 40			
Rugged Point—western extreme	53 47 10	73 35 00			
Sanchez Cape	51 06 56	69 03 40			
Sanderson Island—south extreme...	55 38 40	68 49 00			
Sandy Point—extremity...	53 09 15	70 52 00			
Santiago Cape—summit	50 42 00	75 28 00			
Sarmiento Mount—north-east peak	54 27 15	70 51 15			
Saturday Harbour—O.S.	53 10 15	74 18 00	24 20	2 00	5 S.E.
Schetky Cape—southern pitch	53 21 40	74 12 45	24 00	2 00	5 S.E.
Schomberg Cape—western pitch	54 39 00	72 07 00	24 40	2 30	5
Scott Island—summit	55 16 50	67 46 00			
Scourfield Cape—north-east pitch...	55 45 15	67 08 00			
Sea Rock—summit	55 15 00	70 28 30			
Sebastian, San, Cape—northern height ...	53 19 00	68 09 50	22 40	7 00	13 N.W. to NNW.
Selina Island—summit	54 55 20	71 30 20			
Sesambre—summit	55 27 15	66 59 30			
Seymour Mount—summit	54 19 05	69 50 20			
Sharp Peak—Wickham Island—summit ...	54 06 50	70 26 45			
Singular Peak	50 24 00	74 33 45			
Skyring Mount—summit	54 24 48	72 11 20	24 30	2 30	5
Sloggett Bay—Island, south extreme of ...	55 02 15	66 20 00			
Snowy Sound—extreme of Islet at entrance	53 31 00	72 40 00			
South Cape—south extreme cliff	54 51 00	64 45 40			
Southern Rock (Diego Ramirez)...	56 29 52	68 42 20	25 00	4 00	6 E.
Spaniard Harbour—N.W. extreme	54 53 00	65 53 00			
Spencer Cape—south-east summit	55 55 00	67 37 40	24 30	4 40	8 E.
Staines Peninsula—Isthmus centre	51 40 35	73 41 40			
Stepout Mount	50 11 45	70 16 45			
Stewart Harbour—O.S....	54 54 24	71 29 02	24 14	2 50	5 S.E.
Stokes Monument	51 02 00	75 00 00			
Stokes Mount	50 29 00	73 05 00			
Sulivan Head—south-west summit	55 20 50	69 45 45			
Sunday Cape—north-east cliff	53 39 50	67 56 20	22 50	6 00	12 N.W.
Sunday Cape—summit	53 10 30	74 22 00			
Swim Bluff	50 04 20	69 33 00			
Tapering Point—extremity	50 28 55	74 41 45			
Tamar Cape—south extreme	53 55 30	73 48 10	23 24	2 30	6 E.
Tame-seal Islet—middle	53 23 30	74 05 30			
Tarn Mount—peak at north end	53 45 06	71 02 10			
Turn Cape—extremity	54 24 08	71 07 30	24 00	1 20	6 N.E.
Tate Cape—summit	53 37 15	73 51 30			
Tekeenica Sound—north-west extremity ...	55 15 00	68 54 00			
Terhalten Island—summit	55 26 15	67 01 30	23 40	4 30	8 E.
Terhalten, Island—Cape Caroline—south-extreme	55 21 10	66 52 15	23 45	4 37	8 E.
Thomas Point—extreme	52 26 00	72 48 00			
Three Peaks Mount—summit	53 42 40	72 44 15			
Tiger Mount	51 21 36	69 01 46			
Tower Point—tower	54 59 30	66 01 30			
Tower Rocks—eastern rock	54 36 40	73 02 50	25 00		
Townshend Harbour—O.S.	54 42 15	71 55 30	24 34	2 30	5 E.
Trafalgar Mount—summit	51 38 00	74 24 45			
Treble Island—southern summit	55 07 50	71 02 20	24 15	3 00	5 S.E.
Tres Puntas—Cape	50 02 00	75 21 00			
Trigo Mount—summit	51 15 04	74 15 45			
Tussuck Rock	54 34 00	72 12 10	25 00	2 30	5 N.E.

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SOUTH OF 50°—*continued.*	Lat. South.	Long. West.	Var. East.	H. W.	R. & S.
	° ′ ″	° ′ ″	° ′	h. m.	Feet.
Twoboats Point—north extreme	54 52 30	69 37 00			
Upright Cape—north extreme	53 04 03	73 36 00	23 30	1 30	
Union Peak—summit	54 50 45	70 08 00			
Valentyn Harbour—Observation Mount	52 55 00	74 18 45	24 00	2 00	6
Valentyn Cape—summit at extreme	53 33 30	70 33 45			
Vancouver Port—head south-west of	54 49 50	64 05 45			
Vauverlandt Islet—summit	55 19 30	67 57 00	23 50	4 40	7 E.
Vernal Mount—summit	54 06 28	71 01 24			
Vicente, San, Cape—extreme	54 38 40	65 14 15	22 50	4 30	10 N.W.
Vicente, San, Cape—south-west summit (west coast)	51 30 00	74 00 15			
Vicente, San, Cape—west extreme	52 46 20	70 26 25			
Victory Cape—extremity	52 16 10	74 54 39			
Virgins Cape—south-east extreme	52 20 10	68 21 34	22 30	8 50	38 N. to N.W.
Walker Bay—height south of	50 22 00	74 53 15			
Waller Point—extreme	55 10 10	66 28 00			
Warping Cove—O.S.	54 24 08	71 08 20	24 57		
Walter Point—eastern pitch of	54 55 15	70 58 00			
Webley Cape—Islet off extreme point	55 16 15	68 06 00	23 40	3 30	6
Webster Mount—summit	54 47 12	64 04 52			
Weddell Cape—south-west pitch	55 33 00	68 45 00			
West Point—extremity	55 50 15	67 54 30	24 20	4 30	9 E.
West Hill—Hermite Island—summit	55 50 30	67 46 45			
West Mountain—summit	54 50 00	64 35 35			
West Channel—north head, summit	50 22 15	75 22 00			
West Channel—south head, summit	50 33 30	75 28 15			
West Cliff Cape—cliff extreme	50 36 30	75 31 45			
Western Station—Santa Cruz river	50 12 40	71 50 00			
Westminster Hall—eastern summit	52 37 18	74 24 10			
Whitshed Mount—summit	54 08 00	71 14 00			
White Horse Islet—north summit	51 07 50	75 14 40			
Wilson Cape—south-west summit	55 04 45	71 01 00			
Windhond Bay	55 15 00	67 50 00		4 11	10 E.
Windward Bay—beach	50 03 12	74 41 45			
Wollaston Island—largest—summit of	56 27 44	68 43 01			
Woollya—settlement	55 03 40	68 03 00			
York Minster—summit	55 24 50	70 02 30			
WEST COAST OF PATAGONIA.					
Placed by Latitude from 50° Northwards.					
Double Peak Mount—western peak	49 58 20	74 41 00			
Neesham Bay—beach	49 53 54	74 59 00			
Cape Primero—extremity	49 50 05	75 35 30	20 58		
Mount Corso—south-west summit	49 48 00	75 34 00			
Cathedral—Mount—summit	49 46 30	74 43 50			
Sandy Bay—east point	49 45 40	74 16 45			
Mount Corso—N.E. summit	49 45 15	75 32 00			
Cape Brenton—summit	49 39 00	75 31 00	20 20		
Falcon Inlet—south-east extremity	49 38 00	73 36 30			
Saumarez Island—Bold Head	49 32 48	74 06 15			
Fury Cove—height east of	49 31 50	74 03 00		1 15	W.S.W.
Falcon Inlet—Cape Wellesley—extremity	49 28 30	73 54 25			
Offshore Islet—centre	49 25 10	75 36 00			
Picton Opening—middle of	49 15 00	75 23 00			
Mount Jervis—summit	49 08 30	74 11 15			
Level Bay—west point—extremity	49 07 45	74 14 00			
Cape Montague—western cliff	49 07 30	75 37 00			
Western Rock—centre	49 01 00	75 48 40			

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WEST COAST OF PATAGONIA—*continued.*	Lat. South.	Long. West.	Var. East.	H.W.	R. & S.
	° ′ ″	° ′ ″	° ′	h. m.	Feet.
Wildcoast Head Cliff—summit	48 57 30	75 32 00			
Eyre Sound—north-east extremity	48 57 00	73 41 45			
Halt Bay—middle of islet close to	48 54 15	74 14 20		12 30	8. S. E.
Dyneley Point—extreme	48 50 00	75 26 00			
Parallel Point—extreme	48 47 45	75 34 40			
Parallel Peak—summit	48 45 40	75 31 00			
Station Head—summit of	48 39 00	74 10 00			
Conglomerate Point—extreme	48 36 15	75 35 00			
White Kelp Cove—summit over west side	48 30 15	74 17 10			
Breaker Peak—summit	48 28 00	75 32 30			
Middle Island—north point—extremity	48 27 35	74 21 40		12 00	N.
Point Breakoff—extreme	48 26 00	75 33 40			
Fallos Channel—Duplicate Mount—south summit	48 19 00	75 14 00			
Black Island—south-east summit	48 12 00	74 32 00			
Dundee Rock—summit	48 06 15	75 42 00			
Cape Dyer—extremity	48 06 00	75 34 20			
Miller Island—south extreme	48 03 20	74 35 30			
Port Santa Barbara—Observation Point, north extreme	48 02 20	75 29 20	19 10	11 45	6 E.
Bynoe Islands—northern centre	47 58 00	75 23 30			
Millar Monument—at north extreme	47 55 50	74 41 30			
Campanilla Island—summit at south end	47 45 00	74 37 10			
Good Harbour—Isthmus at the bottom	47 45 00	75 20 20			
Bynoe Island—western extremity	47 44 40	75 24 20			
Cape San Roman—north extremity	47 44 30	74 52 30			
Wager Island—eastern point—extremity	47 41 00	74 55 00			
Supposed position of Wager's Wreck	47 39 30	75 06 30			
Speedwell Bay—hill at north-east point	47 39 30	75 10 00			
Northernmost Islet—summit	47 38 10	75 14 00			
Ayautau Island—summit of largest	47 34 15	74 40 20			
Channel's Mouth—largest rock off entrance	47 29 30	74 29 30			
Channel's Mouth—east side of northernmost Hazard Islet	47 28 55	74 24 20			
CHONOS ARCHIPELAGO.					
Xavier Island—Ignacio Beach	47 10 00	74 25 40	19 50		
Jesuit Sound—central mount	47 09 30	74 08 20			
Xavier Island—Lindsay Point—north-east extremity	47 03 15	74 16 00			
Kelly Harbour—south point extreme	46 59 30	74 08 30			
Kelly Harbour—north point extreme	46 59 00	74 05 50			
Cape Tres Montes—extremity	46 58 57	75 27 50			
Cape Tres Montes—summit over	46 57 50	75 27 55			
Purcell Island—summit	46 55 20	74 39 45			
Cirujano Islet—north-east point	46 51 10	74 21 45			
Forelius Peninsula—Isthmus (narrowest part)	46 50 00	74 41 40			
Port Otway—Observation Spot	46 49 31	75 19 20	20 32	Noon.	6 E.
Port Otway—summit over southern entrance head	46 49 30	75 18 00			
Cape Raper—rock close to	46 49 10	75 40 55			
Bad Bay—summit west of	46 47 10	74 51 40			
Point Rees—extreme	46 44 40	75 42 20			
Sugar Loaf—summit	46 42 40	75 15 00			
Mitford Head—summit	46 39 00	75 40 30			
St. Paul's Dome—summit	46 36 16	75 13 40			
Small Islet near Cape Gallegos	46 35 40	75 40 00			
Cape Gallegos—summit	46 35 00	75 28 30			

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	Lat. South.	Long. West.	Var. East.	H.W.	R. & S.
CHONOS ARCHIPELAGO—*continued.*	° ′ ″	° ′ ″	° ′	h. m.	Feet.
Christmas Cove—O. S.—at south-east extremity of cove	46 35 00	75 34 05	20 40	0 45	5 N.E.
Cone—summit	46 34 10	75 31 00			
Point Pringle—extremity	46 30 50	75 33 00			
Rescue Point—summit—northern	46 18 10	75 13 45		0 14	5 N.E.
Hellyer Rocks—middle	46 04 00	75 14 00			
Cape Taytao—western extreme	45 53 20	75 08 00			
Skyring Monument—summit	45 53 10	75 04 00			
Mount Gallegos—summit	45 52 45	74 56 45			
Patch Cove—O.S.—under Mount Gallegos	45 52 15	74 55 50	20 31	0 45	5 E.
Port Refuge—Puentes Island—summit	45 51 36	74 51 25			
Inche Island—south-east summit	45 48 05	75 01 00	20 36	0 45	5 E.
Anna Pink Bay—St. Julian Island—summit	45 47 25	74 55 00			
Mount Haddington—summit	45 43 25	74 39 50			
Mensuan Island—summit	45 36 00	74 56 00			
Mount Riviero—summit	45 34 45	74 35 00			
Midbay Rock—centre	45 27 30	74 45 00			
Cape Garrido—northern extreme	45 26 10	74 32 20			
Darwin Channel—north-east head	45 25 00	74 25 00			
Mount Isquiliac—summit	45 20 00	74 21 40			
Vallenar Road—O.S.—south-east extreme of Three-finger Island	45 18 30	74 36 15	20 48	0 18	5 N.
Lemu Island—summit	45 12 10	74 34 15			
Paz Island—summit	44 57 00	74 40 45			
Huamblin (or Socorro) Island—south extreme	44 55 50	75 12 45			
Huamblin (or Socorro) Island—west head	44 49 30	75 14 45			
Ypun (or Narborough) Island—John Point—extremity	44 40 40	74 48 30			
Stokes Island—summit	44 40 30	74 33 10			
Cape Lort—summit over	44 32 35	74 50 20			
Hulk Rocks—northern—above water	44 16 00	74 33 00			
Mount Main—summit	44 09 00	74 11 45			
Mellersh Island—western extremity	44 04 45	74 23 50			
Melimoyu Mountain—summit	44 01 30	73 07 00			
Tuamapu Island—summit	43 58 30	74 15 20			
Huaytecas Island—central summit	43 52 45	74 01 00			
Point Huayhuin—western islet off	43 51 00	74 13 00			
Port Low—O.S. on rocky islet in harbour	43 48 30	74 03 05	19 48	0 40	7 N.E.
Point Chaylime—north extremity	43 46 10	73 55 40			
Huacanec Islets—northernmost—small	43 46 05	74 03 30			
Queytao Islet—largest—summit	43 43 00	73 35 30			
ARCHIPELAGO OF CHILOE.					
Huafo Island—south extremity	43 41 50	74 46 00			
Huafo Island—east point (of coves)	43 38 40	74 34 40			
Huafo Island—summit over north west, or weather, point	43 35 30	74 48 40	19 00		
Huafo Island—northern rock	43 32 00	74 44 20			
Canoitad Rock—summit	43 30 00	73 50 30			
Yanteles Mountain—summit—southern	43 30 00	72 50 30			
Huapiquilan Islands—southern islet summit	43 29 30	74 15 00			
Larger Island Huapiquilan—southern summit	43 26 30	74 17 50			
San Pedro Mountain—summit	43 21 00	73 49 00		11 45	
San Pedro Passage—O.S. in cove	43 19 35	73 45 20		0 30	9 N.E.
Cape Quilan—south-west extreme	43 17 10	74 26 00			
Laytec Island—south-east extremity	43 15 05	73 36 00		0 37	
Corcovado Mountain—summit	43 11 20	72 48 40			
Huildad Harbour	43 03 00	73 34 00	18 30	0 48	20 N.
Point Sentinela—extremity	42 59 25	73 22 30			

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	Lat. South.	Long. West.	Var. East.	H.W.	R. & S.
ARCHIPELAGO OF CHILOE—*continued.*	° ′ ″	° ′ ″	° ′	h. m.	Feet.
Cape Ypuntad—north-west extremity	42 59 15	74 16 50			
Quilan Cove—O.S.	42 52 00	73 33 00	18 40	0 29	
Mount Vilcun—summit	42 48 50	72 52 50			
Minchinmadom Mountain—south summit ...	42 48 00	72 34 30			
Talcan Harbour—O.S.	42 47 00	72 58 00		1 03	16 N
Pirulil Head—north-west extremity	42 44 40	74 11 00			
Lemuy Island—Apabon peaked hill	42 40 00	73 35 30		0 55	
Yal Point—summit	42 39 00	73 43 00		0 55	
Nihuel Islet—summit	42 36 10	72 58 10			
Alao Island—summit	42 35 00	73 22 00		0 31	18 N.
Huentemo Head—summit	42 34 20	74 12 40			
Cahuache Island—summit	42 28 05	73 18 45			
Castro Town—easternmost part	42 27 45	73 49 20	18 35	0 11	18 N.
Dalcahue—Chapel	42 23 00	73 40 00		0 26	
Cape Matalqui—west extreme	42 10 40	74 14 00			
Chaugues Islands—north summit...	42 15 00	73 18 00		0 28	
Matalqui Height—summit	42 10 30	74 11 10			
Quicavi Bluff	42 15 00	73 24 00		0 51	20 N.
Quintergen Point—summit	42 09 25	73 24 00			
Oscuro Port—O.S.	42 04 00	73 29 00		1 00	20 N.
Huapilinao Head—summit	41 57 36	73 32 20		1 25	15 N.
Lobos Head—summit	42 04 00	73 27 00		0 29	
Cocotue Height—summit	41 56 40	74 05 35			
San Carlos—town—landing-place at Mole ...	41 52 00	73 52 40	18 33	11 15	6 E.
Poloque Island—south point...	41 51 00	73 06 00		1 05	
San Carlos Harbour—Point Arenas—O.S.	41 51 20	73 56 00	18 00	0 14	6 E.
San Carlos Harbour—English Bank	41 49 00	73 54 00		0 04	
Point Tres Cruces—extreme pitch	41 49 30	73 31 40		1 15	16
Abtao Island—s. Point	41 48 00	73 26 00		0 50	18
Cape Guabun—north-west extreme	41 47 50	74 05 55			
Point Sanoullan—north-eastern cliff	41 47 30	73 35 20		0 48	17
Calbuco Fort—east end of island...	41 46 10	73 10 45		1 18	22
Calbuco—another observation	41 46 00	73 11 00		0 47	18
Corona Head—northern pitch	41 46 00	73 57 30			
COAST OF CHILE.					
Mount Yate (or Llebcan)—summit	41 45 30	72 31 50			
Carelmapu Cove—O.S.	41 45 00	73 45 00		0 50	10 E.
Maullin—Amortajado—north extreme ...	41 37 15	73 44 30			
River Coyhuin—mouth .., ...	41 40 00	72 45 00		0 52	21 N.
Point Godoy—south-west extreme	41 34 15	73 50 20			
Quellaype Mountain—summit	41 22 00	72 43 30			
Osorno Mountain—summit	41 09 30	73 36 45			
Point Coronel—south extremity	41 07 40	73 31 45			
Cape Quedal—summit	41 03 00	73 59 50			
Manzano Cove—rivulet—mouth	40 33 20	73 45 50			
Milagro Cove—depth of...	40 16 00	73 45 00			
River Bueno—entrance (bar)	40 11 00	73 44 00			
Point Galera—west extremity	40 02 00	73 46 40			
Falsa Point—summit over (highest)	40 00 50	73 40 50			
Valdivia—O.S. near Fort Corral	39 52 53	73 29 00	18 15	10 35	5 E.
Gonzales Head—northern pitch	39 51 15	73 30 00			
Valdivia Town — landing-place opposite church (Hospital Mole)	39 49 02	73 18 30	18 20	10 45	Varble.
Chanchan Cove—Islet off	39 26 40	73 18 30			
River Tolten—mouth	39 07 45	73 19 00			
Cauten (or Imperial) River—mouth	38 47 40	73 26 00			
Cauten Head Cliff—summit	38 40 40	73 30 20			
Mocha Island—south summit	38 24 10	73 56 50			

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COAST OF CHILE—*continued.*	Lat. South.	Long. West.	Var. West.	H. W.	R. & S.
	° ′ ″	° ′ ″	° ′	h. m.	Feet.
Cape Tirua—summit of islet off	38 23 00	73 34 30			
Mocha Island—north summit	38 21 15	74 01 09			
Mocha Island—O.S.—east side, near north point	38 19 35	74 00 20	17 20		
Molguilla Point—south-west extreme	37 48 00	73 36 00			
Point Tucapel—extreme	37 42 00	73 43 00			
River Leübu—entrance	37 35 45	73 42 00	17 10	10 30	5 N.
Tucapel Head—summit	37 35 20	73 43 10			
Carnero Head—western summit	37 21 20	73 44 00			
Arauco Fort—middle	37 15 00	73 23 00			
Tubul River—south head—entrance	37 14 25	73 27 30			
Cape Rumena—north-west cliff—summit	37 12 45	73 42 00			
Laraquete River—mouth	37 10 30	73 14 00			
Point Lavapie—extremity	37 08 50	73 38 20			
Colcura Village—western pitch of hill	37 02 50	73 14 00			
Santa Maria Island—O.S. near rivulet (landing place)	37 02 48	73 34 00	17 00	10 20	6 N.
Santa Maria Island—summit of west head	37 01 45	73 36 30			
Point Coronel—west extremity	36 57 00	73 15 00			
Concepcion City—middle—nearest to river	36 49 30	73 05 20			
River Bio Bio—south entrance point	36 48 45	73 13 00			
Talcahuano—Fort Galvez	36 42 00	73 10 00	16 48	10 14	5 N.
Point Tumbes—north-west cliff	36 37 15	73 10 20			
Mount Neuke—summit	36 34 55	72 58 00			
Coliumo Head—north extreme	36 31 30	73 01 15			
Boquitata Point—western extreme	36 16 30	72 54 45			
Bio Bio Paps—south-west summit	36 06 20	73 14 40			
Carranza Point—south-west extreme	35 37 20	72 42 20			
Cape Humos—summit	35 22 50	72 33 00			
Maule Church—rock near entrance	35 19 40	72 29 20	16 24		
Maule River—south head entrance	35 19 15	72 28 00			
Point Huachupure—extreme	34 57 30	72 16 30			
Topocalmo Point—summit on extremity	34 00 50	72 05 00			
Navidad Bay—River Rapel mouth	33 54 00	71 52 20			
Rapel Shoal (wrongly called Topocalma)	33 51 00	71 56 30			
Maypo River—south entrance head	33 39 20	71 43 15			
White Rock Point—White Rock	33 29 00	71 46 50			
Curaumilla Point—rock off	33 06 00	71 48 00			
Valparaiso—Fort San Antonio	33 01 53	71 41 15	15 18	9 32	5 N.
Quillota—Bell—summit	32 57 10	71 10 20			
Quintero Rocks—body	32 52 20	70 37 00			
Quintero Point—summit	32 46 00	70 35 30			
Horcon Rock—largest	32 41 50	70 35 30			
Aconcagua—mountain—summit	32 38 30	70 00 30			
Papudo—Gobernador Mount over Bay	32 31 00	71 31 30			
Papudo Bay—O.S. landing-place	32 30 09	71 30 45	15 12		
Pichidanque—south-east point of island—O.S.	32 07 55	71 36 00	15 24	9 20	5 N.
Conchali Bay—islet in middle	31 53 10	71 36 00			
Point Tablas—south-west extremity	31 51 45	71 37 30			
River Chuapa—south entrance point	31 39 30	71 38 00			
Maytencillo Cove—north head	31 17 05	71 42 05			
Talinay Mount—summit	30 50 45	71 41 45			
Limari River—south head	30 44 53	71 46 25			
Lengua de Vaca—extremity	30 13 40	71 41 30			
Huanaquero Hill—summit	30 12 50	71 30 45			
Sugar Loaf Hill—north-west summit	30 00 10	71 26 10			
Herradura Port—south-west corner	29 58 40	71 25 45	14 30	9 8	5 N.
Coquimbo Port—northern islet (rock)	29 55 10	71 25 10	14 24	9 8	5 N.

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	Lat. North.	Long. West.	Var. West.	H. W.	R. & S.
COAST OF CHILE—*continued.*	° ′ ″	° ′ ″	° ′	h. m.	Feet.
Coquimbo City (La Serena)—Mr. Edwards's house	29 54 10	71 18 45	14 10		
Arrayan Cove—south point	29 42 20	71 23 45			
Juan Soldado, Mountain—summit	29 41 30	71 20 25			
Pajaro Islet—southern summit	29 35 00	71 36 25			
Yerba Buena, village—chapel	29 34 00	71 21 50			
Pajaro Islet—northern summit	29 32 50	71 37 30			
Trigo Island—south-west point	29 32 35	71 24 20			
Tortoralillo—south entrance point	29 29 15	71 23 45	13 40		
Chungunga Islet—summit	29 24 15	71 25 15			
Toro Rock	29 21 10	71 35 25			
Choros Islands—south-west point of largest	29 15 45	71 37 30			
Polillao Cove—south point extreme	29 10 00	71 34 10			
Chañeral Bay—south-west point	29 02 40	71 33 40			
Chañeral Island—south-west summit	29 01 15	71 39 05			
Sarco Cove—middle of beach	28 50 00	71 32 10			
Cape Vascuñan—Islet off (rock)	28 50 00	71 34 30			
Alcalde Point—summit upon	28 34 16	71 23 40			
Huasco—Captain of Port's house	28 27 15	71 19 00	13 37	8 30	6
Lobo Point outer pitch	28 17 50	71 17 10			
Herradura de Carrisal—landing-place	28 05 45	71 15 45	13 23		
Carrisal—middle point—south side	28 04 30	71 14 30			
Matamores Cove—outer point on south side	27 54 10	71 12 35			
Pajonal Cove—south-east corner	27 43 30	71 07 00	13 28		
Salado Bay—Cachos Point—summit	27 39 20	71 06 25			
Copiapo—landing-place	27 20 00	71 01 45	13 36	8 30	5
Morro—summit (Morro of Copiapo)	27 09 30	71 01 45			
Morro, Point—northern extremity	27 06 45	71 01 40			
Port Yngles—sandy beach in south-west corner	27 05 20	70 56 00	13 30		
Cabeza de Vaca—point—extreme	26 51 05	70 55 00			
Flamenco—south-east corner of bay	26 34 30	70 47 30	13 46	9 10	5
Las Animas—summit over point (outer)	26 23 35	70 47 00			
Pan de Azucar—islet—summit	26 09 15	70 47 05			
Ballenita—islet—off Ballenita	25 45 45	70 50 40			
Lavata—cove near south-west point	25 39 30	70 47 15	13 30	9 20	5
Point San Pedro—summit	25 31 00	70 44 30			
Point Taltal—northern extreme	25 24 45	70 38 15			
Hueso Parado—south point of cove	25 24 30	70 35 15			
Point Grande—outer summit	25 07 00	70 33 30			
Point Grande—summit, a mile and a-half inshore	25 07 00	70 33 45			
Paposo—white head	25 02 30	70 33 05	13 00	9 40	5
COAST OF PERU.					
Mount Trigo—summit	24 40 00	70 36 15			
Reyes Head—extreme pitch	24 34 30	70 39 45			
Point Jara—summit	23 53 00	70 35 45			
Jaron Mountain—summit	23 52 30	70 32 15			
Moreno Mountain—summit	23 28 30	70 38 15			
Constitucion Cove—shingle point on island	23 26 42	70 40 30	12 48	10 00	4
George Mount—Morro Jorge—summit	23 15 10	70 39 45			
Mexillones Hill—summit	23 06 30	70 35 00		10 32	3
Cobija—flagstaff—landing-place	22 34 00	70 21 05	12 30	9 54	4
Algodon Bay—extremity of point	22 06 00	70 17 05	12 06		
Chipana Bay—O.S.	21 23 00	70 10 50	12 00		
San Francisco Head—west pitch	21 55 50	70 14 45			
River Loa—mouth of	21 28 00	70 06 15			
Point Lobo, or Blanca—outer pitch	21 05 30	70 15 45			

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COAST OF PERU—*continued.*	Lat. South.	Long. West.	Var. East.	H.W.	R. & S.
	° ′ ″	° ′ ″	° ′	h. m.	Feet.
Mount Carrasco—highest summit	20 58 30	70 09 45			
Pica Pabellon—summit	20 57 40	70 14 00			
Point Patache—extreme	20 51 05	70 18 15			
Iquique—centre of island	20 12 30	70 14 30	12 18	8 45	5
Pisagua—Point Pichalo—extreme	19 36 30	70 19 00	11 30		
Point Gorda—western low extreme	19 19 00	70 21 30			
Point Lobo—summit	18 45 40	70 25 30			
Arica—summit of Monte Gordo	18 28 55	70 23 30	11 10		
Arica—Mole	18 28 05	70 23 45	11 00	8 00	5
Sama—Mountain—highest summit	17 58 35	70 56 15			
Mollendo	17 00 00	71 00 00	11 05	8 00	5
Point Coles—extremity	17 42 00	71 26 15			
Ylo Town—rivulet mouth	17 37 00	71 23 45	11 00	8 20	6
Tambo Valley—Point Mexico—south-west extreme	17 10 50	71 52 00			
Islay—Custom House	17 00 00	72 10 15	11 00	8 53	7
Islay—Mountain—summit	16 56 05	72 08 30			
Quilca—Cove—west head	16 42 20	72 31 00	10 45	8 00	6
Pescadores Point—south-west extreme	16 23 50	73 20 25			
Atico—east cove	16 13 30	73 45 15	11 12	8 53	5
Point Chala—extreme	15 48 00	74 31 00			
Lomas—flagstaff on Point	15 33 15	74 54 45	10 48	8 19	5
San Juan—Needle Hummock	15 20 56	75 13 20	10 30	5 10	3
Point Beware—south-west extreme	15 08 35	75 25 45			
Point Nasca—summit	14 57 00	75 34 30			
Doña Maria—Table—central summit	14 41 00	75 53 40			
Yndependencia Bay—south point of Santa Rosa Island	14 18 15	76 13 30	9 30	4 50	4
Mount Carreta—summit	14 09 50	76 20 20			
Mount Wilson—summit	14 04 50	76 20 15			
San Gallan—Island—northern summit	13 50 00	76 31 15			
Paraca Bay—west point—north extreme	13 48 00	76 22 15			
Pisco—Town—middle	13 43 00	76 16 30	11 00	4 50	4
Point Frayles—extreme	13 01 00	76 34 50			
Asia Rock—summit	12 48 00	76 41 55			
Chilca Point—south-west pitch	12 31 00	76 52 40			
Chilca Cove—Rock—summit	12 29 20	76 52 30			
Chorillos Bay				3 37	6
Morro Solar—summit	12 11 30	77 06 15			
Callao Bay—Arsenal Flagstaff	12 04 00	77 13 30	10 00	5 47	4
San Lorenzo Island—north point	12 04 00	77 19 00	10 36		
Hormigas Islet—largest (southern)	11 58 00	77 50 00			
Pescador Islands—summit of largest	11 47 10	77 19 50			
Chancay Head—summit	11 35 55	77 20 35	10 12		
Pelado Islet—summit	11 27 10	77 53 00			
Salinas Hill—summit	11 15 30	77 39 55		4 56	
Huacho Point—extreme pitch	11 08 45	77 40 15	9 48	4 44	3
Supé—west end of village	10 49 45	77 47 00	9 42	4 50	3
Jaguay, or Gramadel, Head—west extremity	10 25 15	78 03 30			
Huarmey—west end of sandy beach	10 06 15	78 13 00	9 36	6 10	2
Colina Redonda—summit	9 38 35	78 24 20			
Mount Mongon—western summit	9 38 15	78 21 15			
Casma Bay—inner south point	9 28 00	78 25 35	9 30		
Samanco Bay—Cross Point	9 15 30	78 32 45	9 20	6 30	2
Ferrol Bay—Blanco Island—summit	9 06 30	78 39 25			
Santa—centre of projecting point	9 00 00	78 41 30	9 32		
Chao Islet—centre	8 46 30	78 49 00			
Guañape Islands—summit of highest	8 34 50	78 59 15			
Mount Wickham—summit	8 20 00	78 49 00			

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	Lat. South.	Long. West.	Var. East.	H. W.	R. & S.
COAST OF PERU—*continued.*	° ′ ″	° ′ ″	° ′	h. m.	Feet.
Truxillo—church	8 07 30	79 04 00			
Huanchaco Point—south-west extremity	8 05 40	79 09 00	9 30		
Macabi Islet—summit	7 49 15	79 30 55			
San Nicholas Bay				5 04	3
Malabrigo Bay—rocks	7 42 40	79 28 00	9 28	5 00	2
Pacasmayo Point—north-west extreme	7 25 15	79 37 25	9 30		
Sana Point—extreme	7 10 35	79 43 30			
Lobos de Afuera Island—Fishing Cove on east side	6 56 45	80 43 55	9 20		
Eten Head—summit over	6 56 40	79 53 50			
Lambayeque—beach opposite	6 46 00	79 59 30	9 10	4 00	3
Lobos de Tierra—central summit	6 26 45	80 52 50			
Point Ahuja—western cliff summit	5 55 30	81 10 00			
Sechura Town—church	5 35 00	80 49 45			
Lobos Island—near Payta—south extreme	5 13 35	81 13 10			
Payta—Silla (or Saddle)—south summit	5 12 00	81 09 20			
Payta—new end of town	5 05 30	81 08 15	9 00	3 20	3
Pariña Point—extreme	4 40 50	81 20 45			
Cape Blanco—under middle high cliff	4 16 40	81 15 45			
Picos Point—extreme cliff	3 45 10	80 47 30			
Point Malpelo—mouth of Tumbes River	3 30 40	80 30 30	8 50	4 00	10
Puná Island—Consulate on Point Española	2 47 30	79 57 45	9 00	6 00	11
Guayaquil—south end of city	2 13 00	79 53 30	8 30	7 00	11
GALAPAGOS ISLANDS.					
Hood Island—eastern summit	1 25 00	89 43 55			
Charles Island—summit	1 19 00	90 32 00			
Charles Island—Post Office Bay—south-east corner	1 15 25	90 31 30	9 40	2 10	6 N.W.
MacGower Rocks—middle	1 08 30	89 59 30			
Albemarle Island — Iguana Cove — south-west extreme	0 59 00	91 32 15	9 30	2 00	6 N.
Chatham Island—Watering Cove beach	0 56 25	89 33 25			
Barrington Island—summit at west end	0 50 30	90 10 00			
Chatham Island—south-west point of Stephens Bay	0 50 00	89 36 45	9 35	2 23	6½ N.W.
Chatham Island—eastern summit	0 44 15	89 20 45			
Indefatigable Island—summit of Islet in N.W. Bay—Eden Islet	0 33 25	90 37 45	9 30	1 56	6 N.W.
Narborough Island—north-west extremity	0 20 00	91 44 45			
Albemarle Island—Tagus Cove	0 15 55	91 26 45			
James Island—Sugar Loaf near west end	0 15 20	90 56 40	9 36	3 10	5 N.
James Island—cove on N.E. side	0 10 00	90 50 00	9 30	2 34	5
James Island—Adam Cove	0 10 00	90 50 00	9 40	2 14	5
	NORTH.				
Bindloes Island—southernmost summit	0 18 50	90 33 55			
Towers Island—westernmost cliff	0 20 00	90 02 30			
Abingdon Island—summit	0 34 25	90 48 10	9 35	2 10	N.W.
Culpepper Islet—summit	1 22 55	91 53 30			
Wenman Islet—north-western summit	1 39 30	92 04 30			

From Callao to Guayaquil the longitudes depend upon Mr. Usborne's survey, in the Constitucion. He had three chronometers fixed on board the vessel, and one which was used for observations; all four were good watches. If his whole meridian distance between Guayaquil and Callao is incorrect, the error, whatever it may be, must be distributed equally along that portion of coast, but I do not think there is an error of two miles; probably, indeed, there is not near so great a deviation from truth, as Mr. Usborne landed for observations continually, and carried a connected triangulation from Callao to Puná.

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OTHER POSITIONS

ASCERTAINED AND USED TO CONTINUE THE CHAIN OF MERIDIAN DISTANCES.

Not included in the Survey.	Lat. South.	Long. West.	Var. East.	H.W.	R. & S.
	° ′ ″	° ′ ″	° ′	h. m.	Feet.
Otaheite—Point Venus*—extremity	17 29 15	149 30 00	7 54	Noon every day.	1
* By continuing the chain of meridian distances westward from Bahia (in Brazil), Otaheite (Point Venus extremity) would be in...		149 34 30			
And by taking the measures eastward from Bahia		149 26 14			
The mean of the two is		149 30 22			
The longitudes in the following list, from New Zealand to Ascension, are obtained by adding the meridian distances eastward from Bahia.					
		EAST.			
New Zealand—Bay of Islands—Paihia Islet	36 16 30	174 09 45	14 00	9 16	6 N.W.
Sydney—Fort Macquarrie—flag-staff	33 51 30	151 17 00	10 24	7 36	6
Paramatta—Observatory		151 04 00			
Hobart Town—Fort Mulgrave	42 53 30	147 24 15	11 06	8 00	5 W.
			WEST.		
King George Sound—Princess Royal Harbour—New Government Buildings ...	35 02 10	117 56 30	5 36	8 00	4 E.
Keeling Islands—Direction Island—west point	12 05 22	96 54 45	1 12	5 27	5 N.W.
Mauritius—Port Louis—Observatory	20 09 25	57 31 30	11 18	1 02	2 N.W.
Cape of Good Hope—Simons Bay—east end of Dock Yard	34 11 24	18 25 45	28 30	2 30	5
Royal Observatory		18 28 30			
		WEST.			
St. Helena—high water mark, in the meridian of Observatory	15 55 15	5 42 45	18 00	4 50	3W. N.W
Ascension—Barrack Square	7 55 33	14 24 15	13 30	5 30	2 W.
By the Beagle's Chronometers, the meridian distances between Falmouth, Plymouth, Portsmouth, and Greenwich, are as follows:—					
Portsmouth Observatory—R.N. College—from Greenwich Observatory		1 06 07·5			
Devonport (Government House) — from Portsmouth Observatory		3 03 49·5			
Pendennis Castle—Falmouth—from Devonport (Government House)		0 52 46·5			
And Falmouth—Pendennis Castle—west of Greenwich		5 02 43·5			

N.B.—These are identical with the measures of Dr. Tiarcks.

In the foregoing Table, every position, variation, and notice of tide, is the result of observations made by officers of the Adventure or the Beagle, therefore they are, strictly speaking, original, and have no reference whatever to observations made by other persons.

An explanation of the methods and instruments used, and of the basis on which the longitudes, especially, are founded, is given, in an abridged form, at the end of the Appendix.

The positions of those points only are given which are considered to be, generally speaking, satisfactorily ascertained by actual observation on shore, or well connected by triangulation to those stations at which the artificial horizon was used.

Where tidal notices are given opposite to summits of mountains, or other places at some distance from the sea, it is to be understood that they refer to a point at which the sea approaches nearest to that specified.

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TABLE OF THE VARIATION OF THE COMPASS;

OBSERVED ON BOARD (AFLOAT).

Date.	Lat. North.	Long. West.	Var. West.
1831.			
Dec. 30	43 20	12 00	23 50
.. ..	42 37	12 30	23 34
.. ..	42 31	12 40	24 18
.. 31	41 00	13 30	24 49
.. ..	40 15	13 50	24 25
1832.			
Jan. 1	38 41	15 00	23 35
.. 2	37 20	15 30	23 54
.. 4	33 00	16 10	23 00
.. 5	29 32	16 20	20 41
.. ..	29 30	16 22	20 48
.. 7	28 20	16 15	20 24
.. ..	28 12	16 20	20 20
.. 8	26 59	16 48	20 04
.. 9	25 26	18 02	19 59
.. ..	24 40	18 42	19 53
.. 10	23 09	19 47	18 47
.. ..	22 39	20 14	18 45
.. 11	22 02	20 26	18 10
.. ..	21 44	20 39	18 22
.. ..	21 38	20 42	18 37
.. 12	20 42	21 21	18 24
.. ..	20 18	21 28	18 20
.. 13	19 31	21 57	18 06
.. ..	19 06	22 17	17 39
.. 14	17 50	23 10	17 06
.. 15	15 29	23 52	15 52
.. 16	15 17	23 35	15 22
Feb. 7	14 54	23 30	15 55
.. 9	13 20	25 20	14 49
.. 10	12 17	26 25	13 43
.. 11	8 50	27 02	12 44
.. 14	2 10	27 50	11 08
.. 15	1 20	29 05	10 39
.. 16	1 00	29 23	09 23
.. ..	0 51	29 25	07 20
	SOUTH.		
.. 17	0 01	29 59	8 58
.. ..	0 28	30 18	8 18
.. ..	0 28	30 18	8 03
.. 19	3 29	31 57	8 00
.. 20	Fernando de Noronha.		7 53
.. 21	3 09	32 02	7 54
.. 23	5 04	32 01	7 45
March 18	13 12	38 34	2 07
.. 19	13 29	38 30	1 47
.. 20	13 11	38 29	2 11
.. ..	13 38	38 20	1 21
.. 22	15 03	37 25	3 22
.. ..	15 38	37 20	2 44
.. 23	16 29	36 57	3 44
.. 25	18 10	35 55	3 13
.. ..	18 09	35 58	2 50
.. 27	17 54	37 31	2 20
.. 28	18 04	38 30	1 55
.. 30	17 59	38 46	2 24

Date.	Lat. South.	Long. West.	Var. West.
1832.			
March 30	18 07	38 38	2 37
			EAST.
April 3	23 22	42 07	2 19
	At Rio de Janeiro.		1 55
			WEST.
May 13	18 14	38 52	1 04
.. 14	17 12	38 47	1 00
.. ..	17 14	38 48	1 15
.. ..	16 35	38 48	1 52
.. 15	15 01	38 41	1 30
.. 23	13 25	38 37	2 08
.. 25	14 42	38 22	2 20
.. ..	15 29	38 24	2 54
.. ..	15 25	38 24	2 42
.. 26	16 20	38 24	1 59
.. ..	17 31	38 23	2 12
.. ..	17 35	38 23	2 20
.. 27	18 59	38 44	1 14
June 1	22 42	40 21	0 03
			EAST.
.. 2	22 58	41 15	0 33
.. ..	22 58	41 14	0 15
July 5	23 03	43 06	1 39
.. 8	24 06	42 53	1 57
.. 12	26 33	43 48	3 39
.. 13	27 13	45 48	4 35
.. ..	27 14	45 50	4 34
.. 14	27 16	46 16	5 10
.. 17	29 53	48 13	6 52
.. ..	29 52	48 12	6 02
.. 18	31 09	48 57	7 50
.. 21	34 09	52 03	10 27
Aug. 20	35 20	56 47	12 30
.. 21	35 49	56 49	11 21
.. ..	35 54	56 47	11 36
.. 22	36 53	56 34	12 17
.. ..	36 55	56 35	12 23
.. 23	37 02	56 36	13 07
Oct. 27	At Monte Video.		12 42
.. 31	34 50	57 13	12 09
Nov. 1	34 42	57 28	12 24
.. 2	34 35	57 55	11 06
.. 14	34 55	56 19	12 00
.. 26	34 58	56 10	12 56
.. 27	34 48	56 42	12 26
.. 29	35 07	56 05	12 29
Dec. 3	40 46	62 06	15 26
.. 5	42 16	61 32	16 12
.. 6	43 14	61 17	16 20
.. 7	43 56	61 25	16 40
.. 8	45 12	62 23	17 25
.. 11	51 18	65 14	20 26
.. 13	50 42	65 45	20 41
.. 14	52 06	66 58	21 35
.. 15	52 39	67 14	21 31

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Date.	Lat. South.	Long. West.	Var. East.
1833.			
March 12	51 30	57 54	18 42
.. 14	51 30	57 54	18 45
April 16	41 58	64 35	17 00
.. 17	42 18	64 19	16 47
Aug. 2	41 17	61 13	14 23
.. 3	40 50	61 30	16 55
.. 4	40 53	61 50	16 27
.. 5	40 53	61 30	16 44
.. 6	40 27	62 00	16 16
.. 22	39 10	60 41	15 07
.. 26	38 57	61 58	15 11
.. 30	38 57	61 58	14 56
Sept. 1	38 57	61 58	15 25
Nov. 25	34 53	56 13	11 45
.. 29	34 53	56 13	11 21
Dec. 7	34 45	56 48	12 11
.. 15	42 34	58 54	16 01
.. 19	43 27	59 59	15 46
.. 20	44 30	61 18	18 14
.. 23	47 11	65 04	19 50
1834.			
Jan. 1	47 45	66 00	20 30
.. 7	48 10	67 30	20 50
.. ..	48 46	64 24	19 18
.. 8	48 47	67 15	21 28
.. ..	48 45	66 00	18 22
.. 9	49 10	67 15	19 47
.. 23	48 20	66 12	19 56
.. ..	48 26	66 09	19 31
.. 26	52 07	68 05	21 40
.. 30	52 45	70 08	23 38
Feb. 11	53 18	67 15	22 00
.. 13	52 45	70 08	23 45
.. 14	53 23	69 08	24 40
.. 17	53 15	67 51	24 12
.. 19	54 00	67 15	23 05
.. 24	55 48	66 23	23 31
April 11	50 15	64 15	19 52
.. 12	49 47	65 16	22 50
.. 13	49 39	67 55	20 18
.. 14	50 08	68 27	20 21
.. 20	50 08	68 27	21 28
May 22	52 16	67 30	22 22
June 13	52 51	77 28	25 47
Nov. 10	33 04	72 09	17 16
.. 18	38 08	77 12	17 27
.. 19	40 12	77 15	18 30
.. ..	40 12	76 56	17 30
.. ..	39 06	77 09	17 36
.. 20	40 30	76 45	18 58
.. ..	40 30	76 46	18 56
.. 27	41 42	74 00	19 09
.. 30	43 46	77 05	19 42
.. ..	43 46	77 05	20 11
Dec. 1	44 22	76 42	18 54
.. ..	44 26	75 39	19 13
.. ..	44 26	75 15	19 43
.. ..	44 22	76 42	19 01
.. ..	44 27	76 33	19 57
1834.			
Dec. 2	44 26	75 15	20 05
.. ..	44 29	75 44	20 15
.. 3	44 48	75 02	20 30
.. 18	44 52	76 18	21 24
.. 19	45 09	77 48	21 09
.. ..	45 10	77 51	21 53
.. 20	46 31	75 43	22 35
.. 29	45 48	75 06	21 33
.. 30	45 48	75 06	21 39
1835.			
Jan. 6	44 30	74 20	20 18
.. 7	43 58	74 20	20 36
Feb. 28	38 18	72 30	17 22
March 1	38 18	72 30	17 54
.. 25	35 11	71 45	16 34

NOTE.—Hence to the Galapagos Islands the variations were all observed on shore.

Sept. 12	4 42	84 48	9 27
.. 13	2 58	85 16	9 23
	NORTH.	WEST.	
Oct. 22	0 10	97 27	8 43
	SOUTH.		
.. 24	1 12	99 59	8 37
.. 25	4 32	103 56	6 10
.. ..	3 39	102 54	8 20
.. 26	5 31	105 02	7 47
.. 27	6 09	106 26	7 20
.. 28	7 07	109 09	6 33
.. ..	7 47	100 24	6 03
.. 29	7 40	112 40	6 00
.. 30	8 21	113 51	6 00
.. ..	8 47	115 18	6 19
.. 31	9 38	118 20	6 08
Nov. 1	10 04	119 48	5 04
.. ..	10 27	121 16	4 35
.. 2	11 14	123 59	4 54
.. 3	11 33	125 10	6 06
.. ..	11 42	126 06	4 43
.. 4	11 52	127 21	5 38
.. 4	12 07	128 43	5 31
.. 6	13 11	132 11	6 20
.. 27	17 16	150 02	7 57
.. 28	17 22	151 52	7 59
.. ..	17 22	152 02	7 56
.. ..	17 19	152 24	6 45
.. 29	17 26	152 50	8 52
.. ..	17 26	152 51	7 46
.. ..	17 32	152 30	7 03
... 30	18 20	156 31	8 11
Dec. 1	18 21	157 15	7 14
.. 2	18 32	158 01	8 23
.. ..	18 33	158 13	8 33
.. 3	18 42	159 24	10 14
.. ..	18 44	159 27	9 25
.. 4	19 47	161 47	9 20
.. ..	20 17	163 05	8 38
.. 5	21 17	165 24	9 28

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Date.	Lat. South.	Long. West.	Var. East.
1835.			
Dec. 6	21 51	166 37	10 27
.. 7	22 41	169 01	10 56
.. ..	22 41	169 1	11 00
.. 10	25 42	177 6	11 15
.. ..	26 30	178 26	11 15
.. 11	27 26	179 20	11 22
.. ..	28 45	179 27	11 54
		EAST.	
.. 12	29 41	179 08	13 24
.. ..	29 41	179 08	13 16
.. 14	31 25	175 59	14 15
.. 15	32 36	175 05	14 14
.. 21	35 00	174 00	14 05
1836.			
Jan. 1	34 04	172 56	13 05
.. 4	34 40	165 37	13 26
.. 7	34 29	163 26	13 28
Feb. 21	42 53	141 45	8 21
.. 22	42 48	140 40	7 37
		WEST.	
March 2	39 46	123 42	3 35
.. 3	38 20	123 36	2 50
.. ..	37 52	123 13	3 48
.. ..	37 54	123 11	3 02
.. 5	36 27	119 50	5 24
.. 15	35 33	117 30	6 06
.. 16	35 38	117 09	8 15
.. ..	35 34	116 16	6 31
.. 17	34 48	114 00	7 20
.. 21	27 28	108 50	4 59
.. ..	27 27	108 47	5 19
.. 23	23 44	106 17	3 58
.. 25	20 24	104 09	3 22
April 13	12 21	94 04	0 04
.. 15	13 17	88 13	0 18
.. ..	12 59	90 33	0 57
.. 21	16 56	73 02	3 55
.. ..	16 56	73 01	3 38
.. 22	16 58	72 59	3 28
.. ..	17 13	71 48	4 04
.. ..	17 24	71 51	4 10
.. 23	17 36	70 27	5 07
.. 24	17 52	68 30	5 39
.. 26	18 35	63 34	7 36
.. 27	18 43	62 20	8 06
.. ..	18 43	62 14	8 11
.. 28	19 20	60 12	8 59
May 13	25 42	46 42	16 16
.. 15	27 30	41 08	20 37

Date.	Lat. South.	Long. East.	Var. West.
1836.			
May 15	27 33	40 52	21 10
.. 16	27 21	40 13	21 36
.. 17	27 45	33 18	21 43
.. 18	28 12	36 08	20 48
.. 23	34 45	23 11	26 22
.. ..	34 53	22 33	28 59
June 29	22 56	5 06	24 09
.. 30	22 17	4 36	24 12
		WEST.	
July 8	15 57	5 34	19 43
.. 16	13 02	9 07	19 56
.. 18	9 52	12 34	17 43
.. 21	7 57	14 24	17 36
.. 24	9 30	17 32	15 56
.. 25	10 07	18 58	15 57
.. 26	11 25	23 23	13 06
.. 28	12 04	28 31	8 26
.. ..	12 12	29 39	9 00
.. 31	12 48	35 55	4 29
.. ..	12 49	36 52	4 07
Aug. 6	13 09	38 30	2 44
.. 7	12 44	37 54	3 18
.. 8	12 32	37 39	3 11
.. 9	12 44	37 29	2 46
.. ..	12 40	37 00	4 16
.. 13	8 03	34 49	5 11
.. 15	8 03	34 50	5 09
		NORTH.	
.. 22	2 32	29 07	10 23
.. 23	3 39	29 11	10 27
.. 24	5 45	27 11	14 26
Sept. 4	14 43	23 39	17 02
.. 9	23 43	33 50	15 26
.. ..	23 39	33 47	15 13
.. 10	25 00	34 19	16 05
.. 11	28 07	36 00	17 06
.. 12	28 29	36 18	16 25
.. 13	29 59	36 23	17 54
.. 14	31 04	35 57	18 28
.. 15	32 03	35 05	18 22
.. 16	35 38	31 32	21 34
.. 17	37 15	28 54	22 09
.. 18	37 49	28 00	24 00
.. 19	38 35	27 08	25 21
.. 25	38 54	25 03	23 21
.. 26	40 35	22 45	25 00
.. ..	41 28	21 31	25 38
.. 27	42 06	20 06	26 00
.. 27	42 20	19 50	26 03

All the observations for variation, afloat, were taken with a very good Gilbert's compass, placed on a stanchion above the poop, where it was found, by trials in various latitudes, to be nearly free from any effect of local attraction.

ERRATUM in page 65, line 4, of figures, *for* 0 15 *read* 2 15.

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APPENDIX.

No. 1.

SIR: March 19, 1831.

Accompanying this letter, I have the honour to transmit to you, for their Lordships' information, six charts and sixteen plans of harbours and portions of the coast of Tierra del Fuego, the results of Commander Fitz-Roy's surveys in H.M.'s sloop Beagle, between April 1829 and June 1830.

Their Lordships will, I trust, permit me, as the senior officer of that expedition, to state the peculiar nature and extent of this service, as well as the complete manner in which it has been effected.

On the melancholy occasion of Commander Stokes's death, I was fortunate, through the Commander-in-chief Sir Robert Otway's just discrimination of Commander Fitz-Roy's qualifications, on account of which alone he was selected, to receive him as my colleague, in the command of the Beagle.

In April I detached the Beagle, and Adventure's tender, to complete portions of the Strait of Magalhaens that were then imperfect; and by him, and under his superintendence and able direction, the Magdalen and Barbara Channels through the Tierra del Fuego were surveyed; a considerable portion of the interior sounds on the western coast was examined; and the discovery of the Otway and Skyring Waters was made, by Commander Fitz-Roy himself, in the depth of the severe winter of that climate, and on which he was absent from the ship thirty-three days in an open whale-boat.

In August the Beagle joined me at Chiloe, and sailed again early in November following, with a view to examine the outward or sea-

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coast of Tierra del Fuego, from its westernmost extremity to the Strait Le Maire, including Cape Horn and the islands in the vicinity.

The difficulties under which this service was performed, from the tempestuous and exposed nature of the coast, the fatigues and privations endured by the officers and crew, as well as the meritorious and cheerful conduct of every individual, which is mainly attributable to the excellent example and unflinching activity of the commander, can only be mentioned by me in terms of the highest approbation.

For the results of the voyage, and the services of Commander Fitz-Roy, I beg to refer their Lordships to their Hydrographer and the charts herewith transmitted, which I hope will be satisfactory.

I trust their Lordships will permit me once again to express how much I feel that Commander Fitz-Roy, not only from the important service he has rendered, but from the zealous and perfect manner in which he has effected it, merits their distinction and patronage; and I beg leave, as his late senior officer, to recommend him in the strongest manner to their favourable consideration.

I have, &c.

PHILLIP P. KING, Captain.

To the Hon. GEORGE ELLIOT,
Secretary of the Admiralty, &c. &c. &c.

No. 2.

SIR, London, May 23, 1831.

Enclosed is a copy of the letter sent to Captain P. P. King (then commanding H. M.'s sloop Adventure), by the Secretary of the Admiralty, relative to the natives of Tierra del Fuego, who were brought to England in the Beagle; and I have to request that you will honour me by submitting the enclosed copy, and the purport of this letter, to my Lords Commissioners of the Admiralty.

The proper season for the return of these Fuegians is now drawing near. They have been with me fourteen months, and at least five months more must elapse before they can reach their own shores.

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They have always expected to return during the ensuing winter (summer of their country), and should they be disappointed, I fear that discontent and disease may be the consequence.

Having been led to suppose that a vessel would be sent to South America to continue the survey of its shores, and to explore parts yet unknown, I hoped to have seen these people become useful as interpreters, and be the means of establishing a friendly disposition towards Englishmen on the part of their countrymen, if not a regular intercourse with them.

By supplying these natives with some animals, seeds, tools, &c., and placing them, with some of their own tribe, on the fertile country lying at the east side of Tierra del Fuego, I thought that, in a few years, ships might have been enabled to obtain fresh provisions, as well as wood and water, during their passage from the Atlantic to the Pacific Ocean, on a part of the coast which can always be approached with ease and safety.

If their Lordships should so far approve of these ideas as to grant me any assistance in carrying them into execution, I shall feel deeply gratified, and shall exert every means in my power; but should they not be thought worthy of attention and support, I humbly request that their Lordships will grant me twelve months' leave of absence from England, in order to enable me to keep my faith with the natives of Tierra del Fuego, by restoring their countrymen, and by doing them as much good as can be effected by my own very limited means.

I have, &c.,

ROBERT FITZ-ROY, Commander.

To the Hon. GEORGE ELLIOT,
Secretary to the Admiralty, &c. &c. &c.

In June I received twelve months' leave of absence from England, and made the following agreement with Mr. Mawman, a shipowner, of London.

No. 3.

MEMORANDUM of Agreement made the eighth day of June, in the year of our Lord one thousand eight hundred and thirty-one, between John Mawman, of Stepney Causeway, London, merchant,

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owner of the brig or vessel called The John, of two hundred tons register burthen, now lying in the London Dock, whereof John Davey is Master, on the one part, and Robert Fitz-Roy, a Commander in His Majesty's Royal Navy, of the other part.

The said John Mawman agrees with the said Robert Fitz-Roy, in manner following :—

That the said master, or such other master as the said John Mawman shall appoint, shall receive the said Robert Fitz-Roy and his friends and servants, not exceeding in the whole six persons, on board the said brig or vessel, and proceed with them forthwith to South America, to such one or two port or ports, or place or places, as the said Robert Fitz-Roy shall order and direct, such port or ports, or place or places, not to be north of Valparaiso ; and at the first port or place, or so near thereto as the said vessel may safely get, to be named by the said Robert Fitz-Roy, to land the said Robert Fitz-Roy and his said friends and servants, or such of them as the said Robert Fitz-Roy shall require, and receive them, or such of them as the said Robert Fitz-Roy shall require, on board again ; and thence forthwith to proceed to the second port or place, or so near thereto as the said vessel may safely get, to be named by the said Robert Fitz-Roy, there to land such of them, the said Robert Fitz-Roy and his friends and servants, as shall not have been already landed at the said first-named port or place, and receive the said Robert Fitz-Roy, and such other or others of the last-mentioned persons, as he shall require again on board the said vessel, and forthwith proceed to and land him or them at Valparaiso.

That the said Robert Fitz-Roy shall be at liberty to put on board stock and provender, at such places as may be agreed upon, port charges and pilotage being paid by the said Robert Fitz-Roy.

That John Mawman will find and provide the said Robert Fitz-Roy, and the said other persons, with all suitable and proper customary provisions, stores, wines, beer, and spirits.

And the said Robert Fitz-Roy agrees with the said John Mawman, his executors and administrators, as follows :—

That he will not detain the said brig or vessel at either of the ports or places to be named by him, as hereinbefore mentioned, any longer than shall be reasonably necessary to enable him and the said other persons safely to land, re-embark, and finally land at the said ports respectively.

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That he will pay to the said John Mawman, his executors or administrators, as the compensation for the agreement hereinbefore contained on the part of the said John Mawman, the sum of one thousand pounds sterling, to be paid down prior to embarkation.

As witness the hands of the said parties.

Witness,
W. H. Woollett.
W. Wackerbarth.

Robert Fitz-Roy.
John Mawman.

No. 4.

Salisbury Square,
November 10, 1831.

My dear Sir,

Matthews left town this morning to join the Beagle at Plymouth, being detained till to-day for the steamer.

We have provided Matthews with all such articles as appeared to be necessary for him, and which could be most advantageously supplied in this country. These had all been completed before I learned from Mr. Wilson that you are short of stowage. I hope, however, they will not be found to amount to a quantity to occasion you inconvenience; and I think you will be of opinion that no part of his outfit could, with propriety, be dispensed with, in case Matthews becomes a permanent resident in Tierra del Fuego.

Mr. Wilson and myself concurred in opinion that a letter should be addressed by us to Matthews, in reference to the undertaking on which he is about to enter. This I have drawn up at Mr. W.'s request, and hoped to have procured the addition of his signature to it; but a pressure of other engagements has compelled me to drive it off till it is too late to send it to him for that purpose. I have no doubt, however, that it expresses his general views on the subject. If you should think I have dwelt too much on the religious bearing of Matthews's future labours, you must kindly call to your recollection that I am a Missionary Secretary, and could not altogether divest myself of that character on the present occasion. The letter is enclosed, and we shall feel obliged by your giving it to Matthews, when he comes on board. You will, of course, take a copy of it, if you wish to do so.

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I much regret that we could not meet with a suitable companion for Matthews. I trust, however, you will find him to possess many valuable qualifications for the undertaking.

With very cordial wishes for your safety and welfare,

I remain, &c.

D. COATES.

To Capt. FITZ-ROY, R.N.
&c. &c. &c.

No. 5.

Salisbury Square, London,
Nov. 10, 1831.

DEAR MR. MATTHEWS,

The friends by whose means you are enabled to proceed to Tierra del Fuego cannot suffer you to depart without offering to you some suggestions and counsel with regard to your future course.

The undertaking in which you are about to be engaged springs from the benevolent interest taken by Captain Fitz-Roy in the natives of the island of Tierra del Fuego, with whom he became acquainted during his survey of that part of the coast of South America, in which he was employed by His Majesty's Government. Some of them were brought hither by Capt. F. on his return home, about twelve months ago. These individuals, through Capt. F.'s kind exertions, were, during their stay in England, placed under circumstances to receive instruction in the English language, in the principles of Christianity, and in some of the most simple arts of civilized life.

These natives will be your companions on board the "Beagle," a passage to Tierra del Fuego having, at the instance of Capt. F., been granted to them and to you on board that ship, by the liberality of the Lords of the Admiralty.

Some Christian friends having become acquainted with these foreigners, and with Capt. Fitz-Roy's solicitude to promote their welfare and that of the tribes with which they are connected, have supplied the means of providing the outfit, which was requisite to

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enable you, advantageously, to enter on the work before you. Among these friends you are especially indebted to the kindness and liberality of the Rev. W. Wilson. His solicitude to forward Capt. Fitz-Roy's views has been manifested toward these Fuegians, as well as yourself, by his having had them under his immediate care at Walthamstow for many months, in order to impart to them such knowledge and information as seemed calculated to promote their present and eternal welfare, and by contributing largely to the fund raised for your use.

From what has been just stated, you will perceive the peculiar obligations under which you lie to Capt. Fitz-Roy and to Mr. Wilson, and the interest which they both take in your undertaking. You will especially consider yourself as bound to act under the superintendence and direction of Capt. Fitz-Roy. We earnestly recommend you to consult Capt. F. on all your plans and proceedings, and ever to act toward him with entire openness and unreserve. He is cordially desirous to promote the welfare of the Fuegians, and is possessed of information and experience, authority and influence, calculated, under the Divine blessing, powerfully to advance the object you have in view. To him, therefore, you will do well to refer on all occasions, and cheerfully conform to his wishes.

We trust that, in entering on this undertaking, you have been influenced by a sincere desire to promote the glory of God and the good of your fellow-creatures. These are the ends which those friends have in view who have assisted you, and these they trust that you, by the grace of God, will ever steadily keep in view yourself. The means to be employed for the attainment of these ends may be summed up in very few words: it is to make it your study and endeavour to do these poor creatures all the good in your power in every practicable way. By evidencing this to them in the whole of your spirit and conduct, you will gain their confidence and obtain influence over them, without which you cannot expect to succeed. But it is not easy, steadily and consistently, to maintain a line of conduct like this. To enable you to do it, you must be "strong in the grace which is in Christ Jesus," and this grace must be sought by diligent prayer and a constant reading and meditating on the word of God. Here lies your strength, and hence, under God, must your success be derived. "Draw nigh to

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God, and He will draw nigh to you." Walk closely with Him, and his name will be glorified in you. Pursuing this course, you will be sure of enjoying His blessing, and may cheerfully leave all events in His hands.

Your first object must be to acquire the language of the Fuegians. To this you must apply with the utmost diligence, fully availing yourself for this purpose of your intercourse with the natives on the voyage; as, till this point is gained, you can hold no free communication with the tribes on the island. In prosecution of this object, we recommend you carefully to note down in writing every new word which you hear. These vocabularies you will, at your leisure, classify and reduce to order, to form the basis of a grammar and dictionary, and ultimately of translations into the language. In prosecution of this design, it will be requisite that you should ascertain, if practicable, which dialect is most extensively used in the island, if it should be found that there are more than one; as it is obviously desirable that you should fix that which is most extensively used.

In imparting religious instruction to the natives, you will make the Bible the basis of all your teaching. You must never lose sight of that great theological principle laid down in the sixth article of the Church of England:—"That Holy Scripture containeth all things necessary to salvation; so that whatsoever is not read therein, nor may be proved thereby, is not to be required of any man that it should be believed as an article of the faith, or be thought requisite or necessary to salvation." By this sound and salutary principle, let the whole of the religious instruction which you impart to the natives be governed. And we earnestly pray that God may give you a mouth to speak, and them ears to hear, that they may so "know the Holy Scriptures that they may be made wise unto salvation through faith in Christ Jesus."

In your intercourse with the Fuegians, you will bear in mind that it is the temporal advantages which you may be capable of communicating to them that they will be most easily and immediately sensible of. Among these may be reckoned the acquisition of better dwellings, and better and more plentiful food and clothing. Consequently, you will consider it a primary duty to instruct them in cultivating the potato, cabbage, and other vegetables; to rear pigs, poultry, &c., and to construct a commodious habitation, &c. You

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will probably find in this, as well as in more important things, that example is the most influential instructor. You must therefore take care to have a comfortable habitation yourself, furnished with all necessary articles for use, and kept clean and orderly. You will also fence in a piece of ground for a garden, and get it well stocked with the most useful vegetables; and also surround yourself as quickly as possible with a plentiful supply of pigs, poultry, goats, &c. This, indeed, you will find absolutely necessary for your own future subsistence, as well as with a view to the civilization and comfort of the natives.

Captain Fitz-Roy will, we doubt not, afford you assistance in selecting a proper spot for your residence, and raising a dwelling upon it; and also in procuring the requisite seeds and animals for your subsistence, and for the successful prosecution of your work. A very liberal supply of European clothing, implements and tools, ironmongery, earthenware, &c., is included in your outfit.

We trust that these general hints, with the information and assistance which you may acquire from Captain Fitz-Roy and the books with which you are supplied, will suffice to enable you to carry on your work with comfort and efficiency.

You will have the kindness to write to Mr. Wilson, with full particulars of your proceedings and prospects, by every practicable opportunity, sending your letters to Buenos Ayres, or any other point where they may be likely to get into a channel to reach England.

In conclusion, I have only to add that Captain Fitz-Roy has very kindly and considerately offered to bring you back with him to this country, should circumstances, contrary to our anticipations, turn out to be such that you should deem it unadvisable to remain at Tierra del Fuego.

Earnestly praying that the blessing of God may rest on you and your important and interesting labours,

I remain, truly yours,

D. Coates.

No. 6.

Memorandum of Agreement made this eleventh day of September, one thousand eight hundred and thirty-two, between Mr. James

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Harris, resident at the River Negro, and Robert Fitz-Roy, Commander of His Britannic Majesty's surveying sloop Beagle.

Mr. James Harris will provide and furnish two decked schooner-rigged vessels, with their rigging, sails, masts, and all other things necessary for their use and safety, both at sea and in harbour; also, sufficient crews and two pilots, together with provisions for the said pilots, their crews, and eight other persons.

The said Mr. James Harris hereby agrees that the said schooner-rigged vessels, and all on board of them, shall be under, and obey the directions of, the said Robert Fitz-Roy, or those whom the said Robert Fitz-Roy may appoint; and that the said vessels shall continue to perform this expressed service during eight lunar months from the date of this agreement, unless the said Robert Fitz-Roy shall end this agreement at an earlier period; and the said Robert Fitz-Roy shall be at liberty to put an end to this agreement at th end of any month after December of this year.

In consideration of the above useful service to be thus rendered to His Britannic Majesty and the public, the said Robert Fitz-Roy hereby agrees and promises to pay to the said Mr. James Harris, his executors or administrators, the sum of one hundred and forty pounds sterling per lunar month, during the whole time that the said schooners are employed as herein agreed.

As witness the hands of the said parties,

JAMES HARRIS, Resident at the Rio Negro.
ROBERT FITZ-ROY, Commander.

Witnesses to the signatures and agreement.

J. C. WICKHAM, Senior Lieutenant.
B. J. SULIVAN, Second Lieutenant.

No. 7.

ROBERT FITZ-ROY, Esq., Commander of H.M.S. Beagle, Dr. to Mr. James Harris, for the hire of two schooner-rigged vessels, &c., as per annexed agreement, £1,680 sterling.—11th August, 1833.

Received from Robert Fitz-Roy, Commander of H.M.S. Beagle, the sum of £1,680 sterling, in full payment for the hire of two

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schooner-rigged vessels, &c., as per annexed agreement, dated 11th July, 1832.

JOHN HARRIS.

H.M.S. Beagle, at Sea,
15th Sept., 1833.

No. 8.

By Robert Fitz-Roy, Commander of His Britannic Majesty's surveying ship Beagle.

YOU are hereby required and directed to take command and charge of the two vessels, "La Paz" and "La Liebre," and of all on board of them.

They are engaged by me upon the terms specified in the accompanying agreement.

With these vessels you will execute as much of the survey, herein pointed out, as your means and other circumstances will allow.

Between Blanco Bay and New Bay the sea-coast should be accurately examined and charted.

Particular plans should be made of the entrances to False Bay, Brightman Inlet, Union Bay, the Bay of San Blas, and the River Negro.

The plans already made of Port San Josef and Port San Antonio should be verified.

The sea-coast ought to be completed before you undertake any examination of the interior waters; and I have to request that you will be cautious of information which may be coloured or exaggerated by individual interest.

As you are well acquainted with the excellent Memoir, drawn up by the Hydrographer for our guidance, I need only recall your attention to the accompanying extracts.

I wish you to be at the Bay of San Blas on the 10th of November, and there to await my arrival.

ROBERT FITZ-ROY, Commander.

Blanco Bay, 19th Sept., 1832.

To Lieut. J. C. WICKHAM,
Senior Lieutenant of H. M. S. Beagle.

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No. 9.

(MEMORANDUM.)

H. M. S. Beagle, Blanco Bay,
19th September, 1832.

It is my direction that you take command and charge of the hired vessel "La Paz," and of all on board of her.

You will be extremely careful to keep company with Lieutenant Wickham, unless otherwise directed; and you will obey his orders, and assist him in carrying my orders into execution.

ROBERT FITZ-ROY, Commander.

To Mr. J. L. STOKES,
Assistant-Surveyor, H.M.S. Beagle.

No. 10.

H.M.S. Beagle, off San Blas Bay, Coast of Patagonia,
SIR, 4th December, 1832.

As you have already executed a considerable part of the service pointed out to you in my order, dated September 1832, and are ready for a more arduous task than I had supposed your limited means could undertake, you are hereby required and directed to examine and survey as much of the sea-coast between Port Desire and Blanco Bay as time and your means will allow.

In the first instance, you will hasten to Blanco Bay, and deliver the accompanying despatches to the Commandant of the Buenos Ayrean settlement.

Afterwards, your route will be that which appears to you the most proper for the verification of the charts with which you are furnished, and for the execution of the above-mentioned service.

You will endeavour to pass the month of March in the River Negro, and, if we do not meet sooner, you will look for the Beagle in Blanco Bay at the beginning of July.

Should she not arrive there in July, you will go with both vessels to Monte Video. I have, &c.,

Lieut. J. C. WICKHAM, ROBERT FITZ-ROY.
Commanding the hired Schooners
"La Paz" and "La Liebre."

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No. 11.

Extract from Falkner, pp. 61, 62, 63.

I shall here give an account of a strange amphibious animal, which is an inhabitant of the river Parana, a description of which has never reached Europe; nor is there even any mention made of it by those who have described this country. What I here relate is from the concurrent asseverations of the Indians, and of many Spaniards, who have been in various employments on this river: besides, I myself, during my residence on the banks of it, which was near four years, had once a transient view of one; so that there can be no doubt about the existence of such an animal.

In my first voyage to cut timber, in the year 1752, up the Parana, being near the bank, the Indians shouted, "yaquaru!" and looking, I saw a great animal, at the time it plunged into the water from the bank; but the time was too short to examine it with any degree of precision.

It is called yaquaru, or yaquaruigh, which (in the language of that country) signifies the water tiger. It is described by the Indians to be as big as an ass, of the figure of a large overgrown river-wolf or otter, with sharp talons and strong tusks, thick and short legs, long shaggy hair, with a long tapering tail.

The Spaniards describe it somewhat differently:—as having a long head, a sharp nose like that of a wolf, and stiff erect ears. This difference of description may arise from its being so seldom seen, and, when seen, so suddenly disappearing; or perhaps there may be two species of this animal. I look upon this last account as the most authentic, having received it from persons of credit, who assured me that they had seen this water-tiger several times. It is always found near the river, lying on a bank, from whence, on hearing the least noise, it immediately plunges into the water.

It is very destructive to the cattle which pass the Parana, for great herds of them pass every year; and it generally happens that this beast seizes some of them. When it has once laid hold of its prey, it is seen no more, and the lungs and entrails soon appear floating upon the water.

It lives in the greatest depths, especially in the whirlpools made by the concurrence of two streams, and sleeps in the deep caverns that are in the banks.

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No. 12.

Extract of a Letter from Thomas Pennant, Esq. to the Hon. Daines Barrington. (Written in 1771.)

Dear Sir:

I now execute the promise I made in town some time ago, of communicating to you the result of my visit to Mr. Falkner, an antient Jesuit, who had passed thirty-eight years of his life in the southern part of South America, between the river la Plata and the Straits of Magellan. Let me endeavour to prejudice you in favour of my new friend, by assuring you, that by his long intercourse with the inhabitants of Patagonia, he seems to have lost all European guile, and to have acquired all the simplicity and honest impetuosity, of the people he has been so long conversant with. I venture to give you only as much of his narrative as he could vouch for the authenticity of; which consists of such facts as he was eye-witness to, and such as will (I believe) establish past contradiction the veracity of our late circumnavigators, and give new lights into the manners of this singular race of men. It will not, I flatter myself, be deemed impertinent to lay before you a chronological mention of the several evidences that will tend to prove the existence of a people of a supernatural height, inhabiting the southern tract. You will find that the majority of voyagers who have touched on that coast have seen them, and made reports of their size, that will very well keep in countenance the verbal account given by Mr. Byron, and the printed, by Mr. Clarke; you will observe, that if the old voyagers did exaggerate, it was through the novelty and amazement at so singular a sight; but the latter, forewarned by the preceding accounts, seem to have made their remarks with coolness, and confirmed them by the experiment of measurement.

A.D. 1519. The first who saw these people was the great Magellan;—one of them just made his appearance on the banks of the river La Plata, and then made his retreat; but, during Magellan's long stay at Port St. Julian, he was visited by numbers of this tall race. The first approached him singing, and flinging the dust over his head, and shewed all signs of a mild and peaceable disposition: his visage was painted; his garment, the skin of some animal, neatly

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sewed; his arms, a stout and thick bow, a quiver of long arrows feathered at one end, and armed at the other with flint. The height of these people was about seven feet (French); but they were not so tall as the person who approached them first, who is represented to have been of so gigantic a size that Magellan's men did not, with their heads, reach as high as the waist of this Patagonian. They had with them beasts of burden, on which they placed their wives. By Magellan's description of them, they appear to have been the animals now known by the name of Llama. These interviews ended with the captivating two of the people, who were carried away in two different ships; but, as soon as they arrived in a hot climate, each of them died. I dwell the longer on this account, as it appears extremely deserving of credit; as the courage of Magellan made him incapable of giving an exaggerated account through the influence of fear; nor could there be any mistake about the height, as he had not only a long intercourse with them, but the actual possession of two for a very considerable space of time.* It was Magellan who first gave them the name of Patagons, because they wore a sort of slipper made of the skin of animals. "Tellement," says M. de Brosse,† qu'ils paroissoient avoir des pattes de bêtes." In 1525 Garcia de Loaisa saw, within the Straits of Magellan, savages of a very great stature, but he does not particularize their height. After Loaisa, the same Straits were passed in 1535 by Simon de Alcazova, and attempted in 1540 by Alphonso de Camargo, but without being visited by our tall people. The same happened to our countryman, Sir Francis Drake; but, because it was not the fortune of that able and popular seaman to meet with these gigantic people, his contemporaries considered the report as the invention of the Spaniards.

In 1579, Pedro Sarmiento asserts that those he saw were three ells high. This is a writer I would never venture to quote singly, for he destroys his own credibility by saying the savage he made prisoner was an errant Cyclops. I only cite him to prove that he fell in with a tall race, though he mixes fable with truth. In 1586 our countryman, Sir Thomas Cavendish, in his voyage, had only

* Vide Ramusio's Coll. Voyages, Venice, 1550; also the Letter of Maximilian Transylvanus, Sec. to Charles V.; and in the first volume, p. 376, A. and B.

† This account, as well as the others where I do not quote my authority, are taken from that judicious writer, M. de Brosse.

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opportunity of measuring one of their footsteps, which was eighteen inches long: he also found their graves, and mentions their customs of burying near the shore.* In 1591, Anthony Knevet, who sailed with Sir Thomas Cavendish in his second voyage, relates that he saw, at Port Desire, men fifteen or sixteen spans high, and that he measured the bodies of two that had been recently buried, which were fourteen spans long.† In 1599, Sebald de Veert, who sailed with Admiral de Cordes, was attacked in the Strait of Magellan by savages whom he thought to be ten or eleven feet high. He adds, that they were of reddish colour, and had long hair.‡

In the same year, Oliver Van Noort, a Dutch admiral, had a rencontre with this gigantic race, whom he represents to be of a high stature, and of a terrible aspect.

1614.—George Spilbergen, another Dutchman, in his passage through the same Strait, saw a man, of a gigantic stature, climbing a hill as if to take a view of the ship.§ 1615.—Le Maire and Schouten discovered some of the burying-places of the Patagonians beneath heaps of great stones, and found in them skeletons ten or eleven feet long.‖

Mr. Falkner supposes that formerly there existed a race of Patagonians superior to these in size; for skeletons are often found of far greater dimensions, particularly about the river Texeira. Perhaps he may have heard of the old tradition of the natives mentioned by Cieza,¶ and repeated from him by Garcilasso de la Vega,** of certain giants having come by sea, and landed near the cape of St. Helena, many ages before the arrival of the Europeans.

1618.—Gracias de Nodal, a Spanish commander, in the course of his voyage, was informed by John Moore, one of his crew, who landed between Cape St. Esprit and Cape St. Arenas, on the south side of the Straits, that he trafficked with a race of men taller, by the head, than the Europeans. This and the next are the only instances I ever met with of the tall race being found on that side of the Strait.

* Purchas, i. 58. † Purchas, i. 1232.

‡ Col. Voy. by the Dutch East-India Company, &c. London, 1703, p. 319.

§ Purchas, i, 80. ‖ Purchas, i. 91.

¶ Seventeen years travels of Peter de Cieza, 138.

** Translated by Ricaut, p. 263.

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1642.—Henry Brewer, a Dutch admiral, observed, in the Strait Le Maire, the footsteps of men which measured eighteen inches. This is the last evidence, in the seventeenth century, of the existence of these tall people. But let it be observed, that out of the fifteen first voyagers who passed through the Magellanic Straits, not fewer than nine are undeniable witnesses of the fact we would establish.

In the present century, I can produce but two evidences of the existence of the tall Patagonians; the one in 1704, when the crew of a ship belonging to St. Maloes, commanded by Captain Harrington, saw seven of these giants in Gregory Bay. Mention is also made of six more being seen by Captain Carman, a native of the same town, but whether in the same voyage, my authority is silent.*

But as it was not the fortune of the four other voyagers† who sailed through the Straits in the seventeenth century, to fall in with any of this tall race, it became a fashion to treat as fabulous the account of the preceding nine, and to hold this lofty race as the mere creation of a warm imagination. In such a temper was the public, on the return of Mr. Byron from his circumnavigation, in the year 1766. I had not the honour of having personal conference with that gentleman, therefore will not repeat the accounts I have been informed he had given to several of his friends; I rather chuse to recapitulate that given by Mr. Clarke,‡ in the Philosophical Transactions for 1767, p. 75. Mr. Clarke was officer in Mr. Byron's ship, landed with him in the Straits of Magellan, and had for two hours an opportunity of standing within a few yards of this race, and seeing them examined and measured by Mr. Byron.

He represents them in general as stout and well-proportioned, and assures us that none of the men were lower than eight feet, and that some even exceeded nine, and that the women were from seven feet and a half to eight feet. He saw Mr. Byron measure one of the men, and, notwithstanding the Commodore was near six feet high, he could, when on tip-toe, but just reach with his hand the top of

* Frezier's Voy. p. 84.

† Sir John Narborough, in 1670; Bartholomew Sharp, in 1680; De Gennes, in 1696; and Beauchesne Goüin, in 1699.

‡ This able officer commanded the Discovery, in Capt. Cook's last voyage, and died off Kamtschatka, August 22d, 1779.

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the Patagonian's head; and Mr. Clarke is certain that there were several taller than him on whom the experiment was made, for there were about five hundred men, women, and children. They seemed very happy at the landing of our people, and expressed their joy by a rude sort of singing. They were of a copper colour, and had long lank hair, and faces hideously painted. Both sexes were covered with skins, and some appeared on horseback and others on foot.

A few had on their legs a sort of boot, with a sharp-pointed stick at the heel, instead of a spur. Their bridles were made of thong, the bit wood; the saddle as artless as possible, and without stirrups. The introduction of horses into these parts by the Europeans introduced, likewise, the only species of manufacture they appear to be acquainted with. All their skill seems to extend no farther than these rude essays at harness, and to equip themselves for cavaliers. In other respects they would be in the same state as our first parents, just turned out of paradise, clothed in coats of skins; or, at best, in the same condition in which Cæsar found the ancient Britons; for their dress was similar, their hair long, and their bodies like those of our ancestors, made terrific by wild painting. These people, by some means or other, had acquired a few beads and bracelets; otherwise, not a single article of European fabric appeared among them. These they must have gotten by the intercourse with the other Indian tribes; for had they any intercourse with the Spaniards, they never would have neglected procuring knives, the stirrups, and other conveniences, which the people seen by Mr. Wallis had.

I should have been glad to have closed, in this place, the relations of this stupendous race of mankind, because the two following accounts, given by gentlemen of character and abilities, seem to contradict great part of what had been before advanced, or at least serve to give scoffers room to say, that the preceding navigators had seen these people through the medium of magnifying glasses, instead of the sober eye of observation. But before I make my remarks on what has been before related, I shall proceed with the other navigators, and then attempt to reconcile the different accounts.

In 1767 Captain Wallis, of the Dolphin, and Captain Philip Carteret, of the Swallow sloop, saw and measured with a pole several of the Patagonians who happened to be in the Straits of

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Magellan during his passage.* He represents them as a fine and friendly people, clothed in skins, and on their legs a sort of boots; and many of them tied their hair, which was long and black, with a sort of woven stuff of the breadth of a garter, made of some kind of wool; that their arms were slings, formed of two round balls fastened one to each end of a cord, which they fling with great force and dexterity. He adds: "They hold one ball in their hand, and swing the other, at the full length of the cord, round their head, by which it acquires a prodigious velocity; they will fling it to a great distance, and with such exactness, as to strike a very small object." These people were also mounted on horses; their saddles, bridles, &c., were of their own making; some had iron, and others metal bits to their bridles, and one had a Spanish broad-sword; but whether the last articles were taken by war, or procured by commerce, is uncertain; but the last is most probable. It seems evident that they had intercourse with Europeans, and had even adopted some of their fashions, for many had cut their dress into the form of Spanish ponchos, or a square piece of cloth with a hole cut for the head, the rest hanging loose as low as their knees; they also wore drawers.—So these people had attained a few steps farther towards civilization than their gigantic neighbours; others, again, will appear to have made a far greater advance, for these still devoured their meat raw, and drank nothing but water.

M. Bougainville, in the same year, saw another party of the natives of Patagonia. He measured several of them, and declares that none were lower than five feet five inches French, or taller than five feet ten; i. e. five feet ten, or six feet three, English measure. He concludes his account with saying, that he afterwards met with a taller people in the South Sea, but I do not recollect that he mentions the place.

I am sorry to be obliged to remark, in these voyages, a very illiberal propensity to cavil at and invalidate the account given by Mr. Byron, but at the same time exult in having had an opportunity given me by that gentleman of vindicating his and the national honour. M. Bougainville, in order to prove that he fell in with the identical people that Mr. Byron conversed with, asserts that he saw numbers of them possessed of knives of an English manufactory, certainly given them by Mr. Byron. But he should have considered

* Phil. Trans. 1770, p. 21. Hawkesworth's Voy. vol. i. 374.

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that there are more ways than one of coming at a thing—that the commerce between Sheffield and South America, through the port of Cadiz, is most uncommonly large—and that his Indians might have got their knives from the Spaniards, at the same time that they got their gilt nails and Spanish harness. But for farther satisfaction on this subject, I have liberty to say, from Mr. Byron's authority, that he never gave a single knife to the people he saw—that he had not one at that time about him—that, excepting the presents given with his own hands, and the tobacco brought by Lieutenant Cummins, not the least trifle was bestowed. I am furnished with one other proof that these lesser Indians, whom Mr. Wallis saw, were not the same as those described by Mr. Byron, as has been insinuated; for the first had with him some officers who had been with him on the preceding voyage, and who bear witness not only to the difference of size, but declare that these people had not a single article among them given by Mr. Byron.* It is extremely probable that these were the Indians that Mr. Bougainville fell in with; for they were furnished with bits, a Spanish scymeter, and brass stirrups, as before-mentioned.

My last evidence of these gigantic Americans is that which I received from Mr. Falkner: he acquainted me that, about the year 1742, he was sent on a mission to the vast plains of Pampas, which, if I recollect right, lie to the south-west of Buenos Ayres, and extend near a thousand miles towards the Andes. In these plains he first met with some tribes of these people, and was taken under the protection of one of the caciques. The remarks he made on their size were as follows:—that the tallest, which he measured in the same manner that Mr. Byron did, was seven feet eight inches high—that the common height, or middle size, was six feet—that there were numbers that were even shorter—and that the tallest woman did not exceed six feet; that they were scattered from the foot of the Andes over that vast tract which extends to the Atlantic Ocean, and are found as far as the Red River, at Bay Anegada, lat. 40°. 1′; below that the land is too barren to be habitable, and none are found, except accidental migrants, till you arrive at the river Gallego, near the Straits of Magellan.

" M. Frezier was assured by Don Pedro Molino, Governor of

* See Mr. Byron's letter at the end.

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Chiloe, that he once was visited by some of these people, who were four varas, or about nine or ten feet high; they came in company with some Chiloe Indians,* with whom they were friends, and who probably found them in some of their excursions."

"Those whose height is so extraordinary as to occasion a great disbelief of the accounts of voyagers, are indisputably an existent people; they have been seen by Magellan, and six others, in the sixteenth century, and by two, if not three, in the present."

THOMAS PENNANT.

Copy of a Paper transmitted from Admiral Byron to Mr. Pennant, through the hands of the Right Reverend John Egerton, late Bishop of Durham, after he had perused the manuscript of the foregoing account.

"The people I saw upon the coast of Patagonia were not the same that were seen the second voyage. One or two of the officers that sailed with me, and afterwards with Captain Wallis, declared to me that they had not a single thing I had distributed amongst those I saw.

"M. Bougainville remarks, that his officers landed amongst the Indians I had seen, as they had many English knives among them, which were, as he pretends, undoubtedly given by me. Now it happened that I never gave a single knife to any of those Indians, nor did I even carry one ashore with me.

"I had often heard from the Spaniards that there were two or three different nations of very tall people, the largest of which inhabit those immense plains at the back of the Andes: the others, somewhere near the river Gallegos. I take it to be the former that I saw, and for this reason:—returning from Port Famine, where I had been to wood and water, I saw those people's fires a long way to the westward of where I had left them, and a great way inland, so, as the winter was approaching, they were certainly returning to a better climate. I remarked that they had not one single thing amongst them that shewed they ever had any commerce with Europeans. They were certainly of a most amazing size: so much were

* Frezier's Voyage, p. 86.

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their horses disproportioned, that all the people that were with me in the boats, when very near the shore, swore that they were all mounted upon deer; and, to this instant, I believe there is not a man that landed with me, though they were at some distance from them, but would swear they took them to be nine feet high. I do suppose many of them were between seven and eight feet, and strong in proportion.

"Mr. Byron is obliged to Mr. Pennant for the perusal of his manuscript, and thinks his remarks very judicious."*

No. 13.

Extracts from "Diario de Antonio de Viedma, 1783."

Communicated by Don Pedro de Angelis to Sir Woodbine Parish, F.R.S., and by him to Capt. Fitz-Roy, in 1837.

Los Indios todos son de una misma nacion en esta vecindad: su estatura es alta, de dos varas á nueve palmos por lo comun en los hombres, siendo muy raro el que pasa de esta talla. Las mugeres no son tan altas, pero lo bastante con proporcion á su sexo. Todos son de buenos semblantes, y entre las mugeres las hay muy bien parecidas y blancas, aunque curtidas del viento y del sol como ellos. No se encuentra hombre ni muger flaco, antes todos son gruesos con proporcion á su estatura: lo que y usar las ropas del cuello á los pies, habrá contribuido á que algunos viageros los tengan por gigantes.

Su idioma es gutural, y repiten en sus conversaciones una misma voz muchas veces. No interrumpen al que está hablando, aunque su oracion dure todo el dia: comunmente habla uno de mas autoridad ó el mas elocuente. Las mugeres no hablan entre los hombres sin ser preguntadas, y entonces solo contestando á la pregunta: los que hablan mucho sin ocasion ni asunto, no tienen partido entre ellos, ni se les oye.

El vestido de los hombres es un cuero de guanaco, zorillo ó liebre,

* Extract from Pennant's Literary Life, p. 47 to 69.

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de dos varas en cuadro, el pelo para adentro, y la tez pintada de colorado, verde ó amarillo: este los cubre desde el cuello á los pies con tal arte y manejo, que raramente se les vé parte alguna de su cuerpo, excepto los brazos, y estos, cuando usan de ellos para algo. Llevan ademas otro cuero muy sobado, atado á la cintura con una correa por debajo de aquel, con que tapan el vientre y hasta la mitad de los muslos, descendiendo desde aquí en punta hasta los tobillos. En los pies se atan con unas correillas unos cueros de buey, si le tienen ó de caballo ó del cuero de los guanacos grandes, formando á manera de sandalias. Para andar á caballo usan de botas que hacen de los garrones ó piernas de los mismos caballos ó guanacos grandes; y las espuelas son se madera, que labran ellos con bastante primor. Se ciñen la cabeza con una cinta de lana como de dos dedos de ancho, tegida por ellos de varios colores, con que se sugetan el pelo doblado por arriba, con las puntas al aire como plumage por el lado izquierdo, dándose con la cinta seis ó ocho vueltas, y colgando las puntas de ella con unos cabetes de metal amarillo ó laton. Para montar á caballo sujetan el cuero grande con una correa, que se rodean por encima de todo á la cintura, de la cual cuelgan las bolas y daga, que son las armas que generalmente traen: y cuando necesitan de los brazos para usarlas, dejan caer por las espaldas el cuero sobre las ancas del caballo, quedándose desnudos de medio cuerpo arriba, y hacen de este modo buena vista cuando van de huida ó en seguimiento de la caza, porque el cuero cubre las ancas del caballo, y ofrece á los ojos el pelo que tiene por dentro de varios colores. El aparejo de montar es á manera de un albardon, sin pretal ni grupa, hecho tambíen de cuero de guanaco grande, reenchidos los bastos de paja fuerte. Los estribos labrados por ellos de madera, y tan pequeños, que tasadamente cabe el dedo pulgar del pié. Se ponen mal á caballo, pero son muy firmes en él, y lo mismo corren cuesta abajo que cuesta arriba. El freno del caballo se compone de un palito, ó hueso de canilla de avestruz, labrado con dos perillas á los estremos, tan largo como ancha la boca del caballo, y en dichas perillas están sujetas las riendas y dos correitas que atan en la barbada, con lo que queda seguro para que no se le salga de la boca. Las riendas son cordones de ocho ramales, de correitas de cuero muy sobadas.

Las mugeres tienen el vestido de la misma especie de cueros, puesto del mismo modo, con sola la diferencia de que sobre el pecho

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lo sugetan, pasándole dos agujetas de á tercia de largo, hechas de madera ó de fierro, quedando las puntas del cuero colgando como las faldillas de los capingotes, hasta lo bajo de la cintura. Las otras dos puntas les cuelgan, y arrastran atras como media vara, estando suelto, pero para andar se lo recogen y afianzan con la mano izquierda, de la que no hacen mas uso que este, y el de cubrirse con ella en alguna urgencia sus partes. Encima de estas llevan debajo de aquel cuero una especie de mandil cuadrado, que cuelga hasta mas de las rodillas; de bayeta, paño ú otro género si le pueden haber, y sino, de cuero sobado muy bien, el cual atan con un cinto de lo mismo que las rodea el cuerpo, el que guarnece las de alguna autoridad entre ellas, con abalorios. No llevan sandalias en los pies como los hombres, pero cuando montan á caballo, calzan botas como ellos. Llevan descubierta la cabeza, dividido el pelo en dos partes, y de cada una hecha una coleta, que baja por las orejas y hombros hasta el pecho y cintura; cuya cinta es de lana parda de dos dedos de ancho, guarnecida, si es muger rica, en dias de gala con abalorios, y lo mismo las mugeres de alguna autoridad.

Tambien se ponen los abalorios en las agujetas con que sujetan el cuero en el pecho, y en las cañas de las piernas como pulseras, y en el cuello por gargantillas de cualesquiera colores. En las orejas llevan zarcillos de laton, y lo mismo los hombres. Los arreos de las caballerías en que las mugeres montan, que por lo comun son yeguas, se componen de unos sillones de vaqueta ó de zuela, (si la pueden conseguir) muy bien hechos, claveteados con clavitos de laton amarillo, guarnecidos sus extremos con abalorios de diferentes colores, (cuando los tienen) formando dibujos ó labores á su modo y fantasía. La cincha tiene tres argollas, la una en un extremo, y las otras dos en cada tercio una; la evilla con que la abrochan ó ciñen es muy grande. El freno se compone de cabezada, bocado y riendas: la cabezada es rica, guarnecida de abalorios, ó de cuantas cosas tienen ó pueden adquirir al propósito: las riendas y el bocado son del mismo modo que los que usan los hombres. Ponen á la yegua un collar al cuello que cae hasta las rodillas, con cuantos cascabeles y colgajos pueden conseguir. Estos arreos son para gala y fiestas, pero en sus marchas ordinarias no usan estos adornos, y en lugar de dicho collar ponen un cordon de lana azul ó colorado, de un dedo de grueso, con el cual dan tres vueltas al cuello de la caballería, y les sirve tambien de estribo para montar en el sillon, donde

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se asientan con la cara á la cabeza del caballo, recogiendo las piernas arriba sobre las faldillas del mismo sillon, en una postura muy violenta y trabajosa, que solo la costumbre puede hacerles sufrir; por lo que están espuestas á muchas caidas. Parar andar á caballo y para montar guardan suma honestidad, no permitiendo que se les vea parte alguna de su cuerpo. Las mugeres de alguna autoridad llevan en las marchas sombreros de paja, que vienen á ser un redondel con cabo, sin copa, que se lo atan por debajo de la barba con cualesquiera cosa; y con esto se cubren del sol y agua cuando van á caballo.

El egercicio ó ocupacion ordinaria de los hombres es cazar, para mantener con las carnes sus familias, y hacer del cuero los toldos ó chozas en que viven, y todos sus vestidos: cuidan tambien de los caballos que tienen, y trabajan todos sus arreos. Sus divertimientos se reducen á jugar á los dados y la perinola, y egercitarse en su modo de batallar y correr parejas á caballo.

Las mugeres tienen obligacion de guisar la comida, traer el agua y la leña, armar y desarmar el toldo en las marchas, y cargarlo y descargarlo: sin que para nada de esto le ayude el hombre, aunque esté elle enferma, porque ha de sacar fuerzas de flaqueza. Ademas de esto ha de coser el toldo, que es siempre de cuero de guanaco grande, y tambien ha de coser todos los demas cueros de cama y vestidos, que regularmente se componen de cueros de liebre, zorrillo y guanacos nonatos, ó recien nacidos, de los que hacen prevencion y cosecha en la primavera, para con los sobrantes comerciar con los indios del Rio Negro, por caballos, ropas, frenos abalorios y dagas, que aquellos adquiren del comercio, é invasiones que hacen en las fronteras de Buenos Aires: porque los indios, de que aquí se vá hablando, jamas han tratado españoles hasta ahora, ni han visto ninguna de sus poblaciones, ni estas costas tienen fierro, metal, laton, herramientas ni armas; todas estas piezas y géneros las adquieren mediante dicho comercio. Para coser estas mugeres los expresados cueros, usan de alesnas, que forman del fierro que les dan los referidos indios del Rio Negro, y en lugar de hilo emplean nervios, que adelgazan, segun necesitan, de las piernas de los avestruces.

El cacicazgo es hereditario, su jurisdiccion absoluta en cuanto á mudarse de un campo á otro en seguimiento de la caza, que es su subsistencia. Cuando al cacique le parece tiempo de mudar el campo, el dia antes al ponerse el sol hace su platica á grandes voces desde su toldo: todas le escuchan con suma atencion desde los suyos. Les

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dice se ha de marchar al otro dia: les señala hora para recoger los caballos, batir los toldos, y empezar á marchar: nadie le replica, y á la hora señalada todos están prontos como se les ha mandado. Las mugeres van por veredas que hay hechas para todas las aguadas donde deben parar: son las conductoras de todo el equipage. Los hombres, luego que las mugeres empiezan la marcha, se van apostando en el campo para cercar los guanacos y bolearlos á la travesia: porque son tan violentos en la carrera, que ningun caballo ni perro les puede alcanzar: cuando están con las bolas enredados, les sirven los perros para acabarlos de rendir. El mismo cacique señala los puestos de la batida, por lo que, y en testimonio de señorio, el tributan parte de la caza: asi nunca corre, ni hace otra cosa mas que andar de apostadero en apostadero: sus jornadas mas largas son de 4 leguas. En llegando al destino que está asignado, arman las mugeres los toldos, recogen leña, y lo tienen todo pronto para cuando los hombres vengan: estos al ponerse el sol marchan á sus toldos, sin que jamas se verifique llegue á ellos ninguno, obscurecida la noche. Si se ha de continuar la marcha al otro dia, hace el cacique la misma arenga y prevenciones; y si no dice nada, ya saben que por entonces han de permanecer allí, y esta mansion por lo comun es adonde saben que se ha retirado la caza. Aquí, cuando el cacique vé que están escasos de carne, al ponerse el sol, y en la misma forma que para las marchas, les dice recojan los caballos á la hora que señala para el dia siguiente, lo que egecutan sin falta: luego que tienen los caballos en los toldos, les hace otra plática, paseándose á caballo, y señalándoles los apostaderos con lo que cada cuadrilla debe egecutar. Van con ellos algunas mugeres para cargar la caza, porque ni aun este trabajo quieren los hombres hacer: los toldos quedan armados, y en ellos las restantes mugeres, muchachos é impedidos. Al ponerse el sol se retiran otra vez á sus toldos, reduciéndose á solas estas funciones todo el mando de este cacique, el cual por ningun delito castiga á sus indios, aunque en los puntos de obediencia que van expresados jamas se verifica le falten á ella. Cuando quiere hacer guerra á sus vecinos, ó á algunos otros de que hayan recibido agravio, ha de ser con aprobacion de su indios principales, para lo cual se juntan en el toldo del cacique: este pondera y explica los agravios y modo de vengarlos; fuerzas, facilidad ó inconvenientes que hay en hacer la guerra. Los de la junta confieren sobre el asunto, y aprueban ó reprueban lo

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propuesto por el cacique: este no se agravia. La guerra, por lo regular, se aprueba, y solo ventilan el modo de hacerla, y cuando; y suele tardar esta resolucion algunos dias. Luego que están convenidos en salir á campaña, el cacique tres noches seguidas desde su toldo á grandes voces les hace saber á todos los indios la declaracion de la guerra, el tiempo para cuando está resuelta, la forma en que ha de hacerse enemigos contra quien, y su motivo; avisan que esten prevenidos.

Una de las principales causas que tienen para declarar guerra es, que como cada cacique tiene señalado el terreno de su jurisdiccion, no puede ninguno de sus indios entrar en el terreno de otro sin pedirle licencia para ello. El indio que vá á pedirla ha de hacer tres humaradas, y hasta que le correspondan con otras tres no puede llegar á los toldos: en ellos dá razon á aquel cacique del motivo que le trae, ya sea de paso, ó ya porque pretenda permanecer allí. Si al cacique le parece, consiente en su pretension, y si no, le manda salir inmediatamente de sus terrenos y dominios. Si el indio vá como embajador de su cacique ó de otros indios, bien pidiendo paso por aquel terreno, ó bien para comerciar con ellos ó para visitarlos, se le señala por el cacique el tiempo, y por donde deben entrar, camino que han de tomar para seguir su viage, ó terreno que han de ocupar donde hagan su comercio. Luego hacen sus tres humaradas, y en habiéndoles correspondido los indios del terreno, entran todos en este, y á cosa de una legua de la tolderia, se detienen todos los hombres, y pasando adelante las mugeres y criaturas, arman sus toldos á donde se les señala, y en estándolo, todos llegan á ellos los hombres. Nadie sale á recibirlos, quedándose así á la vista unos de otros, hasta que despues de mucho rato vá el cacique, ó cualquiera otro que haga cabeza entre los forasteros, á visitar y cumplimentar al del pais, que le recibe en su toldo acompañado de sus principales indios, que acuden allí luego para cortejar al forastero. Esta visita suele durar todo un dia, porque como cada uno habla sin que nadie le interrumpa, si el forastero trae muchas noticias y quiere enterarse de las del país, suele durar la oracion de cada uno, dos ó tres horas, y aun mas, porque tambien repiten muchas veces ciertas voces. El que oye, y los demas estan con grande atencion, diciendo con frecuencia, á, á, que quiere decir sí, sí; y con ninguna otra voz interrumpen al que habla. En estas juntas se hacen las alianzas, se otorgan amistades amplias, y otros contratos, acuerdos ó convenios, para todo lo cual tienen los caciques facultades absolutas. Cuando

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para entrar en terreno ó tolderia agena, no se observan las expresadas formalidades, es señal de mala fé, y en consecuencia se toca luego al arma.

Tambien se declaran á menudo guerra por robarse algunos caballos, de cuyas resultas quedan los vencidos á pié, y cautivas del vencedor las mugeres mozas, y muchachos; que á las viejas y los hombres no se les dá cuartel, como no lo consigan en la fuga.

El cacique tiene obligacion de amparar y socorrer á los indios de su dominio y territorio en sus necesidades, y por lo tal es mas estimado, tiene mas partido entre ellos, y mas preferencia para cacique el que es mas dispuesto á socorrerlos, mas galan, y mas inteligente en la caza; porque si le faltan estas calidades, se van á buscar á otro que las tenga, dejándolo solo con sus parientes, y expuestos á continuas invasiones de sus vecinos: bien que no pierde aquella familia el derecho del terreno, y con el tiempo suele haber otro que restablece la tolderia que su padre, abuelo ó hermano ha destruido por su desgracia, ó mala conducta. Cuando está viejo el cacique, y en estado que por falta de fuerzas no puede cumplir con las obligaciones de su ministerio, deja el mando en el sucesor.

Los casamientos se hacen por compra que el hombre hace de la muger al padre, ó cualquiera otro á cuyo cargo está ella, que segun su calidad, buen parecer, conducta, &c., es mas cara ó mas barata, sin que pueda oponerse á la venta que celebre su padre ó su tutor, quienes no cuentan con su voluntad para otorgarla. Puede cada hombre tener una, dos ó mas mugeres propias, segun tengan haberes para comprarlas, pero raramente tienen mas de una, á menos de ser cacique ó indio de grande autoridad. El que mas llega à tener son tres mugeres, y todo marido tiene facultad de vender las suyas á otros, cuya segunda venta hace poco apreciable á la muger, y se dá por lo mismo en muy poco precio, comprándolas solamente los pobres que se surten de este modo, porque carecen de medios con que adquirirlas de primera mano. No hay tampoco inconveniente en venderlas á cualquiera pariente, como no sea hijo ó hermano de la vendida, porque todos los demas grados los tienen dispensados. Son muchos los casamientos que hacen de esta especie, por lo caro que cuestan las mugeres solteras, las cuales, interin son mozas, y tienen esperanza de casarse guardan la virginidad; pero en perdiendo aquella esperanza, se entregan á todos. Las casadas, cuyo marido que les trató su padre ó tutor ha sido de su gusto, le guardan suma fide-

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lidad, pero en las que no, hay muchos trabajos ; bien que el adulterio no es delito, como no sea á vista del marido, y en este caso culpan al adultero y no á ella : y tampoco así se castiga, pues por medio de algun corto interes perdona este agravio el marido. El cacique siempre tiene por muger una hija ó hermana de otro cacique ; la cual es la principal entre las demas mugeres suyas, y estas la sirven en todo. Aunque se halle cansado de ella no la puede vender, porque seria agravio y motivo de romper una guerra con sus parientes. Todas estas cacicas manifiestan gravedad, hablan poco, se están recogidas en su toldo, ocupadas en algun trabajo correspondiente á ellas, y no intervienen en las vulgares conversaciones de las demas indias. Los hombres por ningun motivo castigan de obra á las mugeres, excepto cuando están borrachos ; y aun entonces el cacique á la cacica preferente jamas le pega, aunque las otras lleven todas golpes. Las ceremonias del casamiento solo se reducen, una vez ajustada la muger, llevàrsela su padre al novio á su toldo, á menos que ella no se adelante á irse con él sin que la lleve nadie, que en esto no hay inconveniente. Entonces el novio hace matar uno ó dos yeguas, segun tenga de ellas, y convida á los parientes y parientas, amigos y amigas de la novia y suyos, y comiendo todos de aquella carne, queda concluido el casamiento. Así hombres como mugeres son muy celosos y amantes de sus hijos, à quienes luego que nacen atan con muchas fajas de cuero que tienen preparadas, muy sobadas y suaves, contra una à manera de tabla, que forman, porque no las tienen, de palitos cruzados y atados, forrados con fajas de cuero, en donde los tienen sugetos mas de un mes, dándoles el pecho sin desatarlos de allí. Así dicen que se crian derechos, y efectivamente tanto ellos como ellas son todos muy derechos, tienen buenos cuerpos, y no se vè uno que sea cargado de espaldas. En quitándolos de estas ataduras, los traen regularmente siempre consigo las madres, metidos en las espaldas entre su carne y el cuero con que van vestidas, con la cabeza sacada por el cogote de la madre. Cuando van de marcha, hacen de cuero y unos palitos una especie de cuna, atumbada y cerrada por todas partes, menos por los pies y la cabeza, las cuales forran y adornan con bayeta, paño ò lo que tienen, guarneciéndolas con abaloríos, cascabeles, &c., segun pueden, y las aseguran encima de las ancas del caballo, donde va la madre. Entre estas gentes se vé que los muchachos nunca lloran, sino llevan golpes ó alguna caida.

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Su religion viene à ser solamente una especie de creencia en dos potencias; la una benigna que solo gobierna el cielo, independiente y sin poderio en la tierra y sus habitantes, de la cual hacen muy poco caso; y la otra á un tiempo benigna y rigorosa, la cual gobierna la tierra, dirige, castiga y premia á sus habitadores, y à esta adoran bajo cualquiera figura que fabrican, ó que se hayan hallado en las playas, procedidas de algunos navios nàufragos; como son mascarones de proa, ó figuras de las aletas de popa, y estas son las que estiman y prefieren para sus cultos por suponerlas aparecidas. A esta deidad dan por nombre el Camalasque, que equivale á "poderoso y valiente." De estas figuras, cada uno que la tiene defiende y cree ser aquella la verdadera deidad, y que las de los otros son falsas, aunque no llega el caso de empeñar estas disputas, ni armar quimeras sobre ello, porque se persuaden que la misma deidad vengará sus agravios con las supersticiones que se figuran: creyendo que las enfermedades y las muertes son venganzas de estas deidades, á menos de suceder en los ya muy viejos, que solo entonces las tienen por naturales. Estas figuras las guardan en sus toldos, muy cubiertas y liadas con cuero, paño, bayeta ò lienzo, segun cada uno puede, y no se descubre à nadie sin dictàmen del santon ò hechicero, que puede ser muger ú hombre. Tiene de continuo dias en que debe egercer su oficio, cantando à la deidad al son de dos calabazas con chinas dentro,—mùsica tan desagradable como su misma voz. Tambien hace en esta forma rogaciones, por que la deidad enferme ó mate à los que tienen por enemigos: pero esto suele salirles muy mal à los tales hechiceros, porque si acaso tienen sus enemigos algun contagio, ó muere algun indio principal ó cacique, procuran por todos los medios posibles haber á las manos á los referidos hechiceros, y los hacen màrtires del diablo. Tambien deben cantar á la deidad estos hechiceros por los enfermos de sus tolderias, para contradecir á los otros hechiceros sus enemigos, y sino consigue el alivio el enfermo, suelen tambien los amigos de este darle su merecido á aquellos, á lo menos quitándoles el empleo, y tratándole en adelante como á infame: y si la muerte ha sido de muger ò hijo del cacique, suele pagar con la vida el hechicero su mala cura, que solo se reduce al canto, porque no usan de otras medicinas en sus enfermedades. Y por tanto tienen muchos contratiempos estos médicos cantores, siendo pocos de ellos los que mueren de muerte natural: pero siempre sobran pretendientes para este empleo, porque tienen facultad de usar de las mugeres de los indios,

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si ellas consienten, ó de ellos, si el hechicero es muger. De estos hechiceros casi hay tantos como familias, ó como ídolos, porque regularmente cada cabeza de familia tiene su ídolo en su toldo, y si la tolderia se compone de cuatro, cinco ò mas familias, hay otros tantos ídolos y otros tantos hechiceros ó santones: en la inteligencia de que una familia entre ellos se compone no solo del marido, muger è hijos, sino tambien de todos los parientes del dicho marido, que es cabeza y gefe de esta familia, en la cual viene á ser como un cacique subalterno, del que tiene el general gobierno de todos, y derecho en propiedad de aquel terreno.

Cuando enferma alguno en la familia, acude el santon de ella à cantarle al oido, con voces tan fuertes y desentonadas, y tan desagradables, que ellas por sì solas bastarian à matarle. Si se agrava, convida à los demas de su oficio, y à todas las viejas, para que le ayuden á cantar, á fin de que de noche y de dia no cese el canto: pero nadie queda responsable si el enfermo muere, porque este cargo es solo del hechicero. Cuando el enfermo està ya enteramente postrado, si es doncella y jóven, le forman un toldo de ponchos, separado de la tolderia, la ponen en él, y allí es el canto mas fuerte; porque todas cuantas viejas hay, van á cantarle, y una de ellas arma en un palo todos los cascabeles que puede juntar, y haciendo con ellos gran ruido, da una vuelta al rededor del toldo de cuando en cuando, à cuyo tiempo esfuerzan las de adentro su griteria. Durante la enfermedad se matan yeguas y caballos, en ofrenda ó sacrificio al ídolo para que mejore el enfermo; pero esta ofrenda se la comen entre el mismo enfermo y los cantores. Si el enfermo muere, bien sea en el nuevo toldo de ponchos, siendo doncella, ò en el suyo mismo, siendo hombre ò muger casada, se trae al toldo el caballo mas estimado, lo aparejan, y poniéndole encima todas las alhajas del difunto, montan en él un muchacho, y le hacen dar una vuelta al rededor del toldo, donde está el cadáver: bajan al muchacho y ponen al cuello del caballo un lazo, de cuyos dos cabos tiran dos indios hasta que lo ahogan. Tienen ya prevenida una hoguera, donde van arrojando à quemar el aparejo y alhajas que lleva el caballo; y la persona que hace cabeza de duelo se va quitando el vestido y cuanto tiene puesto, y lo va arrojando tambien al fuego; como tambien todos los parientes y amigos echan una prenda cada uno, que al efecto traen de sus toldos ó se quitan de su vestidura, compitiéndose en entregar al fuego las mejores, en que denotan mas

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obligaciones al muerto, ò mas amistad, amor, &a. Luego desuellan el caballo ahogado, y se reparte su carne entre todos los que echaron sus prendas al fuego. La doliente se està en su toldo muy tapada y sin hablar una palabra. Todas las mugeres parientas y amigas las van á hacer compañia, y para ello se cortan del pelo unos mechones, de modo que les caiga por la frente hasta las cejas, se arañan la cara, se sajan los carrillos, y lloran aunque no tengan gana, con unos gemidos y estilo tan lamentable y lastimoso, que parece se les arranca el alma. A la noche se entregan las viejas del cadáver, y ellas lo entierran donde les parece, sin que lo sepan dolientes ni otro alguno, porque ni se les pregunta, ni ellas pueden decirlo á nadie. Sigue el duelo por quince dias, con los mismos gemidos, y se van matando cada dia caballos del difunto hasta no dejar ni uno, porque todos sus bienes han de quedar destruidos sin que puedan darse á nadie, ni menos habria quien los admitiese, sabiendo que eran del muerto, porque este es un sagrado para ellos inviolable. Todas las lunas se repite un dia el duelo y llanto, y se mata caballo ò yegua si hay amigo ò pariente que quiera darlo, porque al difunto ya no le ha quedado ninguno. Cumplido el año, se repite el duelo por tres dias, con llantos, hoguera, arrojar en ella prendas, y demas ceremonias, cuantas pueden hacer para que se renueve el funeral, como en el dia de la muerte. Despues de estos tres dias, ya no vuelven á acordarse mas del difunto para nada. Toda esta fúnebre pompa y ceremonias se hacen solo por jòvenes ó personas de buena edad y robustas, pues á los que mueren viejos ni se les hace duelo ni se les llora, ni se acuerdan mas de ellos, creyendo que su muerte era precisa, y se contentan con matar en ella un caballo, el peor ó mas desechado que tenga.

Se matan caballos por casamientos y muertes, por la salida de los dientes á los muchachos, cuando comienza la menstruacion á las mugeres, por cualquiera leve mal, por aplacar al ídolo enojado, que creen lo està cuando tienen enfermedades, cuando les cuesta mucho trabajo el tomar la caza, cuando otros indios los hostigan y no tienen fuerzas suficientes para hacerles guerra, porque en este caso aguantan las injurias que les quieran hacer: y toda esta matanza de caballos é yeguas es la causa de no estar toda la costa poblada de este ganado; pues aunque las yeguas paren todos los años, con todo, como dejan pocas, no hay suficientes caballos para surtirlos, sino fuera por los que los indios Pampas de Buenos Aires les

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cambian por los cueros que les llevan cuando bajan al Rio Negro, de que resulta tener los de San Julian menos ganado de este que los del golfo de San Jorge y Santa Elena, porque no pueden bajar al Rio Negro con la continuacion que estos.

Creen en la transmigracion del alma, y que las de los que mueren pasan á los que nacen en la familia, en esta forma: el que muere viejo transmigra el alma sin detencion, y por eso no se le llora ni hacen sentimiento, porque dicen vá aquella alma à mejorar de puesto: pero la del que muere jóven ò robusto, queda detenida debajo de tierra, sin destino hasta que se cumple el tiempo que le faltaba para ser viejo, que entonces pasa al primero que nace, y por esta detencion, en que juzgan está comprimida y violenta, le hacen todos los sacrificios al ídolo, para que le dé algun desahogo, interin llega el tiempo decretado. Y son tan supersticiosos en esta materia, que unos se persuaden es conveniente poner en el sepulcro à los difuntos alguna comida y alhajas para que coman sus almas y se diviertan, y otros lo tienen esto por ocioso, creyendo que el ídolo les darà todo lo necesario. Esta materia se gobierna en cada familia segun el modo de pensar del embustero santon, que se engaña y los engaña como quiere, sin que se repare en sus inconsecuencias, aun cuando sus pensamientos y sus disposiciones varíen á cada paso. Estos embusteros les hacen creer que el ídolo hace gestos y habla, haciéndolos ellos conforme les dicen que les vieron hacer; y aunque los mismos indios se hallen presentes al tiempo que el santon descubre el ídolo, y con sus mismos ojos vean que es mentira, como el santon diga que hablò ò hizo gestos, basta para que ellos lo crean así ciegamente.

Júzganse incapaces de poder ofender con alguna de sus operaciones á la deidad que adoran, y así creen que los contratiempos ò castigos que les envia, no es porque ellos los merezcan por sus delitos, sino porque le dà gana al ídolo de tratarlos mal. Así la benignidad de esta potencia consiste en tener buenos caballos, salud y paz, hallar mucha y buena caza, y lograr fidelidad de parte de sus vecinos.

El número de indios que se hallan aquí establecidos, seràn hasta 4,000 personas: ocupan el terreno de la costa que queda señalado. No pueden salir de él, impidièndoselo por el E la mar, por el N el Rio Negro è indios Pampas de Buenos Aires, y por el O y S la Cordillera, imposible de pasar aquí por su altura, y por hallarse

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en todo tiempo cubierta de nieve, sin que se verifique la habitan en estos parages ni aun las aves.

En sus batallas pelean à pié, dejando á las mugeres en custodia de los caballos, y se ponen unas como camisas de hombre con mangas cerradas, hechas de diez ó doce cueros de venado, bien sobados, que no los puede pasar el sable ni la daga. En la cabeza se ponen una especie de sombrero, ó casco hecho tambien de cuero de buey ó de caballo, con cuyos resguardos procuran tirarse las cuchilladas á las piernas por ser mas fácil herir en ellas, cortando las botas. Son muy firmes y constantes en la batalla, y no la dejan, una vez que entran en ella, hasta ser vencidos ó muertos. Usan tambien de las bolas, y todo partido que es vencido, ordinariamente son muertos, porque se ensangrientan de manera que ninguno huye: y esta es la causa de no ser mucho mas poblados estos terrenos, porque las mugeres son muy fecundas, y padecen muy pocas enfermedades.

Los toldos los ponen clavando en tierra dos palos de dos ó tres varas de alto, y una y media distantes uno de otro; al lado de cada palo, y á igual distancia clavan otros dos mas cortos, y al O de los seis, clavan otros seis mas cortos à la misma distancia, y al O de estos con igual distancia otros seis de poco mas de media vara de largo. Sobre estos diez y ocho palos echan el cuero con el pelo para afuera, y lo aseguran á las cabezas de todos los palos, de los cuales cuelgan como cortinas de cuero por dentro, que forman las divisiones segun las necesitan, atàndolas de alto abajo à los mismos palos á manera de mamparos firmes: por afuera llega el cuero hasta el suelo por el NO y S, dejàndole siempre la puerta al E de toda la anchura del toldo, el cual queda como si fuese una cueva ovalada. A la puerta no se le pone cosa alguna con que cerrarla, sino en el rigor de los yelos, que la tapan, colgando de ella otro cuero. Las separaciones interiores las acomodan desde el centro hasta el fondo para cada matrimonio, y los hijos y demas familia y parentela duermen todos revueltos en el resto, que queda franco hasta la puerta, uniéndose aquí viudos, viudas, solteros, solteras, parientes, criados y esclavos, y en fin, cuantos dependen ò tienen relacion con la cabeza principal ò amo del toldo. Las doncellas aqui, sin embargo de esta ocasion, procuran, como queda dicho, guardar su virginidad, mientras

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tienen esperanza de casarse : pero si llegan à perderla se dan à cualquiera, y tanto ellas como las vuidas pasan buena noche, acomodàndose indistintamente con el que primero se les acerca á dormir con ellas.

Las querellas de los hombres dentro de una misma tolderia se deciden entre ellos à moquetes, sin que puedan usar para ello de otras armas, ni que se atreva nadie á separarlos hasta que ellos se rinden ò separan, y los demas estàn mirando, celebràndolos ó riéndose. Las mugeres cuando riñen se estan muy asentadas, diciéndose palabras ofensivas, hasta que la una echa mano à deshacerse las trenzas del pelo con mucha flema, lo que igualmente hace la otra con la misma, continuando en los improperios : y en teniendo ambas el pelo todo suelto, se lo sacuden, se levantan y se arremeten furiosas, dàndose buenos tirones de él, en que se quitan una á otra cuanto pueden sacar, enredado en las uñas, y las demas mugeres y hombres se las estan mirandò, sin que se atreva nadie à separarlas ; hasta que ellas mismas se apartan en estando cansadas, y se quedan tan amigas de resultas de esto, como si nunca hubiesen reñido, permaneciendo todo aquel dia con el pelo suelto : y en la querella no pueden darse como los hombres moquetes, ni tirarse à romper el vestido, sino solamente el pelo, siendo de lo contrario corregidas de las circunstantes espectadoras. En tiempos de duelo, en marchas, en dias de mucho viento, muchos frios ó heladas, se pintan el rostro de negro ò morado, tanto hombres como mugeres, para que no se les corte el cutis.

Generalmente tienen estos indios índole muy dulce è inocente, y me tomaron tanto afecto y trataron con tanta sencillez, principalmente el cacique de San Julian, que si hubieramos tenido caballos bastantes, pienso no quedaria un palmo de aquellos terrenos que no pudiese registrar en su compañia.

ANTONIO DE VIEDMA.

Buenos Aires,
10 de Diciembre de 1783.

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No. 14.

Extract from Byron's Narrative of the Loss of the Wager.

"These people* were of a small stature, very swarthy, having long, black, coarse hair, hanging over their faces. It was evident, from their great surprise, and every part of their behaviour, as well as their not having one thing in their possession which could be derived from white people, that they had never seen such. Their clothing was nothing but a bit of some beast's skin about their waists, and something woven from feathers over the shoulders; and as they uttered no word of any language we had ever heard, nor had any method of making themselves understood, we presumed they could have had no intercourse with Europeans. These savages, who, upon their departure, left us a few muscles, returned in two days, and surprised us by bringing three sheep." . . . . "At this interview we bartered with them for a dog or two, which we roasted and eat."

"In one of my walks, seeing a very large bird of prey upon an eminence, I endeavoured to come upon it unperceived with my gun, by means of the woods which lay at the back of that eminence; but, when I had proceeded so far in the wood as to think I was in a line with it, I heard a growling close by me, which made me think it advisable to retire as soon as possible: the woods were so gloomy I could see nothing; but, as I retired, this noise followed me close till I had got out of them. Some of our men did assure me, that they had seen a very large beast in the woods; but their description of it was too imperfect to be relied upon."†

"The first night we put into a good harbour, a few leagues to the southward of Wager Island; where, finding a large bitch big with puppies, we regaled upon them. In this expedition we had our usual bad weather and breaking seas, which were grown to such a height the third day, that we were obliged, through distress, to push in at the first inlet we saw at hand. This we had no sooner entered than we were presented with a view of a fine bay, in which, having secured the barge, we went ashore, but the weather being very rainy, and finding nothing to subsist upon, we pitched a bell tent, which we had brought with us, in the wood opposite to where the barge lay. As this tent was not large enough to contain us all, I proposed

* Natives of the Guaianeco Islands.

† Showing that the puma crosses arms of the sea.—R. F.

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to four of the people to go to the end of the bay, about two miles distant from the bell tent, to occupy the skeleton of an old Indian wigwam, which I had discovered in a walk that way upon our first landing. This we covered to windward with sea-weed; and, lighting a fire, laid ourselves down in hopes of finding a remedy for our hunger in sleep; but we had not long composed ourselves before one of our company was disturbed by the blowing of some animal at his face; and, upon opening his eyes, was not a little astonished to see by the glimmering of the fire, a large beast standing over him. He had presence of mind enough to snatch a brand from the fire, which was now very low, and thrust it at the nose of the animal, who thereupon made off." . . . . "In the morning, we were not a little anxious to know how our companions had fared; and this anxiety was increased upon our tracing the footsteps of the beast in the sand, in a direction towards the bell tent. The impression was deep and plain, of a large round foot well furnished with claws. Upon acquainting the people in the tent with the circumstances of our story, we found that they too had been visited by the same unwelcome guest, which they had driven away by much the same expedient. We now returned from this cruise, with a strong gale, to Wager's Island; here we soon discovered, by the quarters of dogs hanging up, that the Indians had brought a fresh supply to our market. Upon inquiry, we found that there had been six canoes of them, who, among other methods of taking fish, had taught their dogs to drive the fish into a corner of some pond, or lake, from whence they were easily taken out by the skill and address of these savages."

"Upon returning up the Lagoon,* we were so fortunate as to kill some seal, which we boiled and laid in the boat for sea-stock. While we were ranging along-shore in detached parties, in quest of this and whatever other eatable might come in our way, our surgeon, who was then by himself, discovered a pretty large hole, which seemed to lead to some den, or repository, within the rocks. It was not so rude, or natural, but that there were some signs of its having been cleared and made more accessible by industry. The surgeon for some time hesitated whether he should venture in, from his uncertainty as to the reception he might meet with from any inhabitant; but his curiosity getting the better of his fears, he determined to go in; which he did upon his hands and knees, as the

* Holloway Sound—near Port Otway.

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passage was too low for him to enter otherwise. After having proceeded a considerable way thus, he arrived at a spacious chamber; but whether hollowed out by hands, or natural, he could not be positive. The light into this chamber was conveyed through a hole at the top; in the midst was a kind of bier, made of sticks laid crossways, supported by props about five feet in height. Upon this bier, five or six bodies were extended, which, in appearance, had been deposited there a long time; but had suffered no decay or diminution. They were without covering, and the flesh of these bodies was become perfectly dry and hard; which, whether done by any art or secret the savages may be possessed of, or occasioned by any drying virtue in the air of the cave, could not be guessed. Indeed, the surgeon finding nothing there to eat, which was the chief inducement for his creeping into the hole, did not amuse himself with long disquisitions, or make that accurate examination which he would have done at another time; but, crawling out as he came in, he went and told the first he met of what he had seen. Some had the curiosity to go in likewise. I had forgot to mention that there was another range of bodies, deposited in the same manner, upon another platform under the bier. Probably this was the burial-place of their great men, called caciques; but from whence they could be brought, we were utterly at a loss to conceive, there being no traces of any Indian settlement hereabout. We had seen no savage since we left the island, or observed any marks in the coves or bays to the northward, where we had touched, such as fire-places, or old wigwams, which they never fail of leaving behind them; and it is very probable, from the violent seas that are always beating upon this coast, its deformed aspect, and the very swampy soil that every where borders upon it, that it is little frequented."

"A few days after our return, the mystery of the nailing up of the hut, and what had been doing by the Indians upon the island in our absence was partly explained to us; for about the fifteenth day after there came a party of Indians to the island in two canoes, who were not a little surprised to find us here again. Among these was an Indian of the tribe of the Chonos, who live in the neighbourhood of Chiloe. He talked the Spanish language, but with that savage accent which renders it almost unintelligible to any but those who are adepts in that language. He was likewise a cacique, or

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leading man of his tribe, which authority was confirmed to him by the Spaniards; for he carried the usual badge and mark of distinction by which the Spaniards and their dependents hold their military and civil employments, which is a stick with a silver head."

"This report of our shipwreck (as we supposed) having reached the Chonos by means of the intermediate tribes, which handed it to one another, from those Indians who visited us; this cacique was either sent to learn the truth of the rumour, or, having first got the intelligence, set out with a view of making some advantage of the wreck."

"Having understood my necessities, they (the two women) talked together some little time; after which, getting up, they both went out, taking with them a couple of dogs, which they train to assist them in fishing. After an hour's absence, they came in trembling with cold, and their hair streaming with water, and brought two fish, which, having broiled, they gave me the largest share; and then we all laid down, as before, to rest."

"After rowing some time, they (the women) gained such an offing as they required, where the water was about eight or ten fathoms deep, and there lay upon their oars. And now the youngest of the two women, taking a basket in her mouth, jumped overboard, and diving to the bottom, continued under water an amazing time; when she had filled the basket with sea-eggs, she came up to the boat-side, and delivering it so filled to the other women in the boat, they took out the contents, and returned it to her. The diver then, after having taken a short time to breathe, went down and up again, with the same success; and so several times for the space of half an hour. It seems as if Providence had endued this people with a kind of amphibious nature, as the sea is the only source from whence almost all their subsistence is derived. This element, too, being here very boisterous, and falling with a most heavy surf upon a rugged coast, very little, except some seal, is to be got any where but in the quiet bosom of the deep. What occasions this reflection is, the early propensity I had so frequently observed in the children of these savages to this occupation, who, even at the age of three years, might be seen crawling upon their hands and knees among the rocks

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and breakers, from which they would tumble themselves into the sea, without regard to the cold, which is often intense, and showing no fear of the noise and roaring of the surf."

"The water was at this time extremely cold, and when the divers got into the boats, they seemed greatly benumbed; and it is usual with them, after this exercise, if they are near enough to their wigwams, to run to the fire, to which presenting one side, they rub and chafe it for some time; then turning the other, use it in the same manner, till the circulation of the blood is restored. This practice, if it has no worse effect, must occasion their being more susceptible of the impressions of cold than if they waited the gradual advances of their natural warmth in the open air. I leave it to the decision of the gentlemen of the faculty, whether this too hasty approach to the fire may not subject them to a disorder I observed among them, called the elephantiasis, or swelling of the legs. The divers having returned to their boats, we continued to row till towards the evening, when we landed upon a low point. As soon as the canoes were hauled up, they employed themselves in erecting their wigwams, which they despatch with great address and quickness. I still enjoyed the protection of my two good Indian women, who made me their guest here as before. They first regaled me with sea-eggs, and then went out upon another kind of fishery, by the means of dogs and nets. These dogs are a cur-like looking animal, but very sagacious, and easily trained to this business. Though, in appearance, an uncomfortable sort of sport, yet they engage in it readily, seem to enjoy it much, and express their eagerness by barking every time they raise their heads above the water to breathe. The net is held by two Indians, who get into the water; then the dogs, taking a large compass, dive after the fish, and drive them into the net; but it is only in particular places that the fish are taken in this manner."

"I now understood that the two Indian women with whom I sojourned were wives to this chieftain, though one was young enough to be his daughter; and as far as I could learn, did really stand in the different relations to him both of daughter and wife. It was easy to be perceived that all did not go well between them at this time; either that he was not satisfied with the answers they returned

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him to his questions, or that he suspected some misconduct on their side; for, presently after, breaking out into savage fury, he took the young one up in his arms, and threw her with violence against the stones; but his brutal resentment did not stop here, he beat her afterwards in a cruel manner. I could not see this treatment of my benefactress without the highest concern for her, and rage against the author of it; especially as the natural jealousy of these people gave occasion to think that it was on my account she suffered. I could hardly suppress the first emotions of my resentment, which prompted me to return him his barbarity in his own kind; but, besides that this might have drawn upon her fresh marks of his severity, it was neither politic, nor, indeed, in my power, to have done it to any good purpose at this time."

"Our untoward circumstances now found some relief in the arrival of the Indians we waited for; who brought with them some seal, a small portion of which fell to our share. A night or two after they sent out some of their young men, who procured us a quantity of a very delicate kind of birds, called shags and cormorants. Their manner of taking these birds resembles something a sport called 'Bat-fowling.' They find out their haunts among the rocks and cliffs in the night, when, taking with them torches made of the bark of the birch tree, which is common here, and grows to a very large size (this bark has a very unctuous quality, and emits a bright and clear light, and in the northern parts of America is used frequently instead of candle), they bring the boat's side as near as possible to the rocks, under the roosting places of these birds; then, waving their lights backwards and forwards, the birds are dazzled and confounded so as to fall into the canoe, where they are instantly knocked on the head with a short stick the Indians take with them for that purpose. Seals are taken in some less frequented parts of these coasts with great ease; but when their haunts have been two or three times disturbed, they soon learn to provide for their safety, by repairing to the water upon the first alarm. This is the case with them hereabouts; but as they frequently raise their heads above water, either to breathe or look about them, I have seen an Indian at this interval throw his lance with such dexterity as to strike the animal through both its eyes at a great distance; and it is very seldom that they miss their aim."

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"These Indians are of middling stature, well set, and very active; and make their way among the rocks with an amazing agility. Their feet, by this kind of exercise, contract a callosity which renders the use of shoes quite unnecessary to them. But before I conclude the few observations I have to make on a people so confined in all their notions and practices, it may be expected I should say something of their religion; but as their gross ignorance is in nothing more conspicuous, and as we found it advisable to keep out of their way when the fits of devotion came upon them, which are rather frantic than religious, the reader can expect very little satisfaction on this head. Accident has sometimes made me unavoidably a spectator of scenes I should have chosen to have withdrawn myself from; and so far I am instructed. As there are no fixed seasons for their religious exercises, the younger people wait till the elders find themselves devoutly disposed, who begin the ceremony by several deep and dismal groans, which rise gradually to a hideous kind of singing, from which they proceed to enthusiasm, and work themselves into a disposition that borders on madness; for suddenly jumping up, they snatch fire brands from the fire, put them in their mouths, and run about burning every body they come near: at other times, it is a custom with them to wound one another with sharp muscle-shells till they are besmeared with blood. These orgies continue till those who preside in them foam at the mouth, grow faint, are exhausted with fatigue, and dissolve in a profusion of sweat. When the men drop their part in this frenzy, the women take it up, acting over again much the same kind of wild scene, except that they rather outdo the men in shrieks and noise. Our cacique, who had been reclaimed from these abominations by the Spaniards, and just knew the exterior form of crossing himself, pretended to be much offended at these profane ceremonies, and that he would have died sooner than have partaken of them. Among other expressions of his disapprobation, he declared, that whilst the savages solemnized these horrid rites, he never failed to hear strange and uncommon noises in the woods, and to see frightful visions; and assured us, that the devil was the chief actor among them on these occasions."

"Here I must relate an anecdote of our nominally Christian cacique. He and his wife had gone off, at some distance from the shore, in their canoe, when she dived for sea-eggs; but not meeting with

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great success, they returned a good deal out of humour. A little boy of theirs, about three years old, whom they appeared to be doatingly fond of, watching for his father and mother's return, ran into the surf to meet them: the father handed a basket of eggs to the child, which being too heavy for him to carry, he let it fall, upon which the father jumped out of the canoe, and catching the boy up in his arms, dashed him with the utmost violence against the stones. The poor little creature lay motionless and bleeding, and in that condition was taken up by the mother; but died soon after. She appeared inconsolable for some time; but the brute, his father, shewed little concern about it."

"The first thing that the Indians did in the morning, was to take their canoes to pieces: and here, for the information of the reader, it will be necessary to describe the structure of these boats, which are extremely well calculated for the use of these Indians, as they are frequently obliged to carry them over-land a long way together, through thick woods, to avoid doubling capes and head-lands, in seas where no open boat could live. They generally consist of five pieces, or planks; one for the bottom and two for each side; and as these people have no iron tools, the labour must be great in hacking a single plank out of a large tree with shells and flints, though with the help of fire. Along the edges of the plank they made small holes, at about an inch from one to the other, and sew them together with the supple-jack, or woodbine; but as these holes are not filled up by the substance of the woodbine, their boats would be immediately full of water if they had not a method of preventing it. They do this very effectually by the bark of a tree, which they first steep in water for some time, and then beat it between two stones till it answers the use of oakum, and then chinse each hole so well, that they do not admit of the least water coming through, and are easily taken asunder and put together again. When they have occasion to go over-land, as at this time, each man or woman carries a plank, whereas it would be impossible for them to drag a heavy boat entire."

"Quite worn out with fatigue, I soon fell asleep, and awaking before day, I thought I heard some voices at no great distance from me. As the day appeared, looking further into the wood, I per-

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ceived a wigwam, and immediately made towards it; but the reception I met with was not at all agreeable; for stooping to get into it, I presently received two or three kicks in my face, and at the same time heard the sound of voices seemingly in anger, which made me retire and wait at the foot of a tree, where I remained till an old woman peeped out, and made signs to me to draw near. I obeyed very readily, and went into the wigwam: in it were three men and two women; one young man seemed to have great respect shewn to him by the rest, though he was the most miserable object I ever saw. He was a perfect skeleton, and covered with sores from head to foot. I was happy to sit a moment by their fire, as I was quite benumbed with cold. The old woman took out a piece of seal, holding one part of it between her feet, and the other end in her teeth, and then cut off some thin slices with a sharp shell, and distributed them about to the other Indians. She then put a bit on the fire, taking a piece of fat in her mouth, which she kept chewing, every now and then spirting some of it on the piece that was warming upon the fire; for they never do more with it than warm it through. When it was ready, she gave me a little bit, which I swallowed whole, being almost starved. As these Indians were all strangers to me, I did not know which way they were going; and, indeed, it was now become quite indifferent to me which way I went, whether to the northward or southward, so that they would but take me with them, and give me something to eat. However, to make them comprehend me, I pointed first southward, and after to the lake, and I soon understood they were going to the northward. They all went out together, excepting the sick Indian, and took up the planks of the canoe, which lay near the wigwam, and carried them upon the beach, and presently put it together; and, getting everything into it, they put me to the oar. We rowed across the lake to the mouth of a very rapid river, where we put ashore for that night, not daring to get any way down in the dark, as it required the greatest skill, even in the day, to avoid running foul of the stumps and roots of trees, of which this river was full.* I passed a melancholy night, as they would not suffer me to come near the wigwam they had made; nor did they give me the least bit of any one thing to eat since we embarked. In the morning we set off again. The weather proved extremely bad the whole day. We

* In March—April: beginning of autumn.—Caño de Perdon?—R. F.

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went down the river at an amazing rate; and, just before night, they put ashore upon a stony beach. They hauled the canoe up, and all disappeared in a moment, and I was left quite alone: it rained violently, and was very dark. I thought it was as well to lie down upon the beach, half-side in water, as to get into a swamp under a dropping tree. In this dismal situation I fell asleep, and awaked three or four hours after in such agonies with the cramp, that I thought I must die upon the spot. I attempted several times to raise myself upon my legs, but could not. At last, I made shift to get upon my knees, and, looking towards the wood, I saw a great fire at some distance from me. I was a long time crawling to it; and when I reached it, I threw myself almost into it, in hopes of finding some relief from the pain I suffered. This intrusion gave great offence to the Indians, who immediately got up, kicking and beating me till they drove me to some distance from it; however, I contrived, a little after, to place myself so as to receive some warmth from it; by which I got rid of the cramp. In the morning, we left this place, and were soon after out of the river. Being now at sea again, the Indians intended putting ashore at the first convenient place to look for shell-fish, their stock of provisions having been quite exhausted for some time. At low water we landed upon a spot that seemed to promise well; and here we found plenty of limpets. Though at this time starving, I did not attempt to eat one, lest I should lose a moment in gathering them; not knowing how soon the Indians might be going again. I had almost filled my hat, when I saw them returning to the canoe. I made what haste I could to her; for I believe they would have made no conscience of leaving me behind. I sat down to my oar again, placing my hat close to me, every now and then eating a limpet. The Indians were employed the same way, when one of them seeing me throw the shells overboard, spoke to the rest in a violent passion; and, getting up, fell upon me, and seizing me by an old ragged handkerchief I had about my neck, almost throttled me; whilst another took me by the legs, and was going to throw me overboard, if the old woman had not prevented them. I was all this time entirely ignorant by what means I had given offence, till I observed that the Indians, after eating the limpets, carefully put the shells in a heap at the bottom of the canoe. I then concluded there was some superstition about throwing these shells into the sea, my ignorance of

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which had very nearly cost me my life. I was resolved to eat no more limpets till we landed, which we did some time after, upon an island. I then took notice that the Indians brought all their shells ashore, and laid them above high-water mark. Here, as I was going to eat a large bunch of berries I had gathered from a tree, for they looked very tempting, one of the Indians snatched them out of my hand and threw them away, making me to understand that they were poisonous. Thus, in all probability, did these people now save my life, who, a few hours before, were going to take it from me for throwing away a shell."

"One day, we fell in with about forty Indians, who came down to the beach we landed on, curiously painted.* Our cacique seemed to understand but little of their language, and it sounded to us very different from what we had heard before. However, they made us comprehend that a ship had been upon the coast not far from where we then were, and that she had a red flag: this, we understood some time after, to have been the Anna Pink, whose adventures are particularly related in Lord Anson's voyage; and we passed through the very harbour she had lain in."†

* Probably in the neighbourhood of the 'Estero de Aysen.' in lat. 45° S —R. F.

† No—not through the harbour, but within twenty miles of it, I should suppose.—R. F.

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No. 15.

In the following fragment of a Vocabulary the vowels should be sounded as in the English syllables, bah, băt, eel, bĕt, I, bĭt, no, tŏp, rule, bŭt, hay; and the consonants as in English, but giving to kh a very guttural sound. One Fuegian expression, something like the cluck of a hen, can scarcely be represented by our letters; its meaning is "no."

FRAGMENT OF A VOCABULARY OF THE ALIKHOOLIP AND THE TEKEENICA LANGUAGES.

Also some Words of those spoken by the PATAGONIAN (TEHUEL-HET) and CHONOS INDIANS.

ENGLISH.	ALIKHOOLIP.	TEKEENICA.
York Minster's name	ĕl'lĕpăru	
Jemmy Button's name		o'rŭndĕl'lĭcŏ.
Fuegia Basket's name	yŏk'cŭshlu	
Ankle	acŭl'lăbe	tŭppallă.
Arm	tŏ'quĭm'be	car'mĭnĕ.
Arm (fore)	yŭc'căbă	dow'ĕlă.
Arrow	an'năquă	te'ăcu.
Beads (necklace)		ăcon'ăsh.
Back	tŭccăler'khĭtĕ	am'mŭckă.
Bark (as a dog)	stŭck'stă	wo'onă.
Basket	kă'ĕkhu (or) kha'lŏ	kă'ekhĕm (or) kŭsh.
Beads	ca'ĕcŏl	ah'khĭnnă.
Belly	kŭppŭdde	
Birch apple		a'fĭsh-khă.
Bird (little)	tŏw'quă	be'ghe.
Bite	ĕck'hănĭsh	e'tăŭm.
Black	fcal	
Blood	shŭb'bă	shŭb'bă.
Baby	cos'hĕ	yărŭmăte'ă.
Boat	ăth'lĕ	watch.
Bone	osh'kiă	ah'tŭsh
Bow	kĕrĕc-căna	whŷ-ăn'nă.
Boy	a'll-walkh	yăr'ămuă.

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ENGLISH.	ALIKHOOLIP.	TEKEENICA.
Break	ŭccă'll	ŭttĕrgu'shu.
Brother	ăr're	mar'cŏs.
Butterfly	klkeĕŏw'l	yumĕrtĕ'lĕ.
Children	pătete	yăr'hăm.
Catch	ca	ŭt'tă.
Chain	păru	
Chest	yăca'bĭshăcŭn'nĕ	cŭp'pŭneă.
Child	pătete	yăr'hăm.
Chin	ŭf'ca	won'ne.
Cloud	tŭl'lu	
Cold	klshăsh'	ŭc'cŏwe.
Cheek	cllt'khŏpcă	ches'hă.
Come here	yămăschun'ă	
Come	hăb'rĕluă	ăh'ĕ.
Cry	yĕlk'ĕstă	ŭrră.
Cut	cŭp'pă	ăt'khĕkŭm.
Cough	yilkĕă	ŭttă.
Day	ăn'ŏquăl	
Dead	wllläcar'wŏnă	
Death		apaĭ'nă.
Die	wllläcar'wŏnă	ăppăn'na, or ăpăĭ'nă..
Dive	sko	
Dog	shil'ŏkĕ	shi'lăkĕ, or eashŭl'lă.
Drink	ăfkhĕl'lă	ŭl'lă, or ăllĕ.
Duck	ye'keĭp	măh'e.
Duckling	wĕn.	
Ear	tĕl'dll	ŭf'kheă.
Earth	bar'be	tănn.
East	yul'ăbă	yăh'cŭf.
Egg	llth'le	hĕrch.
Eight		yŭl'cămme.
Elbow	yŏc'kĕ	dŏw'llă.
Eat	lŭf'flsh	ăt'tĕma, or ĕt'tŭmă.
Eye	tĕlkh	della.
Eyebrow	tĕth'llu	ŭtkhĕl'lă.
Firestone	cath'ŏw	
Fall (to)	ăh'lăsh	lŭp'ăe.
Fat	ŭf'ki	tŭf'flă.
Father	cha'ŭl	ay'mŏ.
Feather	i-ĭsh	ŏftuku.
Fright (to)	ŭth'lĕthăl	che'ne.
Fist	ŭf'shĕbă	ŭk-ke.
Finger	skŭl'lă	

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ENGLISH.	ALIKHOOLIP.	TEKEENICA.
Fire	tĕt'tal	pŭshah'ke, or pŏsh'ăky.
Five		cup'ăspă.
Fish	ăp'pŭbĭn, or appŭffĭn	ăp'pŭr'mă (small fish).
Fish (to)	kĕr'rĭkstă	ăp'pŭrmă.
Fly (to)	ah-lăsh	mŭr'ră.
Flower	yĭk'stă	ă'nĕăcă.
Fly (a)	tŏmăt'tŏlă	
Foot	cŭt'lĭcŭlcŭl	cŏeeă.
Forehead	tĕl'chĕ	oshcar'she.
Four	ĭn'ădăbă	cărgă.
Fresh water		sheă'mă, or shaă'mă.
Girl	ăn'nă	yarŭmătĕă.
Guanaco	harmaŭr	armauă.
Go away	ŭs'hăe	khaĭ'drĭsh.
Good	ly'ĭp	
Gown	uckwuĭ	archi.
Grass	kĭttă're	hiănăm'bă.
Grey		owkush.
Grease	kĭn'	kune.
Grandmother	caŭshĭllĭsh	ghuluŏnnă.
Grandfather	cowĭsh, or caŭwĭsh	ghu'luwăn.
Grand daughter	yărrŭkepă	
Grass	khall	
Hair	ay'ŭ	ŏsh'tă.
Hand	yŭc'căbă	mar'pŏ.
Head	ŏf'chŏckă	lŭk'ăbe.
Hear (to)	tĕl'lĭsh	mŭr'ră
Heavy	pah'cŭl	hah'shu
Humming-bird	ămŏwa'ră	ŭt'tŭsh.
Hip	cŏl'khĭstăl	wăsh'nŭe.
Hog	tĕthl	
Hot	kĕt'khĭk	ŭck'hulă.
House	hŭt	ukh'răl.
Hut	ăht	ŭck'ă.
Husband	ăr'rĭk	dugu.
Ice	ătkhur'skă	ye'ăteă.
Jump	ah'culu	
Kelp		ŭt'chă.
Kill	ŭf'tŭclă	ŭt'tŭl.
Knee	tŭl'dŭl	tŭl'lăpuă.
Knife	ăfta're, or ăftăl'lă	tĕt'lŏwăl, or tĕclew'ĕl.
Knuckles	ăh'tells'hăbe	yăsh.
Land	champth	o'shĕ

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ENGLISH.	ALIKHOOLIP.	TEKEENICA.
Large	ŏw′quĕl	o′olu.
Laugh (to)	fĕay′l	tŭsh′că.
Leaf (fall of)		oŏshŏ.
Lean (of seal)	tildum	ŭndŭppă.
Leg	cŭt	hie′tă.
Little	yĭco′-ăt	yŭc′că.
Look		ŭrruks-i.
Man (Vir.)	ăck′ĭnĭsh	ohă.
Many men	ackhĭnĕsh	owĕy.
Man (old)	kĕr′ŏwĭsh	cŭt′tŏăs.
Moon	cŏn′ăk′ho	ănŏcŏ.
Moon	cuunequă	hăn′nŭkă.
Moon (full)	ŏw′quĕl	hul′ush.
Moon (new)	yĕco′ăt	tu′quĭllĕ.
Moon (set)	iko	cay′-e ă.
Moon (rise)	iarsh	carsh.
Morning	ŭsh′quăl, or ilquălĕf	mawlă.
Mother	chăhp	dah′be.
Mouth	ŭf′fĕăre	ye′ăk.
Nail (finger)	esh′cŭl	gŭl′lŭf.
Neck	chah′lĭkhă	yărek′.
Night	yul′lŭpre, or yŏw′lĕbă.	ŭc′cŭsh.
Nine		yŭr′tobă.
No	quĭt′tuk	bar′be.
North	ya′ŏw	uffa′hu.
Nose	nohl	cŭs′hŭsh.
Oar (man's)	wy′ĭc	cŭn′nă.
Oar (woman's)	wŏr′rĭc	ăp′pe.
One	tŏw′quĭdŏw	o′cŏăle.
Owl	tilkibhŏl	lŭf′queă.
Otter	hiăp′pŏ	hiăp′pŏ.
Owl (horned)	shĭp′ĭshĭ	yăputĕllă.
Pain	ahf	ŭm′mayă.
Porpoise	shŏwăn′nĭkĕ	shŏwăn′nĭkĕ.
Rain	căp′pŏcăhsh, or ăb′quăhsh	jŭb′băsha, or wĕrt.
Rope	shŭ′cămĕ	cŭf′lĕnnĕ.
Run	cak′ăsh	dahdu.
Rush	ahl	mŭmpe.
Sail	ăhnayr (made of seal skin)	
Salt water	chăŭw′ăsh	shĕm′ă, or sheă′mă.
Sand		pŭntel.

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ENGLISH.	ALIKHOOLIP.	TEKEENICA.
Sea	chah'bŭcl	hay'-ecă.
Seal	ăl'fēilŏ, or ăf'ăllŏ	dŭp'pă.
Sea shore	wănnŭc	wĭnnўgătă.
Sea-weed		ŭtchă.
Seven		hŏw'căstă.
Shell	car'nĭsh	ters'hŏĭn.
Shore	wăn'nŭc	wĭn'nĕgaytă.
Shoulder	chŏ'ŭks	ăh'kĕkă.
Sickness	yaŭ'hŏl	om'ă, or om'ey.
Side	ŭcshan'ĭqŭa	ŭcshăn'sĭquă.
Sit	shŭckă	mu'tu.
Sister	chol'ĭcl	way kĭp'pă.
Six		cum'ua.
Skin	ŭc'cŏlaўk	ăppŭllă.
Sky	ăc'cŭbă	hŏw'ŭccă.
Sleep	kay'kĕol, or khăk'hŏn	ŭckă, or ăshă.
Sling	shĕn'nĕkăy	wăt'tŏwă.
Small	shoks	
Smell	ŭc'she	ar've.
Smoke	tĕl'lĭcks, or tĕlk'hăsh	ŭsh'cŏ, or ŏch'ăt.
Snow	ăs'hŏ	ŏppŭ'năcă.
Son	păr'ăl	măr'rĭu.
South	ŭc'cŏay	ah'ne.
Spear	ĭhlcă, or fĭshcă	uway' eă, or ŏway eă.
Spear handle	aĭre	
Speak	yăc'ăftă	ăuru'ŏshĕ.
Spunge		ăllŭf'shĕ.
Stand (to)	arcŏ	cŭmmărt.
Stars	quo'unăsh, or cŏnăsh'	áppĕrnĭs'h, or ăp-păn'nă.
Straw		gŏshe.
Stone	kĕhtla'ŏ, or căth'ŏw	ow'ey.
Sun	lŭm	lŭm.
Sunrise	ahlăcŭr'rĭc	cardĭc
Sunset	arshe	coshu
Sunshine	lŭm alkă	lŭm pushĕ.
Swimming	lĭm'pi	căl'ĕ.
Teeth	căŭwăsh, or car'lĭsh	tu'un.
Thigh	cŭt'lăbă	lŭck'hă.
Three	cup'ĕb	mŭt'tă.
Thumb	ŭshcŭc'cŭn	ŭshcŭg'gen.
Thunder	cayru'	kek'ĭkă.
Tired	ŏch'lă	gushă.

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ENGLISH.	ALIKHOOLIP.	TEKEENICA.
Tongue	lŭc′kĭn	lŭn.
Tree	e′ărŭckă, or kăfs′hă	wu′urŭsh.
Two	tĕl′keŏw	cŏm′bäbe.
Vessel	a′un	ăl′lă.
Vulture	ähcŭr′rĭgă	
Walk (to)	ahsh	car′dĭk.
Water	chau′ăsh	shă′mĕă.
West	ŭthquăldăl′	ŭppăh-ush.
Whistle	ŭfshĕxcă	lŭfkĕy.
White	ăkĭf′ca	
Wife	ăshwă′llŭk	to′ucu.
Wind	hŭr′rŭquash	wur′ŭp.
Woman	ătlarăbĭsh, orăck′hănăsh	kepă, or shĕpush.
Wood	ŭf′shă	ăh′-schĭf, or ŏspătăsh.
Wrist	ăccăl′lăbă	tŭppŭl′la.
Yes	o′o	dăs.

A few Fuegian Words which have some similarity to corresponding Huilliche terms.

ENGLISH.	FUEGIAN.	HUILLICHE.
Belly	kŭp′pudĕ	puay.*
Bones	osh′kiă	voso, or yoro.
Cold	ŭc′cŏwe	chosay.
Day	ăn′ŏquăl	antu, or antuigh.
Fire	tĕt′tăl	k′tal, or cutal.
Hand	yŭc′căbă	cuugh, or cuu.
Moon	cuunĕquă	cuyen.
Moon (new)	tu′quĭllĕ	chum cuyen.
Salt-water	chaŭ′ăsh, or shĕa′mă	chasi-co, or chadi-co.
Sea	chah′bŭel, or hay′ĕcă	lavquem.
Sun, (or bright light)	lŭm, or lŏm	antu pelon, or luv.
Shine, to		lumulmen.

* The words in this column are taken from Molina, but compared with Falkner and Febres.

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ENGLISH.	PATAGONIAN.
Another	Sark.
Axe	pĭkĕl, or pĭcḳĕl.
Band, worn round hair	cochĭn.
Barberry (the)	călga.
Boat	tă lĭna căr′rŏ.
Balls (two)	someÿ, or somăĭ.
Balls (three)	ăchĭcŏ.
Boots	chŏcă.
Bridle	sumŏ.
Clothes	tĕrŏna.
Comb made of a coarse dry grass	par′chĭn.
Dog	wărchĭn, or wauchĭn, or wachĭn
Fire	se ăk, or ze ăk.
Give it to me	ey′ nĭ ŏts.
Guanaco	co.
Go away	aŭrŏs, or orŏs, and cha′nŏs.
Horse	căl′gŏ.
Knife	pa′lkă.
Knife (small)	pepă.
Mantle	chorllĭo.
Me	cătlăm.
Meat	sĕy′pră, or zĕypră.
No	cŏmps.
Ostrich	măs′hlŏrs.
Pole	ask.
Put	caĕ.
Ship	carrŏ.
Sinews of the Ostrich, used for sewing mantles, &c.	llŏyu.
Skunk	sŭrrenă.
Slave	zapallo.
Spurs	ta.
Sword	cuchillo.
Tent	cŏw, or caŭ, or toldo.
Water	la.
Wood	cark.
Yes	ohaĭ.
A particular root which is eaten for food	tŭs.
Another similar root	chalăs.

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ENGLISH.	PATAGONIAN.
The Arbutus	ămăcorŏ.
The Cranberry	pĭlecŏ.
Barberry, drink made with the	lĭcone.

ENGLISH.	CHONOS.
Good Deity	yĕrrĭ yŭpon.
Bad Spirit	yăccў-ma.
White Men of the Moon	cŭbba.

No. 16.

Remarks on the Structure of the Fuegians.

The general form of the Fuegians is peculiar; the head and body being particularly large, and the extremities unusually small: but the feet are broad though short. This peculiarity, no doubt, is owing to their mode of life: being a people who take little exercise, but sit constantly huddled together in their canoes or wigwams; the blood, the source of nourishment, can only circulate freely, and must in greater quantity, in the head and trunk, from the obstruction to its passage into the limbs, owing to their bent position. From the same cause, the want of exercise, this is the form of the Esquimaux and Laplanders.

A man whom I examined was of the middle size, five feet seven inches, and his muscular power about a medium; the circumference of the—

	Ft.	in.
Thorax	3	1
Abdomen	2	7
Pelvis	2	5
Thigh	1	10
Calf of the leg	1	0
Arm	1	0
Fore-arm	0	11
Length of the head from the chin upwards	0	9
Length of body, from the symphisis pubis to the top of the sternum	2	0
Length of thigh	0	17

	Ft.	In.
Length of leg	0	17
——— of arm	1	0
——— of fore-arm and hand	0	17
——— from spine to sternum, externally	0	13
——— same internally ...	0	10
Breadth of thorax	0	13
——— of hypochondriac regions	1	0
——— of pelvis between superior and spinous processes	0	11

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I consider that this man was about the average stature of the Fuegians: they are generally short and broad.

The Fuegian, like a Cetaceous animal which circulates red blood in a cold medium, has in his covering an admirable non-conductor of heat; the corpus adiposum envelopes the body to preserve that temperature necessary to continue the vital functions and circulation of the fluids. In this individual it was particularly thick over the abdomen and dorsum; on the hips it formed a perfect cushion, and filled up the interstices between the muscles in general. Unlike the limbs of porters, smiths, and other athletæ in Europe, where the form and size of each muscle may be traced while in action, the limbs of these people are round and smooth, like the female sex, or the child in infancy. The quantity of fat is to be imputed to their diet; their food is shell-fish and birds, but the greatest dainty is fat of all kinds, that of the seal and penguin in particular; as for vegetable aliment they have none,* nor any taste for it. The muscles were soft, and the viscera (in particular the heart, liver, and lungs,) in good order, —a circumstance which but rarely occurs: the bones were well-formed, with their processes, foramina, and sutures complete.

The complexion of this man was dark; his skin of a copper colour, the native hue of the Fuegian tribes; the eyes and hair black (this is universal, as far as I have seen, and predominates throughout all the aborigines of America, from the Fuegians to the Esquimaux); the epidermis is thicker than in white men; but in the rete mucosum I saw no difference, the copper hue arising from the vessels of the cutis, shining through a thickened scarf-skin, and from its incorporating the particles of smoke and ochre with which their bodies are continually covered.

The hair on this man's head was jet-black, straight, long, and luxuriant, but scanty on other parts of the body. The Fuegians have little beard and no whiskers.

The features of this individual were rounder than they generally are among those of his nation; the form of whose countenance resembles that of the Laplanders and Esquimaux; they have broad faces with projecting cheek-bones; the eyes of an oval form, and drawn towards the temples; the tunica sclerotica of a yellow-white, and the iris deep black; the cartilage of the nose broad and de-

* Mr. Wilson was not aware that they eat birch excrescences, and berries.—R. F.

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pressed; the orifice of the mouth large, when shut forming a straight line, when open an ellipsis. The head is bulky, and the hair straight.

The phrenological marks in the skull (said by some persons to include corresponding organs in the brain,) taken on the spot, were as follows:—

THE PROPENSITIES.

Amativeness—full.
Philoprogenitiveness—moderately full.
Concentrativeness—ditto.
Adhesiveness—full.
Combativeness—large.
Destructiveness—very large.
Constructiveness—small.
Acquisitiveness—small.
Secretiveness—large.

THE SENTIMENTS.

Self-esteem—moderately small.
Love of approbation—large.
Cautiousness—very large.
Benevolence—small.
Firmness—moderately full.
Veneration—small.
Hope—ditto
Ideality—ditto
Conscientiousness—ditto

THE INTELLECTUAL ORGANS.

Individuality—small.
Time—ditto
Tune—ditto
Comparison—small.
Wit—ditto
Form—small.
Number—very small.
Language—full.
Causality—small.
Imitation—ditto

The facial angle, according to Camper, 74°, the occipital, 80°.

The warlike propensities in this man were large, agreeing with the little which I know of his history. Taking a general view of the head, the Propensities (the organs most exercised by a barbarian) are large and full; the Sentiments small, few of which are ever called into action, except cautiousness and firmness, which are large; finally, the Intellectual organs, which are chiefly used by man in a civilized state, are small.

The teeth are perfect, and of the usual number; the incisores flat and apparently worn down; other instances of which I have seen. From this it is probable they are sometimes used as grinders.* The reverse of this has been frequently noticed among savages; some, it is said, file their teeth to render them more terrible in battle, while others pull out the two centre incisores, or the cuspidati, by way

* This man could not have been more than forty: probably he was many years younger.—R. F.

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of ornament. Their teeth are generally good, regular, and healthy, arising in all probability from the system being free from any constitutional taint.

The viscera of the thorax were healthy, the heart particularly so, with its valves and columna carnosa in good order; the lower part of the thorax and the whole parietes of the abdomen were unusually expanded; the liver very large though healthy, occupying the right hypochondriac and lumbar, the epigastric, and left hypochondriac regions; the spleen remarkably small; the stomach of a moderate size, and containing some muscles and limpets in a half-digested state; the intestines were filled with flatus, which probably took place after death. The large size of the abdomen is to be referred to the squatting position these people assume, the knees and thighs being brought up against the lower part of the belly, force the viscera and intestines upward and forward, thereby distending the lower part of the thorax and front of the abdomen. Here is a peculiarity from habit becoming inherent in the constitution, and descending to posterity, as the children, male and female, are born with large bellies. In like manner Chinese children, from their parents' custom of compressing the feet, are born with them remarkably small.

Besides distending the abdomen mechanically—to this bent position is to be traced the enlarged state of the abdominal viscera, the passage of blood to the extremities being obstructed; an unusual quantity is thereby determined to, and circulated in, the cœliac and mesenteric arteries; the want of support from dress is also to be taken into account. From this stretched and distended state of the abdomen, separating the fibres of the oblique and transverse muscles, and the open state of the inguinal rings, these people must be peculiarly liable on any exertion to ventral hernia: these passages I found open in this individual; and they appeared to be in the same state in other men whom I examined. Cardiac affections mostly prevail among those who are subject to violent exercise, as porters, carriers, and artillerymen. The healthy state of this heart, which it is probable will be generally the case among the Fuegians, is to be imputed to their moderate exertions. In their canoes they are employed fishing or paddling; in their wigwams, which are seldom many yards from the beach, cooking or making small wares of the bones or skins of beasts. The cremaster muscle was strong and

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fleshy; the lower extremities were short and ill-proportioned; the thigh of a moderate size, but from the smallness of the muscles of the leg in general, and gestatorii in particular, it looked large; the calf of the leg was very small. The diminutive size of these muscles must be referred to the cause already mentioned—the want of a due circulation in these parts, produced by a cramped position and want of exercise. Having the feet broad and short is common to all who do not wear shoes, the bones being somewhat separated, the ligaments stretched, and the muscles flattened from constantly sustaining the weight of the body unsupported by any covering to the feet. The kidneys were healthy, but unusually destitute of fat. There was no tunica adiposa; the adeps, in this instance, was chiefly collected on the surface, but little in the internal parts. If this is universally the case, it is a wonderful provision of nature to protect their bodies from the inclemency of this inhospitable region. This is the method adopted by nature during the first years of infancy, to habituate the constitution to the vicissitudes and variations of the atmosphere, which otherwise would be incompatible with existence. The arms were better proportioned than the lower extremities; and this is general throughout the Fuegian tribes; the muscles being firmer, and better formed, from the more constant use of these parts, paddling in their canoes, climbing, and making their wigwams. The muscles in general, throughout the body, were healthy, but soft and flabby, unlike the firm sinewy muscle of hardy mountaineers: and the bones less indented than is usual in those who have been accustomed to vigorous exertion.

In another Fuegian, whom I examined, the marks of the Phrenological organs, as taken from the skull, were as follows:—

THE PROPENSITIES.

Amativeness—small.	Destructiveness—full.
Philoprogenitiveness—very large.	Constructiveness—small.
Concentrativeness—full.	Acquisitiveness—full.
Combativeness—very large.	Secretiveness—large.

THE SENTIMENTS.

Self-esteem—very large.	Veneration—full.
Love of approbation—full.	Hope—small.
Cautiousness—large.	Ideality—small.
Benevolence—small.	Firmness—large.

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THE INTELLECTUAL ORGANS.

Form—small.	Colouring—small.
Size—large.	Locality—ditto.
Weight—small.	Order—ditto.
Time—very small.	Number—ditto.
Tune—ditto	Language—ditto
Comparison—small.	Wit—ditto
Causality—ditto	Imitation—ditto

The facial angle, 76°, the occipital, 82°.

In this skull also, the propensities were large; the moral sentiments larger than in the former, but the intellectual organs equally small. Destructiveness, secretiveness, and cautiousness, large—faculties, as I have remarked, necessary to a savage warrior: the more refined sentiments, as benevolence, ideality, and conscientiousness were small, with nearly all the intellectual organs.

In this man, also, the teeth were complete; but the incisores not worn down, as in the former: their general regularity and good arrangement were greatly owing to the expanded state of the jaws, giving good space for their growth and shedding. In those persons who have sharp features, where the sides of the face meet at an acute angle, the teeth are often small; or, if large, from want of room, they overlap each other, or push one another out of the natural positions. The broadness of the face and features is owing to the breadth of the base of the cranium, which gives shape and form to the bones of the face. With respect to the arms and legs of this man, I have only to remark, that they agreed exactly with those of the other, in the largeness of the thigh compared to the leg, breadth of the feet, and better proportion of the upper extremities.

JOHN WILSON, (d) Surgeon.

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No. 17.

Phrenological Remarks on three Fuegians.*

Yokcushlu, a female, ten years of age.

Strong in attachment.

If offended, her passions strong.

A little disposed to cunning, but not duplicity.

She will manifest some ingenuity.

She is not at all disposed to be covetous.

Self-will at times very active.

Fond of notice and approbation.

She will show a benevolent feeling when able to do so.

Strong feelings for a Supreme Being.

Disposed to be honest.

Rather inclined to mimicry and imitation.

Her memory good of visible objects and localities, with a strong attachment to places in which she has lived.

It would not be difficult to make her a useful member of society in a short time, as she would readily receive instruction.

Orundellico, a Fuegian, aged fifteen.

He will have to struggle against anger, self-will, animal inclinations, and a disposition to combat and destroy.

Rather inclined to cunning.

Not covetous; not very ingenious.

Fond of directing and leading.

Very cautious in his actions: but fond of distinction and approbation.

He will manifest strong feelings for a Supreme Being.

Strongly inclined to benevolence.

May be safely intrusted with the care of property.

Memory, in general, good; particularly for persons, objects of sense, and localities.

To accustomed places he would have a strong attachment.

Like the female, receiving instruction readily, he might be made a useful member of society; but it would require great care, as self-will would interfere much.

* Made in London, in 1830.

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El'leparu, about twenty-eight.

Passions very strong, particularly those of an animal nature; self-willed, positive and determined.

He will have strong attachment to children, persons, and places.

Disposed to cunning and caution.

He will show ready comprehension of things, and some ingenuity.

Self will not be overlooked, and he will be attentive to the value of property.

Very fond of praise and approbation, and of notice being taken of his conduct.

Kind to those who render him a service.

He will be reserved and suspicious.

He will not have such strong feelings for the Deity as his two companions.

He will be grateful for kindness, but reserved in showing it.

His memory, in general, good: he would not find natural history, or other branches of science, difficult, if they can be imparted to him; but, from possessing strong self-will, he will be difficult to instruct, and will require a great deal of humouring and indulgence to lead him to do what is required.

No. 17 (*a*).

Instrument executed by Mons. Louis de Bougainville for the delivering up of the Malvinas.

"I, Monsieur Louis de Bougainville, colonel of his most Christian Majesty's army, have received six hundred and eighteen thousand one hundred and eight livres, thirteen sols, and eleven deniers, being the amount of an estimate that I have given in, of the expenses incurred by the St. Malo Company in equipments for founding their *intrusive* establishments in the Malvina Islands, *belonging to his Catholic Majesty*, in the following manner:—

"Forty thousand livres delivered on account to me in Paris, by his Excellency the Count de Fuentes, ambassador of his Catholic Majesty to that court, for which I gave the proper receipt.

"Two hundred thousand livres, which are to be delivered to me at the same court of Paris, according to bills drawn in my favour by

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the Marquess of Zambrano, treasurer-general of his Catholic Majesty, upon Don Francisco Ventura Llorena, treasurer-extraordinary of the same; and sixty-five thousand six hundred and twenty-five hard dollars, and three-fourth parts of another, which are equivalent to the three hundred and seventy-eight thousand one hundred and eight livres three sous and eleven deniers, at the rate of five livres per dollar, which I have to receive in Buenos Ayres, on account of bills which have been delivered to me, drawn by his excellency the Baylio Fray, Don Julian Arriaga, secretary of state for the general department of the Indies and navy of his Catholic Majesty.

"In consideration of these payments, as well as in obedience to his Most Christian Majesty's orders, I am bound to deliver up, in due formality, to the court of Spain, those establishments, along with the families, houses, works, timber, and shipping built there, and employed in the expedition; and, finally, every thing therein belonging to the St. Malo Company, as included in the accounts which are so settled, and to his Most Christian Majesty, by this voluntary cession, making void for ever all claims that the company, or any person interested therein may have, or might produce, upon the treasury of his Most Catholic Majesty; nor can they henceforth demand more pecuniary, or any other compensation whatsoever. In testimony whereof, I set my name to this present instrument and voucher, as one principally interested, as well as authorized to receive the whole of this sum, agreeably to a registry in the department of state in St. Ildefonso, 4th October, 1766.

(Signed) "Louis de Bougainville."

Viscount Palmerston to M. de Moreno.

Foreign Office, January 8, 1824.

The undersigned, &c. has the honour to acknowledge the receipt of the note of M. Moreno, &c. dated the 17th of June last, in which he formally protests, in the name of his government, "against the sovereignty lately assumed in the Malvina (or Falkland) Islands, by the crown of Great Britain."

Before the undersigned proceeds to reply to the allegations advanced in M. Moreno's note, upon which his protest against this act on the part of his Majesty is founded, the undersigned deems it proper to draw M. Moreno's attention to the contents of the protest which Mr.

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Parish, the British Chargé d'Affaires, at Buenos Ayres, addressed, in the name of his court, to the Minister for Foreign Affairs of the Republic, on the 19th of November 1829, in consequence of the British Government having been informed that the president of the United Provinces of the Rio de la Plata had issued decrees, and had made grants of land, in the nature of acts of sovereignty over the islands in question.

That protest made known to the government of the United Provinces of the Rio de la Plata :—

1st. That the authority which that government had thus assumed, was considered by the British Government as incompatible with the sovereign rights of Great Britain over the Falkland Islands.

2dly. That those sovereign rights, which were founded upon the original discovery and subsequent occupation of those islands, had acquired an additional sanction from the fact, that his Catholic Majesty had restored the British settlement, which had been forcibly taken possession of by a Spanish force, in the year 1771.

3dly. That the withdrawal of his Majesty's forces from the Falkland Islands, in 1774, could not invalidate the just rights of Great Britain, because that withdrawal took place only in pursuance of the system of retrenchment adopted at that time by his Majesty's Government.

4thly. That the marks and signals of possession and of property, left upon the islands, the British flag still flying, and all the other formalities observed upon the occasion of the departure of the governor, were calculated not only to assert the rights of ownership, but to indicate the intention of resuming the occupation of the territory at some future period.

Upon these grounds Mr. Parish protested against the pretensions set up on the part of the Argentine Republic, and against all acts done to the prejudice of the just rights of sovereignty heretofore exercised by the crown of Great Britain.

The Minister for Foreign Affairs of the Republic acknowledged the receipt of the British protest; and acquainted Mr. Parish that his government would give it their particular consideration, and that he would communicate to him their decision upon the subject, so soon as he should receive directions to that effect.

No answer was, however, at any time returned, nor was any objection raised, on the part of the government of the United Provinces of

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the Rio de la Plata, to the rights of Great Britain, as asserted in that protest; but the Buenos Ayrean government persisted, notwithstanding the receipt of that protest, in exercising those acts of sovereignty against which the protest was specially directed.

The government of the United Provinces of the Rio de la Plata could not have expected, after the explicit declaration which had been so formally made of the right of the crown of Great Britain to the islands in question, that his Majesty would silently submit to such a course of proceeding; nor could that government have been surprised at the step which his Majesty thought proper to take, in order to the resumption of rights which had never been abandoned, and which had only been permitted to lie dormant, under circumstances which had been explained to the Buenos-Ayrean government.

The claim of Great Britain to the sovereignty of the Falkland Islands having been unequivocally asserted and maintained, during those discussions with Spain, in 1770 and 1771, which nearly led to a war between the two countries, and Spain having deemed it proper to put an end to those discussions, by restoring to his Majesty the places from which British subjects had been expelled, the government of the United Provinces could not reasonably have anticipated that the British Government would permit any other state to exercise a right, as derived from Spain, which Great Britain had denied to Spain herself; and this consideration alone would fully justify his Majesty's Government in declining to enter into any further explanation upon a question which, upwards of half a century ago, was so notoriously and decisively adjusted with another government more immediately concerned.

But M. Moreno, in the note which he has addressed to the undersigned, has endeavoured to shew that, at the termination of the memorable discussions referred to between Great Britain and Spain, a secret understanding existed between the two courts, in virtue of which Great Britain was pledged to restore the islands to Spain at a subsequent period, and that the evacuation of them, in 1774, by his Majesty, was the fulfilment of that pledge.

The existence of such a secret understanding is alleged to be proved; first, by the reservation, as to the former right of sovereignty over the islands, which was contained in the Spanish declaration, delivered at the time of the restoration of Port Egmont and its dependencies to his Majesty; and, secondly, by the concurrent description

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of the transaction, as it took place beween the parties, given in certain documents and historical works.

Although the reservation referred to cannot be deemed to possess any substantial weight, inasmuch as no notice whatever is taken of it in the British counter-declaration, which was exchanged against it; and although the evidence adduced from unauthentic historical publications cannot be regarded as entitled to any weight whatever with a view to a just decision upon a point of international rights; yet as the allegations above-mentioned involve an imputation against the good faith of Great Britain, to which his Majesty's Government cannot but feel sensibly alive, the undersigned has been honoured with the King's commands to cause the official correspondence with the court of Madrid, at the period alluded to, to be carefully inspected, in order that the circumstances which really took place upon the occasion might be accurately ascertained.

That inspection has accordingly been made, and the undersigned has the honour to communicate to M. Moreno the following extracts, which contain all the material information that can be gathered from that correspondence relative to the transaction in question :—

The Earl of Rochford to James Harris, Esq.

" St. James's, 25th January 1771.

" I enclose to you a copy of the declaration signed on Tuesday last by Prince Masserano, with that of my acceptance of it in his Majesty's name."

Spanish Declaration.

" Sa Majesté Britannique s'étant plainte de la violence qui avoit été commise le 10 Juin de l'année 1770, à l'Ile communément appelée la Grande Maloüine, et par les Anglais dite Falkland, en obligeant par la force le Commandant, et les sujets de sa Majesté Britannique, à évacuer le port par eux appelé Egmont, démarche offensante à l'honneur de sa Couronne, le Prince de Masseran, Ambassadeur Extraordinaire de sa Majesté Catholique, a reçu ordre de déclarer, et déclare, que sa Majesté Catholique, considérant l'amour dont elle est animée pour la paix, et pour le maintien de la bonne harmonie avec sa Majesté Britannique, et réfléchissant que cet évènement pourroit l'interrompre, a vu avec déplaisir cette expédition capable de la troubler; et dans la persuasion où elle est de la réciprocité de ses senti-

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mens, et de son éloignement pour autoriser tout ce qui pourroit troubler la bonne intelligence entre les deux Cours, sa Majesté Catholique désavoue la susdite entreprise violente, et, en conséquence, le Prince de Masseran déclare, que sa Majesté Catholique s'engage à donner des ordres immédiats pour qu'on remette les choses dans la Grande Maloüine, au port dit Egmont, précisément dans l'état où elles étoient avant le 10 Juin 1770, auquel effet sa Majesté Catholique donnera ordre à un de ses officiers, de remettre à l'officier autorisé par sa Majesté Britannique, le fort et le port Egmont, avec toute l'artillerie, les munitions, et effets de sa Majesté Britannique et de ses sujets, qui s'y sont trouvés le jour ci-dessus nommé, conformément à l'inventaire qui en a été dressé.

" Le Prince de Masseran déclare en même tems, au nom du Roi son Maitre, que l'engagement de sa dite Majesté Catholique, de restituer à sa Majesté Britannique la possession du port et fort dit Egmont, ne peut ni ne doit nullement affecter la question du droit antérieur de souveraineté des Iles Maloüines, autrement dites Falkland.

" En foi de quoi, moi, le susdit Ambassadeur Extraordinaire, ai signé la présente Déclaration de ma signature ordinaire, et à icelle fait apposer le cachet de nos armes. A Londres, le 22 Janvier 1771.

(L.S.) (Signé) " Le Prince de Masseran."

British Counter Declaration.

" Sa Majesté Catholique ayant autorisé son Excellence le Prince de Masserano, son Ambassadeur Extraordinaire, à offrir, en son nom royal, au Roi de la Grande Bretagne, une satisfaction pour l'injure faite à sa Majesté Britannique, en la dépossédant du port et fort du port Egmont; et le dit ambassadeur ayant aujourd'hui signé une Déclaration, qu'il vient de me remettre, y exprimant, que sa Majesté Catholique, ayant le désir de rétablir la bonne harmonie et amitié que subsistoient ci-devant entre les deux couronnes, désavoue l'expédition contre le port Egmont, dans laquelle la force a été employée, contre les possessions, commandant, et sujets de sa Majesté Britannique, et s'engage aussi que toutes choses seront immédiatement remises dans la situation précise dans laquelle elles étoient avant le 10 Juin 1770; et que sa Majesté Catholique donnera des ordres en conséquence à un de ses officiers de remettre à l'officier, autorisé par

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sa Majesté Britannique, le port et fort du Port Egmont, comme aussi toute l'artillerie, les munitions, et effets de sa Majesté Britannique, et de ses sujets, selon l'inventaire qui en a été dressé; et le dit ambassadeur s'étant de plus engagé, au nom de sa Majesté Catholique, que le contenu de la dite déclaration sera effectué par sa Majesté Catholique, et que des duplicatas des ordres de sa dite Majesté Catholique à ses officiers seront remis entre les mains d'un des Principaux Secrétaires d'Etat de sa Majesté Britannique, dans l'espace de six semaines; sa dite Majesté Britannique, afin de faire voir les mêmes dispositions amicales de sa part, m'a autorisé à déclarer, qu'elle regardera la dite déclaration du Prince de Masserano, avec l'accomplissement entier du dit engagement de la part de sa Majesté Catholique, comme une satisfaction de l'injure faite à la Couronne de la Grande Bretagne. En foi de quoi, moi, soussigné, un des Principaux Secretaires d'Etat de sa Majesté Britannique, ai signé la présente de ma signature ordinaire, et à icelle fait apposer le cachet de nos armes. A Londres, ce 22 Janvier 1771.

(L.S.) (Signé) "Rochford."

James Harris, Esq. to the Earl of Rochford.

"Madrid, 14th February 1771.

"They keep the declaration here as secret as possible. I do not find any to whom they have shown it, except those to whom they are obliged to communicate it. They also report that we have given a verbal assurance to evacuate Falkland's Island in the space of two months."

The Earl of Rochford to James Harris, Esq.

"St. James's, 8th March 1771.

"His Majesty has been pleased to order the Juno frigate of thirty-two guns, the Hound sloop, and Florida store-ship, to be prepared to go to Port Egmont, in order to receive the possession from the Spanish commander there; and as I have spoken so fully to Prince Masserano on the manner of its being executed, it is needless for me to say any more to you upon it.

"I think it right to acquaint you, that the Spanish ambassador pressed me to have some hopes given him of our agreeing to a mutual abandoning of Falkland's Islands, to which I replied, that it was impossible for me to enter on that subject with him, as the restitution must precede every discourse relating to those islands.

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"You will endeavour, on all occasions, to inculcate the absurdity of Spain having any apprehensions, from the state in which Port Egmont was before its capture, or the force now sent out, of his Majesty's intending to make use of it for the annoyance of their settlements in the South Sea, than which nothing can be farther from the King's inclination, who sincerely desires to preserve peace between the two nations."

The EARL of ROCHFORD to the LORDS of the ADMIRALTY.

"St. James's, 15th March 1771.

"Your lordships having acquainted me that, in consequence of his Majesty's pleasure, signified in my letter of 22d last, you had ordered the Juno frigate, the Hound sloop, and Florida store-ship, to be prepared to proceed to Falkland's Islands, I am commanded to signify to your lordships his Majesty's pleasure, that you order the commander of the said frigate, as soon as those ships are ready for sea, to repair directly with them to Port Egmont, and presenting to Don Felipe Ruiz Puente, or any other Spanish officer he finds there, the duplicates of his Catholic Majesty's orders sent herewith, to receive, in proper form, the restitution of possession, and of the artillery, stores, and effects, agreeably to the said orders, and to the inventories signed by the Captains Farmer and Maltby (copies of which are annexed), and that you direct him to take an exact account of any deficiency which there may be of the things mentioned in the said inventories, in order that the same may be made good by his Catholic Majesty; giving a copy of the said account, signed by himself, to the Spanish officer, and desiring an acknowledgment under his hand of the same being a true account.

"After the said restitution shall have been completed, it is the King's pleasure that Captain Stott should return immediately to England with the Juno frigate and the Florida store-ship, unless he find it necessary to leave the latter behind; and that the Hound sloop should remain stationed in the harbour till his Majesty's further orders.

"Your lordships will direct Captain Stott to behave with the greatest prudence and civility towards the Spanish commander and the subjects of his Catholic Majesty, carefully avoiding any thing that might give occasion to disputes or animosity, and strictly

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restraining the crews of the ships under his command in this respect; but if, at or after the restitution to be made, the Spanish commander should make any protest against his Majesty's right to Port Egmont, or Falkland's Islands, it is his Majesty's pleasure that the commander of his ships should answer the same by a counter-protest, in proper terms, of his Majesty's right to the whole of the said islands, and against the right of his Catholic Majesty to any part of the same.

"In case, from any accident or otherwise, Captain Stott should not, on his arrival at Port Egmont, find any officer there on the part of the King of Spain, your lordships will direct him (supposing he should find it necessary to put any of his men on shore) to avoid setting up any marks of possession, or letting his Majesty's colours fly on shore, as it is for the King's honour that the possession should be formally restored by an officer of his Catholic Majesty; and for that reason it will be proper that the King's commanding officer should keep a good look-out, and, upon perceiving the approach of any vessel of his Catholic Majesty, should re-embark any of his men who may at that time be on shore, that the possession may be indisputably vacant.

"If it should happen that after the King's ships shall have remained as late as all October, no Spanish officer should yet appear, your lordships will direct Captain Stott, in such case, either to proceed himself, or send an officer to Soledad, to deliver his Catholic Majesty's orders to the Spanish commander there, taking care not to salute the fort as a Spanish garrison, and making a protest, in civil terms, against that settlement of his Catholic Majesty's subjects in an island belonging to his Majesty.

"If, within a reasonable time after the delivery of the said order to the Spanish commander, at Soledad, there still shall not arrive at Port Egmont any officer of his Catholic Majesty to make the restitution, it is the King's pleasure that the commanding officer of his ships should then draw up a protest of the inexecution of his Catholic Majesty's late declaration, and should take formal possession, in his Majesty's name; hoisting his Majesty's colours on shore; and that, leaving there the Hound sloop, and Florida store-ship (if the latter is necessary), and sending a duplicate of his protest to the Spanish officer at Soledad, he should proceed to England to lay before your lordships, for his Majesty's information, his report of the manner in which he has executed his commission.

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"Your lordships will take care that a sufficient quantity of provisions and necessaries of all kinds may be sent out in the said three vessels; and will, at a convenient distance of time, despatch another store-ship for a further supply.

"P.S. I also enclose to your Lordships the copy of his Catholic Majesty's order to Don Felipe Ruiz Puente, with its translation."

ORDER of the KING of SPAIN.

(Translation.)

"It being agreed between the King and his Britannic Majesty, by a Convention signed in London on the 22d of January last past, by the Prince of Masserano and the Earl of Rochford, that the Great Malouine, called by the English Falkland, should be immediately replaced in the precise situation in which it was before it was evacuated by them on the 10th June last year; I signify to you, by the King's order, that, as soon as the person commissioned by the Court of London, shall present himself to you with this, you order the delivery of the Port de la Cruzada or Egmont, and its fort and dependencies, to be effected, as also of all the artillery, ammunition and effects, that were found there, belonging to his Britannic Majesty and his subjects, according to the inventories signed by George Farmer and William Maltby, Esqs., on the 11th July of the said year, at the time of their quitting the same, of which I send you the enclosed copies, authenticated under my hand; and that, as soon as the one and the other shall be effected with the due formalities, you cause to retire immediately the officer and other subjects of the King which may be there. God preserve you many years. Pardo, 7th February 1771.

"The BALIO FRAY, DON JULIAN DE ARRIAGA.

"To Don Felipe Ruiz Puente."

CAPTAIN STOTT to the ADMIRALTY.

"Juno, Plymouth, 9th December 1771.

"I must beg leave to refer their lordships to the letter I had the honour of writing you from Rio de Janeiro, the 30th of July last, for the occurrences of my voyage to that time; from whence I sailed, with his Majesty's ships under my command, the next day, and arrived at Port Egmont the evening of the 13th of September following. The next morning, seeing Spanish colours flying, and

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troops on shore, at the settlement formerly held by the English, I sent a lieutenant to know if any officer was there on behalf of his Catholic Majesty, empowered to make restitution of possession to me, agreeably to the orders of his Court for that purpose, duplicates of which I had to deliver him: I was answered, that the commanding officer, Don Francisco de Orduna, a lieutenant of the royal artillery of Spain, was furnished with full powers, and ready to effect the restitution. He soon after came on board the Juno to me, when I delivered him his Catholic Majesty's orders. We then examined into the situation of the settlement and stores, adjusted the form of the restitution and reception of the possession—instruments for which were settled, executed, and reciprocally delivered (that which I received from the Spanish officer, and a copy of what I gave him, are here enclosed). On Monday, the 16th of September, I landed, followed by a party of marines, and was received by the Spanish officer, who formally restored me the possession; on which I caused his Majesty's colours to be hoisted and the marines to fire three volleys, and the Juno five guns, and was congratulated, as were the officers with me, by the Spanish officer, with great cordiality on the occasion. The next day Don Francisco, with all the troops and subjects of the King of Spain, departed in a schooner which they had with them. I have only to add, that this transaction was effected with the greatest appearance of good faith, without the least claim or reserve being made by the Spanish officer in behalf of his Court."

LORD GRANTHAM to the EARL of ROCHFORD.

"Madrid, 2d January 1772.

"I have received the honour of your lordship's despatch, containing the agreeable intelligence of the restitution of Port Egmont and its dependencies, with the due formalities. On receiving this notice I waited on the Marquis de Grimaldi, to assure him of his Majesty's satisfaction at the good faith and punctuality observed in this transaction. M. de Grimaldi seemed aware of the intention of my visit, and was almost beforehand with me in communicating notice of this event's being known in England. He seemed well pleased at the conclusion of this affair, but entered no further into conversation upon it."

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The LORDS of the ADMIRALTY to the EARL of ROCHFORD.

"Admiralty Office, 15th February 1772.

"Having received by the Florida store-ship, lately arrived at Spithead, a letter from Captain Burr, of his Majesty's sloop the Hound, dated at Port Egmont, in Falkland's Islands, the 10th of November last, giving an account that, in the preceding month, two Spanish vessels had arrived there with the artillery, provisions, and stores, which had been taken from thence by the Spaniards, and that he had received the same from a commissary appointed by Don Philip Ruiz Puente, to deliver them up to him; we send your lordship herewith a copy of Captain Burr's said letter, together with a copy of the inventory of the artillery, provisions, and stores, which he had received as aforesaid, for his Majesty's information."

The EARL of ROCHFORD to LORD GRANTHAM.

"St. James's, 6th March 1772.

"It may be of use to inform your Excellency, that his Majesty has determined to reduce the force employed at Falkland's Island to a small sloop with about fifty men, and twenty-five marines on shore, which will answer the end of keeping the possession: and, at the same time, ought to make the court of Spain very easy as to our having any intention of making it a settlement of annoyance to them."

The EARL of ROCHFORD to LORD GRANTHAM.

"St. James's, February 11th, 1774.

"I think it proper to acquaint your Excellency that Lord North, in a speech some days ago in the House of Commons, on the subject of the Naval Establishment for this year, mentioned the intention of reducing the naval forces in the East Indies, as a material object of diminishing the number of seamen; and at the same time hinted, as a matter of small consequence, that, in order to avoid the expense of keeping any seamen or marines at Falkland's Island, they would be brought away, after leaving there the proper marks or signals of possession, and of its belonging to the Crown of Great Britain. As this measure was publicly declared in Parliament, it will naturally be reported to the Court of Spain; and though there is no necessity of your Excellency's communicating this notice offi-

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cially to the Spanish ministers, since it is only a private regulation with regard to our own convenience; yet, as I am inclined to think, from what passed formerly upon this subject, that they will rather be pleased at this event, your Excellency may, if they mention it to you, freely avow it, without entering into any other reasonings thereon. It must strike your Excellency that this is likely to discourage them from suspecting designs, which they must now plainly see never entered into our minds. I hope they will not suspect, or suffer themselves to be made believe, that this was done at the request, or to gratify the most distant wish, of the French court; for the truth is, that it is neither more nor less than a small part of an economical naval regulation."

M. Moreno will perceive that the above authentic papers, which have been faithfully extracted from the Volumes of Correspondence with Spain, deposited in the State Paper Office, contain no allusion whatever to any secret understanding between the two Governments, at the period of the restoration of Port Egmont and its dependencies to Great Britain, in 1771, nor to the evacuation of Falkland's Islands, in 1774, as having taken place for the purpose of fulfilling any such understanding. On the contrary, it will be evident to M. Moreno, that their contents afford conclusive inference that no such secret understanding could have existed.

The undersigned need scarcely assure M. Moreno, that the correspondence which has been referred to, does not contain the least particle of evidence in support of the contrary supposition, entertained by the Government of the United Provinces of the Rio de la Plata, nor any confirmation of the several particulars related in M. Moreno's note.

The undersigned trusts, that a perusal of these details will satisfy M. Moreno, that the protest which he has been directed to deliver to the undersigned, against the re-assumption of the sovereignty of the Falkland Islands by his Majesty, has been drawn up under an erroneous impression, as well of the understanding under which the declaration and counter-declaration relative to the restoration of Port Egmont and its dependencies were signed and exchanged between the two courts, as of the motives which led to the temporary relinquishment of those islands by the British Government; and the

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undersigned cannot entertain a doubt but that, when the true circumstances of the case shall have been communicated to the knowledge of the government of the united provinces of the Rio de la Plata, that government will no longer call in question the right of sovereignty which has been exercised by his Majesty, as undoubtedly belonging to the Crown of Great Britain.

The undersigned requests, &c.

(Signed) PALMERSTON.

Foreign Office, January 8th, 1834.

No. 18.

By Robert Fitz-Roy, Commander of H. M. sloop "Beagle," off Watchman Cape, on the coast of Patagonia, 22d January 1834.

You are hereby required and directed to proceed in his Majesty's schooner, Adventure, under your command, to survey the Falkland Islands.

New Island appears to me an eligible place for beginning your operations.

Proceeding round the southern coasts, you will endeavour to meet me, in Berkeley Sound, early in March.

After meeting me, or after the twenty-fifth of March, you will proceed to the northern shores of the Falkland Islands, and into Falkland Sound.

If, after going round the islands, you have time enough to make particular plans of any of the best harbours, you will do better than I now anticipate.

All that I think time and weather will allow you to accomplish is a coast survey on a scale of one quarter of an inch to a mile of latitude.

You will time your departure from the Falklands, so as to meet me at the west end of Elizabeth Island, in the Strait of Magalhaens, on or before the first day of next June.

R. F.

To Lieut. J. C. WICKHAM,
commanding H. B. M. schooner "Adventure."

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No. 19.

Winds, Weather, and Currents off Chiloé and the Chonos Archipelago.

So much has been stated by Captain King (vol. i.) respecting the weather at Chiloé; and also with regard to that of the Gulf of Peñas, and neighbouring coast, that I need make but few remarks.

There is much less difference between the climate; the prevailing winds, and the order in which they follow; the tides; and the currents on the outer coast of Chiloé, and at the west entrance of Magalhaens Strait, including the intermediate coasts, than persons would suppose who judge only by their geographical positions. North-westerly winds prevail, bringing clouds and rain in abundance. South-westers succeed them, and partially clear the sky with their fury; then the wind moderates, and hauls into the south-east quarter, where, after a short interval of fine weather, it dies away. Light airs spring up from the north-east, freshening as they veer round to north, and augment the store of moisture which they always bring; from the north they soon shift to the usual quarter, north-west, and between that point and south-west they shift and back sometimes for weeks before they take another round turn. When the wind backs (from south-west to west-north-west, &c.), bad weather and strong winds are sure to follow. On that coast wind never backs suddenly, but it shifts with the sun (with respect to that hemisphere) very suddenly, sometimes flying from north-west to south-west or south in a most violent squall. Before a shift of this kind there is almost always an opening, or light appearance, in the clouds towards the south-west, which the Spaniards call an eye (ojo), and for that signal the seaman ought to watch carefully. As the sudden shifts are always with the sun, no man ought to be taken aback unexpectedly; for so long as a north-wester is blowing with any strength, accompanied by rain, so long must he recollect that the wind may fly round to the south-west quarter at any minute. It never blows hard from east; rarely with any strength from north-east; but an occasional severe gale from south-east may be expected, especially about the middle of winter (June, July, August). In the summer southerly winds last longer and blow more frequently than they do in winter, and the reverse. The winds never go completely

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round the circle; they die away as they approach east; and after an interval of calm, more or less in duration, spring up gradually between north-east by east and north. Heavy tempests sometimes blow, from west-north-west to south-west; and those winds blowing directly on shore are most to be guarded against. As to the tides, they are simple and uniform in the extreme. High water, at full and change, takes place within half an hour of noon, from Valdivia to Landfall Island; and the rise of tide is every where, on the outer coasts within those limits, nearly the same, namely, from four to eight feet. In the offing no stream of tide is any where discernible, and even close to the land it does not exceed one knot, or at most two knots an hour. On this extent of coast what little current is felt, sets southward, except during or before strong or lasting southerly winds: its influence is, however, but trifling, upon a ship out of soundings.* A heavy swell, from the westward, drives in upon all the coast. A barometer is invaluable.

No. 20.

El PRESIDENTE de la República de Chile, &c.

El Señor Roberto Fitz-Roy, comandante del buque de su Magestad Británica Beagle ha recibido de su Gobierno el encargo de reconocer estas Costas y levantar mapas de ellas; y el Gobierno de Chile desea franquear á una operacion de tan conocida utilidad para la navegacion y comercio, y para el adelantamiento de las ciencias, todas las facilidades y auxilios que de él dependan. En su consecuencia, ordeno á todos los Intendentes de Provincia, Gobernadores Departamentales, Jueces de Districto y demas empleados y Ciudadanos por cuyos territorios transitáre el Comandante Fitz-Roy que no solo se le ponga embarazo para que entre con su buque en todos los puertos, bahias y radas de la República que le pareciere conveniente á su empresa, saltando á tierra y ejecutando en ella los reconocimientos y operaciones que crea necesarias, sino que se le proporcione todo el favor de que pueda menester; haciendo y procurando se le haga la mas amistosa acojida por todos los funci-

* By the term out of soundings, I mean in deeper water than three hundred fathoms.

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onarios y Ciudadanos con quienes entable relaciones; cuál conviene á la importancia de los objetos cientificos de que está encargado, y à la amistad y buena harmonia que cultivamos con la Gran Bretaña. Sala de Gobierno, en Santiago, á cuatro de Agosto de mil ochocientos treinta y cuatro.

JOAQUIN PRIETO.

No. 21.

By ROBERT FITZ-ROY, Commander of his Majesty's surveying Sloop "Beagle."

You are hereby required and directed to proceed, with the boats and party placed under your orders, to examine and survey the eastern coast of the island of Chiloé, and the islands, channels, &c. near that coast.

You will endeavour to meet, or wait for the "Beagle," near the island of San Pedro, at the south-east end of Chiloé, on the 10th of December.

Given on board the "Beagle" at San Carlos de Chiloé, this 24th day of November 1834.

To Lieut. B. J. SULIVAN, R. F.
H. M. S. "Beagle."

By ROBERT FITZ-ROY, Commander of his Majesty's Surveying Sloop "Beagle."

You are hereby required and directed to proceed, with the boats and party placed under your orders, to continue the examination and survey of the eastern coasts of Chiloé, and the islands, channels, &c. lying between it and the main land.

You will endeavour to reach San Carlos on or before the 10th of January, and there await the arrival of the "Beagle."

Given on board the "Beagle" at the island of Chiloé, this 9th day of December 1834.

To Lieut. B. J. SULIVAN, R. F.
H. M. S. "Beagle."

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No. 22,

By Robert Fitz-Roy, Commander of his Majesty's Surveying Sloop "Beagle."

You are hereby required and directed to proceed in the whale-boat to survey such parts of the western coasts of the Chonos Archipelago between Lemu Island and the northernmost island, as your very limited time and means will allow.

You will endeavour to reach Port Low, and there meet the Beagle, on or before the 31st of this month.

Given on board the "Beagle" in Vallenar Road, Chonos Archipelago, this 13th day of December 1834.

To Mr. John Lort Stokes, R. F.
Mate and Assistant-Surveyor,
H.M.S. Beagle.

No. 24*.

Extracts from Agüeros.

Francisco Machado, Piloto que fué á la expedicion que se acaba be hacer á la parte del Sud, en obedecimiento del Decreto del Señor Gobernador, y Comandante General de esta Provincia, su fecha 29 de Mayo de este presente año, y para su cumplimiento, segun instruye, dando principio desde la Isla de San Fernando, situada en la latitud 45g. 47m., dice: Que el Puerto que tiene esta Isla es pequeño, manso; pero con mal fondo en partes. La Isla de Inche, que demora al S. ¼ al S. E. de la aguja, no tiene Puerto, ni caleta alguna, bien que una embarcacion puede dar fondo á su abrigo por la parte del E. y esto á necesidad, y por poco tiempo.

Acia la Tierra Firme se hallan dos Puertos muy mansos, y seguros:† el que está mas al S. es el estero de Diego Gallegos, que hace una ensenada ácia el S. y el estero que sigue al E. muy hondable. En la entrada de éste tiene una Isla que, aunque estrecha la boca, no por eso dexa de haber bastante fondo para qualquiera embarcacion. De la boca de este dicho estero, corriendo la Costa al Nd.

* No. 23 is placed after this.—R. F. † 46 grados. S.

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como tres leguas, ó poco ménos, se halla el Puerto donde ancló el Pingue-Ana de la Esquadra de Anson: tiene varias Islitas á entrada: la mayor es la del S. donde dexa un canal de 10 brazas de agua.

Este Puerto se compone de una ensenada ácia el S. S. O. y un estero al S. E. por qualquiera parte de las Islitas que tiene en la boca se puede entrar: es buen Puerto, manso, y seguro para qualquier embarcacion. Desde la punta que avanza mas E. O. como una y media legua del estero de Diego Gallegos, que se ve desde San Fernando al S. corre la Costa al N d. haciendo como ensenada, y en ella está la dicha Isla de Inche, que es el principio del Archipiélago de los Chonos, entre la qual y la Tierra-Firme está otro de Farallones grandes, y pequeños. Los vientos que se experimentáron por tiempo de 17 dias por el mes de Enero fuéron S. O. y O. que es el que llaman Travesía, y regularmente viene con zerrazon.

La Tierra-Firme es de serranía alta, y pelada, de piedra áspera, color de ceniza, y en las faldas y quebradas bosque, que me parece nada cultivable: todo es península que cercan los dos mares: por la parte del N. termina en un golfito casi circular, que llaman la laguna de San Rafael, y por el S. da principio al golfo de San Estevan donde desemboca el rio de San Tadeo; de uno á otro mar habrá de 2 á 3 leguas, aunque lo navegable del rio pasa de 5, por las vueltas y revueltas, que son muchas. De la dicha laguna al embarcadero del mismo rio habrá como 20 quadras; y éste es el Istmo que llaman de Ofqui, y vulgarmente por otro nombre el Desecho. Este rio de San Tadeo baxa de una cordillera, cuya abra se ve muy cerca de la laguna, y desemboca, como he dicho, en el golfo de San Estevan, cuya boca es algo peligrosa porque tiene poco fondo, y estrecha tanto que solo se puede entrar ó salir quando el mar está tranquilo. Al frente de su boca al S. como 4 leguas está la Isla de San Xavier, y al S. O. de 2 ½ à 3 leguas una punta ó península donde hay varias ensenadas, y caletas que son buenos Puertos; y de estos N. O. un bello estero directo mas de 2 leguas, muy sereno, de suficiente fondo, y bueno; pero con un pequeño baxo que tiene en su entrada del medio al S.: se le puso el nombre de San Quintin.

De la expedicion que los Padres Fr. Benito Marin, y Fr. Julian Real, Misioneros del Colegio de Ocópa, y destinados á las Misiones

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del Archipiélago de Chiloe, hiciéron á últimos del año de 1778, y principios del de 1779, á los Archipiélagos de Guaitécas, y Guaianeco, al Sud de aquella Provincia, en solicitud de los Indios Gentiles.

El 10 se hiciéron á la vela, y con viento favorable navegáron casi todo el golfo que media entre Chayamapu, y Tagau, y llegáron por la tarde al Puerto de Tualad.

Surgiéron de éste al amanecer, (11) no obstante que el N. estaba considerablemente fresco, y que les ponia en cuidado, porque permaneciendo anclados conocian mayor riesgo; y lográron en pocas horas anclar en Charraguel, aunque habian ántes arribado á Tagau para comer; y para seguir desde éste el rumbo para el otro dexáron el canal que se dirige á la laguna de San Rafael, y tomáron el de Aú, cuya boca tiene como un quarto de legua de ancho por el O. E. Tomáron este rumbo con el fin de reconocer si habia otra salida mas fácil para el mar de Guaianeco: y diéron fondo en Yepusnec, en donde por la noche estuviéron en manifiesto peligro, porque sentándose la piragua grande sobre una piedra luego que la vaciante tomó su curso, se bolcó por un costado; pero mediante el favor de Dios, y patrocinio de María Santisima, cuyo nombre tenia la embarcacion, y poniendo por su parte las diligencias que en tan arriesgado caso eran necesarias, consiguiéron salir libres en todo, y sin daño alguno en la piragua.

Enderezada ésta, y viéndola ya voyante saliéron de aquel Puerto, y fuéron á comer á otro llamado el Obscuro. (12) Surgiéron luego, y continuáron la navegacion por el mismo canal, dexando al E. otros dos pequeños con rumbo al S. y llegáron á hacer noche en Tucúa: y porque entráron en el canal la víspera de San Diego, y navegáron por él todo el dia de este glorioso Santa, le tituláron con su nombre.

El siguiente dia no pudiéron salir por la mañana por lo mucho que llovió, pero aprovecháron la tarde saliendo para otro sitio, que halláron muy incómodo por la fuerza de la corriente que en él experimentáron llevaban las aguas.

De éste surgiéron á la mañana siguiente (14) con el fin de entrar por la primera boca de los dos referidos canales; y habiendo navegado hora y media con este designio, no pudiéron romper contra la fuerza de las corrientes que halláron, viendose obligados á arribar: á pocas horas se volviéron á levar, y navegáron por la primera boca; pero encontrándose despues con otra, que tampoco les fué posible

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romper contra su corriente impetuosa, y arribáron á una ensenada para esperar proporcion favorable. Por la tarde fuéron algunos marineros, y un práctico con el Padre Fr. Benito á reconocer la boca que esperaban pasar; y regresáron asombrados de haber visto lo encrespado, y entumecido de las olas por el encuentro de unas con otras, todo lo que les causó considerable horror, y llenó su corazon de temor al considerar les era forzoso haber el pasar por tan manifiesto peligro.

Luego que dixéron Misa, (15) y estando el mar en creciente, saliéron de la ensenada, y no obstante el sobresalto que todos llevaban lográron pasar con felicidad la boca: continuáron navegando, y diéron fondo ántes de medio dia. Experimentáron allí el lleno de las aguas entre una y dos de la tarde, siendo en el mar á las nueve.

Prosiguiéron su viage, y viéron el fin de un grande estero. (16) Regresáron, y aunque al O. E. encontráron otro canal no entráron á reconocerle por no perder tiempo, y poder llegar adonde estuviesen asegurados para desembocar por la arriesgada boca referida.

Este dia entre dos y tres de la tarde consiguiéron pasarla felizmente, y fuéron á anclar en un pequeño canal que se dirige al Desecho. (17)

Prosiguiéron la navegacion, y halláron el canal principal que va al Desecho, nombrado Celtau, y llegáron á hacer noche en el Puerto Mosado. (18)

Saliéron de éste, y ántes que principiase la vaciante ganáron la boca de Celtau, lo que no hubieran conseguido con corta detencion que hubiesen tenido, como sucedió á una de las piraguas pequeñas, que se quedó fuera por su demora.

Al siguiente dia navegáron un pequeño golfo que se encuentra ántes de la boca de la laguna de San Rafael, y tomando Puerto ancláron en el, y permaneciéron toda la mañana del otro dia, esperando terminase la vaciante, no obstante haber viento N. claro, y favorable. (21)

Continuáron su derrota, y desembocáron en dicha laguna, la que rebalsáron con tiempo apacible, y tambien lo era su vista por los muchos farallones de nieve que en ella halláron, unos grandes, otros pequeños, y medianos otros. Está situada entre los 46 gr. 55 min. y 47 gr. 5 min. de latitud. Diéron fondo á las nueve de la mañana en el Puerto de San Rafael, el que solamente está resguardado por el S. y O. E. Pasáron luego los prácticos, y el Piloto Oyarsum á reconocer el Desecho, y regresáron con las funestas noticias de que

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el palo donde se enganchaba, y afianzaba el aparejo para subir las piraguas se habia ya caido, y que el rio San Tadeo habia rebentado, y formado varios brazos, y diversos rumbos.

Este dia fuéron los Pilotos, (23) con lo mas de la tripulacion, ésta con herramientas para abrir el camino, y aquellos para reconocer, é informarse si era ó no transitable dicho rio: y juzgándose conveniente que todo esto lo presenciase uno de los Religiosos, fué el Padre Fr. Benito con los referidos al reconocimiento. Hecho éste se resolvió continuar el viage. Despues de puesto el sol amenazó el tiempo de borrasca, la que se verificó, y llegó á tanto, que pasáron la noche con mucha afliccion y temores, sin poder descansar en toda ella. Resultó de esta tormenta, que de las dos piraguas pequeñas, la una perdió el codaste, y la otra quedó tan maltratada, que solo su plan y una falca quedáron servibles. Continuó el tiempo en esta disposicion hasta el dia 28.

En este, aunque ayudó poco, pasáron hasta el principio del Desecho, y luego diéron disposicion, y probáron á subir la piragua entera; pero habiendo conseguido llegase su proa á lo último de la escalera, faltó el puño de la garita, y descendió precipitada al principio, pero sin daño alguno.

Este dia, (29) aunque festivo por Domingo, considerando por suficiente y justa causa la notable necesidad en que se hallaban, le empleáron en trabajar, y prevenir lo necesario para subir la piragua: y al siguiente despues de la Misa se principió la maniobra; pero aun con las muchas y eficaces diligencias que hiciéron no pudiéron conseguir el fin que deseaban, y resolviéron quitar las falcas á la piragua, con lo que lográron su deseo, y la subiéron hasta lo mas penoso.

Conseguido esto empleáron este dia (Dic^{e}. 1°.) en que algunos de la tripulacion fuesen á trabajar para levantar nueva piragua, y otros á conducir las cargas: y el dia 2 despacháron la piragua Santa Teresa á la Ciudad de Castro para que diese noticia de quanto hasta este dia les habia acaecido.

El 3 pasáron á pie el Desecho, y baxáron al rancho que ya estaba prevenido en la playa del rio de San Tadeo. Permaneciéron allí hasta que se aprestáron con todo lo necesario las dos piraguas. El dia 17 continuáron el viage navegando rio abaxo. Padeciéron algunos peligros y aflicciones por haberse quebrado las piraguas, y con especialidad la San Joseph; pero pudiéron llegar á la boca, ó desembocadero del rio San Tadeo en el golfo de San Estevan, y tomar Puerto en un estero estrecho y largo.

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(A la vuelta.)

Al siguiente dia* emprendiéron la subida por el rio, y logrando la creciente favorable hiciéron buen viage; y el 16 llegáron á comer al Desecho, en donde dentro de un rancho halláron una carta del P. Fr. Francisco Menendez, por la que viéron les esperaba en la laguna de San Rafael: gozosos con tan plausible noticia pasáron por la tarde el Desecho, y encontráron á dicho Religioso en la escalera.

Los dos siguientes dias permaneciéron allí, empleando la tripulacion en conducir á la laguna lo que venia en las piraguas (las que dexáron en piezas en el rancho del embarcadero del rio) y pusiéron boyante la piragua del Patrocinio.

El dia 19 saliéron despues de comer, y navegando á remo toda la tarde llegáron al anochecer á tomar Puerto; pero ántes de dar fondo se asentó la piragua, y pasáron en ella la noche, hasta que con la creciente á la madrugada pudiéron lograr que boyase; y no obstante que habia N. se aprovecháron de la vaciante, y pasáron la segunda boca. Refrescó el viento, y continuáron navegando el golfo atracados al E., y fuéron á comer en el Puerto llamado Chauguaguen, y de allí se leváron, y siguiéron por el E. hasta cerca de la boca de Celtau, donde pasáron la noche. (20)

Segunda Expedicion.

Hecha á los referidos Archipiélagos de Guaitécas, y Guaianeco, por los Religiosos Misioneros P. Fr. Francisco Menendez, y P. Fr. Ignacio Bargas, en solicitud de la reduccion de los Gentiles, á fines del año de 1779, y principios del de 1780.

Primeramente, nuestro viage hasta la laguna† (es la de San Rafael) fué feliz, sin otra novedad que algunos sustos á la salida del golfo: llegamos el dia de los Difuntos despues de haber dicho los dos Misa en Vicuñamo al Desecho.‡ Descargóse en la escalera el mismo dia, y por la tarde se sacó la piragua el Patrocinio hasta media quilla del agua: y al otro dia de mañana se aseguró del todo, y por la tarde la otra. Intentamos hacer otra piragua mas, y por haber caido enfermos cinco marineros no se concluyó; quedó hecho el plan, y costados. El Viérnes siguiente (5) comenzáron los temporales, y continuáron con algunas nevadas, hasta que se hallaba el bastimento en el embarcadero del rio, y las piraguas ya levantadas, que fué á los 24 dias de nuestra llegada.

* Febº. 15, 1779. † Octº. 11, 1779. ‡ Novº. 2.

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Parecia que el tiempo se oponia todo á la expedicion. Para botar las piraguas se secó el rio, y comenzó el S.; todo nos iba en contra; pero su Divina Magestad permitió que con buen tiempo creciese el rio, y á los 26 dias, el de San Jacome de la Marca, y primera Dominica de Adviento, baxamos el rio, y fuí á decir Misa á la boca del rio San Tadeo. (Nov^{e}. 28.)

* * * * * *

Uno de los Gentiles nos dixo habia visto por aquellos parages Huampus mas grandes, que andaba la gente por las bergas, y falcas mayores que las nuestras: todas noticias deseadas; pero no lo quieren averiguar.

Nuestro Señor guarde á V. R. muchos años, Castro y Marzo 14 de 1780.

* * * * * *

Huampus es nombre propio del idioma Veliche, y significa qualquiera embarcacion; y en esté dicho dió á entender aquel Gentil á los Religiosos que en aquella altura habia visto navíos, como claramente se infiere de expresar que la gente andaba por las bergas.

No. 23.

EXTRACT from Burney's History of the Discoveries in the South Sea. Vol. iv. p. 118, &c.

Oct. 11th, 1681, they* were in latitude 49° 54′ S., and estimated their distance from the American coast to be 120 leagues. The wind blew strong from the S.W. and they stood to the S.E. On the morning of the 12th, two hours before day, being in latitude by account 50° 50′ S., they suddenly found themselves close to land. The ship was ill prepared for such an event, the fore-yard having been lowered to ease her, on account of the strength of the wind. "The land was high and towering; and here appeared many islands scattered up and down." They were so near and so entangled, that there was no possibility of standing off to sea; and, with such light as they had, they steered as cautiously as they could in between some islands and along an extensive coast, which, whether it was a larger island, or part of the continent, they could not know. As the day advanced, the land was seen to be mountainous and craggy, and the tops covered with snow.

* The buccaneers under Sharp.

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Sharp says, "we bore up for a harbour, and steered in northward about five leagues. On the north side there are plenty of harbours." "At eleven in the forenoon they came to an anchor in a harbour in forty-five fathoms, within a stone's cast of the shore, where the ship was land-locked and in smooth water. As the ship went in, one of the crew, named Henry Shergall, fell overboard as he was going into the spritsail top, and was drowned; on which account this was named Shergall's Harbour."

The bottom was rocky where the ship had anchored; a boat was therefore sent to look for better anchorage. They did not, however, shift their berth that day; and during the night, strong flurries of wind from the hills, joined with the sharpness of the rocks at the bottom, cut their cable in two, and they were obliged to set sail. They ran about a mile to another bay, where they let go another anchor, and moored the ship with a fastening to a tree on shore.

They shot geese, and other wild-fowl. On the shores they found large muscles, cockles like those in England, and limpets: here were also penguins,* which were shy, and not taken without pursuit; "they paddled on the water with their wings very fast, but their bodies were too heavy to be carried by the said wings." The first part of the time they lay in this harbour, they had almost continual rain.

On the night of the 15th, in a high north wind, the tree to which their cable was fastened gave way, and came up by the root, in consequence of which, the stern of the ship took the ground and damaged the rudder. They secured the ship afresh by fastening the cable to other trees; but were obliged to unhang the rudder to repair.

The 18th was a day of clear weather. The latitude was observed 50° 40′ S. The difference of the rise and fall of the tide was seven feet perpendicular: the time of high-water is not noted. The arm of the sea, or gulf, in which they were, they named the English Gulf; and the land forming the harbour, the Duke of York's Island; "more by guess than any thing else; for whether it were an island or continent was not discovered."

Ringrose says, "I am persuaded that the place where we now are, is not so great an island as some hydrographers do lay it down, but rather an archipelago of smaller islands. Our captain gave to them the name of the Duke of York's Islands. Our boat which went eastward found several good bays and harbours, with deep water close to the shore; but there lay in them several sunken rocks, as there did

* Steamer ducks. Penguins swim like fish.—R. F.

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also in the harbour where the ship lay. These rocks are less dangerous to shipping, by reason they have weeds lying about them."

From all the preceding description, it appears that they were at the south part of the island named Madre de Dios in the Spanish atlas; which island is south of the channel, or arm of the sea, named the Gulf de la S^ma^ Trinidada; and that Sharp's English Gulf is the Brazo de la Conçepçion of Sarmiento.

Ringrose has drawn a sketch of the Duke of York's Islands, and one of the English Gulf; but which are not worth copying, as they have neither compass, meridian line, scale, nor soundings. He has given other plans in the same defective manner, on which account they can be of little use. It is necessary, however, to remark a difference in the plan which has been printed of the English Gulf, from the plan in the manuscript. In the printed copy, the shore of the gulf is drawn in one continued line, admitting no thoroughfare; whereas, in the manuscript plan, there are clear openings, leaving a prospect of channels through.

Towards the end of October, the weather settled fair. Hitherto they had seen no inhabitants; but on the 27th, a party went from the ship in a boat on an excursion in search of provisions, and unhappily caught sight of a small boat belonging to the natives of the land. The ship's boat rowed in pursuit, and the natives, a man, a woman, and a boy, finding their boat would be overtaken, all leaped overboard and swam towards the shore. This villanous crew of buccaneers had the barbarity to shoot at them in the water, and they shot the man dead; the woman made her escape to land; the boy, a stout lad about eighteen years of age, was taken, and with the Indian boat, was carried to the ship.

The poor lad thus made prisoner had only a small covering of seal skin. "He was squint-eyed, and his hair was cut short. The doree, or boat, in which he and the other Indians were, was built sharp at each end and flat bottomed: in the middle they had a fire burning for dressing victuals, or other use. They had a net to catch penguins, a club like our bandies, and wooden darts. This young Indian appeared by his actions to be very innocent and foolish. He could open large muscles with his fingers, which our buccaneers could scarcely manage with their knives. He was very wild, and would eat raw flesh."

By the beginning of November the rudder was repaired and hung. Ringrose says, "we could perceive, now the stormy weather was

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blown over, much small fry of fish about the ship, whereof before we saw none. The weather began to be warm, or rather hot; and the birds, as thrushes and blackbirds, to sing as sweetly as those in England."

On the 5th of November, they sailed out of the English Gulf, taking with them their young Indian prisoner, to whom they gave the name of Orson. As they departed, the natives on some of the lands to the eastward made great fires. At six in the evening the ship was without the mouth of the gulf: the wind blew fresh from the N.W., and they stood out S.W. by W., to keep clear of breakers, which lie four leagues without the entrance of the gulf to the S. and S.S.E. Many reefs and rocks were seen hereabouts, on account of which they kept close to the wind till they were a good distance clear of the land. Their navigation from here to the Atlantic was, more than could have been imagined, like the journey of travellers by night in a strange country without a guide. The weather was stormy, and they would not venture to steer in for the Strait of Magalhaens, which they had purposed to do, for the benefit of the provision which the shores of the strait afford, of fresh water, fish, vegetables, and wood. They ran to the S. to go round to the Tierra del Fuego, having the wind from the N.W., which was the most favourable for this navigation; but they frequently lay to, because the weather was thick.

On the 12th, they had not passed the Tierra del Fuego. The latitude, according to observation that day, was 55° 25′, and the course they steered was S.S.E.

On the 14th, Ringrose says, "the latitude was observed 57° 50′ S., and on this day we could perceive land, from which at noon we were due W." They steered S. by E., and expected that at daylight the next morning they should be close in with the land; but the weather became cloudy, with much fall of snow, and nothing more of it was seen. No longitude or meridian distance is noticed, and it must remain doubtful whether what they took for land was floating ice; or their observation for the latitude erroneous, and that they saw the Isles of Diego Ramirez?

Three days afterwards, in latitude 58° 30′ S., they fell in with ice islands, one of which they reckoned to be two leagues in circumference. A strong current set here southward. They held on their course eastward so far, that when at last they did sail northward, they saw neither the Tierra del Fuego nor Staten Island. (End of November 1681.)

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No. 24 (*a*).

EXTRACT from the Voyage of Lionel Wafer in 1686, describing the Island of Santa Maria, under the mistaken name of Mocha.

" The island afforded both water and fresh provision for our men. The land is very low and flat, and upon the sea coast sandy; but the middle ground is good mould, and produces maize, wheat, and barley, with variety of fruits, &c. Here were several houses belonging to the Spanish Indians, which were very well stored with dunghill fowl. They have here also several horses: but that which is most worthy of note, is a sort of sheep they have, which the inhabitants call ' carnero de tierra.' This creature is about four feet and a half high at the back, and a very stately beast. These sheep are so tame that we frequently used to bridle one of them, upon whose back two of the lustiest men would ride at once round the island, to drive the rest to the fold. His ordinary pace is either an amble or a good hand-gallop; nor does he care for going any other pace during the time his rider is upon his back. His mouth is like that of a hare; and the hare-lip above opens as well as the main-lips, when he bites the grass, which he does very near. His head is much like an antelope, but they had no horns when we were there; yet we found very large horns much twisted, in the form of a snail-shell, which we suppose they had shed; there lay many of them scattered upon the sandy bays. His ears resemble those of an ass, his neck is small, and resembling a camel's. He carries his head bending and very stately, like a swan; is full-chested, like a horse, and has his loins much like a well-shaped grey-hound. His buttocks resemble those of a full-grown deer, and he has much such a tail. He is cloven-footed, like a sheep, but on the inside of each foot has a large claw, bigger than one's finger, but sharp, and resembling those of an eagle. These claws stand about two inches above the division of the hoof; and they serve him in climb-ing rocks, holding fast by whatever they bear against. His flesh eats as like mutton as can be: he bears wool twelve or fourteen inches long upon the belly; but it is shorter on the back, shaggy, and a little inclining to curl. It is an innocent and very serviceable beast, fit for any drudgery. Of these we killed forty-three; out of the maw of one of which I took thirteen bezoar stones, of which some were ragged, and of several forms; some long, resembling coral; some

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round, and some oval, but all green when taken out of the maw; yet by long keeping they turned of an ash colour."

No. 25.

By ROBERT FITZ ROY, Captain of H.M. Surveying Sloop Beagle.

You are hereby required and directed to take charge and command of the schooner Constitucion, and the party placed by me under your orders.

Directly the vessel is ready for sea, you will proceed to survey those parts of the coast of Chile which lie between the parallels of thirty-one and thirty-five: and on or before the 31st of July, you will endeavour to meet me in Callao Roads.

MEMORANDA:

At this time of year, unfavourable foggy weather may be expected to impede your progress very materially; but successful, or the contrary, you must endeavour to be punctual at your rendezvous.

At many places the landing will be bad. Do not on any account land then in a boat. Go near only in a boat; land on a balsa.

On so straight a coast, subject to a continuance of cloudy weather, views of the land may be particularly useful. Mr. King is added to your party, because he draws such views very correctly.

Do not delay in attempting to get deep-sea soundings, when not hove-to for other purposes.

Be very particular in noticing characteristic appearances of the land about anchorages; and such peculiarities of marks, or otherwise, as may help to guide a stranger.

Notice where and how wood and water are to be procured.

Let Mr. King keep a journal for you, to be given afterwards to me. No log will be required by me; but let that journal contain every note which you consider likely to be useful.

I shall be anxious to send away a tracing of your work, as soon as possible after your arrival at Callao.

Remember that Paposo is the northernmost inhabited place over which the government of Chile has authority. In approaching vessels or places on the coast of Peru, be particularly on your guard.

Inquire about the earthquake and waves of the 20th of February.

At each place make the chief Authority acquainted with your busi-

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ness, and the accompanying letter from the government of Chile, as soon as possible.

H.M. sloop Beagle, in Port Herradura, Coquimbo,
6th day of June 1835.

To Lieutenant B. J. SULIVAN, R. F.
H.M.S. Beagle.

No. 26.

By ROBERT FITZROY, Captain of His Majesty's Surveying Sloop Beagle.

You are hereby required and directed to take charge and command of his Majesty's surveying sloop Beagle, until I rejoin you at Callao.

You will conform your conduct, in all respects, to the instructions sent to me for my guidance by the Lords Commissioners of the Admiralty.

You will sail from Valparaiso on the 28th of this month, or as soon after as possible, and proceed direct to Copiapo.

Thence you will proceed to Callao, calling at Iquique, if circumstances are favourable ; and at Callao you will await my arrival.

H.M. sloop Beagle, in Valparaiso Bay,
18th of June 1835. R. F.

To Lieut. J. C. WICKHAM,
H.M.S. Beagle.

N.B. Remember that Peru is in a state of anarchy.

No. 27.

JOURNAL of the Proceedings on board the hired schooner, Carmen, in search of the crew of his Majesty's late ship Challenger.

June 22d, 1835.—H.M.S. Blonde's boats getting the schooner Carmen ready for sea; at thirty minutes past eight, P.M. went on board the schooner with the Beagle's whale-boat and surveying instruments.

Tuesday, 23d. Blowing a strong gale from the northward all day, with very heavy rain; a great deal of surf on the beach, made it impossible to land; therefore nothing was done to forward the schooner's sailing.

Wednesday, 24th. More moderate, but very unsettled weather; Blonde's boats preparing schooner for sea; at four, weighed and ran

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under the commodore's stern. Asked the commodore for some ballast, a few muskets, and a little powder; was refused. Thirty minutes past four, received final orders; made all sail, with the wind fresh from the southward, and ran through the small passage.

On board the Carmen were:

Mr. Wm. Thayer, master of the vessel.

George Biddlecombe,	2d master of	H.M.S. Blonde.
Alex. B. Usborne,	2d assist. surveyor,	,, Beagle.
James Bennett,	gunner's mate,	,, Beagle.
John Nutcher,	boatswain's mate,	,, Blonde.
John MacIntosh,	A.B.	,, Blonde.
John Mitchell,	A.B.	,, Blonde.

and ten men hired at Talcahuano, who were of very little, indeed almost no use as seamen.

At about ten, P.M. the wind died away to nearly a calm, which continued throughout the night.

Thursday, 25th. Daylight. Saw the Paps of Bio Bio E.S.E. by compass, nine miles distant; light, variable airs from the northward throughout the day. Sun-set: north end of St. Mary S.b.W. six miles, calm all night.

Friday, 26th. Daylight. North end of St. Mary S.E. five miles; light winds from the northward, until four, P.M., when the wind freshened from north-north-west, with heavy squalls of wind and rain; sun-set, Carnero Head, E. distant five miles. At thirty minutes past six, observed a fire on Tucapel Head, bearing south-east; burnt a blue light, supposing it might be part of the Challenger's crew on their road to Concepcion; but finding no alteration in the size of the fire, and it not corresponding with the signal agreed on, continued our course towards the supposed place of the Lebu, or Leübu.

Saturday, 27th. Strong winds from the northward, and squally weather, with heavy rain; stood off and under foresail until two, P.M., when the weather cleared a little; made all possible sail, and stood in for the point on which the Challenger was lost. At three, Molguilla Point E. two miles and a half distant, saw nothing of the wreck; bore up, and stood along the land toward the southward, from one to two miles off shore, in search of the river Lebu. At five, P.M., having run ten miles south of Point Molguilla, and five miles south of the supposed place of the Lebu, and not seeing any thing of the wreck or crew of the Challenger, hauled off, and hove-to; at

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this time any people on the shore could have seen the vessel five miles north or south of her, she not being more than a mile and a half from the beach, and having a large blue ensign at the fore-top-gallant-mast-head.

At six, fired a rocket, as a signal to the shore; no answer of any description being made, filled and stood off and on, to keep our position during the night; fresh winds and squally, with heavy rain.

Sunday, 28th. Strong winds from north-west, and squally weather, with heavy rain; shortened sail to foresail, and headed to the westward; thirty minutes past ten, saw the island of Mocha south, distant eight miles, sounded in fifteen fathoms; wore to north-east, and carried all possible sail to get out of the bight; fresh gales and squally, with a heavy cross sea.

Monday, 29th. More moderate, but wind still from the northward. At nine A.M. spoke the Blonde, on her way to the supposed place of the Lebu; kept our wind, endeavouring to fetch Tucapel Head, where we had seen the fire three days before; noon, Tucapel Point east-north-east, three-quarters of a mile distant; observed two fires on Tucapel Head; tacked to the westward, to fetch the Head.

At thirty minutes past two, Tucapel Point east-north-east, nine miles; while four men were aloft (James Bennett, gunner's mate, Beagle; John Nutcher, boatswain's-mate; John MacIntosh, A.B.; John Mitchell, A.B., of Blonde), bending the fore-topsail, which had been split the previous night, the vessel gave a very heavy pitch, which sprung the foremast, a little below the cross-trees; and on her recovering herself, the head of the mast snapped short off, a foot below the fore-yard, bringing with it all above, and also the four seamen who were aloft; the mainmast, having no support left from the tryatic stay, and the deck-stay being aft, ready for tacking, the great weight of the main-boom, added to the pressure of the wind on the mainsail, brought the mainmast by the board, fore-and-aft the deck, striking the taffrail in its fall, which again carried it away, leaving the head of the mast hanging by the rigging over the stern, striking heavily against the rudder and the middle-piece in midships on the deck. Fortunately, none of the seamen were seriously injured, as they resolutely kept their hold of the topsail-yard, and were carried with it into the sea, out of which they soon escaped by means of the rigging that was hanging over the side.

Every effort was immediately used to clear the wreck, and get

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the temporary rigging up, to secure the stump of the foremast which had carried away the wedges in the partners, and had about three inches play in the step, from the heel of the mast being decayed; nearly the whole of the standing rigging was lost, from night coming on, and it being necessary to get the wreck clear of the vessel as soon as possible, lest it should carry away the rudder, and otherwise damage the hull of the vessel.

Not having an axe, or any thing but a cooper's drawing-knife, that would cut the rigging in the eyes, which had hide on them that had been placed there several years before, we were obliged to haul it up taut and cut on the rail, thereby rendering it useless for any thing but junk.

There were scarcely any nails on board the vessel; and it was with the greatest difficulty we succeeded, by shifting two cleats up a slippery mast, in getting a tackle each side for shrouds, and a hawser for a stay. At eight, P.M., observed the Blonde north-west one mile; fired a rocket, and burnt three blue lights; no answer returned.

At about midnight we set the jib, peak of foresail, and Beagle's boat sail for a main-sail; during the whole of this time it was blowing fresh from the north-west, with heavy rain and a cross sea, which caused the vessel to roll her gunwale under each time; every one was quite exhausted, particularly those men who had been hanging on the mast, getting the tackles secured, the watch therefore was set until daylight.

Tuesday, 30th. Employed getting the foremast better secured, by raising sheers with fore-yard and jib-boom, and placing a pair of shrouds on each side, about twenty feet from the deck, and an extra stay to set a stay-sail on, the whole kept up by a few spikes *drawn out of the beams*. At ten, A.M. strong winds from the westward, with heavy rain; saw the north-west extreme of Mocha, bearing south-south-east, three miles distant; wore to the north-east, to give time to get more sail on the vessel, intending to weather the island, if possible; if not, to run to leeward, and then stretch off to the southward and westward. Noon; wore, strong winds and squally, with a heavy head sea; at two, set foresail, double-reefed; observed the north-west extreme of Mocha, south by east, one mile and a quarter distant. At three, P.M., when the north-west extreme bore north-east, the wind changed suddenly to south-west, bringing the rocks off the

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south-west extreme of the island about four points on the lee-bow; but the wind increasing and giving the vessel more way, enabled her to pass about three-quarters of a mile to windward of the outer breaker, on which the sea was breaking furiously; the island itself was only visible at intervals, owing to the thickness of the weather, and constant, heavy rain.

At five, the weather being a little clearer, saw the island, its centre bearing north-east, four miles distant; stood to the southward during the night, fresh breezes from south-west throughout.

Wednesday, July 1st. Daylight, employed rigging the fore-yard as a jury main-mast; calm, with drizzling rain and a heavy swell; by noon got the jury main-mast up, and set fore stay-sail for a main-sail, secured the boat's mast to the taffrail, and set the sail for a mizen. At five, a light air from the southward, stood to the westward during the night (no stars visible).

Thursday, 2d. Strong winds from west-north-west; stood to the south-west; at thirty minutes past eight, observed a schooner west, standing to the northward; hoisted the ensign union down in the fore-rigging; but she passed within a mile to windward, and took no notice of us. Noon, weather the same; wore to north-west; thirty minutes past four, observed the land east-north-east, supposed Cocale Head; wore, and stood to the south-west; fresh breezes and squally, with rain at times; no stars visible throughout the night. Midnight, wore to the northward.

Friday, 3d. Moderate from the westward, with rain at times, employed setting up rigging and securing masts; latitude observed (within a few miles) 39° 23′ S.

Repaired the Beagle's boat, which had been badly stove by the fall of the masts, as well as our means would allow. Moderate from the westward, until two, A.M., when the wind shifted to the northward; wore to the westward.

Saturday, 4th. Moderate, with rain at times, wind north-west; employed as most necessary, fitting grummets for sweeps, in case of a calm, and being drifted near the land. Latitude observed nearly 38° 40′. S. P.M. Employed as before; at eight o'clock, wore to the northward; moderate throughout the night.

Sunday, 5th. Light winds from north-west, and fine clear weather; employed repairing sails, chafes, &c. Latitude observed, 38° 35′ S. At one, P.M., observed the island of Mocha, south extreme bearing

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north-east about twenty miles; at five, the south extreme bore north fifty-six east, and by the angle to the north extreme eighteen miles distant. Light airs from north-west and fine weather; at nine, the wind shifted to south; trimmed and steered north by west; midnight, strong winds and fine.

Monday 6th. Strong breezes from south-south-east; at daylight, Tucapel Head north-north-east; hauled up for it; at ten, observed a vessel in shore; but suddenly lost her, and could not again get sight of her.* Noon, Carnero Head east (true), distant ten miles; found a strong current setting along shore to the southward, with at times a heavy ripple, until one, P.M., when it changed and set to the northward, and off-shore withal; at six, Dormido Rocks south-south-east, distant two miles; steered north-east by north for the Paps of Bio Bio; but found it necessary to haul up north-east, and latterly north-east half-east, owing to a strong current setting to the northward and westward; at thirty minutes past nine, Paps of Bio Bio south-south-east, distant three miles; and at two, A.M. (Tuesday, 7th), the north point of Quiriquina bore south one cable distant; stood into the bay, hoping to fetch 'Tomé,' there to anchor, until the wind came more favourable for Talcahuano; but the wind being scant, were obliged to wear (as the vessel would not stay), thereby losing more than she gained on each tack. At eleven, saw H.M.S. Blonde coming down to us; at one, we were taken in tow by the Blonde, and carried into Talcahuano Harbour, at the south-west corner of the bay of Concepcion; and at midnight we anchored.

A. B. USBORNE, July 7th, 1835.

No. 28.

WINDS AND WEATHER.

On the southern coasts of Chile, winds from the southward, or from the northward, prevail more than those from the west; and very much more than those few which come from the east.

From south-south-east to south-west, and from north-west to north (magnetic) are the points whence the wind usually blows—with less or more strength, according to the time of year.

During the summer months, or from September to March, southerly

* The Blonde, shut in by a point of land.—R. F.

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winds are prevalent, almost always. They are frequently strong in the afternoon, and sometimes during a part of the night. Towards morning, and during the early part of the day, moderate winds, light breezes, or calms, are to be expected.

Near the land, it is generally calm at night, excepting about once or twice in a month, when the wind blows strongly from the southward until about midnight. Occasional northerly winds are experienced, it is true, during the summer; but they are usually so moderate, during that season, that they pass almost unheeded.

About the end of March, the 'northers,' as they are called, begin to remind one that fogs, heavy and frequent rains, thick gloomy weather, and strong winds, often trouble the southern coasts of Chile.

During a part of March, and throughout April, May, and June, foggy weather is frequent; and although it is not often that a thick fog lasts longer than a few hours, a day, even two days, of continued thick fog, is not an unknown occurrence.

With northerly and north-west winds the sky is overcast, the weather unsettled, damp, and disagreeable. These winds are always accompanied by clouds, and usually by thick rainy weather. From the north-west the wind in general shifts to the south-west, and thence to the southward. Sometimes it flies round in a violent squall, accompanied by rain, thunder, and lightning. At other times it draws gradually round. Directly the wind is southward of west, the clouds begin to disperse, and as a steady southerly wind approaches, the sky becomes clear and the weather healthily pleasant.

A turn of fresh southerly wind is usually followed by a moderate breeze from the south-east, with very fine weather. Light variable breezes follow, clouds gradually overspread the sky, and another round turn is generally begun by light or moderate north-easterly breezes, with cloudy weather, and often rain.

This is the general order of change. When the wind shifts against this order, or backs round, bad weather with strong wind may be expected.

Lightning is always a sign of bad weather. It accompanies or precedes a change for the worse; which, however, is usually a prelude to clearing up. Squalls are rare, excepting at the shift from north-west to south-west, already mentioned. From the westward (south-west by west to north-west by west) the wind does not usually, if ever,

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blow nearly so strong as from north-west to north, or from south-west to south.

Currents.

Near the island of Mocha, and to the westward of Cape Rumena, the current usually runs to the north-west, from half-a-mile to one mile and a half, each hour. Distant in the offing, more than twenty or thirty miles from land, this set of current is so diminished that it is hardly sensible; but near Mocha, and especially near the very dangerous out-lying rocks off the south and south-west extreme of that island, it is increased to two, and, at times, even three miles an hour.

From the great river Bio Bio, and from other rivers in the vicinity, floods, escaping to seaward, often cause strong and irregular currents which set to the southward—passing the island of Santa Maria, sweeping round Point Lavapié, and Cape Rumena, and Tucapel Point—into the bay where his Majesty's ship Challenger was wrecked.

These southerly currents are usually found to set strongly along-shore, but seldom reach an offing of six miles to the westward of Cape Rumena.

A very intelligent Hanoverian, Anthony Vogelborg, employed during several years upon these coasts, was once drifted in a small vessel, from six miles south of the Paps of Bio Bio, to the rocks off the north end of the Island of Santa Maria, in one night, during a dead calm.

After the great earthquake of the 20th of February, which affected all the coast about Concepcion, and especially the Island of Santa Maria, the currents set to the south-eastward so strongly, that a boat belonging to the above-mentioned Anthony Vogelborg (which he was steering) running near the Island of Mocha, under sail, with a fresh southerly breeze, could hardly make head against the strong stream that was passing along shore from the north-westward. It is, therefore, to be apprehended, that the strength and direction of the currents in the neighbouring ocean are unsettled and extremely uncertain for some time after a serious earthquake.

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No. 29.

Santiago, 12 de Agosto de 1835.

Señor:

He instruido al Presidente del contenido de la carta de V.S. de ayer, en que me incluye una copia de los resultados del viaje de observacion del Capitan FitzRoy, de la fragata de S.M.B. Beagle, en cuanto a la parte de la costa de Chile comprendida en el.

Su E. ha recibido esta prueba de la atencion del Capitan FitzRoy, con el mayor interes y reconocimiento, y me encarga rogar a V.S. se lo manifieste de su parte.

Reitero a V.S. las espresiones de mi mayor consideracion y estimacion; y tengo la honra de ser su mas atento,

Seguro servidor,

(Firmado) JOAQUIN TOCORNAL.

Señor CONSUL JENERAL,
de S.M.B.

No. 30.

By ROBERT FITZ-ROY, Captain of His Britannic Majesty's Surveying Sloop Beagle.

You are hereby required and directed to take upon yourself the charge and command of the schooner Constitucion (tender to the Beagle), and all on board of, or belonging to her.

As soon as you are ready for sea, you will proceed to that part of the coast of Chile, near the Desert of Atacama, at which the survey of Lieut. B. J. Sulivan ended.

From that part you will coast along and survey the shores northward towards Callao, and thence toward Puná, near Guayaquil.

At Puná your survey is to terminate.

You will thence return to Callao in the schooner Constitucion, or you will sell the said schooner, and, with your party, make your way to Callao, by the means which you consider best for his Majesty's service: combining economy with efficiency.

If opportunity should offer, a measurement from Puná to the Galapagos would be very desirable.

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On arriving at Callao, from Puná, you will wait upon his Majesty's Consul-general, and request him to assist in procuring a passage to England, for yourself and your party, at the least expense to the public which will be consistent with the necessary accommodation which you will require, in order to prosecute your work during the homeward passage.

When you arrive in England, you will repair with your party to Plymouth, there report yourself to the Commander-in-chief, and request him to inform the Lords Commissioners of the Admiralty.

You will also request him to allow your party to be borne, for victuals only, on the books of one of his Majesty's ships, until the arrival of the Beagle, or the receipt of orders from the Admiralty.

You will endeavour to leave Callao finally before the month of June, and arrive in England before the month of October 1836.

You are furnished with the documents herein named:

Copy of my instructions.
Letter from the President of Chile.
Circular letter from the Government of Peru.
Copies of correspondence with his Majesty's Consul-general in Peru.
Letter to the Bolivian authorities.

And with instruments, stores, and provisions sufficient to last for eight months.

Money for the purchase of fresh provisions is supplied to you; and you will keep a minute account of all money which passes through your hands on account of Government.

When no longer wanted for the survey, the schooner is to be sold, and the produce of her sale carried to your contingent account.

Previous to sale, you will hold a survey on the vessel, her boat, and all such stores as you cannot advantageously carry with you to England; taking to your assistance in the survey the most competent persons whom you can obtain.

Clear reports of survey, and accounts of sale will be required.

You will not on any account take part in, or in any way interfere with any disturbance or disagreement of any kind, which may arise or be pending in your neighbourhood, bearing always in mind that the exclusive object of your mission is of a scientific nature.

You will not on any account, or for any reason whatever, allow a passenger, letters, effects of any kind, gold, silver, or jewels, to be

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received or carried on board of the schooner Constitucion, or in her boat, excepting what actually belongs to your own party.

Remembering how frequent and uncertain are political changes, you will be very guarded in your conduct. You will show your instructions; explain distinctly that you are detached from the Beagle in her tender, for the purpose of continuing the survey of the coast of Peru; and you will most carefully avoid every act which might unnecessarily offend.

You will communicate frequently with his Britannic Majesty's Consul-general in Peru, whose influence and zealous support will be of the utmost consequence; and you will endeavour upon all occasions, to follow his advice as exactly as possible.

Given under my hand on board his Majesty's Sloop Beagle, in Callao Bay, this 24th day of August 1835.

R. F.

To Mr. Alex. B. Usborne, Master's Assistant, H.M.S. Beagle.

No. 31.

Ministerio de Relaciones Esteriores del Peru.

Palacio del Gobierno, en Lima,

Señor; Setiembre 4 de 1835.

El Infrascrito Ministro de Relaciones Esteriores tiene la honra de acompañar al Señor Consul Jeneral de S. M. Britanica los documentos que ha credido necesarios para que la "Constitucion" practique sin inconveniente en la Costa del Peru el Viage y esploracion cientifica á que está destinada.

Dichos documentos son, unas Ordenes libradas por el Ministerio de la Guerra á las Autoridades de su Dependencia, áfin de que no impiden el aceso a cualquier punto de la Costa del Buque Espedicionario, ni el desembarco de las personas que conduce, y se faciliten en lo posible sus trabajos:

Ordenes del mismo tenor de la prefectura de este departamento à los funcionarios locales subalternos suyos, y finalmente un amplio pasavante para todas las Autoridades Civiles y Militares del litoral de la Republica.

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Tiene el Suscrito la complacencia de dar con estas medidas un Testimonio del Interes que Su Gobierno tomà en el ecsito de la ilustrada empresa del Gobierno Britanico; y de Suscribirse.

Su Muy Atento Servidor,

(Firmado) M. FERREYROS.

Señor CONSUL JENERAL de S.M. Britanica.

Republica Peruana.

Ministerio de Estado del Despacho de Relaciones Esteriores.

Palacio del Gobierno en Lima á 22 de Julio de 1835, 16°.

Señor;

Ha sido muy satisfactorio para el Infrascrito impartir á los Prefectos de este Departamento y del de la Libertad, la Orden que acompaña en Copia á esta comunicacion, relativa al permiso y ausilios que el Señor Consul Jeneral de S.M. Britanica solicita en su apreciable nota de 20 del que exije, se franqueen á los Oficiales del Bergantin "Beagle" para el desempeño de la Comision cientifica que se les ha confiado.

Ya que las Ciencias practicas que mas conspiran á la prosperidad y adelantamiento del Genero humano deben al Gobierno Britanico una proteccion tan decidida, no seria conforme, con los principios ni con los intereses del Gobierno Peruano negarse á dar las facilidades que puede franquear á los Marinos Comisionados para absolver la importante Comision de rectificar al mapa y á contribuer del modo que le es dado á dilatar los limites de la Ciencia, y asegurar el ecsito del Comercio Universal.

Se han hecho prevenciones semejantes al ministerio de Guerra y al de Hacienda para que las trasmita á sus subordinados, y espera el Infrascrito que el Señor Consul Jeneral le indique si aun seran necesarias recever disposiciones que librará gustoso para la consecucion de tan util trascendencia.

Acepte el Señor Consul Jeneral la distinguida consideracion con que es:—

Su Atento Servidor

(Firmado) M. FERREYROS.

Señor Consul Jeneral, de S.M. Britanica.

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Ministerio de Estado de Despacho del Relaciones Esteriores,
Palacio del Gobierno á 22 de Julio de 1835. 16°.

A los Señores Prefectos de los Departamentos de Lima y de la Libertad.

Señor;

Se halla surto en el Puerto del Callao y puede ser que recorra al litoral de este Departamento el Bergantin de S.M. Britanica "Beagle" que ha venido al Pacifico espresamente con el designio de determinar con exactitud la posicion geografica de los Puntos principales de la Costa para corregir cualquier error que hubiese en los Mapas y perfeccionar por este medio la ciencia de la navegacion de que dependen en gran manera las seguridades y ventajas del Comercio. Deseando vivamente S.E. contribuir por su parte al bien exito de esta espedicion cientifica en que la humanidad y la civilizacion se interesan al mismo tiempo y dar al Gobierno de S.M. Britanica una muestra de consideracion me ha ordenado prevenir a V.S., bajo de la mas estricta responsabilidad, que permita acercar y desembarcar sin el menor embarazo en cualquier punto de la Costa de su mando á los oficiales del "Beagle" para que puedan hacer con sus instrumentos todas las Observaciones Astronomicas y cientificas que quisieran practicar; y que ademas se les proporcionen todas los auxilios y recursos que puedan necesitar, y pidieren V.S. quien deberas recomendarlos á sus subordinados con la eficacia y esmero que merecen por su carácter y por la grande importancia de su comision. Digolo a V.S. de Orden Suprema á fin de que sin la menor demora espida la necesaria á su cabal cumplimiento.

(Firmado) M. Ferreyros."

A todas las Autoridades civiles y militares de la costa de Yquique y provincia de Tarapaca hasta Puná.

Palacio del Gobierno en Lima.

Sabed: que la Goleta Constitucion construida en Maule y del porte de treinta y cinco toneladas, patache del Bergantin de S.M.B. "Beagle" conduce á su bordo Oficiales de la Marina Real Inglesa, encargados por S.M.B. de recorrer las costas del Pacifico é islas adyacentes, con el fin de rectificar los Mapas hidrográficos. El Gobierno de la República, no solo les hà permitido toda libertad en la práctica

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de sus observaciones, sino que quiere y manda bajo de la mas estricta responsabilidad á las autoridades litorales de cualesquiera clase y rango que sean, que no les pongan embarazo alguno para acercarse á todos los puntos de la costa sin ecepcion; permanecer en ellos el tiempo que crean conveniente, y desembarcar y morar en tierra á cualquiera hora, y ademàs, que les ministren todos los ausilios que pudieren. A este fin me ordena expedir este documento ligando á su observancia á los funcionarios á quienes se presentare, y recomendándoles muy encarecidamente que si en el distrito de su mando ecsisten algunos planos geográficos de la costa, trabajados en el Perú, interesen á su nombre á los que los posean para que se sirvan mostrarlos á los referidos Oficiales, á fin de que puedan llenar más cumplidamente el importantísimo objeto de su comision. Dado de órden suprema en el Palacio del Gobierno en Lima á 1° de Setiembre de 1835.

(Firmado) M. Ferreyros.

No. 33.

(Duplicado.)

El Ciudadano Mariano de Sierra, Jeneral de Brigada de los Ejercitos Nacionales, Benemerito a la Patria, Ministro de Estado, Secretario Jeneral de S.E. el Presidente de la Republica, &c.

A las autoridades Civiles y Militares de las Costas de la Republica.

Sabed; Que la Goleta "Constitucion" patache del Bergantin de S.M. Britanica Beagle, construida en Maule del porte de veintecinco toneladas, conduce á su bordo Oficiales de la Marina Real de su Nacion con el objeto de recorrer las costas del Pacifico é Yslas adyacentes para la rectificacion de las cartas hidrograficas, que les há sido encargado por S.M. Britanica, y habiendo el Supremo Gobierno de la República permitidoles la necesaria libertad en la practica de sus observaciones, quiere que las Autoridades litorales no les pongan impedimento ni embarazo alguno en la aprocsimacion á los puertos, desembarque y permanencia en ellos por el tiempo que creyesen conveniente los referidos Oficiales Ingleses, y que les proporcionen los ausilios que pidiesen en el orden debido.

A este objeto es que S.E. me ordena espedir el presente documento,

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quedando legada su observancia bajo responsabilidad á los funcionarios á quienes estas letras se presentasen. Dado en la Casa del Supremo Gabierno en Lima à 18 de Enero de 1836. 17o de la Independencia: 15° de la República.

El Ministro Secretario Grâl.

MARIANO DE SIERRA.

No. 34.

That multitude of islands, of which the native name is Paamuto, to us more commonly known as the Dangerous Archipelago of the Low Islands, may be said to lie strewed between the parallels of thirteen and twenty-five south, and the meridians of 120 and 150 west: though stricter limits would be 13° and 22° S.; 135 and 150 west; because some of those south of 22, and east of 135, are high islands, and but rarely have communication with the groups in a lower latitude.

Easter Island, though without the boundaries specified, is but an outpost, as it were, of the Dangerous Archipelago; and, no doubt, was first peopled from that extensive region of (generally speaking) low coral islands. The high, or rather hilly exceptions, such as Gambier, Osnaburgh, Pitcairn, Easter, &c. are few, in comparison with the seventy or eighty groups of islets which surround lagoons, besides many mere dry reefs.

By far the larger number of the lagoon islands have at least one harbour in each cluster accessible to shipping; and a considerable trade has been carried on with the natives for pearl oyster-shells.

What the number of inhabitants may be, who are dispersed through the Archipelago, it is exceedingly difficult to estimate, for two reasons: we know very little of them; and they are migratory. From the little I have learned on the subject, I think they cannot be less than ten thousand, nor more than thirty thousand, exclusive of children.

Fish, and shell-fish, hogs, and cocoa-nuts, are the principal subsistence of the Low islanders; but the natives of Gambier, and a few other hilly islands, have plenty of vegetable food in addition.

Those Paamuto islands which are not very remote from Otaheite, affect to receive laws from her sovereign: they have, however, no resident authority among them, except the head of each family.

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The language of these islanders differs from that of the Otaheitans so much that they do not easily understand each other: yet I believe that both are radically the same. Taata is man, at Otaheite; in Paamuto, Tanaka; which is almost the same as Kanaka, the word for man in the Sandwich Islands; and not very different from Tangata in New Zealand. Some of the Low islanders say their ancestors came from the south-eastern islands; others say from the Marquesas; again there are some who assert that their forefathers arrived from islands to the westward: so that no reliance can be placed upon the little yet known of their origin. There is, however, reason for supposing that the earlier inhabitants were not of one family, or tribe; but that they were emigrants from more than one quarter.

In most of the entrances to harbours in the lagoon islands, there is a strong current of tide, which sets in and out alternately, about six hours each way. The tide rises nearly two, or at most three, feet. It is high water at about one, on the days of full and new moon, among the western groups of islands, and from half an hour to an hour later among those which lie towards the south-east. The currents which do not appear to be caused by tide are irregular; and, as yet, too little is known of their usual direction to enable any one to say more than that during settled weather, and a steady trade wind (south-easterly), the surface waters in general move westward from five to twenty miles a day; and that in the rainy season, from October to March, when westerly winds, squalls, and rain are frequent, the currents vary most, and occasionally set eastward, at the rate of from half a mile to two miles an hour.

Numerous instances are upon record of canoes being drifted out of their course—even several hundred miles—by currents and westerly winds: few narratives of voyages in the Pacific are without a notice of them: and they materially assist in explaining how remote, and perhaps very small, islands, may have been first peopled from the west: against the direction of the generally prevalent wind.

No. 35.

The British Resident at New Zealand, to His Britannic Majesty's Subjects, who are Residing or Trading in New Zealand.

The British Resident announces to his countrymen that he has received from a person who styles himself "Charles, Baron de

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Thierry, sovereign chief of New Zealand, and king of Nuhahiva," (one of the Marquesas Islands) a formal declaration of his intention to establish in his own person an independent sovereignty in this country, which intention he states he has declared to their Majesties the Kings of Great Britain and France, and to the President of the United States; and that he is now waiting at Otaheite the arrival of an armed ship from Panama, to enable him to proceed to the Bay of Islands with strength to maintain his assumed sovereignty.

His intention is founded upon an alleged invitation given to him in England by Shunghi and other chiefs, none of whom as individuals had any right to the sovereignty of the country, and, consequently, possessed no authority to convey a right of sovereignty to another. Also, upon an alleged purchase made for him in 1822, by Mr. Kendall, of three districts on the Hokianga River, from three chiefs who had only a partial property in these districts, parts of which are now settled by British subjects, by virtue of purchase from the rightful proprietors.

The British Resident has also seen an elaborate exposition of the views of this person, which he has addressed to the missionaries of the Church Missionary Society, in which he makes the most ample promises to all persons, whether whites or natives, who will accept his invitation to live under his government; and in which he offers a stipulated salary to each individual missionary in order to induce them to act as his magistrates. It is also supposed, that he may have made similar communications to other persons or classes of his Majesty's subjects, who are hereby invited to make such communications, or any information on this subject they may possess, known to the British Resident, or to the additional British Resident at Hokianga.

The British Resident has too much confidence in the loyalty and good sense of his countrymen, to think it necessary to caution them against turning a favourable ear to such insidious promises. He firmly believes that the paternal protection of the British government, which has never failed any of his Majesty's subjects however remote, will not be withheld from them, should it be necessary to prevent their lives, liberties, or property, from being subjected to the caprice of any adventurer, who may choose to make this country, in which British subjects have now by the most lawful means acquired so large a stake, the theatre of his ambitious projects: nor, in the British Resident's opinion, will his Majesty, after having acknow-

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ledged the sovereignty of the chiefs of New Zealand in their collective capacity, by the recognition of their flag, permit his humble and confiding allies to be deprived of their independence upon such pretensions.

But, although the British Resident is of opinion that such an attempt as is now announced must ultimately fail, he, nevertheless, conceives, that if such a person were once allowed to obtain a footing in the country, he might acquire such an influence over the simple-minded native as would produce effects which could not be too much deprecated or too anxiously provided against; and he has therefore considered it his duty to request the British settlers of all classes, to use all the influence they possess with the natives of every rank, in order to counteract the efforts of any emissaries which may have arrived or may arrive amongst them: and to inspire both chiefs and people with a spirit of the most determined resistance to the landing of a person on their shores, who comes with the avowed intention of usurping a sovereignty over them.

The British Resident will take immediate steps for calling together the native chiefs, in order to inform them of this proposed attempt upon their independence, and to advise them of what is due to themselves and to their country, and of the protection which British subjects are entitled to at their hands. And he has no doubt that such a manifestation will be exhibited of the characteristic spirit, courage, and independence of the New Zealanders as will stop at the outset such an attempt upon their liberties by demonstrating its utter hopelessness.

JAMES BUSBY,
British Resident.

British Residency, at New Zealand,
Bay of Islands, 10th Oct. 1835.

No. 36.

DECLARATION of the Independence of New Zealand.

1. We the hereditary chiefs and heads of the tribes of the northern parts of New Zealand, being assembled at Waitangi in the Bay of Islands, on this 28th day of October 1835, declare the Independence of our country; which is hereby constituted and declared to be an independent state, under the designation of "THE UNITED TRIBES OF NEW ZEALAND."

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2. All sovereign power and authority within the territories of the United Tribes of New Zealand is hereby declared to reside entirely, and exclusively, in the hereditary chiefs and heads of tribes in their collective capacity: who also declare that they will not allow any legislative authority separate from themselves in their collective capacity to exist; nor any functions of government to be exercised within the said territories, unless by persons appointed by them, and acting under the authority of laws regularly enacted by them in congress assembled.

3. The hereditary chiefs and heads of tribes agree to meet in congress at Waitangi, in the autumn of each year, for the purpose of framing laws for the dispensation of justice, the preservation of peace and good order, and the regulation of trade; and they cordially invite the southern tribes to lay aside their private animosities, and to consult the safety and welfare of our common country, by joining the confederation of the United Tribes.

4. They also agree to send a copy of this declaration to his Majesty the king of England, to thank him for his acknowledgment of their flag: and in return for the friendship and protection they have shewn, and are prepared to shew to such of his subjects as have settled in their country, or resorted to its shores for the purposes of trade, they entreat that he will continue to be the parent of their infant state, and that he will become its protector from all attempts upon its independence.

Agreed to unanimously on this 28th day of October 1835, in the presence of his Britannic Majesty's Resident.

Here follow the signatures, or marks, of thirty-five hereditary chiefs and heads of tribes, which form a fair representation of the tribes of New Zealand, from the North Cape to the latitude of the river Thames.

English witnesses,

(Signed) Henry Williams, Missionary C. M. S.
Geo. Clarke, C. M. S.
James C. Clendon, Merchant.
Gilbert Main, Merchant.

I certify that the above is a correct copy of the declaration of the chiefs, according to the translation of missionaries who have resided

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ten years and upwards in the country, and it is transmitted to his most gracious Majesty the King of England, at the unanimous request of the chiefs.

JAMES BUSBY,
British Resident at New Zealand.

No. 37.

Colonial Secretary's Office, Sydney,
29th June 1835.

SIR:

I am directed by the governor to inform you that he has received a despatch from the right honourable the Secretary of State for the Colonies, communicating the representation made by you of the advantages which would result to you personally, as well as to other Europeans who have settled in the district in which you reside, by your being invested with an appointment corresponding to that lately conferred upon Mr. James Busby:—the extreme distance of that gentleman from the quarter in which you and other European settlers reside, preventing him from rendering that assistance which he might otherwise be expected to afford:—and I am accordingly commanded by Sir Richard Bourke to acquaint you, that in pursuance of the authority thus conveyed, his Excellency has been pleased to nominate you to be an "Additional British Resident" at New Zealand.

The creation of the appointment held by Mr. Busby originated in the desire of checking the atrocities and irregularities committed at New Zealand by Europeans, and of giving encouragement and protection to the well-disposed settlers and traders from Great Britain and this colony; and as the general rules by which it is the wish of this government that the British resident should regulate his proceedings, should also guide you in cases in which you may feel yourself called upon to act—

I am directed by his Excellency to transmit to you the enclosed extract of the instructions (13th April 1833) issued to Mr. Busby on his departure to assume the duties of his office.

By an adherence to the principles laid down in these orders, and their discreet application to circumstances, it is hoped that you will not be disappointed in your expectation of being enabled to benefit

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not only yourself, but others, and it will, his Excellency conceives, be unnecessary to do more than impress upon you the importance of obtaining the objects you seek by a moral influence over chiefs and natives.

It should further be your particular study not only to act in concert with the British resident, but to maintain with him that good understanding which is necessary to give effect to your appointment, and to preserve the influence of both.

The British resident will be requested to make known your appointment to masters of vessels, and others resorting to New Zealand; and, on your arrival at your destination, you will take such measures as your own experience, and that of any missionaries who may be on the spot, may suggest as the best for apprising the British settlers and the natives, of the nature of your office and objects.

Upon this subject Mr. Busby, to whom I have the honour of transmitting you a letter of introduction, will no doubt be able to afford you valuable information.

The Secretary of State has intimated that you have disclaimed all desire of emolument in soliciting the appointment now conferred upon you.

I have the honour to be,
Sir,
Your most obedient servant,
(Signed) ALEXANDER M'LEAY,
Colonial Secretary.

To THOMAS M'DONNELL, Esq.,
Additional British Resident
at Hokianga, in New Zealand.

No. 38.

EXTRACT from the Instructions of his Excellency, the Governor of New South Wales, to James Busby, Esq., British Resident at New Zealand, dated 13th April 1833.

To check as much as possible the enormities complained of, and to give encouragement and protection to the well-disposed settlers and traders from Great Britain and this colony, it has been thought proper to appoint a British subject to reside at New Zealand, in an accredited character, whose principal and most important duty it will

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be to conciliate the good will of the native chiefs, and establish upon a permanent basis that good understanding and confidence which it is important to the interests of Great Britain, and of the colony, to perpetuate.

It may not be easy to lay down any certain rules by which this desirable object is to be accomplished; but it is expected, by the skilful use of those powers which educated man possesses over the wild or half-civilized savage, an influence may be gained, by which the authority and strength of the New Zealand chiefs will be arranged on the side of the resident for the maintenance of tranquillity throughout the islands.

It will be fitting that you explain to the chiefs the object of your mission, and the anxious desire of his Majesty to suppress, by your means, the disorders of which they complain; you will also announce your intention of remaining among them, and will claim the protection and privilege which you will tell them are accorded in Europe and America to British subjects, holding, in foreign states, situations similar to yours.

You will find it convenient to manage this conference by means of the missionaries, to whom you will be furnished with credentials, and with whom you are recommended to communicate freely upon the objects of your appointment, and the measures you should adopt in treating with the chiefs.

The knowledge which the missionaries have obtained of the language, manners, and customs of the natives may thus become of service to you. Assuming, however, that your reception will be as favourable as has been anticipated, I will endeavour to explain to you the manner of proceeding, by which I am of opinion you may best succeed in effecting the object of your mission; you will at the same time understand, that the information I have been able to obtain respecting New Zealand is too imperfect to allow of my presenting you with any thing more than a general outline for your guidance, leaving it for your discretion to take such further measures as shall seem needful, to arrest British subjects offending against British or colonial laws in New Zealand.

By the 9th of George IV., chap. 83, sec. 4, the Supreme Court in New South Wales and Van Diemen's Land have power to enquire into, hear and determine all offences committed in New Zealand, by

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the master and crew of any British ship or vessel, or by any British subject living there; and all persons convicted of such offences may be punished as if the offence had been committed in England. The law having thus given the court the power to hear and determine offences, it follows, as a necessary incident, that it has the power of bringing before it any person against whom any indictment should be found, or information filed, for any offences within its jurisdiction.

I would here observe, that I can propose no other means by which you can secure the offender, than the procuring his apprehension and delivery on board some British ship, for conveyance to this country, by means of the native chiefs with whom you shall be in communication. It is well known, that amongst those Europeans who are leading a wandering and irregular life at New Zealand, are to be found transported felons, and offenders, escaped from this colony and Van Diemen's Land. It is desirable that opportunities for the apprehension and transmission of those convicts to either colony should be promptly embraced.

The chiefs are, it is said, well acquainted with the descriptions of the different Europeans residing in their country, and will be found able and willing to point out and secure, at a convenient time, those whom they know to be fugitives from the Australian colonies. You will be furnished from the office of the principal superintendant, with the names and descriptions of those convicts from New South Wales who are known or suspected to be concealed in the islands of New Zealand; and you will use your discretion as to the fittest time for causing their apprehension, and removal of such as may be within your reach, or are guilty of any offence against the peace and tranquillity of the country. You will, of course, take every precaution to avoid the apprehension of a free person in mistake for a convict, as an action for damages would probably follow the commission of such an error.

This government will indeed be disposed to save you harmless in all such cases, where becoming circumspection has been used.

When any of his Majesty's ships are off the coast, you will request the commander to receive the convict, or other person, arrested by your means, for conveyance to this place.

I would further observe, that, by means of the information which you are likely to receive from the chiefs, you may become acquainted

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with the criminal projects of Europeans before their execution; and by a timely interference you may be able altogether to prevent their mischievous designs, or render them abortive.

In the character which you hold you will be justified in addressing any British subject, to warn him of the danger to which he may be exposed, by embarking or persevering in any undertaking of a criminal or doubtful nature.

In the manner I have now described, and by proceedings of a similar character, it may be possible to repress the enormities which have heretofore been perpetrated by British subjects in New Zealand. It may also happen that this salutary control will not affect British subjects only, but that the knowledge of there being a functionary stationed in New Zealand, through whom offences committed by the subjects of any other State against the people of that country will be made known to the British Government, and through that Government to the other European and American powers, may induce the subjects of those powers to adopt a less licentious conduct towards the New Zealanders, and other inhabitants of the South Sea Islands.

There is still another form in which the influence, it is hoped, the British Resident may obtain over the minds of the New Zealand chiefs, may be more beneficially exhibited.

It is possible, by your official moderation, that the evils of intestine war between rival chiefs or hostile tribes may be avoided, and their differences peaceably and permanently composed. It is also possible, that at your suggestion, and by the aid of your councils, some approach may be made by the natives towards a settled form of government; and that by the establishment of some system of jurisprudence among them, their courts may be made to claim the cognizance of all crimes committed within their territory: and thus the offending subjects, of whatever state, may be brought to justice by a less circuitous and more efficient process than any which I have been able to point out.

If, in addition to the benefits which the British missionaries are conferring on those islanders, by imparting the inestimable blessings of Christian knowledge and a pure system of morals, the Zealanders should obtain through the means of a British functionary, the institutions of courts of justice, established upon a simple and comprehensive basis, some sufficient compensation would seem to be rendered for the injuries heretofore inflicted by our delinquent countrymen.

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Having thus explained to you, generally, the course of proceeding by which I think your residence in New Zealand may be made conducive to the suppression of the enormities which British subjects, and those of other states, have been in the habit of committing in these islands, I have only further to observe, that it will be your duty to assist, by every means in your power, the commercial relations of Great Britain and her colonies with New Zealand. It would indeed be desirable that you should become the medium of all communications between the New Zealand chiefs and the masters of British or colonial vessels frequenting the coasts, and the merchants and settlers established in the islands. This arrangement will probably grow out of your residence in the country, and you should keep it in view as an important object. You will be pleased to forward by every opportunity a shipping report, setting forth the names, masters, number of crew, tonnage, and countries, of vessels arriving at the Bay of Islands, or other parts of New Zealand, whence you can obtain correct accounts; with the cargoes of such vessels, their objects in touching at New Zealand, as far as you are informed; and any other particular concerning them that may be worthy of notice.

I beg to call your attention to the strange and barbarous traffic in human heads, which certainly did exist to some extent, but which, I am given to understand, is now nearly abandoned. Should it be found to continue or revive, some legislative act may be necessary to prohibit, in this colony, the crime and disgrace of participating in so brutalizing a commerce.

Having already mentioned the assistance which I anticipate you will receive from the missionaries, I have now only to impress on you the duty of a cordial co-operation with them in the great objects of their solicitude, namely, the extension of Christian knowledge throughout the islands, and the consequent improvement in the habits and morals of the people.

RICHARD BOURKE.

No. 39.

The modes of surveying coasts, where there is anchorage, and water smooth enough to admit of boats being frequently employed, have been so often detailed, that, without repeating what is said in every treatise on the subject, I will only try to describe in this

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place the methods adopted by the officers of the Beagle, in the examination of a wild sea-coast—such, for example, as that of the south-western part of Tierra del Fuego.

On that coast the weather was so continually bad, there was so much swell, and the water near the steep precipitous shores always so deep, that anchorage (except in harbours) was impracticable: boats were seldom able to assist (while under way), and the bearing compass, though particularly good, and well placed, was of very little use: it was therefore never trusted in important bearings. Another impediment, and not a slight one, was the current; which set irregularly from one knot to three knots an hour, along the shore.

But there are seldom evils, unbalanced by remedies. The stormy and desolate shores of Tierra del Fuego are broken into numerous islands, about which anchorages are abundant, and they are excellent, when once a vessel is in them. To find, and enter, or leave them in most instances, was troublesome, and often dangerous. But, with the help of those havens, and the distinct marks afforded by a high rocky shore; and by the sharp peaks of more distant heights, a correct survey was effected.

Beginning at the western extreme, near Cape Pillar (because the prevailing winds are westerly, and the current sets to the eastward), our first object was to find a safe harbour in which to secure the ship. There we made observations for latitude, time, and true bearing; on the tides, and magnetism. We also made a plan of the harbour and its environs; and triangulations, including all the visible heights, and more remarkable features of the coast, so far as it could be clearly distinguished from the summits of the highest hills near the harbour. Upon these summits a good theodolite was used, which was set, invariably, to a well-defined mark, near the observatory; from which mark the true bearings of the stations on the summits of the hills were ascertained by observations of the sun made with a theodolite.

Many leagues of exposed, and difficult coast, were looked down upon, in this manner; and, at the least, their exact bearings from one fixed spot ascertained. But if more than one height afforded a round of angles with the theodolite, and the position of each of those heights was accurately known by triangulation depending upon a base measured at the harbour, then the positions of various other hills or marks were ascertained; and so much easier became

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the sea-work afterwards executed in the ship. I need hardly allude to the facilities, afforded by heights, for making eye sketches of the coast line, and other details, such as the ranges of hills, forms of banks, &c. Ascending heights near the sea is advantageous in another point of view; for not a rock or a shallow escapes notice, if the day is tolerably clear. While in harbour, every place in the vicinity which could be examined in boats, or overland excursions, was explored, as far as our means and time would allow.

Before I speak of the sea-work, it may be useful to say a word about 'bases,' of four kinds, arranged according to their relative value.

The first are those derived from good astronomical or chronometrical observations, made at two stations several miles apart.

The second are deduced from angular measurements of small spaces exactly known.

The third are obtained by actual measurement with a chain, with rods, or with a line:—

And the fourth are the rather uncertain bases obtained by sound.

This statement of the relative value of bases, is only meant to refer to their employment in sea-surveying. I need hardly remind the reader of these notes, that the third description of bases, however exact nominally, requires a host of minute precautions, in addition to what I never found between Valdivia and Cape Horn, namely, a nearly level and accessible space, of considerable length, on which to measure.

To attain the utmost precision is a laudable endeavour, no doubt, when carrying on extensive trigonometrical operations on land; but it should be borne in mind, that every hour employed in what is commonly called 'hair-splitting'—in minute details that do not affect the chart or plan which is the result of a sea-survey, is not only an hour lost, but an hour taken away from useful employment.

The second kind of bases are so quickly and easily measured, either with a sextant or micrometer, across any kind of land or water, and have been so repeatedly proved in every part of the Beagle's surveys, that I consider them unobjectionable, when used for such limited operations as making plans of harbours, or fixing the positions of objects only a few miles distant. By multiplying bases, which with such easy methods is soon effected; and by a frequent use of the sextant, artificial horizon, and chronometer, material errors may be

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kept out of the work of a practised surveyor. With a sextant, horizon, and chronometer (in a sheltered spot), a micrometer and board,* a theodolite, and intelligent assistants, much work may be done in a short time.

When ready to proceed, the chronometer rates being ascertained, and the weather glasses affording reasonable hope of a day or two without a gale of wind, we started at day-light, and worked against time. Those officers who were engaged particularly with the survey, did not take part in the routine duties of the vessel. One attended to the bearing compass, and usually wrote the various angles and bearings, taken by others as well as himself, in a bearing-book. Another officer took angles. A third attended to the ship's course, the soundings, and the patent log. When many angles were required at one time, or when observations for time, latitude, or true bearing, were made while taking a round of angles, other officers assisted.

If the bearing compass was steady enough it was used, even when true bearings were obtained; or when, if cloudy, the triangulation was carried on by points fixed from the last harbour. As the compass was so placed as to be uninfluenced by local attraction, the bearings it gave, when steady, were satisfactory; yet it was never trusted implicitly; nor at all in matters of consequence. Its use was as an auxiliary; not as a principal. Bearings, or angles, of the highest points, or of marks so well defined as not to be mistaken in consequence of a change of the place of an observer, were, of course, always selected, if such were visible: and vertical angles of all notable heights were not omitted.

For the sake of perspicuity, we considered that positions, fixed points, or marks, were separated into three classes. In the first class, were observatories or places at which the latitude, longitude, and true bearing, were accurately ascertained; besides those high peaks, or other well-defined objects which could be seen at a distance of some leagues, and whose exact places were known by a triangulation which connected them with an observatory; and the highest points of islands, which were neither low, nor small enough for the eye to overlook them at the first glance.

* A board some feet long, painted black on one side, white on the other; exactly measured, and suspended horizontally, at right angles to the observer.

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In the second class we considered all the minor fixed points which were included in the triangulation, excepting the details of the coast, and 'boundary lines,'* which belonged to the third class.

We supposed that the ship had sailed from the 'first' harbour.† At six, in the morning, (marked 6) the position of the vessel was fixed by two or more angles between marks, already fixed, upon the land. At 6·30, and at 7 similar means were used to fix the ship's place. Soundings were taken, and laid down by proportioning to the times of each sounding, the portions of distances run between the two stations, as shewn by patent log, by bearings of a mark, such as 6 (in the figure) while sailing from 6·30 to 7: by independent double angles, (two angles between three marks), or by simple cross-bearings.

Transit bearings were always sought for, by compass as well as by noting when marks were 'on;' or, in a line, one with another, without reference to the compass. We endeavoured to ascertain (or fix) the ship's position at the same moment, by the most available of the numerous methods so readily occurring while the log was going, the time noted carefully (as often as angles or bearings were taken), and several first class marks in sight. Transit bearings were useful in the details of the coast line, as may be seen by the lines drawn from 6·30, 7 and 8; and they corroborated the correctness of the triangulation, when applied to first and second class marks.

By a judicious selection of objects, and a clever application of transit bearings, I have seen extensive and correct triangulations carried on from data, obtained at sea, which appeared utterly inadequate.‡ I do not imply that the absolute position of any one point was independently correct, because all depended at first upon observations at sea; but that the points of the triangulation were all so correct, relatively, that, upon after examination, when the regular routine of harbour work had been combined with the data obtained afloat, and their truth ascertained by connection with the previous observatory, no alteration was found necessary.

Perhaps I should explain, that in the plan of the 'first' harbour all depended upon the base Ab; by which also were fixed B and C. From the summits B and C;—G, D, E, F, were fixed, as well as a

* By 'boundary lines' I mean limiting outlines of shoals, or rocky places. † See figure. ‡ By Mr. Stokes.

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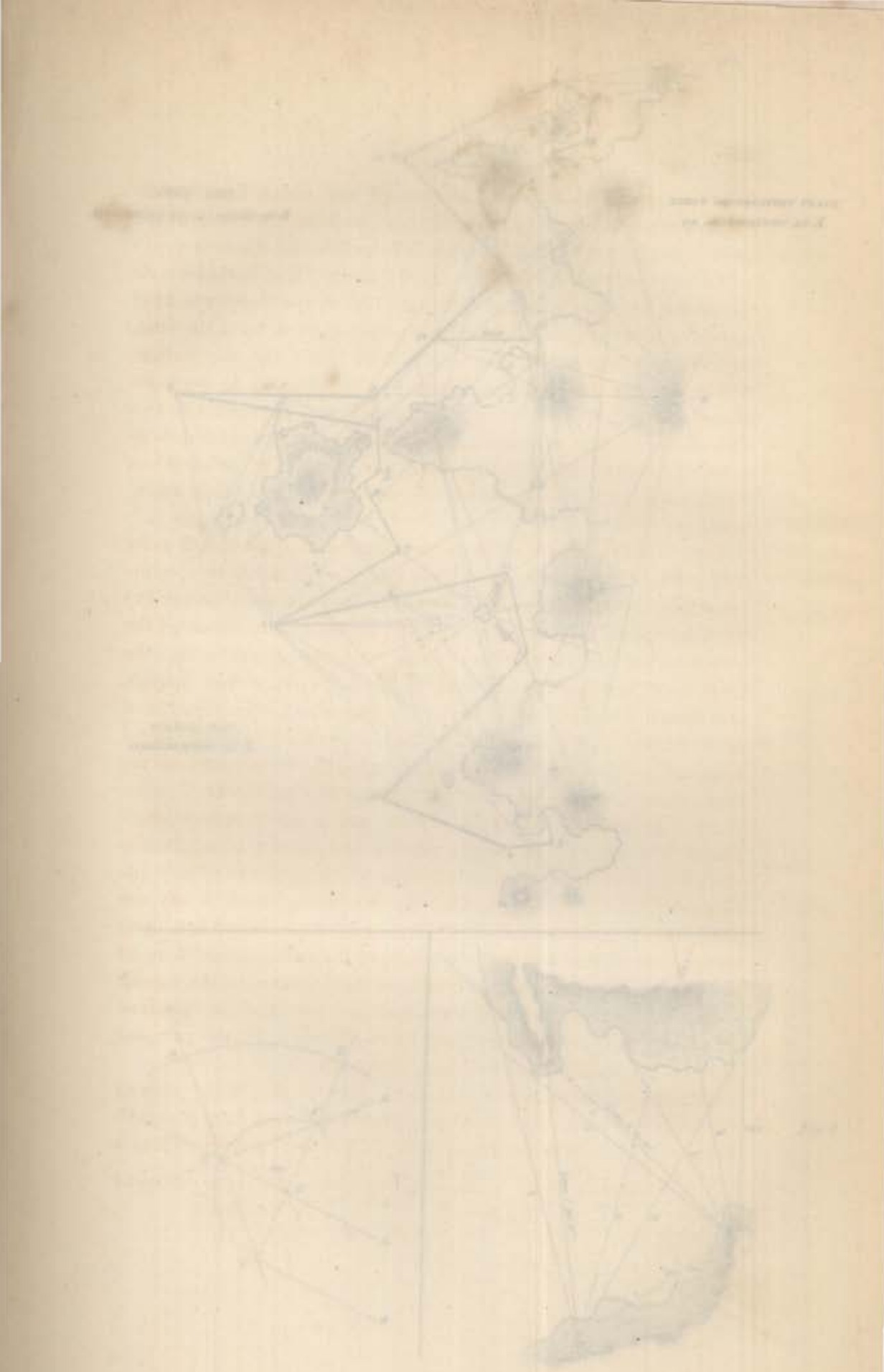

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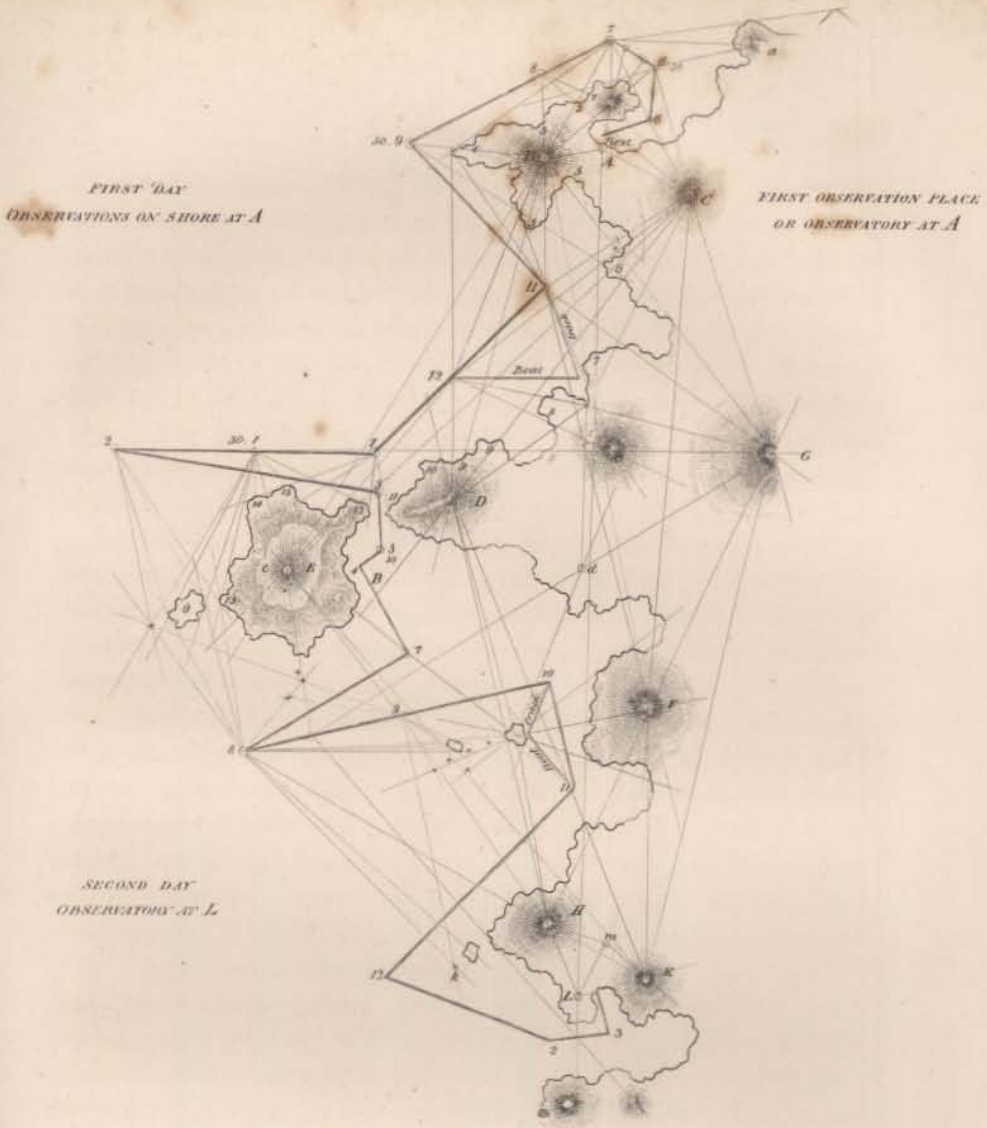

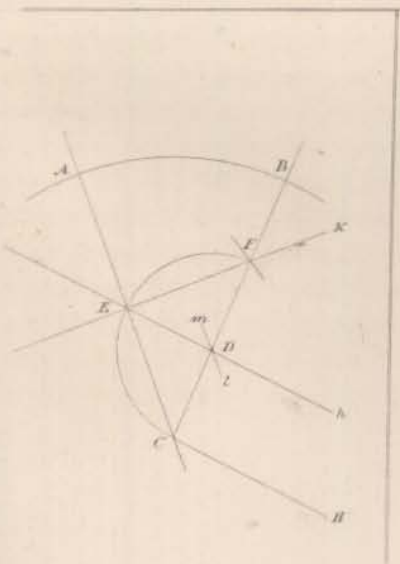

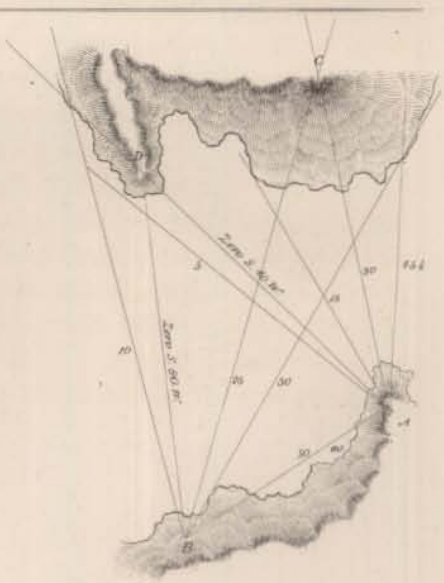

Fig 2

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number of inferior marks; by a 'round' of angles taken with a theodolite, at each station (B and C), the instrument being in each case set to A. From A, the true bearings of B and C were ascertained astronomically. When the position of L was exactly determined by latitude, and distance from the meridian of A, the long and accurate base AL became known. With that, as a foundation, the work was laid down: and by that base, if necessary, the former positions of G, D, E, and F, were corrected. But so well did angular measures answer, that it was scarcely ever requisite to make such corrections.

It has been shewn that the log served only to place soundings, or help to fill up a space, while clouds obscured marks. I should add that it was serviceable in ascertaining the direction and strength of currents. Currents altering in strength, as well as in direction, prevented our applying the patent log to other uses, although we had every reason to put implicit confidence in its indications, and have often proved their value in the still waters of a deep sound, where no stream of tide, or current, existed: as well as in harbours, where angular bases were measured for the special purpose. Views of the lands, both in plan and profile, were very frequently taken. When boats could be lowered, and a sufficient object demanded their employment (as at 11, of the first day, and at 10 of the second day) they did not hang idly at their davits.

In the example I have given, circumstances conspired in our favour, a rare event in Tierra del Fuego, or on any similar coast, exposed to the prevailing westerly winds of high latitudes; but when we failed to find anchorage, the triangulation was carried on by first class marks; and by the ship's positions, when fixed by good observations at sea. But however well such a method may answer in a fine climate—on that coast it was in general unsatisfactory, and very inferior to that of going from one harbour to another.

Among many kinds of notation useful in surveying, the annexed sketch shews a method used by Mr. Stokes, which I had not then seen adopted. It is very convenient, and assists the memory more than any other. In figure 2, A and B are stations, at which the angles specified were taken right and left of a mark, whose bearing was ascertained. Or, the angles only were taken, and the triangles afterwards calculated, or protracted, by reference to the base upon which they depended, such as A B. A sketch on this principle, how-

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ever slightly made, brings the place to mind in an instant, and avoids any necessity for names* or letters.

No. 40.

Nautical Remarks on the Northern Coast of Chile.

Scarcely any extensive coast less requires particular description than that of Chile. With a tolerable chart, and the lead going, a stranger may sail into, or out of, almost any Chilian port without hesitation. As there are, however, some anchorages and landing-places hitherto little known, except to coasters, it may be useful to give a few notices of them.

Valparaiso, and the ports southward, have been described so often, that I will not occupy any of these crowded pages with remarks on such well-known places; although in another publication, strictly nautical, they will appear.

Quintero, Horcon, and Papudo, have no hidden dangers. The two former lie to the southward and northward, respectively, of a straggling cluster of black rocks, above water: the first is now little frequented, being rather shallow, and out of the way: the second is a summer roadstead, with a good landing-place, and easy communication thence to Puchancavi. Papudo is a small open bay, with a good landing-place. Northerly winds throw in a heavy swell. Its situation is pointed out by a high, peaked hill, called Gobernador, immediately over the port.

Pichidanque, sometimes called Herradura, has a rock near the middle, on which, at low tide, there are but fifteen feet of water: it is in a line between the north end of the little island in front of the harbour, and a gully at the north-east side, through which a river runs from Quilimari, and four cables' lengths from the island. The tide rises five feet, and syzygial high water is at nine. The Silla, over Pichidanque, I have already mentioned (p. 426).

Conchali is an exposed roadstead, seldom used but by smugglers. The landing is everywhere bad, excepting in one little cove at the north side of the bay.

* Short characteristic names are preferable to letters, or numbers, because they help the memory so much.

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Maytencillo is a little cove, fit only for a boat to land in at particular times.

The next opening in this high rugged coast is that of the river Limari, which looks large from seaward, but is inaccessible. The coast near Limari is steep and rocky. Two miles from the entrance of the river, there is a low, rocky point, with a small beach on which boats sometimes land; but a heavy surf breaks on it. Near a mile from the coast the land rises suddenly to a range of hills, about one thousand feet high, which runs parallel to the coast, and extends two or three miles north and south of the river; the summits of the hills to the northward are covered with wood. The north entrance point is low and rocky; the south is a steep slope, with a remarkable white sandy patch on the side of it. The river at its mouth is about a quarter of a mile wide; but the surf breaks heavily right across; inside it turns a little to the north-east, and then runs to the eastward through a deep gully in the range of hills before-mentioned. Mount Talinay is a remarkable hill, 2,300 feet high; it is three miles from the coast, and seven miles southward of the river; it is thickly wooded on the top; the sides are quite bare. Ten miles southward of Mount Talinay lies a deep valley, with a remarkable sandhill on its north side, close to the coast; at the mouth of the valley there is a small sandy beach. Within five miles of Maytencillo there is a point with several rocks, running off it about a quarter of a mile; from which to Maytencillo the coast is composed of blue rocky cliffs, about one hundred and fifty feet high; the land above the cliffs rises to between three and four hundred feet; and then about three miles in shore the range of hills runs from three to four thousand feet high.

About fourteen miles northward of Limari is a small bay, with a sandy beach in the north corner; but a heavy surf. From this bay northward the coast is rocky and much broken: about eight miles southward of Point Lengua de Vaca is a small rocky peninsula, with a high, sharp rock in the centre of it, southward of which lies a small, deep cove, with a sandy beach at the head; but the entrance is nearly blocked up by small islets, and rocks both above and below water. The entrance is too bad for the smallest vessel; though in fine weather boats can land in the cove. The outer breaker is not more than two cables from the shore; but when calm the swell sets directly on it. This cove is Tortoral de Lengua de Vaca.

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Point Lengua de Vaca is a very low, rocky point, rising gradually in-shore to a round hummock, about a mile to the southward of the Point. There are rocks nearly awash about a cable's length from the Point, and at two cables' lengths distant there are but five feet. After rounding Point Lengua de Vaca, the coast runs to the south-east, and is rocky and steep for about two miles from the Point, where there are fifteen fathoms about half a mile from the shore. About three miles from the Point, a long, sandy beach commences, which extends the whole length of the large bay as far as the island or peninsula of Tongoy. The south part of the beach is called Playa de Tanque, the north and north-east side of the bay Playa de Tongoy. Off the south-west extreme of the beach there is anchorage about half a mile from the shore, in from five to seven fathoms; the bottom is a soft, muddy sand in some places, but in others it is hard. With a southerly wind it is very smooth, and the landing is very good, but a heavy sea sets in with a northerly breeze. This is an anchorage that was once frequented by American whalers. The village, which is called the Rincon de Tanque, consists of about a dozen 'ranchos.' The only water to be got is brackish; about two miles and a half to the E.N.E.* where there is good water, the landing is generally very bad, and the water is some distance from the beach.

From Tanque to the peninsula of Tongoy there is anchorage in any part of the bay, at from one to two miles from the shore, in from seven to ten fathoms, sandy bottom. There is good anchorage with a northerly wind for small vessels, to the southward of the peninsula, abreast of the small village on the Point, with the outer Point bearing W.N.W. in four fathoms sandy bottom, with clay underneath it; but no vessel, however small, should go into less than four fathoms, as the sea breaks a little inside that depth when blowing hard from the northward. Large vessels would also find a little shelter with the wind to the northward of north-west. With a strong southerly breeze a vessel would not be able to remain at anchor to the southward of the peninsula; but there is a small bay on the north side, which is completely sheltered from southerly winds. In the south-east corner of this bay there is a small creek, into which, when smooth, boats can go; it runs about a mile inland, and near the head there is fresh water for which the whalers sometimes send their boats.

* All bearings are magnetic, unless otherwise specified.

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The village of Tongoy consists of half a dozen small houses, built on a high point at the south side of the peninsula.

The coast on the west side of Huanaquero Hill is broken and rocky, affording no shelter for any thing but a boat; to the northward there is a deep bay, well sheltered from southerly and westerly winds, but open to the northward: between this and Port Herradura there is no place fit for a vessel.

Herradura and Coquimbo are well known. Teatinos is a bold rugged point, the land behind it rising in ridges, which gradually become higher as they recede from the coast to Copper Hill, which is 6,400 feet high. The point which makes as the north extremity of the bay, in coming from the northward, is a low rocky point, called Poroto; about four miles to the northward of Point Poroto, is the port of Arrayan, or Juan Soldado; but it does not deserve the name: it is merely a small bight behind a rocky point, scarcely affording shelter for a boat from southerly winds, and entirely open to northerly. A little to the northward of Copper Hill is another hill, on the same range and about the same height: the north side of the hill is steep, and at the foot of it is the small Bay of Osorno, which is about half a mile long, but not deep enough to afford any shelter for the smallest vessel. About half a mile to the northward of the bay there is a hamlet, consisting of a few small houses, called Yerba Buena.

The Pajaros Islands are two low rocky islands, lying about twelve miles from the coast; the northern is much smaller than the southern, and, as far as could be seen from the shore, there is no danger round or between them. A little to the northward of Yerba Buena there is a small island, called Trigo, separated from the shore by a channel about a cable's length broad; but it is only fit for boats: the island, except when very close, appears to be only a projecting point; there is a large white rock on the west point of it.

About three miles to the northward of Trigo Island, is the Port of Tortoralillo, which is formed by a small bay facing the north, with three small islands off the west point. In coming from the southward, the best entrance for small vessels is between the southernmost island and the point, where there is a channel about a cable's length wide, with from eight to twelve fathoms water. The dry rock off the point on the main land, should not be approached nearer than half a cable, as a sunken rock lies nearly that distance from it. There

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is no channel between the northern and middle islet, as it is blocked by breakers: a vessel may anchor about half a mile from any part of the beach in from six to eight fathoms, sandy bottom. The landing is not good, the best is on the rocks near the entrance; but nothing could be embarked from there: the east end of the beach is the best for that purpose. From the land to the northward, running so far westward, it is not likely that a heavy sea would be caused by a northerly gale.

Tembladar is a small cove in the east side of Tortoralillo, but the landing there is worse than on the other beach, and it is not so well sheltered.

About three miles to the northward of Tortoralillo, there is the small island of Chungunga; it is about a mile from the shore, and is a good mark for knowing the port: there is a rocky point a-breast of it; a little in-shore of which there is a remarkable saddle hill, with a nipple in the middle, which, to a person coming from the southward, appears as the extreme of the high range, that runs thence to the eastward of Tortoralillo, and is from two to three thousand feet high.

A little to the northward of Point Chungunga, there is a large white sand-patch, which is seen distinctly from the westward; it is at the south end of the Choros beach, which runs for seven or eight miles to the north-west, to Point Choros; a heavy surf always breaks upon it.

Off Point Choros there are three islands, the inner one is low and nearly joins the shore; nothing but a boat can pass inside it. About a mile to the westward of this island, there is another small island; between them the channel is clear of danger. To the south-west of this island about a mile, is the largest of the Choros islands; it is about a mile long, the top is very much broken, and at the south-west end it very much resembles a castle: there is a small pyramid off the south end, and rocks break about a quarter of a mile from the shore. The channel between the two outer islands is clear of danger; but about half a mile to the westward of the small island, there is a rock nearly awash. Five miles to the south-east of the southern Choros Island, there is a very dangerous reef of rocks only a little above the water.

Point Carrisal is a low rocky point, about five miles to the northward of Point Choros, with a remarkable round hummock; to the

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southward of it is the small cove of Polillao, where there is shelter for small vessels, but the landing is bad: there are two small rocky islets off the south point of the cove. To the northward of Point Carrisal is the bay of the same name, but it is not fit for vessels; at the bottom of the bay a heavy surf breaks about half a mile from the shore. The north side of the bay is formed by a rocky point, with outlying rocks and breakers about a quarter of a mile off all sides of it. There is a landing-place in the bay, near the south-east corner, where the rocky coast joins the beach, but in bad weather the surf breaks outside it.

Nearly one mile to the northward of the north point of Carrisal Bay is the Port of CHANERAL; it is well sheltered from northerly and southerly winds, but the swell sets in heavily from the south-west, which makes the landing bad; the best is in a small cove on the north side of the port, near the beach at the head of it: there is also a landing-place on the south side, but it is bad when there is any swell. On the beach at the head of the port there is always too much surf to land, except after very fine weather. About four miles and a half to the westward of it is the Island of Chañeral; it is nearly level, except on the south side, near which there is a remarkable mound with a nipple in the centre of it. There are rocks nearly half a mile from the south point of the island, and one about the same distance off the north-west point. On the north side there is a small cove, where boats can land with the wind from the southward; there is anchorage close off it, but the water is deep. An American sealing schooner was lost there a few years ago, from a norther coming on while she was at anchor.

The land round Chañeral is low, with ridges of low hills running from the points, the tops of which are very rugged and rocky, and the land is sandy and very barren; the range of high hills is several miles from the shore at this part, but between the range and coast there are several smaller hills rising out of the low land. The village of Chañeral is about three miles from the port, and is said to consist of about twenty houses. There are no houses near the port. We were told by some of the people that came off, that the only vessel that had ever been here was a small schooner, called the Constitucion (our vessel), which had taken a cargo of copper to Huasco. There was a large quantity of copper, said to belong to Mr. Edwards, ready to be embarked.

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To the northward of Chañeral Bay the coast is low, and projects to the N.W. for about ten miles. The extreme west point, Point Pajaros, has a small rocky islet off it, about two cables from the shore: the land in-shore rises gradually to a low ridge, about half a mile from the coast, the high range is about three miles in-shore. To the northward of Point Pajaros the coast runs to the East, forming a small bay, open to northerly, but well sheltered from southerly winds; there is anchorage in from eight to twelve fathoms, about one-third of a mile from the shore, but the landing is bad.

About four miles N.E. of Point Pajaros is another point, with a high rock off it, to the northward of which is the Bay of Sarco, in which there is also shelter from southerly winds. A deep gully runs inland from the S.E., corner of the bay, at the mouth of which is a sandy beach, with anchorage about one-third of a mile off, in from eight to twelve fathoms, but the landing is not good. There are two or three small huts close to it. To the northward of Sarco the high land runs close to the coast, the sides of the hills are covered with yellow sand, the summits are rocky, and the whole coast has a miserably barren appearance. To the northward of the deep gully about four miles, there is a projecting rocky point, at the foot of a high range of hills, with a very remarkable black sharp peak near its extreme, the coast to the northward of this runs nearly north and south, and is very rocky for about eight miles, when it turns to the westward, forming a deep bay, in the N.E. corner of which is a small beach called Tongoy. To the northward of the bay a high range runs out towards Point Alcalde, the extreme point of the bay, which is nearly seven miles to the southward of Huasco; the point is very rocky with small detached rocks close to it: in-shore it rises a little, and there are several small rocky lumps, running out of the sand, one of which, from the southward, shows very distinctly: it is higher than the rest, and forms a sharp peak; a little in-shore of which the land rises suddenly to the extreme of the high range. About seven miles to the northward of Point Alcalde, is the point forming the Port of Huasco, it is a low rugged point, with several islands off it, one of which only is of any size, it is separated from the main by a very narrow channel, and appears from sea-ward to be the point of the main; it is covered with low rugged rocks, one of which on its north side is much higher than the rest, and shows distinctly coming from the southward, but from the northward it is

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mixed with the other rocks behind it; to the south-west of this island there are several other small rocky islets, which appear as two small islands when seen from a distance. A little in-shore of the extreme point there is a short range of low hills, forming four rugged peaks, which show very distinctly from the southward and westward: the land falls again inside them for a short distance more, and then rises suddenly to a high range running east and west, which is directly to the southward of the anchorage. The top of the range forms three round summits, the easternmost of which is a little higher, and the middle a little lower than the other.

Nearly three miles to the N.E. of the anchorage, there is another range of hills about 1,400 feet high: on the south slope of which there is a sharp peak, from which it slopes to the valley that the river runs through. The river is small, and a heavy surf breaks outside it, the water however is excellent; there is another lagoon small river in the valley, nearer the port, but the water is very brackish. The anchorage is very much exposed to northerly winds, and a heavy sea then rolls in, but a heavy norther does not occur more than once in two or three years. The village consists of about a dozen small houses, scattered among the rocks on the point dividing the old and new ports. The country round presents a more barren and miserable appearance than any part even of this desolate coast: the ground is composed of a mass of small stones mixed with sand, out of which project masses of rugged, craggy rocks. A little in-shore the stony ground is changed for a loose yellow sand, which covers the sides and bases of nearly all the hills round: the summits are stony without any appearance of vegetation; but in the low grounds a few stunted bushes grow among the stones, and after rain (a rare blessing) they look much fresher than might be expected in such soil, and then the valley through which the river runs also appears green, forming a striking contrast to the country around.

Point Lobo, about ten miles to the northward of Huasco, is rugged, with several small hummocks on it; to the southward of this there are several small sandy beaches with rocky points between them, but a tremendous surf breaks on them, allowing no shelter even for a boat. A little in-shore of the point, there are two low hills, and within them the land rises suddenly to a range about 1,000 feet high. In the bay to the northward of Point Lobo, there

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are several small rocks, and about six miles from it there is a reef which runs perhaps half a mile off a low rocky point: the outer rock is high and detached from the others.

About eleven miles to the northward of Point Lobo, is a very rugged point, with several sharp peaks on it, about half a mile to the northward of which is the small port of HERRADURA, which can hardly be distinguished till quite close to it. Off the rugged point, and between it and the entrance to Herradura, there are outlying rocks and breakers, about a quarter of a mile from the shore: off the south entrance point there is a patch of low rocks, which in coming from the southward appear to extend right across the mouth of the port. The entrance faces the N.W., and is between this low patch of rocks, and a small islet to the N.E. of it: there is no danger within half a cable of either point. The port runs in about three-quarters of a mile to the eastward of the islet, and is sheltered from both northerly and southerly winds, but with a strong northerly breeze a swell rolls in round the islet. It is rather small for large vessels, and they would not be able to lie at single anchor in the inner part of the cove, but there is quite room enough to moor across it, about a quarter of a mile above the islet, in four fathoms, fine sand. In this place an American ship, the Nile, of 420 tons, was moored during a northerly gale, which blew very heavily; and she was perfectly sheltered. The landing is better than in any place between it and Coquimbo: but there is a very serious inconvenience in the want of water. There is a small lagoon about a mile from this place, in the valley at the head of Carrisal Cove, but it is worse than brackish; yet the 'peones,' who are at work shipping the ore, make use of it. A deep valley runs in from the head of the cove, separating the high ranges of hills, and is a good mark to know it by. The range to the southward of the valley is the highest near the coast, and is distinctly seen from both the northward and southward; there is a small nipple in the highest part of it. CARRISAL is a small cove about a mile to the N.E. of Herradura, well sheltered from southerly winds, but as it is so close to Herradura, which is so much superior, it is not likely to be of much use.

To the northward of Carrisal the coast is bold and rugged, with outlying rocks a cable's length off most of the points. About nine miles to the northward of Herradura there is a high point with a

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round hummock on it, and several rugged hummocks a little in-shore. To the northward of this there is a cove, sheltered from the southward, where small vessels may anchor, but it is not fit for large vessels; there is another cove similar to it about a mile to the northward of it. A little to the northward of the second cove, there is a high rocky point, which is the termination of the high part of the coast; to the northward of the point there is a small port, which from the chart appears to be Tortoralillo: it is well sheltered from southerly winds, and the landing is good. In the inside part of it a vessel, not drawing more than ten or twelve feet, might moor sheltered from northerly winds, in three and four fathoms, but with a northerly wind there would be a heavy swell in: there is anchorage farther out under the point, in from eight to ten fathoms; but a vessel should not go nearer the shore than eight fathoms, as the bottom inside is rocky.

During the summer months this would be a very good port for small merchant vessels; but there is no appearance of water near. Abreast of it the high range of hills recedes from the coast, which is low, with some low rocky hills a little in-shore.

About two miles to the northward of Matamores there is a low rocky point, a little to the northward of which there is a small deep bay, at the mouth of a valley, in which, apparently, there is anchorage for a vessel; but there was a heavy surf on the beach, and as the landing was bad we did not wait to examine it. To the northward of this the low hills are not so rocky, but are covered with yellow sand, except near the summits, where they are stony.

About six miles to the northward of this bay there is a remarkable rocky point, with a detached white rock off it, and a lump with a nipple on it, a little in-shore. About half a mile to the northward of this, is the small port of Pajonal, which, in coming from the southward, may be easily known by this nipple, and a small island, with a square topped lump in the centre of it, which is off the point to the northward of the port. A range of hills, higher than any near, rises directly from the north side of the port; and in the valley, about a mile from it, there is a range of small and very rugged hills rising out of the low land.

The anchorage is better sheltered from southerly winds than any to the southward, except Herradura, and there would not be much swell, as the point and island to the northward project considerably

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to the westward. The southerly swell rolls into the mouth of the port, but on the south shore it is smooth, and the landing pretty good: there is a dangerous breaker about a quarter of a mile to the south-west of the south extreme point, which only shows when there is much swell. The best anchorage is about half way up the cove, near the south shore, in five fathoms: near the head it is very flat. We found a cargo of copper ore ready to be shipped here, but no vessel had ever been in the port: there is no water within two miles, and there it is very bad indeed. The name of Pajonal was told to us by a young man who was getting the ore down, but he appeared to know scarcely anything of the coast, and there were no inhabitants near the place.

About a mile and a half to the northward of the island before mentioned, there is another point, with an island and several rocks off it; both the islands may be passed within half a mile, but there is no passage inside them. To the northward of the northernmost island, the coast runs to the eastward, forming a large and deep bay, which at a distance looks very inviting; but before we were within a mile of the depth of it, we were in three fathoms, with rocks all round us, some above and others a little below water. From the bay being well sheltered from the southward, they do not show till close to, except two patches which are off the north point, and are always uncovered. A mile to the northward of these rocks there is another bay, which is quite clear of danger; and in the south corner of it, a small cove, there is good anchorage in seven fathoms, well sheltered from southerly winds, but very open to northerly. The water is perfectly smooth with a southerly wind, and no swell could ever reach it unless it blew from the northward. There is a small bay, half a mile to the northward of this, where a vessel may anchor, but it is not so well sheltered; there were no signs of inhabitants, nor the least appearances of water in the valleys. The land at the back of the bay is low, but to the northward of the north bay it rises to a ridge of sand hills, running east and west, and terminating in a steep rocky point, with a cluster of steep rocky islets off it. To the northward of this point the coast is rocky and broken, with rocks a short distance from the shore for about four miles, where there is a rugged point with a very high, sharp-topped hill a little in-shore, which from the southward shews a double peak; directly to the northward of this point, there is a deep rocky

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bay, with a small cove close to the point where we anchored in five fathoms, but half a cable off shore on either side: it is not fit for a vessel. The bay is partly sheltered from northerly winds, but a northerly swell rolls in, and it does not appear to be a proper place for a vessel to enter.

From an old fisherman, who was living in a hut, we learned that the name of the place is BARRANQUILLA DE COPIAPO, and to our surprise saw a cargo of copper prepared for shipping. He also told us that another cargo had been shipped from the same place about a year before; though the cove is too small for any vessel to anchor in with safety, and outside it the water deepens very suddenly. There is no anchorage in the cove at the head of the bay, and the landing there is very bad; in the small cove the landing is good. There is no fresh water nearer than the river of Copiapo, which is about fifteen miles off.

The deep bight to the southward of this, in which are the three bays before mentioned, is called Salado Bay; the south point of it, with the island off it, is Point Cuernos. No vessel had ever been in either of these bays, but the middle one is much superior to Barranquilla, and might be a much better place to embark the ores.

From Barranquilla to Point Dallas the coast is rocky and broken, without any place sufficient to shelter the smallest vessel. Point Dallas is a black rocky point, with a hummock on its extreme, which, coming from the southward, appears to be an island; the land rises to a range of low sandy hills, with rocky summits.

The Caxa Grande is a small sharp-topped rock, which is the only one of the reef that shows above water; the patch near the point was a-wash when we passed.

The channel between it and Point Dallas appears to be wider than it is given in former charts, but the reef off the point projects much farther. The sea was high, and there was occasionally a breaker above a quarter of a mile from the point; at about that distance from the breakers on the reef, the least water we had was eleven fathoms; when the swell is not high, the breaker off the point would not show; it appeared to be detached from the reef which joins the point.

COPIAPO is a very bad port; the swell rolls in heavily, and the landing is worse than in any port to the southward; it may easily be known by the Morro, to the northward, which is a very

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remarkable hill, nearly level at the top, but near the east extreme of it there are two small hummocks; the east fall is very steep, the end of another range of hills shews to the northward. To the S.W., apparently forming part of the same range, is another hill, the west side of which forms a steep bluff; in coming from the southward, these hills will be seen in clear weather, before the land about the port can be made out. From a fisherman, who knew the coast to the southward, we learned that the small port we passed the night in, to the northward of Port Herradura, is called Matamores; the high point to the southward of it is Point Matamores. Tortoral, or Tortoral baxo, is the bay between it and Pajonal. He described it as having always a heavy surf in it, and the landing bad. The south point of the Bay of Salado, with the islet off it, is called Point los Cachos. He was in the vessel that took the cargo of copper from Barranquilla. She was a large brig of 300 tons, and was anchored off the mouth of the cove. The island to the north of Copiapo Bay, called Isla Grande, is very remarkable; it has a small nipple on each extreme, that on the eastern is the highest: to the westward of the middle of the island, there is another small round nipple.

The channel between Isla Grande and the main is clear of danger in the middle; but such a heavy swell rolls through, that it is scarcely fit for any vessel. Off the north extreme of the island there is a reef under water, projecting two cables to the eastward; at a cable's length distance from the reef we had eight fathoms; the point on the main appeared to have no danger off it; the rocks to the southward of it are inside the line of the points. The swell in the channel was by far the worst we had experienced on this coast: to the northward of the island there are several small rocks, one of which is high. There is no danger within a quarter of a mile of them.

The point on the main, to the northward of the island, is very rocky; on the S.W. point there are two rugged hummocks, and several rocks and islets close to the shore, but no danger outside them: from this to Point Morro, the shore is steep and cliffy, with remarkable patches of white rock in the cliffs to the south of the point, which is steep, with rugged lumps on its summit. The Morro rises suddenly, a little in-shore.

On rounding the point, you open a deep bay which runs in to the

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S.E.; there are several small rocky patches in it, and at the north end of the long sandy beach there is a piece of rocky coast, the north extreme point of which has a small island off it. The entrance to Port Yngles is to the southward of this point, round a low rocky point, to the southward of which, close in-shore, there is a small island off a sandy cove; there is a rock a-wash at high-water, about a cable's length to the N.W. of the south extreme point, but it always shows; after passing this rock the point is steep-to, and may be approached within a cable's length. The harbour inside forms several coves, in the first of which, on the starboard hand going in, there is anchorage for small vessels, but the bottom is stony and bad. There is a low island to the S.E. of this cove, above which is the best anchorage, with southerly winds. About half-way between it and a projecting rocky point on the east shore, small vessels may go much closer into the cove, to the southward of the island, where the landing is very good. The bay in the N.E. corner is well sheltered from northerly winds, and no sea could ever get up in it; but the landing is not so good there, the best is at a rocky point at the south end of the northernmost beach, where there is a small cove among the rocks perfectly smooth: it is by far the best harbour, but there is no fresh water near. The cove at the head of the harbour is very shoal; no vessel should go higher up than abreast of the projecting rocky point on the east shore, where she would have four and five fathoms in mid-channel. The bottom is hard sand, and may be seen in twelve fathoms water, which makes it appear very shallow. In the entrance there are eighteen fathoms close to the shore on both sides.

Port Caldera is close to the northward of Port Yngles, and is directly round the point with the small island off it; it is a fine bay, well sheltered, but the entrance more open than Port Yngles, and the landing not so good. There was a cargo of copper ore ready to be shipped in the south corner of the bay; but no vessel had then ever taken a cargo away. There were a few fishermen living in a hole in the cliff during the fishing season: the only vessel they had ever seen in the port was a brigantine, with provisions for the mines. No vessel had ever been in Port Yngles. There is water near the beach, on the east side, but it is very salt; it appears wonderful how they can make use of it, but they have no other nearer than Copiapo. The land is entirely covered with loose sand, except a few

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rocks on the points; the bottom of the bay is low, but the hills rise a little inland, and the ranges become higher as they recede from the coast: the first hill to the eastward is a very remarkable sharp-topped hill, the sides of which are covered with sand, with two low paps to the eastward of it. They have had strong northers here for two days, and sometimes a good deal of sea in the south corner of the bay; but in the north-east corner, which they call Calderillo, it is then smooth; they very seldom have heavy northers. There are fish to be got in the bay, but only with a net: in all the ports we visited we caught none alongside. Near the outer points of the ports there are rock fish to be caught, but there is always a heavy swell in such places.

Point Cabeza de Vaca is a remarkable point, about twelve miles to the northward of Caldera: it has two small hummocks near its extreme; inside them the land is nearly level for some distance in-shore, where it rises to several low hills, which form the extremity of a range. The coast between Caldera and the point forms several small bays, with rocky points between them, off all of which there are rocks a short distance: there is no danger within a quarter of a mile from Point Cabeza de Vaca. To the northward of the point there is a small rocky bay, called Tortoralillo, off the north entrance point of which there is a reef of rocks, with a high rock at the extreme of it, which extends above a quarter of a mile from the shore: about half a mile to the north-west of this there is a heavy breaker when there is much swell.

To the northward of this the coast is steep and rocky for three or four miles, with a high range of hills running close to the shore; then there is a small cove, called Obispito, with a white rock on the south point of it: to the northward of this the land is low and very rocky, with breakers about a quarter of a mile from the shore. About two miles from the cove there is a point, with a small white islet off it; to the northward of which the coast trends to the eastward, and forms the small cove of Obispo, in which we anchored, but it is not fit for any vessel. There was a fire on shore in the night, but we saw no ore, and as the landing was bad we did not attempt it. There is a very high sand hill, with the summit stony, a little in-shore of the cove, and to the northward of it a higher range of stony hills running close to the

* For more information respecting the vicinity of Copiapo, see pages 229 and 230.

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coast for about seven miles, where it terminates in low rugged hills a little in-shore of a brown rugged point, with a large white patch on its extreme, which is an islet, but does not show as one from the sea. To the northward of this point there is a fine bay, in which we anchored, and, from a fisherman who came off, learned that it is FLAMENCO: it is a very good port, well sheltered from southerly winds, and better from northerly, as the point projects far enough to prevent a heavy sea getting up. The landing is good in the S.E. corner of the bay, either on the rocks, or on a beach in a small cove in the middle of a patch of rocks, a little more to the northward, where there are a few huts, in which two brothers, with their families, were living; their chief employment was catching and salting fish, called congre, and drying them to supply Copiapo. In one day they had caught four hundred. They appeared to live in a miserable way, in huts made of seal and guanaco skins, much worse than a Patagonian "toldo"; the only water they had to drink was half salt, and some distance from the shore. They sometimes get guanacoes, that they run down with dogs, of which they have a great number.

The only vessel they had ever seen here, was a ship which anchored one night, on her way to Las Animas for copper ore, six years ago; they described Las Animas as a very bad place, not fit for any vessel, and in consequence no cargo had ever been shipped again, but taken to Chañeral, which was better, but not so good as Flamenco. There are no mines so near Flamenco as to Chañeral.

Flamenco may be known by the white patch on the brown rugged point, to the southward of which, in-shore, there are low rugged hills, rising to a high range. On the north side of the bay the land is very low: the north point is a low rocky point, with a detached hill rising out of the low land a little in-shore. To the northward there is another hill very much like it; in the depth of the bay the land is very low, and a deep valley runs back between two ranges of rugged hills. The hills are all covered with yellow sand near their bases, and to about half way up their sides, the tops are stony, with a few stunted bushes.

In the bay, to the northward of Flamenco, in which Las Animas was said to be, we could see no place fit even for a boat to land; the whole bay is rocky, with a few little patches of sand, and a heavy surf was breaking on the shore. The north point of this bay is

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low, but a little in-shore there is a high range of hills, the outside of which is very steep: to the northward of this point there is a small rocky bay, which appears to answer better to the description of Las Animas than the other; it did not appear a fit place for vessels, and the landing was bad. The north point of this bay is a steep rocky point, with a round brown hill rising directly from the water's edge; the sides of the hills are crossed by dark veins, running in different directions, which are very remarkable. To the northward of this point there is a deep bay, which, from the description, must be Chañeral: the south side of it is rocky with small coves, but the landing appeared to be bad; the east and north shores of it were low and sandy, and a heavy surf was breaking on the beach. We could see no signs of any people, or piles of ore, along the coast; and as it did not appear a good place for vessels, and our time was short, it was not thought worth a more particular examination. The north point of the bay is low and rocky, with a high range a little in-shore. To the northward of this point the hills and coast are both composed of brown and red rocks, with a few bushes on the summits of some of the hills: the sandy appearance the hills have to the southward ceases, and the prospect is, if possible, more barren.

Nearly nine miles to the northward of the point of this bay is Sugar Loaf Island, which is about half a mile from the shore; in coming from the southward, there is a high sugar loaf hill on the main, a little to the southward of the island, for which it may be mistaken, but the island is not so high and the summit is sharper. Between Sugar Loaf Island and Chañeral, the coast is rocky and affords no shelter: there is a small bay to the southward of the passage, between the island and the main, which would afford shelter from northerly winds, but with southerly it is exposed, and the landing is very bad. In the middle of the passage there are five fathoms in the shallowest part: the water in the northern end of it is smooth, and a vessel might anchor off the point of the island, sheltered from southerly winds, in six or seven fathoms; but after eight fathoms it deepens suddenly to thirteen and twenty fathoms, about half a mile from the island. There is a small bay on the main, to the northward of the channel, where a vessel would be sheltered from southerly winds, but we did not examine it.

About twenty miles to the northward of the Sugar Loaf Island

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there is a projecting point, with some small rocky islets off it, which we supposed to be Point Ballena, from the description given at Port Caldera. Between the point and the Sugar Loaf Island, the coast runs back a little, and is rocky, with a high range of hills running close to the shore. A little to the northward of Point Ballena there is a small bay, with a rocky islet about half a mile off the south point of it; the top of the islet is white, and answers the description given to us of a port called Ballenita: but it is not worth the name of a port; it is very rocky, with two or three small patches of sandy beaches, in which a heavy surf was breaking; the hills run close to the water, and have a very rugged appearance. A little to the northward of this there is another bay, which seemed to be Lavata: the south point has several low rugged points upon it, and in-shore the hills rise very steep. There is a small cove with excellent landing, directly behind this point, on which we anchored; there was a better-looking port inside, but it was so far from the outer coast, that our time would not allow more than a hasty glance.

The inner cove of the bay in which we anchored appeared to afford good shelter from southerly winds, and the water was very smooth. A little to the northward of this bay there is a point, which, till close, appears to be an island: but it is joined to the shore by a low shingle spit: the summit of it is rugged, with several steep peaks on it: several rocky islets lie scattered off the point.

Near three miles and a half to the northward of this, there is another point, very rugged, and with a high round hummock a little in-shore: to the southward of this point there is a deep bay, in which we expected to find Paposo, as we were some distance to the northward of its position in the old charts, but there were no appearances of any houses or inhabitants: the bay is very rocky, and does not afford good anchorage; several rocks lie off the south point, and a little inside it there is a reef running half-a-mile from the shore: in the bottom of the bay there are several small white islets; and two or three small sandy coves, which are not large enough to afford shelter for a vessel. This bay is called Isla Blanca.

About three miles from the north point of the bay, there is a white islet, with some rugged hummocks upon it: a little in-shore there is a hill of a much lighter colour than any round it; to the northward of this there is a deep bay, in which we were certain of finding Paposo, and, as we were becalmed, I went in a boat to search for it;

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on landing at the point we saw a smoke on the east side of the bay, and, on pulling over there, found two fishermen, who told us that the place was Hueso Parado, and that Paposo was round another point about eight miles to the northward. On inquiring for water, they brought us some, which was better than what was used in some other places to the southward, but it was still scarcely fit for use; they said it was similar at Paposo, and they thought it very good. In the south corner of the bay there appeared to be fit anchorage for vessels, and the landing good, but very open to northerly winds. No vessel had ever been there in the recollection of the men that we spoke to, neither had they heard of any; they described Paposo as having only four 'ranchos' and a few fishermen: the port not good. The bay that Paposo is in they called Nuestra Señora, the north point of the bay Point Rincon, and the south, Point Grande; the projecting point, answering to the Point Nuestra Señora of the Spanish charts, they called Point Plata. The bay to the northward of Point Ballena, is Ballenita; the bay in which we anchored to the northward of it is called Lavata; the point, with the peninsula, is Isla de las Tortolas: the point to the northward of it Point San Pedro; the bay which we were in afterwards is Isla Blanca, and the point of Hueso Parado Bay, Point Taltal.

The only place at which we observed the time of syzygial high-water, quite satisfactorily, was Huasco,* where it is 8.30, and the rise four feet at neap tides; at springs, it rises about two feet more. From the swell on all this coast, it is very difficult to get the time of high-water at all near the truth; the rise and fall appeared to be five or six feet on all parts of the coast. The only perceptible current we experienced was in the channel between Sugar Loaf Island and the main, where there was a very slight one to the northward, not more than a quarter of a mile an hour; and this was after a fresh breeze from the southward for several days. It is said, however, by coasters, that there is usually a set, towards the north, of about half a mile an hour.

* And here the tide was very carefully observed in a cove, where there was no swell; yet from the small rise, the exact time could not be taken within a few minutes. The water remained at the same level about half an hour.

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Winds on the Coast of Chile.

Very few words will suffice to give strangers to the coast of Chile a clear idea of the winds and weather they may expect to find there, for it is one of the least uncertain climates on the face of the globe.

From the parallel of 35° S., or thereabouts, to near 25° S., the wind is southerly, or south-easterly, during nine months out of twelve; in part of the other three there are calms, or light variable breezes, and the remainder is really bad weather: northerly gales and heavy rain prevailing, not only on the coast, but far across the ocean in parallel latitudes.

From September to May is the fine season, during which the skies of Chile are generally clear, and, comparatively speaking, but little rain falls. I do not, however, mean that there are not occasional exceptions to the general case: strong northers have been known (though rarely) in summer; and two or three days of heavy rain, with but little intermission, now and then disturb the equanimity of those who have made arrangements with implicit confidence in the serenity of a summer sky. These unwelcome interruptions are rarer, and of less consequence, northward of 31° than they are to the south of that parallel: so nearly uniform, indeed, is the climate of Coquimbo, that the city is called 'La Serena.'

In settled weather a fresh southerly wind springs up a little before noon (an hour sooner or later), and blows till about sunset, occasionally till midnight. This wind is sometimes quite furious in the height of summer; so strong, indeed, that ships may be prevented from working into anchorages, especially Valparaiso Bay, although they may take every previous precaution, by sending down top-gallant yards, striking top-gallant masts, and close-reefing their sails. But the usual strength of the southerly sea-breeze (as it is called, though it blows along the land from the south) is such as a good ship would carry double-reefed top-sails to, while working to windward.

This is also nearly the average strength of a southerly wind in the open sea, between the parallels above-mentioned, and there it is neither so strong by day, nor does it die away at night. Within sight of the land a ship finds the wind freshen and diminish,

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nearly as much as in the ports of this coast, where the nights are generally calm, till a land breeze from the eastward springs up. This light message from the Cordillera is never troublesome, neither does it last many hours. With these winds the sky is almost always clear; indeed, when the sky becomes cloudy it is a sure sign of little or no sea breeze in summer, and probably a fall of rain: in the winter it foretels an approaching northerly wind, with rain.

In summer, ships anchor close to the land, to avoid being driven out to sea by strong southerly winds; but as the winter approaches a more roomy berth is advisable, though not too far out, because near the shore there is always an undertow, and the wind is less powerful. Seamen should bear in mind that the course of the winds on this coast, as in all the southern hemisphere, is from north to south, by the west: that the hardest northerly blow, with most sea, comes from the westward of north, and that, therefore, they should get as much as possible under the shelter of rocks or land to the westward of them, rather than of those which only defend from north winds. 'Northers,' as they are called, give good warning: an overcast sky; little or no wind unless easterly; a swell from the northward; water higher than usual; distant land remarkably visible, besides being raised by refraction; and a falling barometer; are their sure indications: but all northers are not gales: some years pass without one that can be so termed; though few years pass in succession without ships being driven ashore on Valparaiso beach. Thunder and lightning are rare: wind of any disagreeable strength from the east is unknown. West winds are only felt while a 'norther' is shifting round, previous to the sky clearing and the wind moderating. The violence of southerly winds lasts but a few hours: that of a northerly gale seldom continues beyond a day and a night, generally, indeed, not so long.

Some persons say that the strength of northerly winds is not felt to the northward of Coquimbo, but I have evidence of gales, with heavy seas, at Copiapo: and Captain Eden informed me that he had a very heavy gale of wind in H.M.S. 'Conway,' in latitude 25° S., and longitude 90° W., where such an interruption to the usual southerly winds was little expected.

How to make passages is easy to tell, for there are but two ways. When going northward, steer direct to the place, or as nearly so as is consistent with making use of the steady winds which prevail in

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the offing: and if bound to the south, steer also direct to the place, if fortunate enough to have a wind which admits of your doing so; but if not, stand out to sea, by the wind, keeping every sail clean full: the object being to get through the adverse southerly winds as soon as possible, and reach a latitude from which the ship will be sure of reaching her port, on a direct course. Every experienced seaman knows that no method is more adverse to making quick passages than that of 'hugging the wind,' as it is called. When Sir Thomas Hardy was on this coast, he used to cross the southerly winds with a topmast studding-sail set, as many men cross the trades, his object being to get into other winds. The current on the coast of Chile is northerly, about half a mile an hour; varying a little with the wind.

The idea some persons have of Copiapo being a difficult place to make is rather unfounded; the following is the manner in which we made it in the Beagle, when strangers to that part of the coast.

July 3. A dull gloomy day, wind moderate from the southward; at 10 A.M. we were thirty miles south of Copiapo, by the dead reckoning from noon yesterday; but being aware of the northerly set, which near the shore is half a mile an hour, we steered an E.N.E. course in for the land; at noon it was in sight, forming two long rounded-topped hills: the northern one was the highest, it ended in a bluff, with a low point sloping off it; this we rightly supposed was the Morro of Copiapo, it bore N.E.; and the other which was a-head the high land of Tortoral; this had a gradual slope to seaward. A round and rather peaked black rock, about ten feet high, a little open, of a low level (eighty-five feet high) of a light brown colour, with some remarkable white patches on it, was seen at three; and a little before it, about a point south of the Morro, was a low, black, rocky island. The latter was Isla Grande, and the former the Caxa Grande rock, with the west point of the anchorage cove, on which there is a flag-staff: as we neared the land the wind gradually left us; and, as the day closed, we were four miles from the Caxa Grande. The clouds that covered the high land in-shore of Copiapo, lifted off a little in the evening, showing us two remarkable hills, one with a notched top, and the other like a sugarloaf, with rather a flat top; this was in a direction a little south of the Caxa Grande, and

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the other nearly over Isla Grande. (Head to the westward during the night with light variable airs.)

July 4. A perfect calm all day, and no observation: we were drifted abreast of the bluff under the Morro by the afternoon; it has some very curious white patches, which are seen at some distance; indeed the whole of the land is very remarkable. Plyed to the southward during the night, wind light.

July 5. Wind light from the N.N.E., and gloomy weather; at 10 A.M., passed one mile to the N.E. of the reef; north of the Caxa Grande rock we had eighteen fathoms, between it and the Isla Grande, with fifty-seven outside, and sixteen in. As we stood in we could not, from the mast-head, see any thing of the breakers said to be off the Caxa Grande rock: as the breakers ran high on the other reefs; had there been any thing of the sort there, we should most likely have seen it: all the information we have been able to get on the subject denies their existence. Detached, but close to the N.E. part of the anchorage point, are two black rocks, ten feet high; they show well from the northward. About twenty-five miles to the N.E. of the Morro, are two singular peaks: they are higher than any of the other land; the summit of the northern one is very pointed, and the southern is rather saddle-topped; these, it would seem, must be very remarkable from seaward. We anchored in seven fathoms, Caxa Grande rock bearing S. 67° W., distant three cables from the two rocks before-mentioned.

As Iquique is situated on a part of the coast where calms are frequent, and exposed to a constant swell from the westward, there may perhaps exist some difficulty in finding it; indeed, from this very circumstance, persons do not go sufficiently near the shore, although the position of the spot is nearly correct in the common charts.

The centre of the island lies in lat. 20° 12′ 30″ S. and long. 70° 15′ W. The slight indentation the bay makes in this high precipitous coast is not perceptible from an offing of nine or ten miles, neither is the collection of sand behind and south of the bay likely to catch the eye of a stranger: should there happen to be a vessel there, her dark masts against the white sand make an excellent mark; without which, there is nothing to guide a stranger until he gets within sight of the church steeple, or some white patches in the cliffs under Ta-

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rapaca Mountain; the latter will probably be seen first; they are nine miles to the southward of the anchorage.

The houses in the village, when first seen, have just the appearance of so many black rocks on a sandy beach. The anchorage is very tolerable, as it is sheltered from the S.W. swell by the island; which is surrounded by numerous small detached rocks, particularly on the N.E. and W. sides; therefore it should not be approached nearer than half a mile.

This island was once much higher; the many cargoes of birds' dung* it has afforded have reduced it to its present low state. The landing is bad at the best time, as you have to thread your way among patches of sunken rocks; on which the sea breaks with great violence at the full and change of the moon: several boats have been knocked to pieces, and lives lost. In the summer it is a calm nearly all night, sometimes there is a light air from the land. The sea breeze sets in from the southward or south-west about ten or eleven in the forenoon; it seldom blows fresh, but lasts until eight or ten at night. In the winter, calms, hazy weather, and light northerly winds are common.

The only trade now to Iquique is for saltpetre; the rich silver mines formerly worked are exhausted.

The water the inhabitants use is brought from Pisagua, a small bay thirty miles to the northward, for which they pay dearly, brackish as it is. Forty houses and an old church, situated on a bare sandy flat, without a vestige of verdure of any kind near, are the features Iquique presents; in vain does the eye wander for something green to rest upon—extreme desolation reigns every where, from shore to summit.

No. 41.

Remarks on the Coast of Peru.

All the bearings are magnetic.

From Point San Pedro (the south point of the bay of Nuestra Señora), at the distance of twenty miles, is Point Grande, the north point of the before-named bay. This point, when seen from the S.W., appears high and rounded, terminating in a low rugged

* Called 'guano:' it is a valuable manure.

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spit, with several hummocks on it, and surrounded by rocks and breakers to the distance of a quarter of a mile. N. 21° W., nine miles and a quarter, is Point Rincon, having a large white rock off it; between these two points, in the latitude of 25.02 S., lies the village of Paposo, the most northern village on the coast of Chile. This is a miserable place, containing about 200 inhabitants, under an Alcalde; the huts are scattered, and difficult to distinguish, from their being the same colour as the hills at the back of them. Vessels touch here occasionally for dried fish and copper ore: the former plentiful but the latter scarce. The mines lie in a S.E. direction, seven or eight leagues distant: but are very little worked. Wood and water may be obtained on reasonable terms; the water is brought from wells two miles off, and is difficult to embark. Vessels bound for this place should run in on a parallel of 25.05., and when at the distance of two or three leagues, the white islet off Point Rincon will appear, and shortly after the low white head of Paposo. The course should be immediately shaped for the latter; for with that head bearing S.S.E., distant half a mile, is the anchorage, in from fourteen to twenty fathoms, sand and broken shells. Should the weather be clear (which is seldom the case), a round hill, higher than the surrounding ones, and immediately over the village, is also a good guide.

North twenty-three degrees west from Point Grande, at the distance of twenty-three miles, is Point Plata, similar in every respect to Point Grande, terminating in a low spit, off which lie several small rocks, forming a bay on the northern side, with from seventeen to seven fathoms water; rocky, uneven ground.

From this point to Point Jara, which lies north ten degrees west, fifty-two miles, the coast runs in nearly a direct line, a steep, rocky shore, surmounted with hills, from 2,000 to 2,500 feet high, and without any visible shelter, even for a boat.

Point Jara is a steep, rocky point, with a rounded summit, and has on its northern side a snug cove for small craft; it is visited occasionally by sealing vessels, who leave their boats to seal in the vicinity. Water is left with them; and for fuel they use the kelp, which grows in great quantity, as neither of these necessaries of life are to be had within twenty-five leagues on either side ofthem.

Nearly four miles due north from this point is the south point of the large bay of Moreno, or Playa brava, high and rocky, with a

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black rock lying off it; and N. 26° W., twenty-two miles distant, is Point Davis (the south-west point of Moreno peninsula), which slopes gradually from Mount Moreno, and has two nipples on its extreme.

Mount Moreno, formerly called George Hill, is the most conspicuous object on this part of the coast; its summit is 4,060 feet above the level of the sea, sloping gradually on the south side to Point Davis, where it terminates; and on the north more abruptly towards the barren plain on which it stands. It is of a light brown colour, without the slightest sign of vegetation, and has a deep ravine on its western side.

Immediately under Mount Moreno is Constitucion Harbour, a small but snug anchorage, formed by the main land on one side and Forsyth Island on the other. Here a vessel might careen and undergo repairs without being exposed to the heavy rolling swell which sets into most of the ports on this coast; and the landing is excellent: the best anchorage is off a sandy spit at the north-east end of the island, in six fathoms water, muddy bottom; farther out the holding ground is bad; it would be advisable to moor ship securely, as the sea-breeze sometimes sets in strong. In running in, the island, or weather side, should not be hugged too close, as a number of sunken rocks lie off the low cliffy points—some only being buoyed by kelp. A mid-channel course would be the best, provided the wind allowed of reaching the anchorage before-mentioned: neither wood nor water are to be found in this neighbourhood—therefore provision must be made accordingly.

N. 8° W., twelve miles from this harbour, is Moreno Head, a steep bluff, the termination of a range of table land, which runs in a line from Mount Moreno; on the northern side of this head is Herradura Cove, a narrow inlet, running in to the eastward, without affording any shelter.

N. 4° W., nine miles from this head, lies Low Point, with some sunken rocks lying off it, and five miles farther on is Leading Bluff; this is a very remarkable headland, and with the hill of Mexillones, which lies a few miles south of it, is an excellent guide for the port of Cobija; it is about one thousand feet high, and facing the north is entirely covered with guano, which gives it the appearance of a chalky cliff. There is an islet about half a mile to the north-west, attached to the main by a reef of

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rocks, but no danger of any description outside it. The hill of Mexillones is 2,650 feet high, has the appearance of a cone with the top cut off, and stands conspicuously above the surrounding heights. This in clear weather is undoubtedly the best of the two marks; but as the tops of hills on the coast of Peru are frequently covered with heavy clouds, the bluff is the surer mark, for it cannot be mistaken; as, besides its chalky appearance, it is the northern extreme of the peninsula, and the land falls back several miles to the eastward of it.

Round this head is the spacious bay of Mexillones, eight miles across—but of little use, as neither wood or water is to be obtained. The shore is steep-to; there is anchorage on the west side, two miles inside the bluff, a cable's length off a sandy spit, in seven fathoms sandy bottom: at the distance of three cables there is thirty fathoms.

From this bay the coast runs nearly north and south, without any thing worthy of remark, until you reach the Bay of Cobija, or La Mar. This lies N. 13° E. thirty-one miles from Leading Bluff, is the only port of the Bolivian Republic, and contains about fourteen hundred inhabitants. Vessels call occasionally to take in copper ore and cotton; but the trade is small (particularly in 1835, as the revolution in Peru had destroyed the little they had). Water is scarce, at least, that which is good: there are wells, but the water from them is very brackish, and will not keep in casks. Fresh meat may be procured at a high price; but fruit and vegetables, even for their own consumption, are brought from Valparaiso, a distance of seven hundred miles. They have a mud-built fort, of five or six guns, on the summit of the Point; the only fortification about the place.

If coming from the southward toward this bay: after having passed the Leading Bluff (which should always be made), it would be advisable to shape a course so as to close the land two or three leagues to windward of the port, and then coast along until two white-topped islets, off False Cobija Point, are seen; a mile and a quarter to the northward of them is the port. On the Cobija Point there is a white stone, which shews very plainly, in relief against the black rocks at the back of it: a white flag is usually hoisted at the fort, when a vessel appears in the offing—which is also a good guide. In going in there is no danger; the point is steep-to, and may be rounded at a

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cable's length distant, and the anchorage is good in eight or nine fathoms, sand and broken shells. In the bay there are a number of straggling rocks, all well pointed out by kelp. It is high water at the full and change at 9 h. 54 m., and the tide rises four feet. Landing, at all times is indifferent, and at full and change, owing to the heavy swell, it requires some skill in winding through the narrow channel, formed by rocks on each side. Two miles north and east is Copper Cove, a convenient place for taking in the ore; there is anchorage in twelve fathoms, a short distance from the shore.

After leaving the north point of Cobija Bay, which has a number of straggling rocks a short distance off it, the coast takes a rather more easterly direction; generally shallow sand bays, with rocky points, and hills from two to three thousand feet high close to the coast, but no anchorage or place fit for shipping, until you reach Algodon Bay, twenty-eight miles from Cobija.

This bay is small, and the water deep; we anchored a quarter of a mile from the shore, in eleven fathoms, sand and broken shells, over a rocky bottom; its only use is as a stopping-place for water, should it be required. It may be obtained at the Gully of Mamilla (seven miles to the northward) from a spring, a mile and a half from the beach; the usual method of bringing it is in bladders made of seal-skin, holding seven or eight gallons each, with which most of the coasters are provided—the only vessels that profit by a knowledge of these places.

Algodon Bay may be distinguished by a gully leading down to it, and that of Mamilla to the northward, which has two paps on the heights, over the north side of it; there is also a white islet off Algodon Point.

N. 2° W., ten miles from this bay, is a projecting point, called in the Spanish chart San Francisco, but known more generally by the name of Paquiqui; on the north side of it, and near the extreme, is a large bed of guano, so much used on this coast for manure, that it may be said to be quite a trade. A brig of one hundred and seventy tons was loading with it for Islay at the time we passed; she was moored head and stern within a cable's length of the rocks, on which a considerable surf was breaking, and the guano was brought off in a balsa to a launch just outside the surf. There is better anchorage farther in the bay; but this is chosen for convenience.

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N. 2° W., sixteen miles from Paquiqui, is Point Arena, a low, sandy point, with rocky outline: between the two is a small fishing village, near a remarkable hummock: anchorage may be obtained under Point Arena, in ten fathoms; fine sandy bottom.

N. 6° E., twelve miles from Point Arena, is the gully and river of Loa, which forms the boundary line between Bolivia and Peru. It is the principal river on this part of the coast; but its waters are extremely bad, in consequence of running over a bed of saltpetre, and the hills surrounding it containing a quantity of copper ore. It is said that the ashes of a volcano fall into it, which add greatly to its unwholesomeness; but bad as it is, the people residing on its banks have no other. At Chacansi, in the interior, where it divides, it is tolerably good. In the summer season it is about fifteen feet broad and a foot deep, and runs with considerable strength to within a quarter of a mile of the sea, where it spreads, and flows over, or filters through the beach; but does not make even a swatchway, or throw up any banks, ever so small. A chapel on the north bank, half a mile from the sea, is the only remains of a once populous village. People from the interior visit it occasionally for guano, which is in abundance.

There is good anchorage, but rather exposed to the sea-breeze, with the chapel bearing north, half a mile from the shore, in from eight to twelve fathoms, muddy bottom; and landing may be effected under Point Chileno; but the best anchorage near here is the Bay of Chipana, six miles N. 39° W. from the river, and a snug cove for landing, near the extreme of the point; but at the full and change, a heavy swell sets in, and I doubt a boat being able to land with goods at those times.

The best distinguishing mark for the Loa is the gully through which it runs, that may be easily known from its being in the deepest part of the bay, formed by Point Arena on the south and Point Lobo on the north; and the hills on the south side being nearly level, while those on the north are much higher and irregular.

For the Bay of Chipana—after making the land in the latitude of the Loa, a large white double patch is seen on the side of a hill near the beach, and another similar one, a little to the northward: on discovering these marks (which may be seen three or four leagues), a course should be shaped directly for the southern end, where lies the anchorage in seven fathoms, sand and broken shells, under a low,

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level point. No danger need be feared in entering; as although the land is low, it may be approached within half a mile, in from six to ten fathoms. The anchorage inside the long kelp-covered reef might perhaps, be preferred; but the landing is not so good.

N. 27° W. of this bay, at the distance of eighteen miles, is Point Lobo, or Blanca, high and bold, on its extreme are several hillocks. Between these two is a small fishing village, called Chomache, under a point, which has a long reef off it, on the outer part of which a cluster of rocks shew themselves a few feet above water. The people of this village get their water from the Loa—a passage requiring, on a balsa, four days or more.

N. 21° W., fourteen miles off Point Lobo, is Point Pacache, a low rugged projecting point, with an islet a quarter of a mile off it, but quite clear outside this islet: half way between these two points is the Cone (Pabellon) of Pica, a remarkable hillock of guano appearing as if it had been covered with snow which had thawed at the top, leaving the lower half frozen, contrasting strongly with the surrounding hills, which are of a barren sun-burnt brown. This is also a place of resort for the guano vessels; they find pretty good anchorage close to the northward of the Pabellon.

East, a little southerly, a few miles in-shore of this, is a bell-shaped mountain, named Carrasco, 5,500 feet high: in clear weather it is a good mark for the neighbourhood of Iquique.

From Point Pacache to Point Grande, N. 8° W. twenty-eight miles, the coast is low and rocky, the termination of a long range of table land, called the heights of Oyarvide, or Barrancas, from its cliffy appearance: it has innumerable rocks and shoals off it, and should not be approached on any account nearer than a league, for the frequent calms and heavy swell peculiar to this coast render it unsafe for nearer approach.

Point Grande at the north end of the Barrancas, is a low cliffy point, with three white patches on its northern side; round this point is the Bay of Cheuranatta.

N. 3° W., eleven miles from Point Grande is the anchorage and town of Iquique; a miserable place that affords scarcely sufficient provisions for the consumption of its inhabitants, about five hundred souls; and no water nearer than Pisagua (a distance of nearly forty miles), from which place it is brought by boats built for the purpose, and is very dear. Yet, with these disadvantages, it is a place of con-

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siderable trade, from the quantity of saltpetre, and the silver mines of Huantacayhua, in its neighbourhood: the latter are little worked, as the saltpetre is a surer profit, large cargoes of which are annually taken in English vessels. There are no imports; all the property belongs to merchants in Lima, where vessels are chartered, and have only to call here and take in their cargoes.

Vessels bound for this place should run in on the parallel of Point Grande, until the white patches on that point are discerned, when a course should be shaped for the northern of three large sand hills: stand boldly in on this course till the church steeple appears, when shortly after, the town and low island will be seen, under which is the anchorage; care must be taken in rounding this island to give it a good berth, a reef extending off it to the westward, to the distance of two cables' lengths.

The anchorage is good in eleven fathoms, with Point Piedras bearing N. 9° W.; W. extreme of the island, W. 32° S.; church steeple S. 15° E.

Vessels have attempted the passage between the island and the main by a mistake, and thereby got into danger, from which they have been extricated with difficulty: it is only fit for boats or very small vessels.

Landing is bad and the way hazardous, owing to the number of blind breakers with which it abounds; boats have been lost at the full and change of the moon, when the heavy swell sets in. Balsas are employed to bring cargoes to a launch at anchor outside the danger, as is the case in most of the ports on this coast.

N. 12° W., eighteen miles from Point Piedras (the north point of Iquique Bay, which has a cluster of rocks round it), is the small bay of Mexillones, appearing as a low black island with a white rock lying off it, and may be known by the Gully of Aurora a little to the southward, and a road apparently well trodden on the side of the hills, leading to the mines. And N. 20° W., thirty-three miles from Point Piedras, is Point Pichalo, a projecting ridge at right angles to the general trend of the coast, with a number of hummocks on it. Round to the northward of this point is the village and roadstead of Guano Pisagua; this, as well as Mexillones, is connected with Iquique in the saltpetre trade, and is resorted to by vessels for that article. In rounding the point, a sunken rock lies about half a cable's length off, and should be looked out for, as it is necessary to

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hug the land close to ensure fetching the anchorage off the village at the beginning of the ridge; baffling winds are frequent, which may throw you near the shore, but do not signify, as the water is smooth and the shore steep-to. The best anchorage is with the extreme of Pisagua Point, N. 7° 30′ W.; and Pichalo Point, W. 19° S., two cables' length off the village, in eight fathoms, by which you will avoid a rock with four feet water on it, lying off the sandy cove at the distance of two cables.

North of this, at the distance of two miles and a half, is the gully and river of PISAGUA, the water of which supplies the neighbouring inhabitants; it is not, when at its greatest strength, more than ten feet across, and then does not overflow, but merely filters through the beach into the sea. Generally speaking, it is dry nine months in the year; wells are dug near it where water, such as it is, may always be found: but no vessel should trust to watering at this place, as, besides its unwholesomeness, the difficulty and expense attending it would be very great.

From this to Point Gordo the coast is in low broken cliffs, with a few scattered rocks off it, and ranges of high hills near. Point Gordo is a low jutting point, where a long line of cliff, several hundred feet high, commences; which continues, with only two breaks, to Arica.

These breaks or gullies, as they are called, are very remarkable, and are useful in making Arica from the southward. The first is the gully of Camarones, which lies seven miles north of Point Gordo, and is about a mile in width, running at right angles to the coast towards the mountains, with a stream of water running down it, and a quantity of brush-wood on its banks; it forms a slight sandy bay, scarcely sufficient to shelter a vessel from the heavy swell.

The Gully of Victor is the other; it lies N. 17° W., twenty-nine miles from that of Camarones, and fifteen miles from Arica; it is about three quarters of a mile in width, and from a high bold point, called Point Lobo, jutting out to the southward, forms a tolerably good anchorage for small vessels; it also runs toward the mountains in a similar manner to that of Camarones, and like it has a small stream running through, with verdure on its banks. Vessels bound to Arica should endeavour to make this gully or ravine, and when within three or four leagues of it they will see Arica Head, which appears as a steep bluff, with a round hill in shore, called Monte Gordo. Upon nearer approach the island Huano will be observed, joined to

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the head by a reef of rocks. To the northward of this island, and round the head is the port and town of Arica, the sea-port of Tacna. Of late this place has been the seat of civil war from which it has severely suffered. It was in contemplation in the latter end of 1836 to make it the port of the Bolivian territory; should that take place, it would perhaps become next in importance to the harbour of Callao, the principal port in Peru: its present exports are bark, cotton, and wool; for which is received, in return, merchandize, chiefly British. Fresh provisions and vegetables, with all kinds of tropical fruit, may be had in abundance and upon reasonable terms; the water also is excellent, and may be obtained with little difficulty; as a mole is run out into the sea, which enables boats to lie quietly while loading and discharging: the only inconvenience is having to carry or roll it through the town. Fever and ague are said to be prevalent; this in all probability arises from the bad situation which has been chosen for the town, the high head to the southward excluding the benefit of the refreshing sea-breeze, which generally sets in about noon. In entering this place there is no danger whatever; the low island may be rounded at a cable's distance in seven or eight fathoms, and anchorage chosen where convenient.

Hence the coast takes a sudden turn to the westward, and as far as the river Juan de Dios, is a low sandy beach with regular soundings: from this river it gradually becomes more rocky, and increases in height till it reaches the Point and Morro Sama, known by some as the Devil's Headland. This is the highest and most conspicuous land near the sea, about this part of the coast, and appears from its boldness to project beyond the neighbouring coast line; on its western side is a cove formed by the point called Sama, where coasting vessels occasionally anchor for guano; there are three or four miserable looking huts, the residence of those who collect the guano; it would be quite impossible to land except in a balsa, and even then with difficulty. Should a vessel be drifted down here by baffling winds and heavy swell, which has been the case, she should endeavour to pass the head (as a number of rocks surround it); and about a mile to the westward anchorage may be obtained in fifteen fathoms.

N. 49° W., nine miles from Point Sama, is a low rocky point, called Tyki, and between the two, the small river Lucumbu, having low cliffs on each side of it; this, like most of the rivers on the coast, has not strength to make an outlet for itself, but is lost in the

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shingle beach at the foot of the before-mentioned cliffs; regular soundings, which continue gradually increasing until you reach Point Coles, may be obtained at the distance of two miles, in from fifteen to twenty fathoms.

W. 21° N., at the distance of thirty-one miles from Point Sama, is Point Coles; the coast between is alternately sandy beach, with low cliff, and moderately high table land a short distance from the coast. I doubt if landing could be effected any where between Arica and Port Coles, as a high swell sets directly on this part and appears to break with redoubled violence.

Point Coles is very remarkable; it is a low, sandy spit, running out from an abrupt termination of a line of table land. Near its extreme is a cluster of small hummocks, the whole, at a distance, appearing as an island; off the point, to the south-west, is a cluster of rocks or islets, but no hidden danger exists, although there is generally a quantity of froth, under which a reef may be suspected. N. 13° E., five miles and a half from this point, is the village and roadstead of Ylo. This is a poor place, containing about three hundred inhabitants, under the local governor and captain of the port. But little trade is carried on, and that chiefly in guano: a mine of copper has been lately discovered, which may add to its importance. The inhabitants have to supply the necessaries of life by cultivation, and do not care to trouble themselves about luxuries. Water is scarce, and wood is brought from the interior, so that it is not on any account a suitable place for shipping. The best anchorage is off the village of Pacoche (a mile and a quarter south of the town), in twelve or thirteen fathoms, and the best landing is in Huano Creek: but bad, indeed, is the best, and great care must be taken lest the boat be swamped, or hurled with violence against the rocks.

In going into Ylo, the shore should not be approached nearer than half a mile (as many sharp rocks and blind breakers exist), until three small rocks, called 'the Brothers,' always visible inside the table end, bear east, when the village of Pacoche may be steered for, and anchorage taken abreast of it, as convenient.

English Creek affords the best landing, but boats are forbidden that cove, to prevent contraband trade being carried on.

From Ylo, the coast trends to the westward, with a cliffy outline, from two to four hundred feet in height, and with one or two

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coves, useful only to small coasters, until you reach the VALLEY OF TAMBO, which is of considerable extent, and may be easily distinguished by its fertile appearance, contrasting strongly with the barren and desolate cliffs on either side: those on the east maintain their regularity for several miles, while on the west the regularity is broken, and from the near approach of the hills their aspect is bolder.

The next point of this valley is called Mexico, it is E. 18° S., twenty-one miles from Islay Point, and is exceedingly low, projecting considerably beyond the general trend of the coast; it is covered with brushwood to the water's edge, and at the distance of two miles in a southerly direction, soundings may be obtained in ten fathoms, muddy bottom; from that depth, in the same direction, it increases to twenty fathoms; but on each side of the bank there are fifty fathoms.

W. 18° N., twenty-one miles from Point Mexico, is Point Islay, and between the two, five miles from the latter, the cove of MOLLENDO, once the port of Arequipa; but of late years the bottom has been so much altered, that it is only capable of affording shelter to a boat or very small vessel; in consequence of which it has been thrown into disuse, and the bay of Islay now receives vessels that bring goods to the Arequipa market.

ISLAY, the port of Arequipa, formed by a few straggling islets off the point, extending to the north-west, is capable of containing twenty or five and twenty sail. The town is built on the west side of a gradually declining hill, sloping toward the anchorage, and is said to contain fifteen hundred inhabitants (chiefly employed by the merchants of Arequipa). As in all the sea-ports of Peru, a local governor and captain of the port are the Authorities; this is also the residence of a British vice-consul. Trade was in a more flourishing condition here, even during a civil war, than at any place we visited; there were generally four or five, and often double that number of vessels discharging or taking in cargoes. The principal exports were wool, bark, and specie, in exchange for which British merchandize was chiefly coveted.

Islay being much frequented by British merchant vessels, and differences of opinion having arisen as to the best method of making it, detailed and clear directions should be given. Vessels have frequently been in sight, to the westward of the port, yet from the strength of the current (half a knot, and at the full and change often

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as much as one knot per hour) setting to the westward, have been prevented from anchoring for several days.

This, no doubt, has been partly owing to the hitherto inaccurate position assigned it, and from a proper reluctance to expose a vessel on an imperfectly known coast, to be baffled and drifted about by light and variable airs, in addition to a heavy swell continually rolling directly toward the shore.

With the following directions, it is to be hoped that more confidence will be acquired, and consequently less delay occasioned in sailing to the seaport of the second city of Peru.

Coming from the southward, the land abreast of Tambo should be made, and a certainty of that place ascertained, which (according to the state of the weather) may be seen from three to six leagues: the course should then be shaped toward a gap in the mountain to the westward, with a defined sharp-topped hill in the near range, a short distance from it. In this gap is the road leading to Arequipa, which winds along the foot of the before-named hill from Islay.

As the coast is approached, the foot of the hills will be seen to be covered with white ashes (said to have been thrown from the volcano of Arequipa), not found on any other part of the coast. This peculiarity commences a little westward of Tambo, and continues as far as Point Ornilius, and when within three leagues, the Point Islay and white islets forming the bay, will be plainly observed, and should be steered for.

Care must be taken in closing the point, as a rock, barely covered, lies a quarter of a mile to the southward. It is the custom to go to the westward of all the islands; but, with a commanding breeze, it would unquestionably be better to run between the third outer and next island,* which enables you to choose your berth at once; this can seldom be done by the other route, the wind heading as you enter, obliging you to anchor, and use warps. The best anchorage is just within Flat Rock Point, off the landing-place, in ten or twelve fathoms. A hawser is necessary to keep the bow to the swell, to prevent rolling heavily, even in the most sheltered part. Vessels from the eastward should close the land about Tambo, and observe the same directions.

If from the eastward the parallel of seventeen degrees five minutes

* His Majesty's ships Menai and Challenger passed in between these islands.

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should be made, and run in on, this will be about a league to the southward of the point; and, if the longitude cannot be trusted, Point Ornelius, being the most remarkable land, and easily seen from that parallel, should be searched for in passing. It lies W. 28° N., fourteen miles from Point Islay—is about two hundred feet high—has the appearance of a fort, with two tier of guns, and is perfectly white; the adjacent coast to the west is dark, and forms a bay; and on the east are low black cliffs; with ashes on the top extending half-way up the hills. If the weather be clear, the valley of Quilca may be seen, which is the first green spot west of Tambo. Ornelius, however, must be searched for, and when abreast of it Point Islay will be seen, topping to the eastward, as two islands off a gradual declining point, the sharp hill before-named in the near range, will also be seen, if favourable weather; and shortly after the town will appear like black spots, in strong relief against the white ground, when a course may be shaped for the anchorage under the white islets, as before. Landing at ISLAY is far from good; a sort of mole, composed of a few planks, with a swinging ladder attached to it, enables you generally, with a little management, to get on shore in safety; but often at the full of the moon vessels are detained three days or more, without being able to land or take in cargo. Fresh provisions may be had on reasonable terms; but neither wood nor water can be depended on. There are no fortifications of any description.

The coast between Islay and Point Cornejo is an irregular black cliff, from fifty to two hundred feet high, bounded by scattered rocks to the distance of a cable's length; about two leagues from Islay is a cove, called Mollendito, the residence of a few fishermen: there is a similar cove a little to the eastward of Point Cornejo. Westward of that point the coast retires and forms a shallow bay, in which are three small coves—Aranta, La Guata, and Noratos; and W. 36° N., thirteen miles distant, is the valley and river of QUILCA, off which vessels occasionally anchor, under the Seal Rock lying to the south-east of Quilca Point. This anchorage is much exposed; but landing is good in the cove westward of the valley. Watering is sometimes attempted, by filling at the river and rafting off, but must always be attended with much difficulty and danger. The valley is about three-quarters of a mile in width, and differing from the others, which are level, runs down the side of a hill; and from the regu-

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larity of the cliffs by which it is bounded, has the appearance of a work of art.

W. 6° N., at the distance of six leagues, is the valley of CAMANA; the coast between is nearly straight, with alternate sandy beach and low broken cliff, the termination of the barren hills immediately above. Camana is from two to three miles broad, near the sea; and apparently well cultivated: the village is situated about a mile from the sea; but is scarcely perceptible, being small, and surrounded by thick brushwood.

On approaching from the eastward, a remarkable cliff, resembling a fort, will be seen near the sea; this is an excellent guide till the valley becomes open. There is anchorage in ten or twelve fathoms, muddy bottom, due south about a mile; but landing would be dangerous.

W. 18° N., twenty-three miles, is the the valley of Ocoña, the next remarkable place; it is smaller and less conspicuous than the former; but similar in other respects. An islet lies at its southern extreme, and several rocks near the extreme of the cliff, on its eastern side.

W. 11° N., fourteen miles, is a projecting bluff point called PESCADORES, it has a cove on its east side surrounded by islets; and off the point, at the distance of three quarters of a mile in a southerly direction, lies a rock barely covered: to the westward of the point is a bay, but no anchorage; the coast then runs in nearly a direct line until you reach POINT ATICO, a rugged point, with a number of irregular broken hillocks on it, barely connected with the coast by a sandy isthmus. At a distance it appears like an island, the isthmus not being visible far off: there is tolerable anchorage in nineteen or twenty fathoms on its west side, and excellent landing in a snug cove at the inner extreme of the point. By keeping a cable's length off shore, no danger need be feared in running into this roadstead. The valley of the same name lies a league and a half to the eastward, where are about thirty houses, scattered among the trees, that grow to the height of some twenty feet. From this point the coast continues its westerly direction (low and broken cliff, with hills immediately above) until you reach Point Capa, where a bay commences that runs as far as Point Chala; in it there are several coves, but none that could be serviceable to shipping.

Point Chala bears from Point Atico W. 20° N. and distant sixteen

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leagues and a half, is a high rocky point, the termination of the Morro, or hill of that name. This mount shows very prominently, and has several summits to it; on the east side is a valley that separates it from another lower hill, with two remarkable paps, and on the west it slopes suddenly to a sandy plain; the nearest range of hills to the westward are thrown in-shore considerably, making Morro Chala still more conspicuous.

W. 26° N., eighteen miles from Point Chala, is Point Chavini, which appears like a rock on the beach; between the two is a sandy beach, with little green hillocks and sand-hills; there are also two rivulets, running from the valleys of Atequipa and Lomas, that are seen in the distance.

Half a mile to the westward of Chavini is a small white islet, and a cluster of rocks level with the water's edge; hence to the roadstead of Lomas a sandy beach continues, with regular soundings off it, at two miles from the shore.

Point Lomas projects at right angles to the general trend of the coast, and, similar to Atico, is all but an island; it may easily be distinguished although low, by its marked difference (being black rock) from the adjacent coast.

This road is the port of Acari, affords good anchorage in from five to fifteen fathoms, and tolerable landing; it is the residence of a few fishermen, and used as a bathing place for the inhabitants of Acari, which, from the information obtained, is a populous town several leagues in-land. All supplies, even water, are brought here by those who visit it: the fishermen have a well of brackish water scarcely fit for use. Boats occasionally call here for otters, which are plentiful at particular seasons.

W. 21° N., twenty-three miles from Lomas Road, is the Harbour of San Juan; and eight miles further, that of San Nicolas. The former is exceedingly good, and fit for a vessel to undergo any repairs in, or heaving down, in case of necessity, without being inconvenienced by a swell; but all materials must be brought, as well as water and fuel, none of which are to be found there.

The shore is composed of irregular broken cliffs, and at the head of the bay is a sandy plain; still the harbour is good, indeed much better than any other on the south-west coast of Peru, and might be an excellent place to run for if in distress. It may be distinguished by Mount Acari, a remarkable sugar-loaf hill, almost perpendicu-

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larly over the cliff on the north side of the bay; and three leagues to the eastward, a short distance from the coast, a high bluff head, the termination of a range of a table land. Between this bluff and the harbour the land is low and level, with few exceptions, and has a number of rocks lying off it to the distance of half a mile.

S.W. three-quarters of a mile from Steep Point (the southern point of the harbour) lies a small black rock, always visible, with a reef of rocks extending a quarter of a mile to the northward; and nearly two miles to the S.E., there is an islet that shows distinctly. A passage may exist between this reef and the point, but prudence would forbid its being attempted; the safest plan is to pass to the northward, giving it a berth of a cable's length; and not close the shore until well within the next point (a sunken rock lies off it), when you may haul your wind and work up to the anchorage at the head of the bay, and come to in any depth from five to fifteen fathoms, muddy bottom. In working up, the northern shore may be approached boldly; it is steep-to, and has no outlying dangers.

The harbour of San Nicolas lies N. 41° W. eight miles from San Juan, is quite as commodious and free from danger as the latter, but the landing is not so good.

Harmless Point may be rounded within a cable; there are a number of scattered rocks to the southward of it, but as they all appear, there is no danger to be feared. There are no inhabitants at either of these ports, so that vessels wanting any repairs may be sure of not being interrupted while so employed.

N. 59° W., eight and a half miles from Harmless Point, is Point Beware, high and cliffy, with a number of small rocks and blind breakers round, and some heights close above it; from this point the coast is alternately cliff and small sandy bays, till you reach Point Nasca, round which is what has been termed Port Caballos.

Point Nasca may be readily distinguished: it is a bluff head of a dark brown colour, 1,020 feet in height, with two sharp topped hummocks of a moderate height at the foot of it; the coast to the westward falls back to the distance of two miles, and is composed of white sand hills; in the depth of this bight is Caballos, a rocky shallow hole, that should only be known to be avoided; we lay at anchor in seven fathoms, as far in as it was thought prudent to go, for twenty four hours, without being able to effect a landing: the wind came round the head in heavy gusts, which, combined with the

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long ground swell, made it doubtful if two anchors would hold us till our observations were concluded. The only traces we saw of there ever having been any inhabitants at this dreary place, was a pole sticking up on the top of a mound, near the head of the bay.

N. 64° W., thirteen leagues from Point Nasca is Point Santa Maria, and the rock called the Ynfiernillo. This point is low and rugged, surrounded by rocks and breakers. At the distance of a league and a half, inland, to the eastward, is a remarkable table topped hill, called the table of Doña Maria; this hill may be seen in clear weather at a considerable distance from seaward, and from its height and peculiar shape is a good mark for this part of the coast.

The Ynfiernillo Rock lies due west from the northern extreme of the point, at the distance of a mile; it is about fifty feet high, quite black, and in the form of a sugar loaf; no dangers exist near it: there are fifty-four fathoms at two miles distance. Between this rock and Point Caballos, the coast to a short distance west of the small River Yca is a sandy beach, with ranges of moderately high sand hills. From thence to the Ynfiernillo it is rocky, with grassy cliffs immediately over it, and some small white rocks lying off.

N. 31° W., ten and a half miles from Santa Maria, is Point Azua, a high bluff, with a low rocky point off it; between is a sandy beach, interrupted by rocky projections, and a small stream running from the hills.

N. 3° W., from Point Azua, and at the distance of twenty-one miles, is the southern entrance to the bay of the Yndependencia. This extensive bay which is fifteen miles in length in a N.W. and S.E. direction, and three miles and a half broad, has been till of late years, completely unknown or overlooked: no mention is made of it in the Spanish charts, and it was not till the year 1825 that the Hydrographer at Lima became aware of its existence, and then only by an accidental discovery. It has two entrances: the southern called Serrate, which takes its name from the master of the vessel by whom it was discovered, is formed by the Island of Santa Rosa on the north, and Point Quemada on the south: it is three quarters of a mile wide and free from danger. The northern entrance is named after the Dardo and Truxillano, two vessels that were conveying troops to Pisco: they ran in, mistaking it for that place, and were wrecked: many of the people on board perished. It is formed by Point Carretas on the north and the Island of Vieja on the south,

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is five miles in width, and clear in all parts. It is bounded on the west by the Islands of Vieja and of Santa Rosa, and on the east by the main-land, which is moderately high, cliffy, and broken by a sandy beach, at the south end of which is a small fishing village called Tungo. The people of this village are residents of Yca, the principal town in the province, which is about twelve leagues distant; they come here occasionally to fish and remain a few days, bringing with them all their supplies, even to water, as that necessary of life is not to be obtained in the neighbourhood. There is anchorage in any part of this spacious bay; the bottom is quite regular, about twenty fathoms all over, excepting off the shingle spit on the north-east side of Vieja Island, where is a bank running off that spit to the northward, on which are five and six fathoms: this is decidedly the best place to anchor, for on the weather shore, near Quemado Point, it blows strong and in sudden gusts off the high land, and great difficulty would be found in landing; whereas, at the spit, you are not annoyed by the wind, and there is a snug cove, or basin, within it, where boats may land or lie in safety at any time.

Approaching this part of the coast from seaward, it may be distinguished by three clusters of hills, Quemado, Vieja Island, and Carretas; they are nearly of the same height, and at equal distances from one another. The S.W. sides of Morro Carretas and the Island of Vieja are steep dark cliff, but Morro Quemado slopes gradually to the water's edge, and is of a much lighter colour. At the southern extreme of Vieja Island, is a remarkable black lump of land, in the shape of a sugar loaf: off which lies the white level island of Santa Rosa, the S.W. side of which is studded with rocks and breakers, but there is no danger a mile from the shore.

N. 35° W., six leagues and a half from the north head, or Point Carretas, is the Boqueron, or southern entrance to the Bay of Pisco; between the two is a deep angular bay, with the Island of Zarate near its centre. The Boqueron is formed by the main land on the east, and the Island of San Gallan on the west; this island is two miles and one-third long in a north and south direction, and one mile in breadth: it is high, with a bold cliffy outline. There is a deep valley dividing the hills; which when seen from the south-west, gives it the appearance of a saddle; the south extreme terminating abruptly, while at its northern end it slopes more gradually and has

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several peaks on it. Off this end are some detached rocks, the northern of which has the appearance of a nine-pin, and shews distinctly.

S. ¼ E., at the distance of a mile from its south extreme, lies the Pinero Rock, which is much in the way of vessels bound to Pisco from the southward; it is just level with the water's edge, and in fine weather can always be seen; but when it blows hard (which it sometimes does through this channel) and a weather tide is running, there is such a confused cross sea that the whole space is covered with foam, rendering it difficult to distinguish the rock; at such a time the shore should be kept well aboard on either side, and when in a line with the outer extreme of the island and the white rock off Point Huacas, you will be within the rock and may steer for Point Paracca; on rounding which you will open the Bay of Pisco.

This extensive bay, formed by the Peninsula of Paracca on the south, and the Ballista and Chincha Islands on the west, is the principal port of the province of Yca. The town of Pisco is built on the east side, about a mile from the sea; and is said to contain three thousand inhabitants, who derive considerable profit from a spirit they distil, known by the name of Pisco or Italia, great quantities of which are annually exported to different parts of the coast: sugar is also an article of trade, but the pisco is the staple commodity. Refreshment may be obtained on reasonable terms: wood is scarce: excellent water may be had at the head of Paraccas Bay, under the south cluster of trees, two miles from the fishing village of Paracca: the landing there is very good, and the wells are near the beach.

The best anchorage off the town is with the church open of the road, bearing E. 14° N., in four fathoms, muddy bottom, three-quarters of a mile from the shore. A heavy surf beats on the beach with rollers to the distance of a quarter of a mile off, rendering it dangerous to land in ship's boats; launches built for the purpose are used in loading and discharging vessels; but at times even these cannot stand it, and all communication is cut off for two or three days together.

There are four entrances to this capacious bay: that to the southward already named; between San Gallan and the Ballista Islands; between those and the Chincha Islands; and the great or northern entrance; all of which, from appearances, may be safely used; but,

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between the islands, time would not allow a full examination, and, therefore, there may be dangers that were unseen by us.

In coming from the southward, after passing Point Paracca, a course may be shaped midway between Blanca Island and the church of Pisco, which will be seen distinctly: this will lead directly to the anchorage. A mile and a half round Point Paracca is a bay, off which a shoal patch extends, with four fathoms on it; the tail of this bank will be passed in standing towards the anchorage, the water then deepens suddenly, and when abreast of Blanca Island you will have twelve fathoms muddy bottom; from this depth it decreases gradually to the anchorage.

In coming from the northward it is all plain sailing; after passing the Chincha Islands stand in boldly to the anchorage; the water shoals quicker on this side Blanca Island, but there is no danger whatever. Vessels having to ballast here, should work up and anchor under Shingle Point; they can lie close to the shore, and boats may load with expedition.

In coming from seaward this part of the coast may easily be known by the Island of San Gallan, and the high Peninsula of Paracca at the back of it, which make like large islands, the land on each side being considerably lower and falling back to the eastward, so as not to be visible at a moderate distance. As the shore is approached the Chincha and Ballista Islands will be seen; which will confirm the position, there being no other islands lying off the coast about this parallel.

From Pisco the coast runs in a northerly direction, a low sandy beach with regular soundings off it, till you reach the River Chincha; from thence commences a clay cliffy coast, which continues as far as the River Canete. From this river to Point Frayle is a beautiful and fertile valley, in the middle of which is situated the town of Cerro Azul. This valley produces rum, sugar, and chancaca, a sort of treacle, for which it is resorted to by coasters. The anchorage is W.N.W. from the bluff that forms the cove, three-quarters of a mile distant, in seven fathoms; nearer the shore the water is shoal, which causes a long swell; the landing place is on the northern side of the point, on a stony beach, where a heavy surf is constantly breaking.

N. 39° W., fifteen miles from Cerro Azul, lies the Island of Asia. a round, white island, about a mile in circumference, with some rocks

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extending from it to the shore. Between the two is a bay, but scarcely affording anchorage. The coast line is partly a rocky and partly a sandy beach; in-shore are hills about fourteen hundred feet in height, inclining gradually toward the coast.

N. 41° W., twenty miles from Asia Island, is CHILCA POINT; it is about three hundred feet in its highest part, has several rises on it, and terminates in a steep cliff, with a small flat rock close off it. The valley of Chilca lies a league to the southward of the point, and the harbour of the same name half a league to the northward. This is a snug cove, but very confined; anchorage is good in any part of it, and landing tolerable; there is a small village at the head of the bay, but no information could be obtained from the inhabitants about Chilca, for they deserted their huts on our arrival.

From Chilca the coast forms a bend to about the Valley of Lierin, off which are the PACHACAMAC ISLANDS. The northern is the largest, half a mile in length, and about a cable's length broad; the next but one to it is the most remarkable, being quite like a sugar-loaf, perfectly rounded at the top: the others are mere rocks, and not visible at any distance. At the northern end of these islands lies a small reef, even with the water's edge: the group run nearly parallel to the coast, in a N.W. and S.E. direction, and are about a league in extent. There is no danger on their outer side, but towards the shore the water is shoal, which causes a long swell, that at times must break. Between these islands and the Morro Solar is a sandy beach, with moderately high land a short distance from the sea. The Morro Solar is a remarkable cluster of hills, situated on a sandy plain; when seen from the southward it has the appearance of an island in the shape of a quoin, sloping to the westward, and falling abruptly on its in-shore side; facing the sea it terminates in a steep cliff, and has a sandy bay on each side of it.

Off the point of the southern sand bay is an islet with some rocks lying about it, and off the point of the northern sand bay is a reef of rocks of about a cable's length; round this reef, on the north side of the Morro, is the town and road of Chorillos. The town of Chorillos, built on the cliff, at the foot of one of the slopes of the Morro Solar, is used chiefly as a bathing-place for the inhabitants of Lima, and during a revolution its road is filled with the shipping from Callao; though it is an exceedingly bad place for them: the bottom is a hard sand, with patches of hard stony clay

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mixed together, called tosca; and the heavy swell that sets round the point causing almost a roller, brings a vessel up to her anchor and throws her back again with a sudden jerk, each of which makes her drag, or endangers snapping the cable.

Vessels having to anchor here ought not to shut the southern point the Morro in with the next point to the northward: by keeping this mark open they will be in eight or nine fathoms, and not have so much swell as there is further in. The landing is very bad; canoes built purposely and dexterously managed are the usual means of communication: no doubt there are times when a ship's boat may land without danger, but very seldom probably without the crew being thoroughly drenched. From Chorillos the coast runs in a steady sweep with cliffs of less height, till it reaches the Point of Callao, which is a shingle spit, stretching out toward the Island of San Lorenzo, and with it forms the extensive and commodious Bay of Callao.

The Island of San Lorenzo, which is 1050 feet at its highest part, is four miles and a half long, in a N.W. and S.E. direction, and one mile broad. Off its S.E. end lies a small but bold-looking island, called Fronton, and to the S.W. are the Palominas rocks: its northern end, or Cape San Lorenzo, is clear, and round it is the usual passage to the anchorage at Callao. In rounding this Cape do not close the land nearer than half a mile, for within that distance there are light baffling airs caused by the eddy wind round the island; by getting among which you would be more delayed than if you gave the island a good berth, and should have to make an additional tack to fetch the anchorage.

This is the usual route; but there is another which, with common precaution, may be used to great advantage, by vessels coming from the southward. This is the Boqueron, formed by the Island of San Lorenzo and Callao Point. After making San Lorenzo and Fronton, steer so as to keep the south extreme of the latter about a point open on the bow port; and keep on this course until Callao Castle is seen, which has two martello towers on it, and is situated on the inner part of the shingle spit, that forms the point: then steer for it till Horadada Island (with a hole through it) comes on with the middle of the southern sandy bay of the Morro Solar, and with the inner declivity of the hill on Solar Point bearing S. 66° E.: with these marks on, and steering N. 66° W., for the furthest point of

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Lorenzo you can see, you will be clear of all danger; and when the west martello tower in the castle comes on with the northern part of Callao spit, bearing N. 49° E., you may haul gradually round, till the same tower is seen to the northward of the breakers on a shoal lying off the spit; when a direct course may be shaped for the anchorage. There is no regular tide in this passage, but generally a little setting directly through, sometimes to the N.W. and at others the contrary; should the stream be adverse, and it fall calm while in the channel, there is good anchorage in eight or nine fathoms, with the leading marks on.

Callao is well known as the sea-port of Lima, which is seven miles inland, situated five hundred feet above the level of the sea, and at the foot of a range of mountains: when seen from the anchorage on a fine day, it has an imposing appearance.

Trade was in a flourishing condition in 1836, and when the government becomes settled, this may be the first commercial port on the west coast of South America.

Supplies of all sorts may be obtained for shipping; fresh provisions as well as vegetables, with an abundance of fruit: watering is also extremely convenient, a well-constructed mole being run out into the sea, at which boats can lie and fill from the pipes projecting from its side; wood is the scarcest article, and very dear, so that vessels likely to remain at this port should husband their fuel accordingly.

From Callao, the coast is a sandy beach, running in a northerly direction until you reach Point Vernal; it there becomes higher and cliffy, which character continues as far as Point Mulatas, round which is the little bay of Ancon.

To the west and south-west of Ancon lie the Pescador Islands, the outer and largest of which bears N. 31° W. from Callao Castle, and at the distance of eighteen miles. There is no danger among these islands; they are steep-to, with from twenty to thirty fathoms near them.

N. 33° W. from Point Mulatas, twelve miles distant, is the Bay of Chancay and river of that name; this bay may be known by the bluff head that forms the point, and has three hills on it, in an easterly direction; it is a confined place, and fit only for small coasters. From Chancay, the coast runs in a more westerly direction, as far as Point Salinas, a shingle beach, with a few broken, cliffy points; the

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hills are near the coast, and from four hundred to five hundred feet high.

The point or head of Salinas is five miles in length, in a north and south direction; off its southern extreme is a reef of rocks, a quarter of a mile from the shore; and at its northern part, called Las Bajas, is an islet at a cable's distance; between these points are two coves fit only for boats; there is a remarkable round hill, called Salinas, at a short distance from the coast, and further in shore, is a level, sandy plain; at the south side of this plain is a number of salinas, or salt-ponds, from which the headland takes its name. These ponds are visited occasionally by people from Huacho.

Off the south part of Salinas, in a south-west direction, lie the Huara Islands, the largest of which is called Mazorque. It is two hundred feet in height, three-quarters of a mile long, and quite white; sealers occasionally frequent this island; there is landing on its north side.

The next in size is called Pelado; it lies S. 49° W. six miles and a half from Mazorque, is about one hundred and fifty feet high, and apparently quite round; between these two islands a safe passage exists, and may be used without fear in working up to Callao. Between Mazorque and Salinas are several smaller islands, all of which, from their appearance, may be approached without danger; but as no advantage could be gained, it would not be prudent to risk going between them. Vessels, in working up, sometimes go between the inner one and the point; but what they gain by so doing does not appear, for when the current sets to the southward, it runs equally as strong between Mazorque and Pelado as it does nearer the shore.

Round the northern point of Salinas Head is the bay of that name, of large dimensions, and affording anchorage. From this bay the coast is moderately high and cliffy, without any break, until you reach the Bay of Huacho. This bay lies round a bluff head, is small; but the anchorage is good in five fathoms, just within the two rocks that run off the northern part of the head. The town is built about a mile from the coast, in the midst of a fertile plain, and in coming from seaward has a pleasant appearance; it is not a place of much trade, but whale-ships find it useful for watering and refreshing their crews. Fresh provisions, vegetables, and fruit, are abundant and on reasonable terms; wood is also plentiful, and a stream of fresh water

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runs down the side of the cliff into the sea. Landing is tolerably good: rafting seems to be the best method of watering.

In coming from seaward, the best distinguishing marks for this place, are the BEAGLE MOUNTAINS, three in number, in the near range, each of which has two separate peaks on it; these lie directly over the bay, and on closing the land, the round hill on Salinas Point and the Island of San Martin to the northward, will be seen; about midway between them is the Bay of Huacho, under a light brown cliff, the top of which is covered with brushwood: to the southward the coast is a dark, rocky cliff.

N. 29° W., three miles and two-thirds from Huacho, are the Head and BAY OF CARQUIN, scarcely as large as Huacho, and apparently shoal and useless to shipping; off the Head, which is a steep cliff, with a sharp-topped hill on it, are some rocks above water, and an islet about three-quarters of a mile distant. N. 31° W. three miles from this islet is the island of San Martin, and round to the northward of the point abreast of it, is the Bay of Bequeta.

This is no place for a vessel, being full of rocks and breakers, and having nothing to induce one to go there. From this bay the coast is moderately high, with sandy outline, until you reach Point Atahuanqui. This is a steep point, with two mounds on it, and is partly white on its south side: there is a small bay on its north side, fit only for boats. Between this point and the south part of Point Thomas the coast forms a sandy bay, low and shrubby; with the town of Supé about a mile from the sea.

Point Thomas is similar in appearance to Atahuanqui, without the white on the south side. To the northward of this Point is a snug little bay, capable of containing four or five sail; it is called the Bay of Supé, and is the port of that place and Barranca.

There is a fishing village at the south part of it, which is used by the inhabitants of Barranca during the bathing-season. Hitherto it had been a forbidden port by the government: in consequence of which it is little known, and has had few opportunities of exchanging its produce for the goods of other countries. When we were there, little information could be gained as to the size of the neighbouring towns, and number of inhabitants they contain; but from their appearance we thought they might be of considerable extent. These places produce chiefly sugar and corn, cargoes of which are taken in the various little vessels that trade along the coast. Refreshments may

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be obtained ; but water is scarce, the greater part of which is brought from Supé, for the use of the inhabitants of the village.

The best anchorage is in four fathoms, with Point Thomas shut in by the inner point, about a cable's length from the rocks running off that point, and rather more than a quarter of a mile from the village. There is good anchorage further out, in six or seven fathoms, but little sheltered from the swell. In entering, there is no danger ; Point Thomas is bold, with regular soundings, from ten to fifteen fathoms three-quarters of a mile off it. Off Inner Point there are a few rocks to a short distance ; but there is no necessity for hugging the shore so close, as you can always fetch the anchorage, by keeping at a moderate distance in standing in.

To distinguish this port, the best guide at a distance is the Bell Mountain, the highest and most remarkable mountain in the second range ; it bears from the anchorage E. 39° N. ; may be distinguished by its shape like a bell, and has three distinct rises on its summit—the highest at the north end ; on that side it shews very distinctly, there being no other hills near it for a considerable distance. On approaching the coast, the island of San Martin to the southward, and Mount Darwin and Cerro Horca (a small round hill on the beach, with a steep, cliffy side to it, facing the sea, with apparently an islet off it), will be seen, nearly four leagues to the northward. The harbour itself has a white rock at its north extreme, and cannot be mistaken, for there is no other like it near this part of the coast.

From Supé the coast is a clay cliff, about a hundred feet in height, to the distance of a league and a half ; it then becomes low and covered with brushwood, until you reach Cerro Horca already mentioned ; here it again becomes hilly near the sea, with alternate rocky points and small sandy bays, which continue to the distance of six leagues ; where is the bay called Gramadel.

This is a wild-looking place, with a heavy swell rolling in ; it is visited occasionally for the hair seal, with which it abounds : there is anchorage in six or seven fathoms, sandy bottom, with the bluff that forms the bay bearing S.S.E. about half a mile from the shore ; but landing is scarcely practicable.

The coast maintains its rocky character, with deep water off it, as far as the Buffadero, a high, steep cliff, with a hill having two paps on it, a little in-shore. From this bluff is a rocky cliff, from two hundred to three hundred feet high, and more level country, as far as Point Leganto, round which is the Port of Guarmey.

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This is a tolerable harbour, with good anchorage any where in from three and a half to ten fathoms, over a fine sandy bottom.

Fire-wood is the principal commodity, for which it is the best and cheapest place on the whole coast. Vessels of considerable burthen touch here for that article, which they carry up to Callao, and derive great profit from its sale. There are also some saltpetre works, established by a Frenchman, but little business is done in that line. The town lies in a north-easterly direction, about two miles from the anchorage, but is hid by the surrounding trees, which grow to the height of thirty feet. It has only one street, and cannot contain more than five or six hundred inhabitants. At the anchorage there is a small house, used to transact business, but no other building, which is unusual, as at most of these places there is a small village near the sea. Large stacks of wood are piled up on the beach, ready for embarking.

Fresh provisions, vegetables, and fruit, are plentiful and moderate; but water is not to be depended on. It is true, there is a river, and for several months after March there is a plentiful supply; but in the summer season there is sometimes great drought. At the time we were there, a whale-ship put in to supply her wants, and had to remain several days, waiting for the water to come down from the mountains.

Legarto Head is a steep cliff, with the land falling immediately inside it and rising again to about the same height. In sailing in, after having passed the head, a small, white islet will be seen in the middle of the bay; steer for it, that you may not border on the southern shore, for there are many straggling rocks running off the points; and when sufficiently far to the northward to shape a mid-channel course between the white islet and the point opposite it, to the southward, do so, and it will lead to the anchorage. In standing in, in this direction, the water shoals gradually to the beach; but the southern shore must on no account be approached nearer than a quarter of a mile.

The best anchorage is in four fathoms, with Harbour Islet bearing N. 26° W., and the ruins of a fort on a hill in-shore E. 5° N. about a quarter of a mile from the landing-place on the beach. This landing-place does not seem to be so good a one as a steep rock on the outer side of the bluff, where the sand beach commences; but probably it is the most convenient for loading boats.

The rise and fall of tide is irregular, and the time of high water

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uncertain; but, generally speaking, three feet may be considered about the extent to which it ranges. The sea breeze sets in so strongly occasionally, that it is difficult for boats to pull against it; this is particularly the case under the high land, whence it comes in sudden gusts and squalls.

In coming from seaward, the best way to make this port is to stand in on a parallel of 10° 06′, and when within a few leagues of the coast, a sharp-peaked hill, with a large white mark on it, will be seen standing alone a little north of the port: the break in the hills through which the river runs, is high and cliffy on each side. The land is also much lower to the northward of Legarto Head; and there is a large white islet at the north end of Guarmey Bay.

N. 34° W., seven miles and a half from the white islet at the north extreme of Guarmey Bay, is Point Culebras, a level projecting point, similar in appearance to Legarto Head, as seen from the northward; the coast between is a mass of broken cliffs and innumerable detached rocks, with moderately high land near the coast.

On the north side of Point Culebras, there is anchorage off the valley of that name. From this point the coast is rocky, with small sandy bays, and some rocks lying off it about three quarters of a mile; there is also a white cliffy islet, five miles to the northward of Culebras; whence the coast takes a bend inwards, forming a bay, and then runs out towards the Colina Redonda; a point with two hummocks on it, and as seen from the southward, appearing like an island. On the north side of this point is the Caleta (only fit for boats); and immediately over it, the Cerro Mongon.

The Cerro Mongon is the highest and most conspicuous object on this part of the coast; when seen from the westward it has the appearance of being round, with rather a sharp summit; but from the southward, it shows as a long hill with a peak at each end. It is said there is a lake of fresh water on its summit, and that its valleys abound with deer; but the truth of this cannot be vouched for, as our examination did not extend so far.

From Mongon there is a range of hills running parallel to the coast (which is high and rocky, with some white islets lying off it) as far as Casma, where they terminate in a steep rocky bluff, that forms the southern head of the port of that name.

The Bay of Casma is a snug anchorage, something in the form of a horse-shoe; at its entrance it is a mile and three quarters in a

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N.W. and S.E. direction, and a mile and a half deep from the outer part of the cheek, with regular soundings from fifteen to ten, and three fathoms near the beach.

The best anchorage is with the inner part of the south cheek, bearing about S.S.E. a quarter of a mile off shore, in seven fathoms water; by not going farther in you escape, in a great measure, the sudden gusts of wind that at times come down the valley with great violence. Captain Ferguson, of H.M.S. Mersey, mentions a rock with nine feet water on it, on the south side, half a mile from the shore, that sometimes breaks: we saw nothing of it while we were there, but doubtless it exists.

This place seemed quite deserted; the only things that indicated its ever having been visited, were a few stacks of wood piled up on the beach.

The best distinguishing mark for Casma, is the sandy beach in the bay, with the sand hills in-shore of it contrasting strongly with the hard dark rocks, of which the heads at the entrance are formed: there is also a small black islet lying a little to the westward of it.

From Casma the coast takes rather a more westerly direction, but continues bold and rocky.

N. 44° W., five leagues from Casma, is the Harbour of Samanco, or Huambacho; midway between them is a bay, almost hidden by two islands that lie across the entrance: this bay is four miles long and two miles deep; but as the Bay of Samanco is so near at hand, it was not examined by us as to its capabilities.

The Bay of Samanco is the most extensive on the coast to the northward of Callao; it is two leagues in length, in a N.W. and S.E. direction, and a league and a half wide: at its entrance it is two miles wide, formed by Point Samanco on the south, and Seal Island on the north, and has regular soundings all over it.

At the S.E. corner, in a sandy bay, is a small village (the residence of some fishermen), situated at the termination of the River Nepeña. This river, like most on the coast, has not sufficient strength to force a passage for itself through the beach, but terminates in a lagoon within a few yards of the sea.

The town of Huambacho is the nearest place to this bay; it lies about a league distant, at the east extreme of the valley. Nepeña, which is the principal town, lies to the north-east about five leagues off. There is very little trade at this place; small coasting vessels

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from Payta sometimes call here with a mixed cargo, and they get in exchange sugar and a little grain,

Refreshment may be obtained from the neighbouring towns, but wood is scarce. The water of the river is brackish and unfit for use; but there are wells on the left bank, a short distance from the huts. When taken on board, this water is not good; but, contrary to the general rule, after it has been some time confined on board, it becomes wholesome and pleasant tasted.

When at a distance, the best mark to distinguish this bay, is Mount Division, a hill with three sharp peaks, situated on the peninsula between Samanco and the Bay of Ferrol. There is also a bell-shaped hill on the south side of the bay that shows very distinctly.

Mount Tortuga, a short distance inland to the N.N.E., will also be seen: it is higher, and similar in appearance to the Bell Mount. The south entrance point is a steep bluff, with some rocks lying off it to a cable's length; on opening the bay, Leading Bluff will be seen, a large lump of rock on the sandy beach at the N.E. side, that looks like an island. In going in, give Samanco Head a berth in passing; you may then stand in as close as convenient to the weather shore, and anchor off the village in four, five, or six fathoms, sandy bottom: when rounding the inner points, take care of your small spars; for the wind comes off the Bell Mount in sudden and variable puffs.

N. 43° W., three leagues from Samanco, is the entrance to the Bay of Ferrol, nearly equal in size to Samanco, and separated from it by a low sandy isthmus; it is an excellent place for a vessel to careen, being entirely free from the swell that sets into most of the ports. On its N.E. side is the Indian village of Chimbote, where, we were told, refreshment of any kind might be had, but no water. The entrance is clear; but there is a reef of rocks off Blanca Island, half a mile to the northward, which must be avoided.

N. 40° W., two leagues from the entrance of Ferrol, is Santa Island: about a mile and a half in length; lying N.N.E. and S.S.W., and of a very white colour; just without it are two sharp-pointed rocks, twenty feet above the sea. Two miles N.N.E. from the island is Santa Head, on the north side of which is the harbour of that name. This, although small, is a tolerable harbour; the best anchorage is in four or five fathoms, with the extreme of the head bearing S.W. Fresh provisions and vegetables may be obtained on moderate terms. It is also a tolerable place for watering.

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The town lies west from the anchorage, about two miles distant; and the mouth of the river is a mile and a half along the beach. This is the largest and most rapid river on the coast of Peru: from Santa Head it is seen to wind its way down the valley, with several islets interrupting its course; but at its termination it branches off and becomes shallow, with only sufficient strength to make a narrow outlet for itself, through the sandy beach that forms the coast line: a heavy and dangerous surf lies off it; so that no boat could approach with any degree of safety.

This part of the coast may be known by the wide spreading valley down which the river runs, bounded on each side by ranges of sharp-topped hills; and as you approach, Santa Island will be plainly seen; with the Head of the same name; there is also a small but remarkable white island, called Corcovado, to the N.W. of the harbour. There is no danger in entering; the soundings are regular for some distance outside; and you may anchor any where between the islands in a moderate depth of water, but of course exposed to the swell.

N. 35° W., five leagues from Santa, lie the Chao Islands, one mile and three quarters off the point and hill of that name. The largest is a mile in circumference, about one hundred and twenty feet high, and, like most of these islands, quite white; there are regular soundings from ten to twenty fathoms, at the distance of a mile off shore.

Between Santa and Chao the coast is a low sandy beach, which continues and forms a shallow bay, as far as the hill of Guañape, with moderately high land a few miles in-shore.

The hill of Guañape is about three hundred feet high; rather sharp at its summit, and when seen from the southward, appears like an island; on the north side of it is a small cove, with tolerable landing just inside the rock that lies off the point.

S. 8° W. from this point, between six and seven miles from the coast, lie the Guanape Islands, with a safe passage between them and the shore; they may be said to be two, with some islets and rocks lying about them; the southern is the highest and most conspicuous.

From the hill of Guañape the coast continues a sandy beach, with regular soundings; and ranges of high sharp-topped hills, about two leagues from the sea, until you near the little hill of Carretas, which is on the beach, and has Morro Garita de Mocha overlooking it. Here commences the valley of Chimu, about the middle of which

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is situated the city of Truxillo, and at the northern extreme, the village and road of HUANCHACO. This is a bad place for shipping, and seems to have been badly chosen: the north side of the hill of Carretas is a much better place for landing and embarking goods; and might be farther improved by sinking some small craft laden with stones, plenty of which the hill would afford.

The road of Huanchaco is on the north side of a few rocks that run out from a cliffy projection; sheltering the land in a slight degree, but affording no protection to shipping. The village is under the cliff, and not distinguishable till to the northward of the point; but the church, which is on the rising ground, shows very distinctly, and is a good guide when near the coast.

The usual anchorage is with the church and a tree that stands in the village in one, bearing about east, a mile and a quarter from the shore, in seven fathoms dark sand and mud. Vessels often have to weigh or slip and stand off, owing to the heavy swell that sets in: it is also customary to sight your anchor once in the twenty-four hours, to prevent its being imbedded so firmly as to require much time to weigh it when required.

Landing cannot be effected in ship's boats; there are launches constructed for the purpose, manned by Indians of the village, who are skilful in the management of them: they come off on your arrival, and will land you safely, for which they charge six dollars, equal to one pound four shillings sterling: it is to be remembered that no more is charged for a cargo of goods; their having to risk the surf being that for which you pay.

Fresh provisions may be had from Truxillo, but watering is out of the question. The city is said to contain 4,000 inhabitants. Rice is the principal production of the valley; for that article and specie it is that vessels call here.

If bound for this road, you should stand in on a parallel of 8°, (which is a mile to windward), and you will see Mount Campana, a bell-shaped mount, standing alone, about two leagues to the northward: and Huanchaco Peak, which is very sharp, and the first hill in the range on the north side of the valley. Shortly after the church will come in sight, and the shipping in the road.

The coast is cliffy for a few miles to the northward of Huanchaco; the low sandy soil with bushes on it then commences, with regular soundings off it, and continues as far as Malabrigo Road. This bay

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although bad, is considerably preferable to Huanchaco; it is formed by a cluster of hills, projecting beyond the general trend of the coast, which at a distance appear like an island; there is a fishing village at the S.E. side, but no trade is carried on. The town of Paysan lies some leagues to the S.E., and, by the account they gave of it at Malabrigo, must be of considerable extent.

The best anchorage here is with the village bearing about E.S.E., three-quarters of a mile from the shore, in four fathoms sandy bottom: landing is bad, but the fishermen have what they call 'caballitos,' bunches of reed fastened together, turned up at the bow like a balsa of Chile, but much higher. These are so light that they are thrown on the top of the surf to the beach, when they jump off and carry them on their shoulders to the huts. It seems that each different bay or road has its peculiarly-constructed vessel, adapted to the surf which it has to go through. The small island of Macabi, lies S. by E. two leagues from Malabrigo, with a safe channel of ten fathoms between it and the main land.

N. 35° W., six leagues and a half from Malabrigo, is the road of Pacasmayo; between the two the coast is low and cliffy, with a sandy beach at the foot of the cliff, and soundings of nine and ten fathoms two miles off shore. Pacasmayo is a sufficiently good roadstead, under a projecting sandy point, with a flat running off it to the distance of a quarter of a mile. The best anchorage is with the point bearing about S. by E., and the village east; you will there have five fathoms, sand and mud: there is no danger in standing in; the soundings are regular, shoaling gradually towards the shore. Landing is difficult: launches are used as at Huanchaco. The principal export is rice, which is brought from the town of San Pedro de Yoco, two leagues inland. Fresh provisions may also be obtained from the same place; wood and water may be had at the village on the beach, which is principally inhabited by Indians, employed by the merchants of San Pedro.

To distinguish this road from seaward, the best guide is to stand in on a parallel of 7° 25′ to 30′, and when within six leagues, the hill of Malabrigo will be seen, which appears like an island sloping gradually on each side; and a little to the northward, Arcana Hill, rugged with sharp peaks. As you approach, the low yellow cliffs will appear (those north of the road the highest), on the summit of which, on the north side of the point, is a dark square building that

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shews very distinctly. The best mark for the anchorage is the shipping, when any are there. From this road the coast continues low, with broken cliff, until you reach Point Eten, which is a double hill (the southern one the highest), with a steep cliff facing the sea. The north side of this cliff is white, and shews conspicuously.

N. 43° W., a little more than four leagues, is the road of LAMBAYEQUE, the worst anchorage on the coast of Peru. There is a small village on the rising ground, with a church that shews white towards the sea; off which vessels anchor in five fathoms, a mile and a quarter from the shore. The bottom is a hard sand, and bad holding ground, it is always necessary to have two anchors ready, for the heavy swell that sets on this beach renders it almost impossible to bring up with one, particularly after the sea breeze sets in.

Rice is the chief commodity for which vessels touch here: the only method of discharging or taking in a cargo (or in fact landing at all), is by means of the balsa. This is a raft of nine logs of the cabbage palm, secured together by lashings, with a platform raised about two feet, on which the goods are placed. They have a large lug sail which is used in landing, the wind being along the shore enables them to run through the surf and on the beach with ease and safety; and it seldom happens that any damage is sustained by this peculiar mode of proceeding. Supplies of fresh provisions, fruit, and vegetables may be obtained, but neither wood nor water.

The coast continues low and sandy, similar in appearance to that of Lambayeque, to the distance of twenty-five leagues: an extensive range of table-land of considerable height, with broken rocky points, then commences, and continues to Point Aguja or the Needle. Fifteen leagues from Lambayeque in an E.S.E. direction, lies a small group of islands called LOBOS DE AFUERA. These islands are a league in length north and south, and a mile and a half broad; are about a hundred feet high, of a mixed brown and white colour, and may be seen several leagues off; they are quite barren, affording neither wood nor water. There is a cove on the north side formed by the two principal islands, but with deep water and rocky bottom; within this cove are several nooks, in which a small vessel might careen, without being interrupted by the swell.

These islands are resorted to by fishermen from Lambayeque on their balsas; they carry all their necessaries with them, and remain

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about a month salting fish, which fetch a high price at Lambayeque. There is no danger round these islands, at the distance of a mile; regular soundings will be found between them and the shore, from fifty fathoms abreast of the islands.

N. 26° W., ten leagues from Lobos de Afuera, lies the Island of Lobos de Tierra, nearly two leagues in length, north and south, and little more than two miles wide; when seen from seaward it has a similar appearance to the former islands, and many rocks and blind breakers lie round it, particularly on the west side. There is tolerable anchorage on the N.E. side, in eleven or twelve fathoms, sand and broken shells. A safe passage is said to exist between this island and the main, which is distant ten miles, but as no advantage could be gained by going between, it was not thoroughly examined by us.

Point Aguja is long and level, terminating in a steep bluff 150 feet high, and has a finger rock a short distance off it, with several detached rocks round the point.

Three miles and a half N.N.E. of this is Point Nonura, and five miles farther in the same direction is Point Pisura, the south point of the Bay of Sechura; between Aguja and Point Pisura are two small bays, where anchorage may be obtained, if required. The land about this part is much higher, and has deeper water off it, than on either side, and may be readily known by its regularity and table-top. The bay of Sechura is twelve leagues in length, formed by the little Lobos Island of Payta and Point Pisura, and is six leagues deep; on the S.E. side the coast shows low sand hills, but as you go northward it becomes cliffy and considerably higher.

Near the centre of the bay is the entrance to the River Piura, and the town of Sechura situated on the banks of it. This town is inhabited chiefly by Indians, who carry on a considerable trade in salt, which they take to Payta on their balsas, and sell to the shipping. The river is small, but of sufficient size to admit the balsas when laden. There is anchorage any where off the town, in from twelve to five fathoms, coarse sand; in the latter depth you will be better than a mile from the shore. This place may easily be distinguished by the church, which has two high steeples on it, and shows conspicuously above the surrounding sand hills; one of these steeples has a considerable inclination to the northward, which at a distance gives it more the appearance of a cocoa-nut tree than a stone building.

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From Lobos Island Point the coast is cliffy, about 120 feet high, and continues so as far as Payta Point, which is three leagues distant; between these two, a mile and a half from the coast, is a cluster of hills called the saddle of Payta; accurately described by Captain Basil Hall. The SILLA or SADDLE OF PAYTA is sufficiently remarkable, it is high and peaked, forming three clusters of peaks joined together at the base, the middle being the highest; the two northern ones are of a dark brown colour; the southern is the lowest, and of a lighter brown. These peaks rise out of a level plain, and are an excellent guide to vessels bound for the Port of Payta from the southward.

A few leagues to the northward, as already mentioned, is PAYTA POINT, round which is the port of that name. This is without exception the best harbour on the coast, and considerable trade is carried on. Vessels of all nations touch here for cargoes, principally cotton, bark, hides, and drugs, in return for which they bring the manufactures of their several countries. In the year 1835 upwards of forty thousand tons of shipping anchored in this port. Communication with Europe (viâ Panama) is more expeditious than at any of the other ports.

The town is built on the slope and at the foot of the hill, on the south-east side of the bay; at a distance it is scarcely visible, the houses being of the same colour with the surrounding cliff. It is said to contain 5,000 inhabitants, and is the sea port of the province of Piura, the population of which is estimated at 75,000 souls.

The City of SAN MIGUEL DE PIURA is situated on the banks of the River Piura, in an easterly direction from Payta, between nine and ten leagues distant. Fresh provisions may be had at Payta on reasonable terms, but neither wood nor water, except at a high price, the latter being brought from Colan (a distance of four miles) for the inhabitants of the place. When we were there hopes were entertained of a supply of water from the west side of the bay; an American having commenced boring with an apparatus proper for the purpose.

There is no danger in entering this excellent harbour: after rounding the point which has a signal station on it, you will open False Bay: this must be passed, as the true bay is round Inner Point. That point ought not to be hugged closely, for there are some rocks to the distance of a cable's length, and the wind baffles off it.

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After rounding Inner Point you may anchor where convenient, in quiet still water, with from four to seven fathoms, over a muddy bottom. The landing place is at the mole about the centre of the town.

N. 41°. W., nine leagues and a half from the town of Payta, is Point Parina, a bluff, about eighty feet high, with a reef to the distance of half a mile on its west side; between this point and Payta the coast is low and sandy, with table land of a moderate height, a short distance from the beach; and the mountain of Amatape five leagues in the interior.

After rounding Point Pariña (which is the western extreme of South America), the coast trends abruptly to the northward, and becomes higher and more cliffy, until you reach Point Talara. This is a double point, the southern part of which is cliffy; about eighty feet high, with a small black rock lying off it; the northern part is much lower, and has few breakers near. On the north side of this point is a shallow bay, in the depth of which the high cliffy coast again commences, and runs in a line towards Cape Blanco.

Cape Blanco is high and bold (apparently the corner of a long range of table-land), sloping gradually toward the sea; near the extreme of the cape there are two sharp-topped hillocks; and midway between them and the commencement of the table land, is another rise with a sharp top. There are some rocks that shew themselves about a quarter of a mile off, but no danger exists without that distance. From Cape Blanco the general trend of the coast is more easterly, in nearly a direct line to Point Malpelo, which is twenty-one leagues distant.

N. 34° E., seven leagues and a half from the former is Point Sal, a brown cliff, one hundred and twenty feet high; along the coast is a sandy beach, with high cliff as far as the valley of Mancora, where it is low with brush wood near the sea; the hills being at a distance inland.

Northward of Point Sal the coast is cliffy, to about midway between it and Point Picos; it then becomes lower, and similar to Mancora.

Point Picos is a sloping bluff, with a sandy beach outside it, and another point, exactly similar, a little to the northward: at the back of it is a cluster of hills with sharp peaks, hence arises, probably, the name given by the Spaniards to this point. From Point Picos the coast is a sandy beach, with a mixture of hill and cliff of a

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light brown colour and well wooded. There are several small bays between it and Point Malpelo, which bears N. 41° E., seven and a half leagues distant.

Point Malpelo, the southern point of the entrance of Guayaquil River, may be readily known by the marked difference between it and the coast to the southward: it is very low and covered with bushes to its extreme; a short distance in-shore, is a clump of bushes higher and more conspicuous than the rest, which shews plainly on approaching. At the extremity of the point is the River Tumbes off which a reef extends, to the distance of a quarter of a mile. This place is much frequented by whalers, for fresh-water, which is found about a mile from the entrance, where they fill their boats from alongside; great care is necessary in crossing the bar, as a heavy and dangerous surf beats on it, rendering it at all times difficult to cross.

The entrance to the river may be distinguished by a hut on the port hand going in, which is perceived immediately you round the point. About two leagues up the river stood the old town of Tumbes, now scarcely more than a few huts, barely sufficient to supply the whalers with fruit and vegetables. This is the boundary line, between Peru and the State of the Equator. You may anchor any where off the point in six or seven fathoms.

Winds.

The prevailing winds on the coast of Peru blow from S.S.E. to S.W.; seldom stronger than a fresh breeze, and often in particular parts scarcely sufficient to enable shipping to make their passages from one port to another. This is especially the case on the south and south-western coast, between Cobija and Callao.

Sometimes during the summer, for three or four successive days, there is not a breath of wind; the sky is beautifully clear, with a nearly vertical sun.

On the days that the sea-breeze sets in, it generally commences about ten in the morning; then light and variable, but gradually increasing till one or two in the afternoon. From that time, a steady breeze prevails till near sunset, when it begins to die away; and soon after the sun is down there is a calm. About eight or nine

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in the evening light winds come off the land, and continue till sunrise; when it again becomes calm until the sea-breeze sets in as before.

During winter (from April to August) light northerly winds may be frequently expected, accompanied by thick fogs, or dark lowering weather; but this seldom occurs in the summer months, although even then the tops of hills are frequently enveloped in mist.

To the northward of Callao, the winds are more to be depended on; the sea-breeze sets in with greater regularity, and fresher than on the southern parts; and near the limit of the Peruvian territory (about Payta and off Cape Blanco), a double-reefed topsail breeze is not uncommon.

It is to be remarked, and may be laid down as a general rule, that although such moderate winds blow on the coast of Peru, yet sudden and heavy gusts come over high land after the sea-breeze sets in, which, from the smallness of the ports, may be attended with some inconvenience, if precautions are not taken in shortening sail previous to entering them.

The only difference between winter and summer, as far as regards the winds, is the frequency of light northerly airs during the former months; but in the state of the weather, the difference is far greater than one would imagine in so low a latitude. In the summer the weather is delightfully fine, with the thermometer (Fahrenheit's) seldom below 70°, and often as high as 80°, in a vessel's cabin; but during winter the air is raw and damp, with thick fogs and a cloudy overcast sky. Cloth clothing is then necessary for the security of health; whereas in summer the lighter you are clad, the more conducive to comfort and health.

The general set of the CURRENT on the coast of Peru is along the shore to the northward, from half a knot to one knot an hour; but occasionally it sets to the southward, with equal or even greater strength.

The period at which these southerly sets take place cannot be ascertained with any degree of certainty. Neither seasons, the state of the moon, nor other causes common on almost every coast, seem to have an influence here. The oldest navigators, and men accustomed to the coasting trade, can assign no reason for these changes—they only know that they do take place, and endeavour to profit by them accordingly.

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During our stay on the coast, we frequently experienced these southerly sets, immediately preceding and during northerly winds; but as this was not always the case, no general rule can be laid down, although it certainly appears a natural inference to draw. We also remarked, that at times the current was setting to the southward, when a fresh wind was, and for days previous, had been blowing from that quarter. And as no inequalities or irregularities in the coast line could have occasioned this, it only served to heighten our curiosity, without affording any clue to discover how the peculiarity was caused.

On Passages.

With regard to making passages on this coast—little difficulty is found in going northward; a fair offing is all that is requisite to ensure your making a certain port in a given number of days; but in working to windward, some degree of skill, and constant attention are necessary.

Much difference of opinion exists as to whether the in-shore or off-shore route should be preferred; but from the experience we had ourselves, and from information gained from those who were said to understand the coast, we were led to suppose the following the best line to follow.

On leaving Guayaquil or Payta, if bound to Callao, work close in-shore to about the island of Lobos de Afuera. All agree in this. Endeavour always to be in with the land soon after the sun has set, that advantage may be taken of the land wind, which begins about that time; this will frequently enable a ship to make her way nearly along shore throughout the night, and place her in a good situation for the first of the sea-breeze.

After having passed the before-named islands, it would be advisable to work up on their meridian, until you approach the latitude of Callao; then stand in, and if it is not fetched, work up along shore, as above directed.

Some people have attempted to make this passage, by standing off for several days, hoping to fetch in on the other tack, but have invariably found it a fruitless effort, owing to the northerly set that is experienced on approaching the equator.

If from Callao and bound to Valparaiso, there is no question but

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that by running off with a full sail the passage will be made in much less time than by working in-shore, for you run quite through the trade-wind, and fall in with the westerly winds which are always found beyond the trades. But for the intermediate ports (excepting Coquimbo) the case is different, as they lie considerably within the trade-wind, and must be worked for by that alone.* It may, however, be recommended to work along shore as before stated, to about the island of San Gallan. Whence the coast trends more to the eastward, so that a long leg and a short one may be made (with the land just in sight) as far as Arica, or to any of the ports between Pisco and that place.

From Arica, the coast being nearly north and south, vessels bound to the southward should make an offing of about fifteen or twenty leagues (to ensure keeping the sea-breeze), and work up on that meridian till in the parallel of the place to which they are bound. On no account is it advisable to make a long stretch off; for as you approach the limit of the trade-wind it gradually hauls to the eastward, and great difficulty will be found in even fetching the port from which you started.

The average passage in a well-conditioned merchant-vessel from Guayaquil to Callao is from fifteen to twenty days; and from Callao to Valparaiso about three weeks; fast-sailing schooners have made these passages in much less time; and there is an instance of two men-of-war, in company, having gone from Callao to Valparaiso, remained there two days, and re-anchored at Callao on the twenty-first day. But these are rare occurrences, and only to be done under most favourable circumstances, such as taking a "norther" soon after leaving Callao.

N.B. These remarks and notices, relating to Peru, are the work of Mr. Usborne. Those referring to Northern Chile are by Lieut. Sulivan. Mr. Stokes and I have added a few words.

* A dull sailer might do better by running through the trade, making easting with westerly winds, and then steering northward along the coast, than by attempting to work to windward against a trade-wind, which varies but a few points.

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No. 42.

Al Sñr. Comandante de la barca de S.M.B. Beagle, Dª. R. FITZ ROY.

Buenos Ayres, Nov. 8 de 1832.
Año 22 de la Libertad, y 17 de la Yndependencia.

El Ministro de Relaciones Esteriores que subscribe ha recibido con la mayor satisfaccion la Carta del Puerto de Bahia Blanca, que se ha servido remitirle el Sñr. Fitz Roy, Comandante de la Barca Beagle de S.M.B.

El Ministro agradece al Sñr. Fitz Roy este presente que considera de mucha importancia, y en su consecuencia tiene el placer de incluirle las ordenes que por el Ministerio de la Guerra se libran à los Comandantes politicos y militares de los Puertos de la Republica, para que no le pongan impedimento en sus operaciones facultativas sobre la Costa y si le faciliten los auxilios que puedan serle precisos para este desempeño.

Dios guarde muchos Años al Sñr. Comᵉ. Dⁿ. Roberto Fitz Roy.

MANUEL V. E. MAZA.

No. 43.

SIR, Lima, 21st June 1836.

We, the undersigned British merchants, residing in this capital, have just learned with much satisfaction from his Majesty's Consul-General, Mr. Wilson, that the survey of the sea-coast from Cape Horn to Guayaquil has been completed. This important work executed by you and under your orders, will, doubtless, prove of great value to British commerce in the Pacific; and we should be wanting in gratitude if we did not avail ourselves of the earliest opportunity of returning you our sincere thanks, not only for the skill and zeal you displayed in this arduous undertaking, but for the pecuniary sacrifices you made to insure its complete and speedy accomplishment. To Mr. Usborne we also feel much indebted, for the energy and perseverance manifested by him in the fulfilment of his duty, under circumstances not a little embarrassing and difficult; and we hope that his conduct, being made known in the proper quarter, will meet the reward it deserves. That you may long live to serve your

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country, and establish fresh claims to the gratitude of your countrymen, is the sincere wish of,

Sir,

Your obliged and faithful servants,

For Dickson, Price, and Co.—W. Hodgson.
Naylor, Kendall, and Co.
For Laylem, Read, and Co. —Valentine Smith.
Swayn, Reid, and Co.
Lang, Pearce, and Co.
Fredk. Huth, Gruning, and Co.
For Gibbs, Crawley, and Co.—H. Witt.
J. W. Leadley.
For Hegan, Hall, and Co.—J. Farmer.
John Mackie.
J. Sutherland.
For Christopher Briggs. — H. N. Briggs.
Templeman and Bergman.
Frederick Pfeiffer.

No. 44.

Description of a Quadrant, the power of which is increased by means of an additional Horizon Glass.

Let C A B, in the figure, represent a common quadrant, having the angle A C B equal to forty-five degrees: let C be the index-glass; C A the zero line, or the plane of the glass produced; D the horizon-glass, and E the sight-vane.

Suppose C and D to be parallel, and that a ray coming from an object H, is reflected from C, along the line C D, and from D along the line D E to the eye.

A ray of light from h may be supposed to come from H, if the two, H h, are more than half a mile from the instrument, and the object H will be seen directly, as well as by reflection, in the line D E.

The angle D C E being equal to the angle D E C, D C is equal to D E. With the centre D describe the circle C E F. Place a glass at F, similar to that at D, but making an angle with C B, which will reflect a ray passing along C F, in the line F E, to E.

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CIRRUS.

STRATUS.

NIMBUS.

CUMULUS.

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C F E is an angle at the circumference of a circle, and therefore half C D E, at the centre; and equal to D E F, or forty-five degrees.

An object at H being reflected from F along the line F E, will appear in contact with an object at K, which we may here suppose to be the horizon of the sea. But, by looking through the glass F, and bringing an object into contact with the horizon, which is really forty-five degrees above it, the index of the quadrant will be at zero; and by looking through F, and bringing an object into contact with K, or the horizon, which is really one hundred and thirty-five degrees from it, the index of the quadrant will be at ninety degrees.

The principle being thus shown, it is unnecessary to go farther in this place; either in explaining how it applies equally well to a quintant or sextant, or in describing Mr. Worthington's ingenious method of taking advantage of it, in the sextants he has lately made with power to measure 160°.

In adjusting or verifying the adjustment of the additional glass, I found that by measuring the angular distance of two fixed stars more than forty degrees apart—first carefully by the ordinary method, and then using the extra or additional glass—it was practicable to ascertain its exact error: the only difficulty I had foreseen in the efficient use of this auxiliary.

I may add, that the telescope moves parallel to the plane of the instrument, and that there are two sets of numbers referring to one graduation.

No. 45.

On Clouds.

Clouds may be divided into four classes, called—

Cirrus, Stratus, Nimbus, Cumulus.

Cirrus is the first light cloud that forms in the sky after fine clear weather. It is very light and delicate in its appearance; and generally curling or waving, like feathers, hair, or horses' tails. It may also be called the 'Curl Cloud.'

Stratus is the shapeless smoke-like cloud that is most common, and of all sizes: sometimes it is small, and at a distance, like spots of inky or dirty water; its edges appearing faint or ill-defined; sometimes it rises in fog-banks from water, or land; sometimes it overspreads and hides the sky. Rain does not fall from it. Its exact

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resemblance cannot be traced upon paper, because the edges are so ill-defined. It may also be called the 'Flat Cloud.'

Nimbus is the heavy-looking, soft, shapeless cloud, from which rain is falling. Whatever shape a cloud may have retained previous to rain falling from it—at the moment of its change from vapour to water, it softens in appearance, and becomes the 'Nimbus,' or 'Rain Cloud.'

Cumulus is the hard-edged cloud, or cloud with well-defined edges; whose resemblance can be accurately traced on paper. This cloud is not, generally speaking, so large as the Stratus or Nimbus, aud appears to be a compact mass of either the former or latter, or of both. It may also be called the 'Heap Cloud.'

These four classifications of clouds will not, however, suffice to describe exactly the appearance of the sky at all times. More minute distinctions are required, for which the following may be used:—

Cirro-stratus—signifying a mixture of Cirrus and Stratus.

Cirro-cumulus—Cirrus and Cumulus.

Cumulo-stratus—signifying a mixture of Cumulus and Stratus.

Which terms may be rendered more explanatory of the precise kind of cloud, by using the augmentative termination onus, or the diminutive, itus. Thus:—Cirronus, Cirritus; Cirrono-stratus; Cirrito-stratus; Cirrono-cumulus, Cirrito-cumulus; Stratonus, Stratitus; Cumulonus, Cumulitus; Cumulono-stratus, Cumulito-stratus. Should these be found insufficient to convey distinct ideas of every variety of clouds, the second word may be augmented or diminished, thus: Cirrono-stratitus, &c.

These terms may be abbreviated for common use by writing only the first letters of each word; allowing one letter to represent the diminutive, two letters the ordinary, or middle degree, and three letters the augmentative. As Cirrus and Cumulus begin with the same letter, it will be necessary to make a distinction between them by taking two, three, and four letters, respectively, of Cumulus: thus, C., Ci., Cir.; S., St., Str.; N., Ni, Nim.: Cu., Cum., Cumu. Suppose it were desired to express Cumulito-stratoni, C.-Str. would be sufficient, &c.

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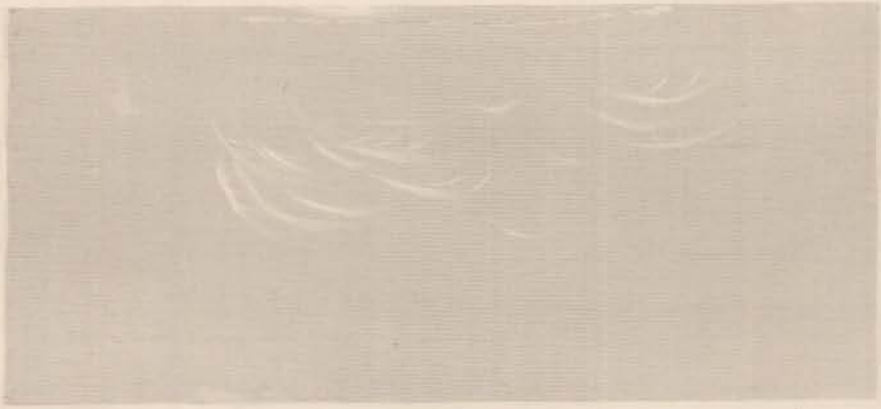
CIRRONUS.



CIRRITUS.

CIRRONO-STRATUS.

CIRRITO-STRATUS.

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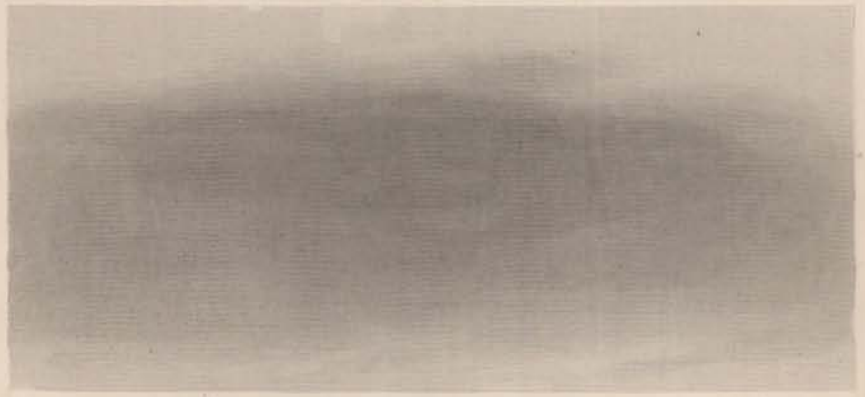
CIRRONO-CUMULUS.

CIRRITO-CUMULUS.



STRATONUS.

R. Fox Rey

STRATITUS.

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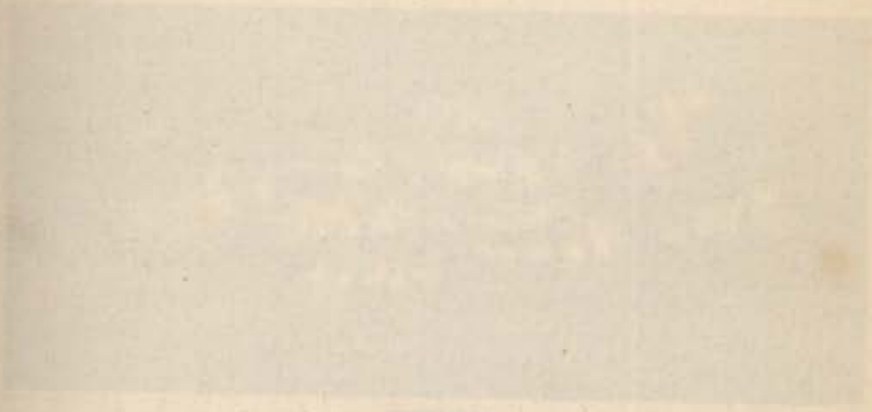

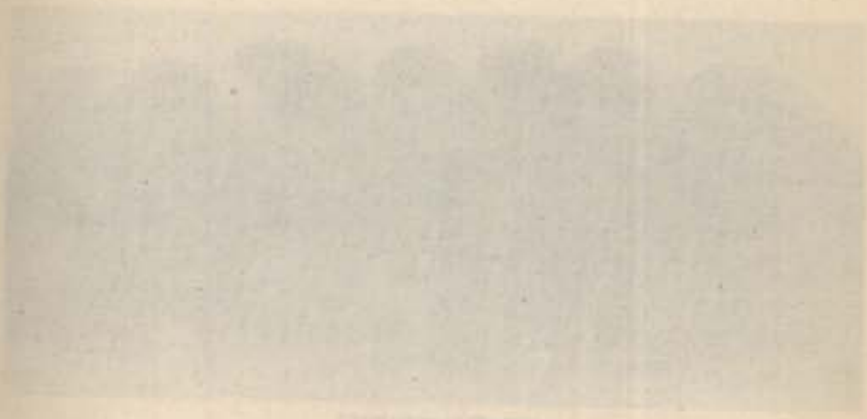

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CUMULONUS.

CUMULITUS.

CUMULONO-STRATUS.

F. Pitt Rep. J. Bull.

CUMULITO-STRATUS.

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No. 46.

Winds.

Much notice has lately been taken of the theory respecting storms, suggested by Colonel Capper in 1801, discussed by Mr. Redfield in 1831, and carried out in much detail by Colonel Reid. I have neither ability, nor at present space, to make more than a few brief remarks on this subject.

Are not storms exceptions to the general winds, or atmospheric currents; not the causes of them?* Variable winds are almost continual, except during short intervals of calm; but hurricanes, or even ordinary storms, are rare. May not opposing or passing currents cause eddies, or whirls, on an immense scale in the air, not only horizontal, but inclined to the horizon, or vertical?

In laying a ship to, during a storm, there are other points to consider besides the veering of the wind; such as the direction of the sea, with or against a current, &c. I cannot agree with Colonel Reid, in his remarks (page 425) about the "problem to be solved," or in his "Rule for laying ships to in hurricanes."

I never myself witnessed a storm that blew from more than fifteen points of the compass, either successively, or by sudden changes.

In most, if not all of the storms to which I can bear any testimony, currents of air arriving from different directions appeared to succeed each other, or combine together. One usually brought 'the dirt,' to use a sailor's phrase, and another cleared it away, after driving much of it back again, often with redoubled fury. One of these currents was warm and moist—another cold and dry, comparatively speaking. While one lasted, the barometer fell, or was stationary; with another it rose. At all places I have visited, or of which I have obtained notices on the subject, the barometer stands high with easterly, and comparatively low with westerly winds, on an average. Northerly winds in the northern hemisphere affect the barometer, like southerly winds in the southern hemisphere.

No. 47.

Tides.

At the end of the year 1833, I received from Mr. Whewell a copy of a work for which seamen in general are deeply indebted to him. It

* Reid's Law of Storms, p. 120, &c.

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bore the unpretending title of an "Essay towards a first approximation to a Map of Cotidal Lines;" but however lightly the author might esteem it, there can be no doubt that it tended to remove a cloud which hung over numerous difficulties; and to enable us not only to take a general view of them, but to see how we should direct our course in order to attain some knowledge of their intricacies.

In 1831 Mr. Lubbock called the attention of mathematicians, as well as of practical seamen, to the subject of Tides: but it was Mr. Whewell who aroused general interest; and, assisted by the Admiralty, engaged the co-operation of observers in all quarters of the globe.

At the first perusal of Mr. Whewell's essay, I was particularly struck by the following passages: "But in the meantime no one appears to have attempted to trace the nature of the connexion among the tides of the different parts of the world. We are, perhaps, not even yet able to answer decisively the inquiry which Bacon suggests to the philosophers of his time, whether the high water extends across the Atlantic so as to affect, contemporaneously, the shores of America and Africa? or, whether it is high on one side of this ocean when it is low on the other? at any rate, such observations have not been extended and generalized." * Also: †

"If the time of high water at Plymouth be five, and at the Eddystone eight (as formerly stated), the water must be falling for three hours on the shore, while it is rising at the same time at ten or twelve miles distance; and this through a height of several feet. We can hardly imagine that any elevation in one of the situations, should not be transferred to the other in a much shorter time than this.

"There is, in fact, no doubt that most, or all the statements of such discrepancies, are founded in a mistake arising from the comparison of two different phenomena; namely, the time of high-water, and the time of the change from the flow to the ebb current. In some cases the one, and in some the other of these times, has been observed as the time of the tide; and in this manner have arisen such anomalies as have been mentioned." And again: ‡

"The persuasion that, in waters affected by tides, the water rises while it runs one way, and falls while it runs the opposite way, though wholly erroneous, is very general."

These, and other valuable remarks, showed me what indistinct or erroneous ideas I had entertained; and that many other seamen had

* Philosophical Transactions, 1833, p. 148. † Ibid. 157. ‡ Ibid.

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been similarly perplexed, I could have little doubt, having often talked to experienced practical men on the subject. Probably the expressions 'tide and half-tide,' 'tide and quarter-tide,' &c., conveyed more distinct ideas to their minds, than to mine: for to me they were unsatisfactory, and although quite aware of their meaning, I never liked them. From 1833, I and my companions on board the Beagle paid more attention to the subject, and made observations in the manner suggested by Mr. Whewell, as often as our other avocations allowed. It was, however, impossible to take interest in the subject, and discover difficulties, facts irreconcileable to theory, without trying to think how to account for them—unqualified even as I knew myself to be for such a task.* Perhaps I was encouraged to meditate by Mr. Whewell's concluding paragraph; † and, separated from assistance, I tried to reason my way out of the dilemma, by the help of such few data as I could dwell upon with certainty.

* Among the points which I could not establish in my own mind, by appeal to facts, were—"the tides of the Atlantic are, at least in their main features, of a derivative kind, and are propagated from south to north." (p. 164.) "That the tide-wave travels from the Cape of Good Hope to the bottom of the Gulf of Guinea, in something less than four hours." (p. 167.) "That the tide-wave travels along this coast (American) from north to south, employing about twelve hours in its motion from Acapulco to the Strait of Magalhaens." (p. 194.) "From the comparative narrowness of the passage to the north (of Australia), it is almost certain that these tides must come from the southern side of the continent." (p. 200.) "The derivative tide which enters such oceans (North and South Pacific) from the south-east, is diffused over so wide a space, that its amount is also greatly reduced." (p. 217.) &c.

† "I cannot conclude this memoir without again expressing my entire conviction of its very imperfect character. I should regret its publication, if I supposed it likely that any intelligent person could consider it otherwise than as an attempt to combine such information as we have, and to point out the want and the use of more. I shall neither be surprised nor mortified, if the lines which I have drawn shall turn out to be, in many instances, widely erroneous: I offer them only as the simplest mode which I can now discover of grouping the facts which we possess. The lines which occupy the Atlantic, and those which are near the coasts of Europe, appear to have the greatest degree of probability. The tides on the coasts of New Zealand and New Holland, have also a consistency which makes them very probable. The Indian Ocean is less certain; though it is not easy to see how the course of the lines can be very widely different

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Some of the facts which seem to stand most in opposition to the theory that deduces tides in the northern Atlantic from the movement of a tide-wave originated in the great southern ocean are:—the comparative narrowness of the space between Africa and America; with the certainty that the sea is neither uniformly nor excessively deep in that space,* and the trifling rise of tide; not only upon either nearest shore (where it does not exceed four or five feet at the utmost), but at Ascension Island, where the highest rise is not two feet.† Secondly, the absence of any regular tide about the wide estuary of the river Plata, the situation and shape of which seems so well disposed for receiving an immense tide.‡ Thirdly, the flood-tide moving towards the west and south along the coast of Brazil,

rent from that which we have taken. The course of these lines in the Pacific appears to be altogether problematical; and though those which are drawn in the neighbourhood of the west coast of America connect most of the best observations, they can hardly be considered as more than conjecture: in the middle of the Pacific I have not even ventured to conjecture. It only remains to add, that I shall be most glad to profit by every opportunity of improving this map, and will endeavour to employ for this purpose any information with which I may be supplied."—pp. 234-5.

* Besides the 'Roccas', Fernando de Noronha, and St. Paul rocks, various accounts have been received, from time to time, of shoals near the equator, between the meridians of fifteen and twenty-four degrees west. There can be no doubt, from the descriptions, that many alarms have been caused in that neighbourhood by earthquakes; which are, to my apprehension, indications of no very great depth of water. In 1761, a small sandy island was said to have been seen by Captain Bouvet, of Le Vaillant. This, if seen, has probably sunk down since. Krusenstern saw a volcanic eruption thereabouts in 1806. In 1816, Captain Proudfoot, in the ship Triton, from Calcutta to Gibraltar, passed over a bank, in latitude 0° 32′ S. and longitude 17° 46′ W. It appeared to extend in an east and west direction three miles, and in a north and south direction one mile. They sounded in twenty-three fathoms, brown sand; but saw no appearance of breakers.

† At St. Helena it is not three feet: while at Tristan d'Acunha there is a rise of eight or nine feet under ordinary circumstances.

‡ I have passed months in that river without being able to detect any periodical rise of water, which I could attribute to tide; though it is said, that when the weather is very settled, some indications of a tide may be perceived.

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from near Pernambuco to the vicinity of the river Plata; and lastly, the almost uniformity of the time of high water along that extent of the coast of Africa which reaches from near the Cape of Good Hope to the neighbourhood of the Congo.

Against the supposition that a tide-wave travels along the west coast of America, from north to south, are the facts—that the flood-tide impinges upon Chilóe and the adjacent outer coast, from the southward of west; that it is high water at Cape Pillar and at Chilóe, including the intermediate coast, almost at one time;* that from Valdivia to the Bay of Mexillones (differing eighteen degrees in latitude), there is not an hour's difference in the time of high-water; that from Arica to Payta the times vary gradually as the coast trends westward; that from Panama to California, the times also change gradually as the coast trends westward; and that from forty to sixty north, high water takes place at one time.

Having thus stated a few of the difficulties to be encountered by a theory which supposes such important tide-waves to move in the direction of a meridian, rather than in that of a parallel, I will venture to bring forward the results of much anxious meditation on the subject, trusting that they will be received by the reader—not as assertions—not as conclusions to which assent is asked without a reason for acquiescence being given—but as the very fallible opinion of one individual, who is anxious to contribute a mite, however small, towards the information of those for whom this work is more particularly written—namely, seafaring men; and who, if his ideas are fallacious, will rejoice at their refutation by the voice of truth.

Resting in confidence upon the Newtonian theory—which assigns as the primary causes of tides the attractions of the moon and sun—I will make a few remarks, and then state some facts from which to reason.

Some persons seem to view the tidal phenomena more in connection with what would have happened had the globe been covered with water, than with reference to what actually happens, now that the oceans are nearly separated by tracts of land. They appear to consider that the effects of the moon's attraction (leaving the sun's out of the question at present, as it is similar though smaller) are felt only in vertical lines; and they do not allow for the lateral action of

* Within about half an hour; an irregularity easily accounted for, and to which any one place is subject.

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the moon upon a body of water, by which any portion is attracted towards her before she is vertically over it, as well as after she has passed to the westward of the meridian of that portion.

But little attention appears to have been paid to a consideration of the momentum acquired by any great body of water moved from the position it would occupy if undisturbed, and to the consequences of that momentum, when the water returns from a temporary displacement. And there seems to be a difficulty in altogether reconciling the statement that "tides are diminished by diffusion,* with the manner in which the great tides of the Northern Atlantic are supposed to be caused—a supposition which is mainly dependent upon the principle of "forced vibrations or oscillations."†

In consequence of similar ideas, excited by the facts previously mentioned, the following questions were inserted in the Geographical Journal for 1836:—

"It may appear presumption in a plain sailor attempting to offer an idea or two on the difficult subject of 'Tides;' yet, with the utmost deference to those who are competent to reason upon the subject, I will venture to ask whether the supposition of Atlantic tides being principally caused by a great tide-wave coming from the Southern Ocean, is not a little difficult to reconcile with the facts that there is very little tide upon the coasts of Brazil, Ascension, and Guinea, and that in the mouth of the great river Plata there is little or no tide?

"Can each ocean have its own tides, though affecting, and being affected by the neighbouring waters?

"Can the mass of an ocean have a tendency to move westward as well as upward, after and towards the moon as she passes? If so, after the moon has passed, will not the mass of that ocean have an easterly inclination to regain that equilibrium (with respect to the earth alone) from which the moon disturbed it (sun's action not here considered)?

"In regaining its equilibrium, would not its own momentum carry it too far eastward; and would not the moon's action be again approaching?

"Can one part of an ocean have a westward tendency, while another part, which is wider or narrower, from east to west, has an eastward

* Whewell's Essay, p. 217.

† Herschel's Astronomy, Cab. Cyc. p. 334.

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movement? If so, many difficulties would vanish; among them those which were first mentioned, and those perplexing anomalies on the south coast of New Holland."—(Jour. R. Geog. Soc. vol. vi. part II. p. 336.)

It might have been concluded that these questions had scarcely been noticed, as I heard nothing on the subject, had I not lately read the following remarks in a work published in 1837. Whether their author ever saw the questions, I do not know; but as his observations bear strongly upon the subject, and are those of an eminent mathematician, I quote them verbatim:—

"Suppose several high, narrow strips of land were now to encircle the globe, passing through the opposite poles, and dividing the earth's surface into several great, unequal oceans; a separate tide would be raised in each. When the tidal wave had reached the farthest shore of one of them, conceive the causes that produced it to cease; then the wave thus raised would recede to the opposite shore, and continue to oscillate until destroyed by the friction of its bed. But if instead of ceasing to act, the causes which produced the tide were to re-appear at the opposite shore of the ocean, at the very moment when the reflected tide had returned to the place of its origin, then the second tide would act in augmentation of the first; and if this continued, tides of great height might be produced for ages. The result might be, that the narrow ridge dividing the adjacent oceans would be broken through, and the tidal wave traverse a broader tract than in the former ocean. Let us imagine the new ocean to be just so much broader than the old, that the reflected tide would return to the origin of the tidal movement half a tide later than before; then instead of those two super-imposed tides, we should have a tide arising from the subtraction of one from the other. The alterations of the height of the tides on shores so circumstanced might be very small, and this might again continue for ages, thus causing beaches to be raised at very different elevations, without any real alteration in the level, either of the sea or land."—(Babbage's Ninth Bridgewater Treatise, pp. 248, 249.)

Additional data, and leisure to reflect upon them, have tended to confirm the view taken previously to asking those questions in the Geographical Journal; but before stating this view more explicitly, it is necessary to lay facts before my readers, from which they may judge for themselves.

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In the greatest expanse of ocean, that which meets with only partial interruption to free tidal movements—the zone, if it may be so called, near fifty-five degrees of south latitude—there is high water at opposite sides, and low water at opposite sides of the globe nearly at the same time.

At the eastern part of the Falkland Islands, exposed to the tide of this zone, it is high water, or full sea, at about nine o'clock on the day of new, or full moon, by Greenwich time ;* and on the southern shore of Van Diemen's Land it is high-water at about ten. This is not a point exactly opposite, it is true, but it is the nearest so at which we have yet observed.

At each of these places the tide rises six hours and falls six hours, alternately ; therefore when it is low water at one, it is also low water at the other. There is no intermediate place in this zone, rather distant from these points, at which I know of a tide observation deserving confidence ; but those above-mentioned are certain, and corroborate the Newtonian theory in a satisfactory manner.

This is, however, the only zone of ocean, which is at all able to follow the law which would govern its undulations if the globe were covered with water. In other zones (taking about ten degrees in latitude as a zone) it is high water, generally speaking, at one side of an ocean near the time that it is low on the other.

In oceans about ninety degrees wide, this happens very nearly ; but as the width diminishes, so do the times of high water at each side approach ; and as the width increases beyond ninety degrees, as in the case of zones of the Pacific, the times of high water still approach (in consequence of the tendency to high water at opposite points), and farther confirm the Newtonian theory.

For examples (on the day of full moon) :—In the Pacific, at Port Henry, in 50° S. it is high water at 5h. at which time it is near low water at Auckland Island, where the time of high tide is 12h. 30m. In this case, the interval between one high water, and the other on the opposite side of the ocean, is 7h. 30m. or 4.30 ; and the width of that ocean is nearly eight hours (measured in time.)

At Valdivia, in lat. 40° S. it is high water at 3h. 30m. and at New Zealand, on that parallel, at 9h. 50m. The space of ocean between is seven hours nearly : the differences are 6.20 and 5.40.

* To which all the times are here reduced for easy comparison.

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In 30° S. at Coquimbo, it is high water at 2h. and at Norfolk Island it is high at about 9h. The intermediate space of ocean is nearly eight hours wide.*

In 20° S., at Iquique, it is high water at 1h. 30m., and at New Caledonia, in the same parallel, it is high water at 9h. 15m. The space between is about eight hours wide : the least difference 4.15.

Near 10°, or 12°, at Callao, it is high water at about ten; but as on this parallel a multitude of islands spread across half the Pacific, no comparison of times can be trusted.

On the equator—at the Galapagos Islands—it is high water at 8h. 20m.; and at New Ireland it is high water at 3h. 00m.—a difference of seven hours nearly. The ocean is here eight hours wide; but at New Ireland there is only one tide in twenty-four hours—an anomaly to be considered presently.

The parallel of 10° N. is similar to that of the equator—however, we may as well examine it. At the little Isle of Cocos, and at Nicoya, on the main, it is high water at about 8h.; and at the Philippine Islands, in the same latitude, at 4h.; the difference, eight hours, is not far from the meridian distance, which is about ten hours; but the Philippines also feel the effects of causes which influence the tides at New Ireland, and, generally, those of the Indian Archipelago.

In 20° N. at San Blas, it is high water at 3h; and at Loo-choo, the nearest known point of comparison at the other side of the ocean, at 10h. The difference, 7 hours, is about an hour less than the meridian distance. In 30° N. on the Coast of California, it is high water at 4h., and at Nangasaky, in Japan, in lat. 32° 44′, at 11.12. The difference, 7.12, is nearly half an hour less than the meridian distance. In 40° N. it is high water at about 8h. on the American coast, but for the opposite shore I have no data. In 50° N. it is high water on Vancouver Island at 9h., and at the south extreme of Kamschatka it is said to be high water at about 6h.; the difference, 9 or 3 hours, is anomalous—made so probably by a derivative tide.

Having examined the Pacific, let us proceed in a similar manner with the Atlantic, and the Indian Ocean :—

In 40° S. off Blanco Bay, the time of high water is 9h.; the same as at the Falklands.

At Amsterdam Island, one authority says 6h., another 12h, for the

* A derivative tide (p. 289) may act here.

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time of high water. Both cannot be right: but thinking the latter correct, I have preferred it. In Bass Strait it is high water at about ten. Between the two extremes there are thirteen hours, and between the times of tide there are eleven, or thirteen hours. At Amsterdam Island, high water is taken as two hours after that of Bass Strait, but the difference of meridians is about four hours. The difference between the high water of Amsterdam, and Blanco Bay, is nine hours, and their difference of meridians is about nine hours.

In 30° S. it is high water on the African coast at two, and on the American coast at six. There are about four hours difference of meridian between them in that parallel.

In 20° S. it is high water at 3h. on the African shore, and 6h. on the Brazilian; the meridian distance is about three hours and three quarters.

In 10° S. at 3h. 15m. on the east side and 7h. on the west: the distance is about three hours and a quarter.

On the equator we have 4h. 30m. at the eastern limit, and nearly 8h. at the western; the distance being about three hours and a half.

In 10° N. 7h. and 10h. the distance being three hours.

In 20° N. at Cape Blanco, at about 1h.; and on the north coast of San Domingo, nearly at 11h. The interval is about 3.40: but there are interfering derivative tides, probably, as well as local peculiarities, among the West-India Islands.

In 30° N. about 4h. on the east and 1h. 30m. on the west. The distance is nearly five hours. This seems anomalous.

In 40° N. 3h. on the coast of Spain, and at about 1h. on the coast of America. This is another anomaly: but easy of explanation.

In 50° N. it is high water at 4h. 36m., in the mouth of the channel; and at 10h. 45m. on the coast of Newfoundland. Their meridian distance is about 3.20.

On the west coasts of Ireland and Scotland, from 5h. to 6h. is the hour of high water; on the coast of Labrador, it is from 10h. to 11h., in the same parallels. The meridian distances are from three to four hours: but as we approach the parallel of 60° N. the North Sea and Davis Strait open, which probably affect the tide between Ireland and Labrador.

The Indian Ocean appears to have high water on all sides at once, though not in the central parts at the same time. Thus, it is high water at the north-west extremity of Australia; on the coast of

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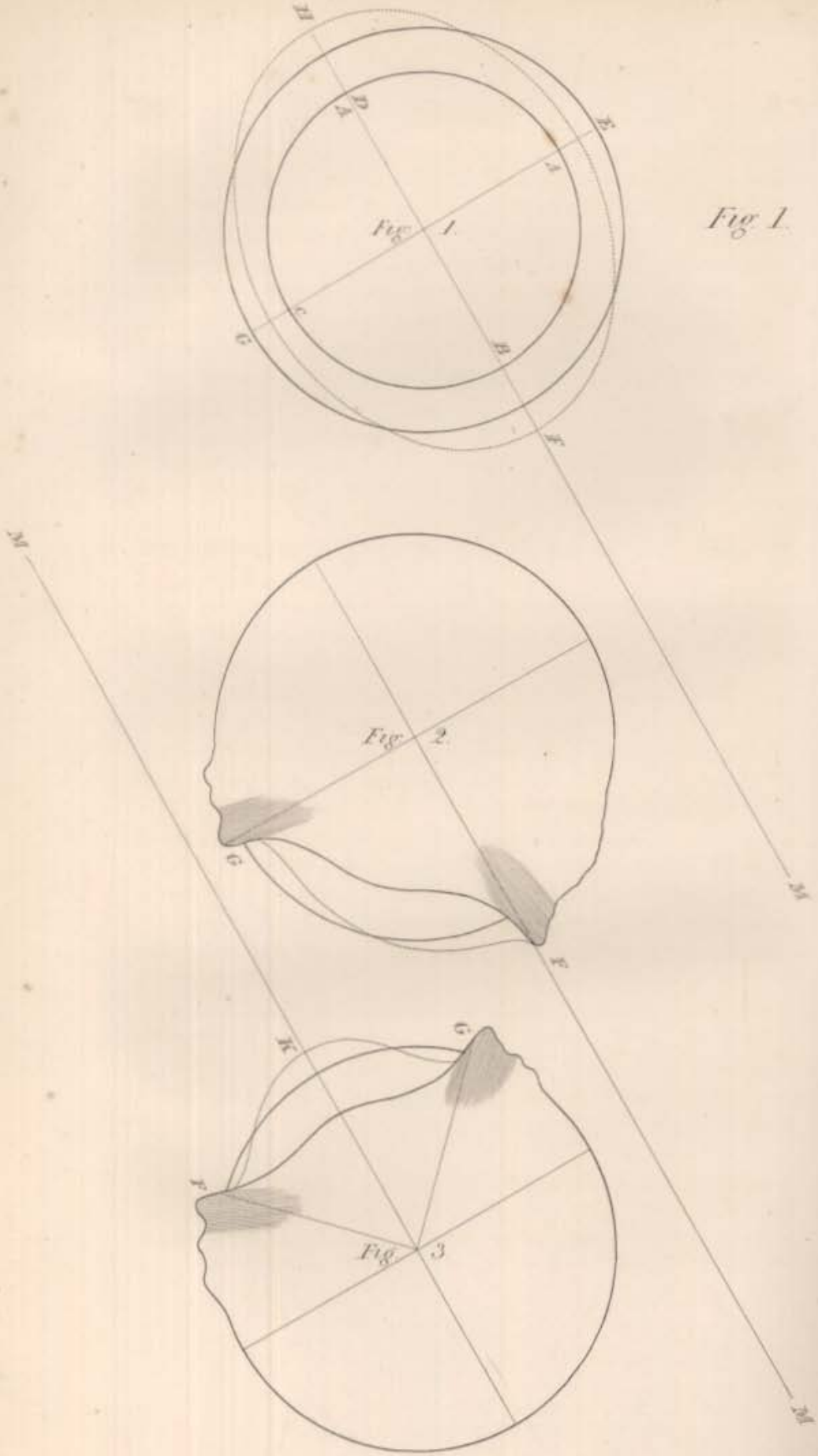

Fig. 1.

Published by Henry Colburn 13 Great Marlborough Street. 1839.

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Java; on that of Sumatra; at Ceylon; at the Laccadiva Islands; at the Seychelles; on the coast of Madagascar; and at Amsterdam Island, at twelve: but at the Chagos Islands and Mauritius it is high water at about nine, and at the Keeling Isles about eleven. Here, then, it would seem that there is cause for much perplexity.

Having now stated the principal facts which occur to my mind, I will mention the conclusions drawn from them, and then attempt to explain the anomalies.

Let E G (fig. 1.) represent a section of our globe, of which A B C D is supposed to be land, and E F G H water. Let H M show the direction in which the moon's attraction would operate. The effect of her attraction, according to Newton's demonstration, would be to raise the water at F by positive attraction of the water, and at H by attracting the earth more than the water:—let the dotted line represent the consequent figure of the ocean.

In fig. 2, let the ocean be supposed 90° or six hours wide; let the moon act in the direction M F; and let the dotted line represent the altered position of the water when moved out of its natural position (with respect to the earth) by the moon's attraction.

Again, in fig. 3, suppose the moon acting in the line M K, and the dotted line representing the figure taken in that case by the ocean.

It will occur to the reader that but little water can rise at F and H (fig. 1), at F (fig. 2), or at K (fig. 3), unless water falls or sinks, at E and G (fig. 1), G (fig. 2), F and G (fig. 3), because water is but slightly compressible, except under extraordinary pressure, and because it is incapable of being stretched; therefore, if at any place the sea is raised above its natural level, the excess must be supplied by a sinking taking place elsewhere. There cannot be a void space left under the sea between the water and its bed; and there is no lateral movement of the particles at the surface only of the ocean sufficient to cause high tides on either shore:—therefore the conclusion may be drawn, that the whole mass librates or oscillates.

By librating I mean such a movement as that which a large jelly would have, if its upper part were pushed on one side, and then allowed to vibrate while the base remained fixed: and by oscillating I mean a movement like that of water in a basin, after the basin is gently tilted and let down again: and that such a motion would be

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imperceptible, except by its effects, there can be little doubt after reflecting how small a lateral movement of an ocean would cause immense commotion at its boundary, in consequence of the slight elasticity of water, when free to move.

Now let the moon be supposed to move from M in fig. 2 to M in fig. 3. The highest point of the water would then be transferred from F to K, during which transfer the water must fall at F and rise at G: and so of other points. In this manner when the moon causes a tide by her direct attraction, a wave or swelling, whose crest is above the natural level of the sea, moves westward, until it is stopped by a barrier of land. But when it recedes from that barrier, how is the excess of the wave above the height of the sea (when uninfluenced by the moon) transferred to the other side of the same ocean? There is no return wave: if there were, islands intermediate would have an ebb, and a flood tide, every six hours; four floods in twenty-four hours; but they have, on the contrary, six hour tides, alternate ebb and flow, twice in twenty-four hours, like those of the shores of continents, though generally smaller in amount. Water cannot rise in one place unless it falls in another —it does fall on one side of an ocean, while it rises on the other —how then is the fluid transferred? There is only one way— which is by the mass oscillating. In the former case when the moon passed over, it was a libratory movement, in this latter it is an oscillation.

If it is shown, as I believe, that the ocean oscillates, we see that there are two principal causes of tides—one the direct raising of water by the moon: and the other, oscillation excited by that temporary derangement of the natural level of the sea.

From the preceding facts and deductions combined with the commonly received laws of fluids and gravitation, the following conclusions may be drawn:—

1. Every large body of water is affected by the attraction of the moon, and sun, and has tides caused by their action.

2. Bodies of water are not only raised, or accumulated, vertically, by the attraction of the moon and sun; but they are also drawn laterally by them.

3. When a large body of water is prevented from continuing a horizontal movement, it rises until whatever momentum it had acquired ceases; and then it sinks gradually.

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4. The momentum acquired by a body of water in thus sinking back to the position it should occupy, with reference to the earth's attraction only, carries it beyond that position to one from which it has a tendency to recoil again—and so to keep up an oscillation until brought to rest by the friction of its bed. (Attraction of the moon and sun not considered.)

5. The recurring influences of the moon and sun are checks on these oscillations, and prevent their taking place more than once between each separate raising of the water in consequence of their attractions.

6. Different zones (or widths measured by latitude) of an ocean, may move differently, each having waves and oscillations at times differing from those of an adjoining zone, in consequence of one having more or less longitude, depth, or freedom from obstacles than another.

7. Original waves and oscillations combine with, and modify one another, according to their relative magnitude, momentum, and direction.

8. The natural tendency of tide-waves, and oceanic librations, is from east to west; and of oscillations, from west to east, and east to west also: but derivative waves or oscillations move in various directions according to primary impulse, and local configuration of the bed of an ocean.

Conformably to these conclusions, I will now try to explain a few of the more remarkable anomalies of tides, in various parts of the world: taking it for granted that the reader is acquainted with existing works on the subject, especially those of Mr. Whewell,* and the brief but comprehensive and explanatory view taken by Sir J. Herschel in his treatise on astronomy.†

I mentioned that between Callao and the western shores of the Pacific, in the parallel of about 12° south, no comparison of times can be trusted? Why not? may be asked. Four or five hours west of Callao, there is a multitude of islands which checks the libration of the ocean. Another tide wave forms westward of them, on a small scale, and it is by this second tide, altered by derivative tides

* Published in the Philosophical Transactions.

† Cabinet Cyclopædia. A Treatise on Astronomy, chap. xi., pp. 334, 5, 6, 7, 8, 9.

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from each side, that the western portion of this zone is affected. Otaheite is thus at the edge, or limit, of four tides—one east, another west, a third to the north, and a fourth to the south, and as these tides are moving with different impulses, and at different times, it is not at all surprising that they should almost neutralize each other at Otaheite. As we go west or east of that island, we find the tides augmenting gradually in height. At the Friendly Islands they rise five feet, and at the Gambier Islands three feet.

Respecting the twelve hour tide at New Ireland, and at other places in the Indian archipelago—appeal to facts, so far as we can trace the tides at present, tends to confirm the explanation of Sir Isaac Newton, which consisted in supposing that such tides are compounded of two tides, which arrive by different paths, one six hours later than the other. "When the moon is in the equator, the morning and evening tides of each component tide are equal, and the tides obliterate each other by interference, which takes place about the equinoxes. At other periods the higher tides of each component daily pair, are compounded into a tide which takes place at the intermediate time, that is, once a day; and this time will be after noon or before, according to the time of year."—Whewell, in Phil. Trans. 1833, p. 224.

At New Ireland, the time of high water is about 3; but at New Caledonia it is 9. Again, at the north-west coast of Australia, it is 12; and at the eastern approach to Torres Strait, 10: at the Philippine Islands it is 4; and at Loo Choo, 10. Now here are various times of tide, and different impulses, crowded together into a comparatively small space, sufficient to perplex any theorist of the present day. Owing to local configurations, and a variety of incidental circumstances, we find every kind of tide in this region, in a space sixty degrees square. Although tidal impulses, waves, and resulting currents are checked and altered by the broken land of the Indian archipelago, they cannot be suddenly destroyed, or prevented from influencing each other, while communications, more or less open, exist in so many directions.

At the Sandwich Islands there is said to be very little tide. As it is high water in 40° N., on the American coast, at 8; at which time it is also high water at the Galapagos, it appears that the two zones of the ocean—one about the equator, and the other near 40° N. —have high water, in the meridian of the Sandwich Islands, at two

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very different times; and that the high water of the northern zone will have passed that meridian about three hours before the equatorial wave. Impulses derived from them might succeed one another at an intermediate point, such as the Sandwich Islands. Besides which, there is the tide of their own zone to be considered; in consequence of which alone it might be high water at about 6: thus these islands are so situated as to receive at least three tides—one primary and two derivative—whose respective times of high water are 1, 6, and 10, a succession which may well be supposed to neutralise any ebb, and maintain the water thereabout above its natural level, independent of tide.

About the Strait of Magalhaens, and along the eastern coast of Patagonia, there are very high tides; apparently complicated, but perhaps less so than is usually believed.

A powerful tide arrives at the Falklands, and at the east end of Staten Land, at about 9; which is opposed by another powerful tide arriving from the west. The union of these two accumulates the water between Tierra del Fuego and the Falklands, and on the east coast of Patagonia.

Within the Strait of Magalhaens, westward of the Second Narrow, it is high water at about 4.40, and the tide rises six feet: but eastward of the First Narrow it is high at 1.30, and the tide rises forty feet.

Now, as in one case the sea only rises three feet, and in the other twenty, above its mean level, every one would expect to find a rush of water through the Narrows, from the high sea to the low, and such is the fact. From ten to four the water runs westward with great velocity, and from four till ten it rushes eastward. During the first interval, from ten to four, the eastern body of water, between Tierra del Fuego and the Falklands, is above the mean level; and during the latter interval, from four till ten, it is below the mean level—that which it would have if there were no tides.

From 50° S. to near Blanco Bay in 40° S. the tide-wave certainly travels along the coast to the north; but this is a derivative from the meeting of tides above-mentioned, combined with the primary tides on the coast traversed. In this way principally may we account for a high tide in one place on this coast, and a low one on another (similarly situated, though differing in latitude); and, again, a high tide at another place. During the twenty-four hours that the deri-

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vative wave occupies in moving from Cape Virgins to the Colorado, it alternately augments or diminishes two floods and two ebbs of the great ocean. Perhaps, indeed, it reaches farther and affects the water about the Plata.

The extraordinary 'races' about the Peninsula of San José, and the apparent absence of currents about the straight coast extending eastward from Blanco Bay, may be attributed to conflicting tidal impulses.

Why there should be no tide in the River Plata, situated and shaped as it is, seems extraordinary; but as it is high water at 6h. on the coast of Brazil, and at 9h. about Blanco Bay; and as a derivative wave from this neighbourhood must move eastward and northward, there is a filling up, from the southward, as an ebbing takes place in consequence of a regular six-hour tide; and vice versâ.

Tristan d'Acunha has a considerable rise of tide, about eight feet, though Ascension and St. Helena have only about two feet. The former place is affected by a great southern tide; the two latter are influenced by the comparatively small tide which traverses the space between Africa and Brazil.

In the West Indies there are varieties of tides, caused by primary and derivative impulses, exceedingly modified by local circumstances: none however are large, while some are as small as those of Otaheite—scarcely a foot at the utmost. There are places also in that archipelago where there is only one tide in twenty-four hours. In considering the West-India tides, those of the east coast of North America, and the exceedingly high ones of Fundy Bay, the gulf stream ought not to be overlooked, as it may affect the tides on the coasts it traverses even more than those on the Patagonian coast are altered by the current driven along it from near Tierra del Fuego.

I may here remark that Mr. Whewell was misled by inaccurate data respecting several times of high water, of material consequence to his cotidal lines. At the Western Islands he had $1\frac{1}{2}$ and $2\frac{1}{4}$, where there ought to have been $4\frac{1}{4}$, according to Mendoza Rios' tables, confirmed by the Beagle's observations; at Madeira he used $1\frac{1}{2}$, the time of the stream changing, instead of 4, the time of high water; at the Cape Verde Islands he took the time of low tide, instead of that of high water; his 5h. line is near Ascension, where the time of high water is 6.20; and his 2h. line is close to St. Helena, where the time is about five. The deficiency of data is so great, owing to mistaking

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the turn of stream for the time of high water, and registering or calculating observations erroneously, that little dependence can be placed in at least one-third of those hitherto recorded. On this account chiefly, though partly to simplify the question, I have not hoped to be much nearer the mark than half an hour in this discussion, discarding fractions as much as possible, and attempting only to avoid errors of material consequence.

Looking at the Atlantic, as represented on a globe, we see that Newfoundland and the adjacent coasts are so placed as to receive tidal impulses from the Arctic Sea, North Atlantic Ocean, the tropical part of the North Atlantic and the gulf stream: besides which, no doubt, a derivative from the equatorial zone is felt there.

It is high water at the east side of the Atlantic, from the Canary Islands to Scotland, within an hour or two of the same time, on the salient points of the coast, namely, at about 4h.; and if the opposite coast were straight, like that of Chile, and uninfluenced by derivative tides or by currents, we might expect that it would be high water there at about 7h., allowing that the tide-wave moved as it is found to do generally. But it is high water at about 1h., from 30° to 40,° the times increasing northward from 40° N. to the Bay of Fundy, and also increasing southward from 50° N. to that bay, where, as every sailor knows, the tides rise higher than in any other part of the world. This sequence of times, each ending in about 43° N., the adjacent gulf stream, (an immense river in the ocean), and an accumulation of water in that corner higher than is known any where else, show that we cannot there expect to find data for tidal rules. In that quarter is evidently a marked exception, caused by the conflux of at least two primary tides, two derivatives, and a powerful current, aided by the peculiar configuration of the land.

In the Mediterranean it is supposed by many persons that there is no ebb and flow; but Captain Smyth, who surveyed so much of its shores, informs me that he found a tide, small certainly and apparently not governed by the moon, but regular. I have myself noticed a small rise and fall there; and the current, caused by tide, in the Faro of Messina, is well known.

As the moon passes over the Indian Ocean, the natural effect of her attraction must be to accumulate the waters, and draw the wave so caused after her, as in other places: but while that ocean is obey-

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ing her power, and the wave is travelling toward the west, another wave is approaching from the Pacific—a wave which has been retarded in its passage—and its crest passes through the Indian archipelago, while the water would otherwise be falling at the western part of Torres Strait. At the same time, a derivative* wave moving northward along the west Australian coast, combines with the Pacific wave to raise a high tide about the north-west coast of Australia, where, if it were not for these auxiliaries, there would be low water at that time. Six hours afterwards, one body has ebbed toward the Pacific—the other southward, toward the then comparatively low ocean, south of Australia, and what—if Torres Straits were blocked up; and the water prevented from falling away toward the south—would be a high tide, is, in fact, low water. The tides in the two northern bays are derivatives, and move northward.

High water taking place at one time—within an hour—all along the east coast of Africa, shows that the rise of sea, or tide-wave, there moves westward or eastward, and the times of high water at the islands are farther confirmations; for the wave is at Chagos and at the Mauritius three or four hours before it is high water on the African coast. The Keeling time shows that there the water rises longer, in consequence of that part of the ocean being affected by the advancing swell of the Pacific.

The only remaining particular case which I now recollect is that of the south coast of Australia—from King George Sound to Spencer Gulf—a large space of sea, in which there is very little rise of tide—and even that little very irregular.

As the high water moves westward from the meridians of that great bay, a tide moves southward from the Indian archipelago, where it is high water just as it should be low in the bay mentioned: hence there is a filling, or flowing, from one wave, while another is retreating. In this wide expanse, affected by derivative tides from three adjoining oceans, we cannot but expect irregularities; either very high tides, caused by combination—or little or no tide, in consequence of mutual destruction—one tide ebbing from, while another is flowing toward the same place.

Throughout these remarks I have intentionally omitted to say much of the sun's action, because, though very inferior, it is simi-

* Derived from a great southern wave passing westward.

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lar to that of the moon. Perhaps the Otaheite tide may be purely solar; this, however, is not at all certain.

It appears to me probable, that many important currents are caused by the tidal libration or oscillation of the sea. As the earth turns only one way, the moon is continually pulling, as it were, in one direction, and to this cause, I think, most of the greater currents may be traced. Wind, evaporation, and the variable weight of the atmosphere may each have a share in moving the waters horizontally; but there are many facts which lead to a conclusion that the moon and sun are principal agents in causing currents.*

Having alluded to the effect of atmospheric pressure on the ocean, I will take this opportunity of mentioning that the chief cause of water rising on the shore before hurricanes, or gales of wind, may be the lightened pressure on the surface of the sea, indicated by the mercury being low in a barometer. This is very remarkable at the Mauritius and in the river Plata, at both which places the water rises unusually before a storm, while at the same time the mercury falls. As the column rises, so the water falls again. I have instanced those places as being well known, and affected very little by tide: but the fact has been observed by me in many places during the Beagle's voyage, and I have besides collected the testimony of others respecting it.

These causes may materially affect the height of tides and the strength of currents. In the wide but shallow Plata, the depth of water and nature of current varies in extraordinary accordance with the barometer.

Another cause of the water rising before a high wind, or storm, as well as of a ground swell, of rollers, or of that disturbed tumultuous heaving of the sea, sometimes observed while there is little or no wind at the place, may be the action of wind on a remote part of that sea; an action, or pressure, which is rapidly transmitted, through a fluid but slightly elastic, to regions at a distance.

I have collected many instances of rollers, or a heavy swell, or a confused ground swell being felt at places, where not only there was no wind at the time, but to which the wind that caused the move-

* A continued stream may be produced by a succession of impulses, as a rotatory system of waves may "be kept in constant circulation by impulses received from the adjacent tides."—See Whewell in Phil. Trans. 1836, p. 299.

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ments of water never reached. That they were caused by wind I proved by the logs of ships, which were in the respective gales at the time their effects on the sea were thus felt at a great distance. The places to which I particularly allude are the Cape Verde Islands, Ascension, St. Helena, Tristan d'Acunha, Cape Frio, Tierra del Fuego, Chiloe, the coast of Chile, the Galapagos Islands, Otaheite, the Keeling Islands, Mauritius, and the Cape of Good Hope.

Waves, or rollers, caused by earthquakes, or volcanic eruptions, are, of course, unconnected with wind or atmospheric pressure.

But in accounting for currents, as occasioned in some if not many instances by tidal pressure, or a succession of tidal impulses, we must not overlook the well known power of wind in giving horizontal motion to water, as well as in elevating or depressing it.

Wind blowing almost always in one direction is known to communicate a movement to waters, and it is remarkable that the general movements of the North Pacific as well as the North Atlantic are from west by the north to east, or, as a sailor would say, 'with the sun;' while in the southern oceans, Pacific, Atlantic, and Indian, they are generally 'against the sun,' or from west to east by the south—both corresponding to the general turn of the winds in the respective hemispheres. The Chile current after coasting Peru, preserves a temperature of about 60° up to the Galapagos, and there it meets a warm stream out of the Gulf of Panama, at a temperature of about 80°. The two unite together and turn westward along the equatorial zone. There is a remarkable exception on the east coast of Patagonia, where the current sets northward, owing, probably to tides.

I cannot end this imperfect attempt to sketch out some of the movements of ocean, without reminding young readers to whom the subject may not be so familiar as it is to others, that there may be circulations of water in a vertical direction, or in a plane inclined to the horizon, as well as horizontally: and that bodies of water differing in temperature, as well as in chemical composition, do not hastily blend together. Their reluctance to mix is observable at sea, when we sail out of one current, or body of water, into another—differing perhaps in temperature, chemical composition, and colour. At the meeting, or edge, of such bodies there is usually a well defined line, often considerable ripplings, which indicate some degree of mutual horizontal pressure—as of separate masses.

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At the mouths of large rivers it sometimes happens that salt water is actually running up the river, underneath a stream of fresh water which still continues to run down. This I have witnessed in the river Santa Cruz. Of course intermixture takes place gradually, though by slow degrees.

The height of waves may be here mentioned, with reference to rollers or other undulations of water however caused. Large waves are seldom seen except where the sea is deep and extensive. The highest I have ever witnessed myself were not less than sixty feet in height, reckoning from the hollow between, perpendicularly to the level of two adjacent waves: but from twenty to thirty feet is a common height in the open ocean during a storm.

I am quite aware of, and have long been amused by the assertion of some persons, whose good fortune it has been not to witness really large waves—that the sea never rises above twelve or fifteen feet—or, that no wave exceeds thirty feet in height, reckoning in a vertical line from the level of the hollow to that of the crest.

In H. M. S. Thetis, during an unusually heavy gale of wind in the Atlantic, not far from the Bay of Biscay, while between two waves, her storm try-sails were totally becalmed, the crest of each wave being above the level of the centre of her main-yard, when she was upright between the two seas. Her main-yard was sixty feet from the water-line. I was standing near her taffrail, holding by a rope. I never saw such seas before, and have never seen any equal to them since, either off Cape Horn or the Cape of Good Hope.

Calculations of tides, applicable to the method of following out Newton's general principles, adopted by Mr. Whewell and most persons whose opinions on this subject all men respect—are equally applicable to the view here taken. In either case the time of high water, and rise of tide on a certain day, is ascertained at a given place experimentally: and as the causes of that tide are the moon and the sun; changes in their position with respect to the earth will operate changes in the tides, which, as to time and quantity, will depend upon the above data, and the positions of earth, moon, and sun.

The variation of tide is what we have to deal with in ordinary calculation, not the original movement.

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No. 48.

Previous to sailing from England in 1831, the Beagle was fitted with the permanent lightning conductors invented by Mr. Wm. Snow Harris, F.R.S.

During the five years occupied in her voyage she was frequently exposed to lightning, but never received the slightest damage, although supposed to have been struck by it on at least two occasions, when—at the instant of a vivid flash of lightning, accompanied by a crashing peal of thunder—a hissing sound was heard on the masts; and a strange, though very slightly tremulous, motion in the ship indicated that something unusual had happened.

The Beagle's masts so fitted, answered well during the five years' voyage above-mentioned, and are still in use on board the same vessel, on foreign service.

Even in such small spars as her royal masts and flying jib-boom, the plates of copper held their places firmly, and increased rather than diminished their strength.

No objection which appears to me valid, has yet been raised against them; and were I allowed to choose between having masts so fitted and the contrary, I should not have the slightest hesitation in deciding on those with Mr. Harris's conductors.

Whether they might be farther improved, as to position and other details, is for their ingenious inventor to consider and determine. He has already devoted so many years of valuable time and attention to the very important subject of defending ships against the stroke of electricity; and has succeeded so well for the benefit of others—at great inconvenience and expense to himself—that it is earnestly to be hoped that the Government, on behalf of this great maritime country, will, at the least, indemnify him for time employed and private funds expended in a public service of so useful and necessary a character.

No. 49.

MEMORANDUM OF SOME OF THE FRESH PROVISIONS, PROCURED FOR THE BEAGLE'S CREW, BETWEEN 1831 AND 1835.

Many other animals and birds were shot at various places (besides those enumerated in this list), by which every one on board

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profited in turn. Fish were caught frequently, either with nets or lines, sometimes with both; so that, except in long passages, the crew of the Beagle were seldom many weeks without a supply of fresh and wholesome food; while the provisions carried on board were always of the best quality that could be procured.

Number and Weight of the Animals killed with two Rifles only.

Date.	Animals.	By whom Shot.	Weight.
1832.	Blanco Bay, Eastern Patagonia.		
Sept. 11	One cavia ..	H. Fuller	*22 lbs.
— 12	Three deer ..	Ditto	122
— 15	One cavia ..	A. B. Bute ..	*19
— 17	Two deer ..	Mr. Stokes ..	81
Oct. 16	Four deer ..	H. Fuller	167
1833.			
August 25	Two deer ..	H. Fuller	96
— —	One deer ..	Mr. Stokes ..	*62
— 30	Two deer ..	H. Fuller	79
— —	Two cavias ..	Ditto	35
— —	One deer ..	A. B. Bute ..	43
— 31	Ditto ..	Mr. Bynoe ..	45
Sept. 1	Ditto ..	Mr. Stokes ..	39
— —	Ditto ..	H. Fuller	46
— —	One fawn ..	Ditto	12
— —	Four cavias ..	Ditto	73
— 3	One cavia ..	Capt. FitzRoy ..	21
— —	One deer ..	Mr. Stokes ..	48
— 4	Three cavias .	H. Fuller	52
	Port Desire, Eastern Patagonia.		
Dec. 28	One guanaco ..	H. Fuller	164
1834.	Santa Cruz, Eastern Patagonia.		
April 24	One guanaco .	H. Fuller	130
— 30	Two guanacoes	Ditto	220
May 8	One guanaco .	Mr. Bynoe ..	150
— —	Ditto ..	H. Fuller	143
— 9	Ditto ..	Mr. Bynoe ..	166
— 11	Ditto ..	Ditto	139
			2,174 lbs.

* The weight of the whole animal. The rest are as served out to the ship's company.

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Fresh Provisions purchased in the Pacific and Indian Oceans, for the use of the Crew of H.M.S. Beagle.

CHARLES ISLAND, GALAPAGOS.

DATE.	ARTICLES.	DLRS.	RLS.
1835.			
Sept. 25	1 Pig }	4	0
— 26	1 Pig } 269 lbs.	4	0
— —	1 Pig }	4	0
— —	3 Pigs }	7	4
— —	13 Barrels Potatoes	26	0
— —	8 Pumpkins	1	6
	TOTAL	47	2

OTAHEITE.

16th to 28th November 1835:—

	Dlrs.	Rls.	Mds.
706 lb. Fresh Beef	35	0	1
4 Barrels Potatoes, 3 dlrs. each	12	0	0
3 Pigs, 5 dlrs. each	15	0	0
25 Heads of Taro Root	2	4	0
Dlrs.	64	4	1

25th November 1835:—

Fresh Beef	20 lb. 1 dlr.
Ditto Pork	15 lb. 1 dlr.

Sweet Potatoes, 3 dollars per barrel.

NEW ZEALAND.

22d Dec. 1835 to 1st Jan. 1836:—

10 Pigs, weighing 840 lbs., at 2½*d.* per lb. ..	£8	15	0
8 cwt. Potatoes, at 3*s.* per cwt	1	4	0
	£9	19	0

£9 19*s.* equal to 49 dlrs. 6 rls.

22d December 1835:—In the Bay of Islands.

Current Prices:—Pork, 2½*d.* per lb.
Potatoes, 3*s.* per cwt.
Corned Pork, 4½*d.* per lb.
Beef, when procured, 2½*d.* per lb.

KEELING ISLANDS.

12th April 1836:—

26 Turtle, at 4*s.* 4*d.* each	£5	12	8
2 large Pigs	2	0	0
	£7	12	8

In payment—500 lbs. Bread at 2½*d.* ..	£5	4	2	
Cash	2	8	6	
				7 12 8

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No. 50.

A few Observations on the Temperature of the Sea in latitude 27° 30′ S. and longitude 41° E.; on the 15th May 1836.—(Six's self-registering Thermometer, Fahrenheit's Scale, used.)

At the surface	..	75°,6	
At 5 fathoms below		74,5	
8	.. ..	74,2	
18	.. ..	74,0	
20	.. ..	74,0	
28	.. ..	73,0	
40	.. ..	72,5	
48	.. ..	71,0	
50	.. ..	70,0	
75	.. ..	68,0	
100	.. ..	64,5	
At 200 fathoms below		58°,5	
300	.. ..	55,5	
400	.. ..	52,5	
420	.. ..	52,0	
A few repeated:—			
At 5 fathoms below		74,4	
20	.. ..	74,0	
48	.. ..	71,0	
50	.. ..	70,0	
100	.. ..	64,5	

In April 1836, at the Keeling Islands in the Indian Ocean (lat. 12° S.), the temperature at the bottom, in 363 fathoms, was 45° (very carefully observed).

No. 51.

TABLE OF REMARKABLE HEIGHTS VISIBLE FROM A SHIP.

The heights given in this table were ascertained by angular measurement: they are on the coasts of South America, the Falkland Islands, and the Galapagos.

Summits.	Feet.	Summits.	Feet.
Abingdon Island	1,950	Animas Las, Height south of	1,800
Acari Mount	1,650	Aymond Mount	1,000
Aconcagua	23,200		
Ahuja Point, Height near ..	1,000	Banks Hill, Good Success Bay	1,400
Albemarle Island, S.W. summit	4,700	Bell Mount (Tierra del Fuego)	2,600
Albemarle Island, S.E. ditto	3,720	Benson Mount	1,780
Albemarle Island, Middle ditto	3,780	Boqueron Mount	3,000
Albemarle Island, North ditto	3,500	Bufadero Hill	1,620
Albemarle Island, over Cape Berkeley	2,360	Burney Mount	5,800
Alexander Mount	1,960	Callao, Height near	3,000
Amatape Mountain	3,270	Campana Mount	3,450

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Summits.	Feet.
Carreta Mount	1,430
Carr Hill	2,500
Carrasco Mount	5,520
Carrasco Heights	3,000
Carrisal, Herradura de, Height near	3,050
Castro Hill (Peru)	1,160
Chala Mount	3,740
Chañeral, Height north of	1,100
Charles Island, Saddle Hill	1,780
Chatham Island, west summit	1,550
Chatham Island, middle summit	1,210
Chatham Island, south summit	1,550
Chilca, Port, height over	1,320
Chileno Point	1,640
Cliff Cove Hill	1,550
Cobija Range	3,330
Cocotue Head	1,500
Coles Point, height near	2,970
Cone, Port San Andres	1,600
Corcovado, Rio de Janeiro	2,340
Corcovado (Chiloé)	7,510
Cruz, Mount	2,260
Cucao Heights	1,800
Culibras Cove, height near	2,390
Curauma Head	1,830
Dark Hill	2,150
Darwin Mount (Tierra del Fuego)	6,800
Darwin Mount (Peru)	5,800
Davis Mount	1,420
Division Mount	1,830
Dripstone (Galapagos)	1,500
Duende Summit	2,580
Eten, Height inshore, near	2,450
Galera Range, over Point Falsa	1,550
Gallan, San, Island	1,130
Garita Hill	3,720
Gobernador Hill	1,020
Gorda Point	2,520
Grande Point	1,570
Graves Mount	1,438
Haddington Mount	3,130
Herradura Hill (Coquimbo)	1,000
Herradura, South distant hill	2,450
Huacho, Peak	4,220
Huanaquero Hill	1,850
Huanchaco Mount	3,450
Huayteca Grande	1,000
Islay Mount	3,340
Isquiliac Mount	3,000
James Island (Galapagos), summit	1,700
Jaron Mountain	3,990
Juan Fernandes, Yungue	3,000
Juan Soldado	3,900
Kater Peak	1,750
Lechuza Mount	1,300
Limari Range	2,150
Lobo Height, south of Victor	3,380
Lobo Point, Height over	3,090
Lomas Range, over San Antonio	2,960
Lorenzo, San	1,050
Luis, San, range near Cape Quedal	2,400
Main Mount	2,060
Malacuen	3,000
Mamilla Height	4,020
Manzano Hill	1,550
Maria, Doña, Table of	2,160
Matalqui Heights	1,500
Matamores, Height near	2,450
Maule, Heights near	1,300
Maytencillo Range	3,900
Mellersh Height	3,560
Mexillones Height	2,650
Midhurst Island	1,760

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Summits.	Feet.
Milagro, east height	2,400
Milagro, south height	3,150
Minchinmadom	8,000
Mitford Head	1,220
Mocha Island	1,240
Mollendo Peak	3,090
Mongon Mount	3,900
Monument Peak	2,850
Moore's Monument	3,400
Moreno Mount	4,160
Narborough Island (Galapagos)	3,720
Nasca Point	1,020
Neuke Mount	1,800
Obispo, Height near	2,850
Oyarvide Mount	5,800
Osorno Mountain	7,550
Pabellon, Pico	1,040
Payta, Silla de	1,300
Paul, St., Dome of	2,280
Paz Islet	1,180
Pedro, San	3,200
Peje Peumo, Point	1,900
Philip Mount (Chonos)	2,760
Philip, St., Mount	1,310
Pisagua, Height north of	3,220
Plata Point	1,670
Pond Mount	2,500
Pyramid Hill	2,500
Quilan Ridge	1,180
Quillota Bell	6,200
Quemado Mount	2,070
Raper Cape	2,000
Rees Point, range near	3,500
Refuge Peak (Chonos)	3,460
Rugged Peak	2,840
Sama Hill	3,890
Sarmiento Mount	6,910
Serena Hill	1,660
Silla Hill (Pichidanque)	2,000
Simon Mount	1,600
Skyring Mount	2,200
Skyring Peak (Chonos)	2,620
Solar, Height near	3,420
Sulivan Mount (Peru)	5,000
Sulivan Peaks (Chonos)	4,350
Stokes Mount (Peru)	4,000
Sugar Loaf, (Rio de Janeiro)	1,270
Sugar Loaf (Galapagos)	1,200
Sugar Loaf (Chonos)	1,840
Talinay Mount	2,300
Tarn Mount	2,850
Tarapaca Mount	5,780
Tres Montes, Cape	2,000
Tres Puntas, Cape	2,000
Twenty-six degree Range	2,200
Usborne Mountains (Peru)	4,000
Usborne Mount (Falklands)	1,630
Valparaiso, Heights over	1,480
Valparaiso, Signal Post hill	1,070
Ventana Mountain	3,350
Villarica Mountain	16,000
Weddell Mount	1,160
Wickham Heights (in the Falklands)	1,700
Wickham Mount (Peru)	4,010
Williams Island	2,530
Wilson Mount	8,060
Yanteles Mount	8,030

Note.—The heights are given only to the nearest ten feet above the mean level of the sea; but they were calculated to the utmost degree of accuracy that was attainable.

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No. 52.

In pp. 228-9 of vol. ii, it is stated, "In 1501-2 Americus Vespucius, then employed by the King of Portugal, sailed six hundred leagues south, and one hundred and fifty leagues west, from Cape San Agostinho (lat. 8° 20′ S.) along the coast of a country then named Terra Sanctæ Crucis. His account of longitude may be very erroneous, but how could his latitude have erred thirteen degrees in this his southernmost voyage?"

Since those pages were printed, I have obtained a perfect copy of the four voyages of Americus Vespucius, written in Latin; and I now hasten to correct any erroneous impression which might arise out of my having asserted that Vespucius "could not have explored farther south than the right bank of La Plata."

By the subjoined extracts from the third voyage of Vespucius, it appears that he sailed to about fifty-two degrees of south latitude; and near that latitude discovered land:—which I have no doubt whatever was Georgia.

These extracts are not only verbally but literally copied from the original: every passage which can throw even the slightest light upon dates, times, courses, distances or positions, is here given; the portions of the narrative which are omitted relate solely to what Vespucius saw on the land. According to his narrative, he went to the Canaries, thence to the coast of Africa near Cape Verde; from which place he sailed to the coast of Brazil, near, but to the westward of Cape St. Roque; thence he worked to windward against the current, till he reached Cape San Agostinho; and from that point he coasted to about the River Grande, in thirty-two south. From this port, whether the River Grande or a place near it, Vespucius steered to the south-east (per Seroccum) five hundred leagues; found the south pole elevated fifty-two degrees, the night fifteen hours long, the cold excessive, a high sea, a succession of tempestuous weather, and land precisely like Georgia, but not at all resembling any part of the Falklands. Georgia lies somewhat farther south than the latitude mentioned (being in 54°—55°); but we should take into consideration the instruments used at sea in 1502; the all but utter ignorance of southern stars; and the succession of bad weather encountered by Vespucius about the time of his seeing land near 52° S.

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From this latitude he sailed thirteen hundred leagues towards the north and north-east, and arrived at Sierra Leone; whence he went to the Azores and to Lisbon.

The internal evidence contained in the narrative of this voyage affords satisfactory proof of its authenticity. Whether the design of Vespucius was to seek for southern land, or endeavour to sail to 'Cathay' by the shortest line (the arc of a great circle), does not appear: but as we know he was skilled in mathematics and of an enterprising character, such a conjecture as the latter may be not totally improbable.

Navigatio tertia Americi Vesputii.

"Igitur ab hoc Lisbonæ portu cum tribus conservantiæ navibus die Maii decima MDI abeuntes, cursum nostrum versus magnæ Canariæ insulas arripuimus, secundum quas et ad earum prospectum instanter enavigantes, idem navigium nostrum collateraliter secundùm Aphricam occidentem versus sequuti fuimus."

* * * * * * *

"Exinde autem ad partem illam Æthiopiæ, quæ Besilicca dicitur, devenimus: quæ quidem sub torrida zona posita est, et superquam quatuordecim gradibus se septentrionalis erigit polus in climate primo: ubi diebus undecim nobis de lignis et aqua provisionem parantes restitimus, propter id quod Austrum versus per Atlanticum pelagus navigandi mihi inesset affectus. Itaque portum Æthiopiæ illum post hæc relinquentes, tunc per Lebeccium ventum in tantum navigavimus, ut sexaginta et septem infra dies insulæ cuidam applicuerimus, quæ insula septingentis à portu eodem leucis ad Lebeccii partem distaret. In quibus quidem diebus pejus perpessi tempus fuimus, quàm unquam in mari quispiam antea pertulerit, propter ventorum nimborumve impetus, qui quamplurimum nobis intulere gravamina, ex eo quod navigium nostrum lineæ præsertim æquinoctiali continue junctum fuit. Inibique in mense Junio hyems extat, ac dies noctibus æquales sunt, atque ipsæ umbræ nostræ continue versus meridiem erant. Tandem verò omninotanti placuit novam unam nobis ostendere plagam, decima septima, scilicet, Augusti, juxta quam, leuca sepositi ab eadem cum media, restitimus, et postea assumptis cymbis nonnullis in ipsam visuri si inhabitata esset, profecti fuimus."

* * * * * * *

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" De qua quidem ora pro ipso serenissimo Castiliæ rege possessorium cepimus, invenimusque illam multum amænam ac viridem esse, et apparentiæ bonæ. Est autem extra lineam æquinoctialem Austrum versus quinque gradibus: et ita eadem die, ad naves nostras repedavimus."

* * * * * * *

" Postquam autem terram illam reliquimus, mox inter Levantem et Seroccum ventum, secundum quos se continet terra, navigare occepimus, plurimos ambitus, plurimosque gyros interdum sectantes: quibus durantibus gentes non vidimus, quæ nobiscum practicare, aut ad nos appropinquare voluerint. In tantum vero navigavimus ut tellurem unam novam quæ secundum Lebeccium se porrigeret, invenerimus. In qua quum campum unum circuivissemus, cui sancti Vincentij campo nomen indidimus, secundum Lebeccium ventum post hæc navigare occœpimus: distatque idem sancti Vincentij campus a priore terra illa, centum quinquaginta leucis ad partem levantis: qui et quidem campus octo gradibus extra lineam æquinoctialem versus Austrum est."

* * * * * * *

" nos portum illum linquentes, per Lebeccium ventum, et in visu terræ semper transcurrimus, plures continue faciendo scalas pluresque ambitus, ac interdum cum multis populis loquendo, donec tandé versus austrum extra Capricorni tropicum fuimus. Ubi super horizonta illum meridionalis polus triginta duobus sese extollebat gradibus, atque minorem jam perdideramus ursam, ipsaque major ursa multum in fima videbatur, fere in fine horizontis se ostentans, et tunc per stellas alterius meridionalis poli nosmetipsos dirigebamus, quæ multo plures, multoque majores ac lucidiores quam nostri poli stellæ existunt: propter quod plurimarum illarum figuras confinxi, et præsertim earum quæ prioris ac majoris magnitudinis erant, unà cum declinatione diametrorum, quas circa polum austri efficiunt, et unà cum denotatione earundem diametrorum, et semidiametrorum earum, prout in meis quatuor diætis, sive navigationibus inspici facile poterit. Hocce vero navigio nostro, a campo sancti Augustini incepto, septingentas percurrimus laucas (leucas?) videlicet, versus Ponentem centum, et versus Lebeccium sexingentas: quas quidem dum peragraremus, si quis quæ vidimus enumerare vellet, non totidem ei papyreæ chartæ sufficerent."

* * * * * * *

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" Et in hac quidem peragratione decem fere mensibus extitimus."

* * * * * * *

" edixi, mandavique ubique, ut de lignis et aqua pro sex mensibus munitionem omnes sibi pararent: nam per navium magistros nos cum navibus nostris adhuc tantundem navigare posse judicatum est. Qua quidem, quam edixeram, facta provisione, nos oram illam linquentes, et inde navigationem nostram per Seroccum ventum initiantes, Februarii decima tertia, videlicet, quum sol æquinoctio jam appropinquaret, et ad hoc Septentrionis hemisphærium nostrum vergeret, in tantam pervagati fuimus, ut meridianum polum super horizonta illum quinquaginta duobus gradibus sublimatum invenerimus, ita ut nec minoris ursæ: nec majoris stellæ amodo inspici valerent. Nam tunc a portu illo, à quo per Seroccum abieramus, quingentis leucis longe jam facti eramus, tertia, videlicet, Aprilis. Qua die tempestas ac procella in mari tam vehemens exorta est, ut vela nostra omnia colligere, et cum solo nudo que malo remigare compelleremur, perflante vehementissime Lebeccio, ac mari intumescente, et aëre turbulentissimo extante. Propter quem turbinis violentissimum impetum nostrates omnes non modico affecti fuerunt stupore. Noctes quoque tunc inibi quam-maximæ erant. Etenim Aprilis septima, sole circa Arietis finem extante, ipsæ eædem noctes horarum quindecim repertæ sunt: hyemsque etiam tunc inibi erat, ut vestra satis perpendere potest majestas. Nobis autem sub hac navigantibus turbulentia, terram unam Aprilis secunda vidimus, penes quam viginti circiter leucas navigantes appropiavimus: verum illum omnimodo brutalem et extraneam esse comperimus, in qua quidem nec portum quempiam, nec gentes aliquas fore conspeximus, ob id, ut arbitror, quod tam asperum in ea frigus algeret, ut tam acerbum vix quisquam perpeti posset. Porrò in tanto periculo, in tantaque tempestatis importunitate nosmet tum reperimus, ut vix alteri alteros prægrandi turbine nos videremus. Quamobrem demum cum navium prætore pariter concordavimus, ut connavitis nostris omnibus, terram illam linquendi, seque ab ea elongandi, et in Portugallia remeandi signa faceremus. Quod consilium sanum quidem et utile fuit, quum si inibi nocte solum adhuc illa perstitissemus, disperditi omnes eramus: nempe quum hinc abiissemus, tam grandis die sequenti tempestas in mari excitata est, ut penitus obrui perdite metueremus. Propter quod plurima peregrinationum vota, necnon alias quamplures cæremonias, prout nautis mos esse solet, tunc feci-

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mus. Sub quo tempestatis infortunio quinque navigavimus diebus, demissis omnino velis. In quibus quidem quinque diebus ducentas et quinquaginta in mari penetravimus leucas, lineæ interdum equinoctiali, necnon mari et auræ temperatiori semper appropinquando, per quod nos à præmissis eripere periculis altissimo Deo placuit. Eratque hujuscemodi nostra navigatio ad transmontanum ventum et Græcum, ob id quòd ad Æthiopiæ latus pertingere cupiebamus, à quo per maris Atlantici fauces eundo, mille tercentum distabamus leucis. Ad illam autem per summi tonantis gratiam Maij bis quinta pertigimus die. Ubi in plaga una ad latus Austri, quæ Serraliona dicitur, quindecim diebus nos ipsos refrigerando fuimus. Et post hæc cursum nostrum versus insulas Lyazori dictas arripuimus: quæ quidem insulæ à Serraliona ipsa septingentis et quinquaginta leucis distabant, ad quas sub Julii finem pervenimus, et pariter quindecim inibi nos reficiendo perstitimus diebus. Post quos inde exivimus, et ad Lisbonæ nostræ recursum nos accinximus, à qua ad occidentis partem tercentum sepositi leucis eramus, et cujus tandem deinde portum MDII cum prospera salvatione et cunctipotentis nutu rursum subivimus cum duabus duntaxa navibus, ob id quod tertiam in Serraliona, quoniam amplius navigare non posset, igni combusseramus. In hac autem nostra tertiò cursa navigatione, sexdecim circiter menses permansimus: è quibus undecim absque transmontaneæ stellæ, necnon et majoris ursæ minorisve aspectu navigavimus, quo tempore nosmetipsos per aliam meridionalis poli stellam regebamus: quæ superius commemorata sunt, quæ in eadem nostra tertiò facta navigatione, relatu magis digna conspexi."

The above is a literal extract from pp. 116—126 of the Novus Orbis, id est, Navigationes primæ in Americam. Roterodami, apud Johannes Leonardi Berewout. Anno 1616.—an exceedingly scarce work.

No. 53.

BAROMETRIC OBSERVATIONS IN THE RIVER SANTA CRUZ.

Before leaving the Beagle, to explore part of the river, two mountain barometers, afterwards carried in the boats, were suspended on shore, close to the sea, and compared with a barometer on board the ship, the cistern of which instrument was at the level of the sea.

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After returning from exploring part of the river, both mountain barometers were again similarly compared, and the difference between the best instrument and that fixed on board was found to be the same as before, namely, 0,19 inch. At sunrise on the 5th of May, at the westernmost station reached by the boats, the mountain barometer which was preferred showed 29,81 (β'); the thermometers, attached, and detached, 44° Fahrenheit; and the cistern of the instrument was one foot above the level of the river. At the same time (allowing the difference of longitude) the barometer on board the Beagle showed 30,07 (β); while the attached thermometer showed 44°, and the detached 43°.

The rise of tide that morning at the ship was twenty-one feet, and it was high water at thirty minutes past seven, A.M.

By Baily's rule—*

$B = 0{,}00000$ (subtract 0,19 from 29,81)

$\log.\ \beta' = 1{,}47159$

$1{,}47159$

$\log.\ \beta = 1{,}47813$

$D = 0{,}00654$ - - - $\log = \overline{7}{,}81558$

$c = \overline{9}{,}99980$

$A = 4{,}79207$

$405 = 2{,}60745$

$+\ 7$

412 feet.

Half-tide 10,5 feet.

$-\ 2{,}5$

8

$-\ 1$

7

Hence the western station appears to be about four hundred and twelve feet above the level of the eastern—that of the Beagle:—but other pairs of observations were made during the previous and following days (May 4th and 6th) of which the results, similarly deduced, were 464, 501, 527, 487, 497, 434, and 436;—each considerably above 400 feet: and as that part of the river (the western station) is about two hundred miles from the sea, the fall, on an average, cannot be less than two feet in each mile.

* Pp. 183 and 263 of Astronomical Tables and Formulæ, by Francis Baily, Esq. F.R.S. Pres. A.S. &c. &c.

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No. 54.

A FEW NAUTICAL REMARKS.

Without extending this work to an unwieldy size, it would be impossible to give particular descriptions of, or sailing directions for, half the anchorages surveyed by the Beagle and her consorts. I can here only allude to some which are least easy of access; and for details concerning the rest, I must ask the reader to refer to Captain King's Sailing Directions, published by the Admiralty in 1832; and, hereafter, to a similar work, which I am compiling.

In approaching or entering any port between the southern coast of Brazil and Tierra del Fuego,* both leads and charts must be closely attended to, tides and currents must be well considered, and the colour, as well as rippling of the water, narrowly watched. Generally speaking, much of this extent of coast is comparatively shallow, and beset with insidious dangers in the shape of banks and currents. Where rocks occur they are less to be feared, because their position is, in most cases,† pointed out by kelp.‡ Some of the banks are particularly dangerous, being exceedingly steep-sided and hard. Where there is a strong stream or great rise of tide, or where both are found, the risk of approaching such banks is proportionably increased.

Of the River Plata I have spoken briefly in Chapter IV., and of Blanco Bay there is a slight description in Chapter V. of the second volume.

Before entering Port Belgrano (within Blanco Bay), or any similar port, such as False Bay, Green Bay, Brightman Inlet, Union Bay, &c. I should advise anchoring, and ascertaining the ship's position exactly, sending a boat to find the middle of the principal entrance, and there dropping a buoy with a good anchor. If the weather is at all hazy, no marks on the distant low land will be made out by a stranger, until he has had time to take a few angles, look round from the masthead, and examine the chart leisurely. These things cannot be so well done while the ship is sailing fast; she may, however, be brought to for a time.

* Except at the Falklands.

† That in the entrance of Port Desire is a notable exception to the general rule

‡ Seaweed growing in rocky places.

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The Falkland Islands, Tierra del Fuego,* the west part of Patagonia, the shores of the Chonos Archipelago, and Chiloe,† those of Chile and Peru, and the Galapagos Islands, have bold coasts, with deep water near them;—in such places the lead is of less importance. Most lurking dangers are buoyed by kelp; but where they are not so distinguished, the lead would hardly warn the seaman of them, because rocks usually rise so abruptly. A careful and experienced eye at the masthead, another perhaps on the fore-yard or at the jib-boom end, a manageable quantity of sail, under which the vessel may be instantly brought to the wind or hove in stays, and a good estimation of distances by the commanding officer will be of more consequence in frequenting these coasts, than either lead or directions. San Carlos and the Narrow of Chacao are remarkable exceptions. Both banks and rocks are there to be guarded against—by chart, eye, and lead, however, rather than by lengthy directions, which sometimes perplex more than they assist. Of these a particular plan is given in the map which accompanies the first volume of this work.

Remarks upon the winds, weather, and climate of each of the southern portions of the South American coast have already been given in various pages of this work; but I will add some more, referring particularly to the outer coast of Tierra del Fuego, previous to saying a few words on the passage round Cape Horn.

Some Observations upon the Appearance and Character of the Sea Coast of Tierra del Fuego; a brief Description of the Anchorages; and a few Remarks upon the Seasons, Wind, and Weather.

From Cape Pillar to Cape Horn the coast of Tierra del Fuego is very irregular and much broken; being, in fact, composed of an immense number of islands. It is generally high, bold, and free from shoals or banks; but there are many rocks nearly level with the surface of the water, distant two and even three miles from the nearest shore, which make it very unsafe for a vessel to approach nearer than five miles, excepting in daylight and clear weather. The coast varies in height from eight to fifteen hundred feet above the sea.

* Except the northernmost and the eastern shores.

† Except San Carlos de Chiloe.

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Farther inshore are ranges of mountains always covered with snow, whose height is from two to four thousand feet, and in a few instances about six or seven thousand.

With daylight and clear weather a vessel may close the shore without risk, because the water is invariably deep, and no rock is found, which is not so marked by sea-weed (or kelp as it is generally called), that by a good look-out at the mast-head, its situation is as clearly seen as if it were buoyed. By avoiding kelp you are sure of having sufficient water for the largest ships on any part of this coast. At the same time, it must be remembered that kelp grows in some places from a depth of thirty fathoms, and that on many parts of this coast you may pass through thick beds of sea-weed without having less than six fathoms water; still it is always a sign of danger, and until the spot where it grows has been carefully sounded, it is not safe to pass over it with a ship. As an instance;—after sounding a large bed of this weed in one of the Beagle's boats, and thinking it might be passed safely, a rock was found, not more than four feet in diameter, having only one fathom water over it.

Viewing the coast at a distance, it appears high, rugged, covered with snow, and continuous, as if there were no islands. When near you see many inlets which intersect the land in every direction, and open into large gulfs or sounds, behind the seaward islands: and you then lose sight of the higher land, which is covered with snow throughout the year, and find the heights close to the sea thickly wooded towards the east, though barren on their western sides, owing to the prevailing winds. These heights are seldom covered with snow, because the sea winds and the rain melt it soon after it falls.

Opposite to the eastern valleys, where the land is covered with wood, and water is seen falling down the ravines, good anchorage is generally found. But these valleys are exposed to tremendous squalls which come from the heights. The best of all anchorages on this coast is where you find good ground on the western side of high land, and are protected from the sea by low islands. It never blows near so hard against high land as from it; but the sea on the weather side is of course very formidable, unless stopped, as I mentioned, by islets.

Where the land is chiefly composed of sandstone or slate, anchorages abound; where of granite, it is difficult to strike soundings.

The difference between the granite and slate or sandstone hills, can be distinguished by the former being very barren and rugged,

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and of a grey or white appearance; whereas the latter are generally covered with vegetation, are dark-coloured, and have smoother outlines. The slate hills shew some sharp peaks, except which, the only bare places are those exposed to wind or sea.

Soundings extend about thirty miles from the coast. Between ten and twenty miles from the land, the depth of water varies from sixty to two hundred fathoms; the bottom almost every where being white or speckled sand. From ten to five miles distant, the average depth is fifty fathoms; it varies in general from thirty to one hundred, but in some places there is no ground with two hundred fathoms of line. Less than five miles from the shore the soundings are very irregular indeed, generally less than forty fathoms, though in some places deepening suddenly to one hundred or more; while in others a rock rises nearly to, or above the surface of the water.

After carrying fifty, forty, thirty, or twenty fathoms, towards an inlet, which you are desirous of entering, you will perhaps find the water deepen to sixty or one hundred fathoms as soon as you enter the opening: and in the large sounds, behind the seaward islands, the water is often considerably deeper than on the outside.

There is a bank of soundings along the whole coast, extending from twenty to thirty miles from it, which appears to have been formed by the continued action of the sea upon the shore, wearing it away, and forming a bank with its remains.

Between the islands, where there is no swell or surf worth notice, the water is deep, and the bottom very irregular.

A small ship may run among the islands in many places, and find good anchorage; but she will enter a labyrinth, from which her retreat may be difficult, and in thick weather very dangerous.

Fogs are extremely rare on this coast; but thick, rainy weather, and strong winds prevail. The sun shews himself but little; the sky, even in fine weather, being generally overcast and cloudy. A clear day is a rare occurrence.

Gales of wind succeed each other at short intervals, and last several days. At times the weather is comparatively fine and settled for perhaps a fortnight, but those periods of quiet are few.

Westerly winds prevail during the greater part of the year. The easterly wind blows occasionally in the winter months, and at times very hard, but it seldom blows in summer.

Winds from the eastern quarter invariably rise light, with fine

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weather; they increase gradually, the weather changes, and at times they end in a determined heavy gale. More frequently they rise to the strength of a treble-reefed topsail breeze, then die away gradually, or shift to another quarter.

From the north the wind always begins to blow moderately, but with thicker weather and more clouds than when from the eastward: it is generally accompanied by small rain. Increasing in strength, it draws to the westward gradually, and blows hard from between north and north-west, with heavy clouds, thick weather, and much rain.

When the fury of the north-wester is expended, which varies from twelve to fifty hours, or even while it is blowing hard, the wind sometimes shifts suddenly into the south-west quarter, blowing harder than before. This wind soon drives away the clouds, and in a few hours causes clear weather, though perhaps with heavy squalls passing occasionally.

In the south-west quarter the wind (generally speaking) hangs several days, blowing strong, but moderating towards the end, and admitting two or three days of fine weather.

Northerly winds then usually begin again, during the summer months; but all manner of shifts and changes are experienced, from north to south by the west, during that season; which would hardly deserve the name of summer, were not the days so much longer, and the weather a little warmer. Rain and wind prevail during the long, much more than in the short days.

It should be remembered that bad weather never comes on suddenly from the eastward, neither does a south-west or southerly gale shift suddenly to the northward. South-west and southerly winds rise suddenly as well as violently, and must be well considered in choosing anchorages, or preparing for shifts of wind at sea.

The most usual weather in these regions is a fresh wind between north-west and south-west, with a cloudy overcast sky.

Much difference of opinion has prevailed as to the utility of a barometer in these latitudes. I may remark, that during some years' careful trial of a barometer and sympiesometer (Adie's), I found their indications of the utmost value. Their variations did not of course correspond to those of middle latitudes, but they corresponded to those of high northern latitudes in a remarkable manner, (changing south for north, east and west remaining the same).

Gales of wind from the southward, and squalls from the south-

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west, are preceded, and therefore foretold, by heavy banks of large white clouds rising in those quarters, having hard edges, and appearing very rounded and solid.

Winds from the northward and north-westward are preceded and accompanied by low scud clouds, with a thickly overcast sky, in which other clouds appear to be at a great height. The sun shews dimly through them, and has a reddish appearance. For some hours, or a day before a gale from the north, or west, it is not possible to take an altitude of the sun, although he is visible; the haziness of the atmosphere in the upper regions causing his limbs to be quite indistinct. Sometimes, but very rarely, with the wind light between N.N.W. and N.N.E. there are a few days of beautiful weather: but they are sure to be succeeded by gales from the southward, with much rain.

It may be useful to say a few words regarding the seasons in the neighbourhood of Cape Horn, as much question has arisen respecting the propriety of making a passage round the Cape in winter rather than in summer.

The equinoctial months are the worst in the year, generally speaking, as in most parts of the world. Heavy gales prevail about those times, though not perhaps exactly at the equinoxes. In August, September, and October, there is usually very bad weather; strong winds, snow, hail, and cold, then prevail.

December, January, and February, are the warmest months; the days are long, and there is some fine weather; but westerly winds, at times very strong gales, with much rain, prevail throughout this season, which carries with it less of summer than in almost any part of the globe.

March, as I said, is stormy, and perhaps the worst month in the year, with respect to violent winds, though not so rainy as the summer months.

In April, May, and June, the finest weather is experienced; and though the days are short, it is more like summer than any other time of the year. Easterly winds are frequent, with fine, clear, settled weather. But bad weather occurs during these months, though not so often as at other times. During this period there is some chance of obtaining a few successive and corresponding observations. To try to rate chronometers by equal altitudes would be a fruitless waste of time at other seasons.

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June and July are much alike, but easterly gales blow more during July. The days being so short, and the weather cold, make these two months very unpleasant, though they are, perhaps, the best for making a speedy passage to the westward, as the wind is then prevalent from the eastern quarter.

I should say that December and January are the best for making a passage from the Pacific to the Atlantic Ocean, though that passage is so short and easily made, that it hardly requires a choice of time. For going to the westward, I should prefer April, May, or June, and should wait for a wind.

Lightning and thunder are seldom known: violent squalls come from the south or south-west, giving warning of their approach by masses of clouds. They are rendered more formidable by snow and hail of a large size.

There is a continual current setting along the south-west coast of Tierra del Fuego, from the north-west towards the south-east, as far as the Diego Ramirez Islands. From their vicinity the current takes a more easterly direction, setting round Cape Horn towards Staten Island, or off to seaward to the E.S.E.

Much has been said of the strength of this current; some persons supposing that it is a serious obstacle in passing to the westward of Cape Horn, while others almost deny its existence.

We found it run at the average rate of a mile an hour. Its strength is greater during west,—less or insensible during easterly winds. It is strongest near the land, particularly near the projecting capes or detached islands.

This current sets rather from the land, which diminishes the danger of approaching the south-west parts of the coast: but there is, in fact, much less risk in approaching this coast than is generally supposed. Being high and bold, without sandbanks or shoals, its position accurately determined, and a bank of soundings extending twenty or thirty miles from the shore, it need not be much feared. Rocks, it is true, abound near the land, but they are very near to the shore, and out of a ship's way.

A line from point to point along the coast (beginning from the outermost Apostle), will clear all danger, excepting the Tower Rocks, which are steep to, and high above water.

The preceding notices were written by me in 1830, and I have not found it necessary to alter them materially. Taken in connection with

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Capt. King's, Chapt. 24, in Vol. 1, and the following brief remarks, I hope they may prove useful to a stranger to the passage round Cape Horn: but he will doubtless avail himself also of what has been written on this subject by other persons, especially Weddell.

In going westward, Captain King recommends keeping near the eastern coast of Patagonia, and "after passing Staten Island, if the wind be westerly, the ship should be kept upon the starboard tack, unless it veer to the southward of S.S.W. until she reaches the latitude of 60° S."—(vol. i. pp. 464-5.) I do not think keeping near the eastern coast of Patagonia of importance to a large or strong vessel; smoother water is found near that coast, it is true, but currents set to the northward alongshore more strongly than in the open sea. Icebergs, however, are never found in sight of that land, though they have been met farther eastward, to the north of forty degrees south latitude. Instead of going into sixty, south latitude, I should prefer working to windward, near the shore of Tierra del Fuego;—through Nassau Bay; where anchorages are numerous, and easy of access.

In Orange Bay, or farther south, a ship may await a favourable time for making a long stretch to the westward: if foiled in one effort, she may return, or seek for anchorage under Noir Island, in Euston Bay, or elsewhere, until a better opportunity occurs. To make westing ought to be the principal object, in my humble opinion, till the meridian of about 82° is reached.* Icebergs are not found near the land of Tierra del Fuego, but they are frequently met with at a distance from it.

By adopting this plan of passing through Nassau Bay, or near Cape Horn, much labour and damage may be avoided, because a ship may lie quietly at anchor during the worst weather, and be ready to profit by any advantageous change.

* Eighty degrees will be far enough west for a fast-sailing ship; but eighty-five degrees will not be too westerly for a dull sailer.

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No. 55.

REMARKS on the Chronometrical Observations made during the Surveying Voyages of H. M. Ships Adventure and Beagle, between the years 1826 and 1836.

Before I proceed to notice the chronometrical observations made during the Beagle's latter voyages, from 1831 to 1836, it appears to me necessary to give a copy of Captain King's Report of those made under his direction between 1826 and 1830.

Copy of a Report of the Chronometrical Observations made during a Voyage for the purpose of surveying the southern extremity of America, in H.M. Ships Adventure and Beagle, between the years 1826 and 1830, under the orders of Captain P. P. King, by direction of the Right Honourable the Lords Commissioners of the Admiralty.

Among the important objects to which my attention was directed by the Lord Commissioners of the Admiralty, upon my appointment to the command of the Expedition for the survey of the southern part of South America, was that of measuring the differences of certain meridians in the north and south Atlantic Oceans by means of chronometers; and for this purpose I was supplied from the Royal Observatory at Greenwich with nine chronometers; eight of which, at the suggestion of the Astronomer Royal, were suspended in gimbals, and divided into two boxes; and the ninth, an eight-day box-watch, was fitted in the usual manner. The whole were fixed in a chest that was firmly secured to the deck as low down as possible, and as near to the middle part of the ship as could be managed, in order to diminish the effect of the ship's motion, and to counteract that of the ship's local attraction, which, whatever it might have been, always remained the same, as the chronometers were never moved from their positions.

These nine chronometers were made by Mr. French. Their description and number were as follows:—

Eight-day box chronometer,	No.	3233	designated	Z
Two-day	.....	3296	.....	A
Two-day	.....	3295	.....	B
Two-day	.....	3271	.....	C
Two-day	.....	3227	.....	D

in one box.

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One-day box chronometer,	No. 3290	designated	E		
One-day	.....	3291	.....	F	in
One-day	.....	3292	.....	G	one box.
One-day	.....	3293	.....	H	

Z had been going at the Observatory for many months, and had preserved a very regular rate, but all the others were quite new, and had scarcely settled to a steady rate when I received them.

In addition to the above I was furnished with a pocket chronometer, No. 553, by Mr. Murray. This watch had been at the Observatory for several months, and had performed remarkably well: and before I sailed Messrs. Parkinson and Frodsham intrusted to my care for trial a pocket chronometer, No. 1048, that was only completed in time to be sent to me two days before the Expedition sailed from Plymouth. Mr. French also lent me a pocket-watch to use for observing with, in order that the rest might not be unnecessarily moved.

In the Beagle were three excellent box chronometers. Two by Messrs. Parkinson and Frodsham, Nos. 254 and 228, which had been used in the Polar Voyages; and the third, No. 134, made by Mr. M'Cabe.

The means, therefore, that were placed at my command to effect this most interesting object were tolerably ample: and the result will prove how admirably these machines are adapted to measure such differences when a great number are employed; because the irregularities and errors of individual watches are compensated for by employing the mean of the whole.

In the observations for the determination of time, a sextant by Troughton, No. 1140, and an artificial horizon, were the instruments used: and the mode, whenever it could be adopted, was that of corresponding altitudes. Occasionally, however, absolute altitudes were used, but only in those places where the latitude was correctly ascertained;—and in some instances the chronometers were rated by a transit instrument.

The chronometers were always compared with the 'journeyman' watch before and after the observations, and when corresponding altitudes were observed all the watches were compared at noon. Their rates were carefully observed before sailing from one port, as well as after the arrival at another; and in calculating the acceleration or retardation of their rate of going, the correction was obtained by interpolation, upon the supposition of their having changed gradually. Whenever it appeared, by comparing the watches with each other,

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that any one had suddenly varied from its rate, its result was omitted in the determination.

The method of interpolating for the alteration of the rates which I have adopted, is one that was successfully employed by Captain Flinders in his survey of New Holland; and one that I have been for many years in the habit of using with most satisfactory results. In cases where chronometers alter their rates suddenly, the rule cannot be applied; but, in general, the alterations are caused by changes of temperature; and as these changes are gradual, so the rates alter in the same progressive manner.

The correction has, therefore, been obtained by an arithmetical progression; in which the first term, the number of terms, and the common difference, are given to find the sum of the terms.

The difference between the two rates divided by the number of days that have intervened, called the daily variation of rate, is the first term F; as well as the common difference D: the interval between the determination of the errors of the watches, in mean time, of the place left and arrived at, is the number of terms N: and the sum of the terms is the correction required, S. The formula, when reduced to its simplest form, is $F\,(N+1)\,\frac{N}{2}=S$.

The places which I was instructed to visit for the purpose of measuring their respective meridional differences were Madeira, Santa Cruz in the island of Teneriffe, the north-east end of San Antonio, and Port Praya in the island of St. Jago, in the North Atlantic; and the island of Trinidada, Rio de Janeiro, and Monte Video, in the South Atlantic Ocean.

After the chronometers had been carefully rated at the Observatory, they were embarked on board H.M.S. Adventure, on the 23rd April, 1826; but as the ship was detained at Deptford and Northfleet until the 4th May, an opportunity was offered of ascertaining what change had been produced by the alteration of the place; and it turned out to be by no means inconsiderable. Five of the watches had accelerated, and the remaining four had retarded rates. It would be difficult to assign any other reason for this change than the effect of the ship's local attraction.

With this newly found rate we sailed for Plymouth; and, after five days' passage, arrived in the Sound; and, on the 9th May, obtained a set of corresponding altitudes upon the Breakwater, upon a stone marked $\frac{430}{1}$; which, by the Ordnance map, is $0'\,31''{\cdot}5$ in longi-

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tude to the eastward of the flag-staff of Drake's Island; 10″ 2 to the westward of Plymouth old church, and 0′ 25″·1 to the westward of the new church. The longitude, therefore, of the station, by the Ordnance survey, would be 4° 7′ 41″·7, but by applying a proportion of the error detected by Dr. Tiarks, in his chronometrical observations between Greenwich and Falmouth, viz., 4″·09 or 1′ 11″·3, the corrected longitude of the station will be 4° 8′ 43″. Our chronometers made it 0′ 40″·2 to the eastward of the corrected longitude, and 0′ 19″·6 to the westward of the original determination by the Ordnance survey.

The Breakwater being the point from whence all my differences are measured, I have considered its longitude west of Greenwich to be as above stated, namely, 4° 8′ 43″.

It now remains to record the results, the details of which are given in another form.*

Madeira.—The observations were made at Mr. Veitch's garden-house, that being the spot used by Dr. Tiarks with ten chronometers. The difference between it and the Breakwater is 12°45′45″ west: the longitude will therefore be .....16° 54′ 28″ W. which is 0′17″·4 to the eastward of Dr. Tiarks's determination.

Teneriffe (Fort San Pedro)—by eleven chronometers is 0° 40′ 6″ to the eastward of Madeira, and will therefore be ...16°14′ 22″ W.

St. Jago (landing place at Port Praya)—by ten chronometers it was found to be 7° 15′ 55″ west of Teneriffe, and therefore.....23° 30′ 17″

Rio de Janeiro (Villegagnon Island)—by fourteen chronometers the difference was found between it and Port Praya to be 19° 34′ 46″ which will make its longitude.....43° 05′ 03″

St. Antonio (Terrafal Bay at the south-west end).—In consequence of unfavourable weather we were unable to land at the north-east end, and, therefore, made our observations at Terrafal Bay; the longitude of which was found by eleven chronometers to be 9° 05′ 39″ to the westward of Teneriffe which makes it .....25° 20′ 01″

Trinidada.—On account of the south-east trade being scant, we were prevented from making this island.

Monte Video (Rat Island).—The difference of longitude between this place and Rio de Janeiro was measured, on various occasions,

* These details are lodged in the Hydrographical Office. R. F.

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between the years 1826 and 1830; and in the whole 62 different results were obtained, the mean of which makes it 13° 4′ 27″ west of Villegagnon Island, or.....56° 9′ 30″

Gorriti (well at the north-east end) is 1 15′ 51″, by twenty-four chronometrical results, to the eastward of Rat Island, Monte Video, or.....54° 53′ 38″

Cape St. Mary is.....54° 5′ 58″

Buenos Ayres (Cathedral).—By three chronometers is 2° 8′ 24″ west of Rat Island, Monte Video, or.....58° 17′ 53″

Port Famine (Observatory at the west side of the bay).—The meridional difference between this place and Rat Island at Monte Video was also found on the several occasions of the ships passing to and fro. In all, 54 chronometrical results were obtained, the mean of which makes the Observatory 14° 44′ 31″ to the westward, or.....70° 54′ 01″

Port Desire (Ruins of the Spanish colony).—Fifteen chronometrical results make it 9° 42′ 15″ to the west of Rat Island, Monte Video, or..... 65° 51′ 45′′

Sea Bear Bay (Sandy beach on the south side of the bay)—is 7′44″ east of Port Desire, and therefore .....65° 44′ 01″

St. Martin Cove, near Cape Horn (the head of the cove).—Twelve chronometers made its longitude 11° 19′ 33″ west of Rat Island, Monte Video, or.....67° 29′ 03″

Valparaiso (Cerro Alegre).—This place was found by seven chronometers to be 4° 3′ 48″ to the westward of St. Martin Cove, or 71° 32′ 51″ west of Greenwich, but between it and Port Famine the difference being by ten chronometers 0° 41′ 8″ or 71° 35′ 9″ west, the mean has been taken, viz.....71° 34′ 12″

Juan Fernandez (Cumberland Bay, the fort).—This place was found by nine chronometers to be 7° 11′ 52″ west of Valparaiso, which makes it .....78° 46′ 04″

Talcahuano Bay (Fort Galvez).—By eleven chronometers the difference between it and Valparaiso is...1° 28′ 53″ or 73° 03′ 05″

San Carlos de Chilóe (Sandy Point).—The point which is opposite to the town is, by twenty chronometrical results, 2° 16′ 13″ west of Valparaiso, or.....73° 50′ 25″

The above are the principal chronometrical determinations that were made: the following are dependant on them:—

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Santos (the Arsenal).—By twelve chronometers this place is 3° 11′ 31″ west of Rio de Janeiro, or .....46° 16′ 33″

St. Catherine (Flag Staff of Sta. Cruz D'Anhatomirim) is, by fifteen chronometrical results, 5° 24′ 38″ to the west of Rio de Janeiro, or..... .....48° 29′ 41″

Port Sta. Elena (the spot marked "Observatory" on the plan).—Eleven chronometers made it 10° 23′ 46″ west of the Island of Gorriti, or.....65° 17′ 25″

Cape Virgins (extremity of the cliff).—By ten chronometers is 13° 24′ 8″ to the west of Gorriti, or 68° 17′ 46″ west of Greenwich; but by comparing it with Port Famine, from which ten chronometers make it 2° 36′ 0″ to the eastward, the result is 68° 18′ 01″; the mean of the two determinations makes it..... 68° 17′ 53″

Port Gallant (Wigwam Point).—By twenty-one chronometers is 1° 2′ 55″ west of Port Famine, or.....71° 56′ 57″

Harbour of Mercy (Observation Islet) at the western end of the Strait of Magalhaens is 3° 40′ 55″ west of Port Famine, or 74° 34′ 56″ west of Greenwich. By the survey, however, it is laid down in.....74° 35′ 31″

During the voyage various astronomical observations were made for the longitude, the summary of which is as follows:

Period.	Place.	Between the ☾ and	No. of Series.		Longitude by Observation.	Longitude by Chronometer.
			On each side.	In all.		
Sept. 1826	Rio de Janeiro	☉	8	16	43° 8′ 18″	43° 5′ 3″
Oct. 1828	Gorriti*.....	☉	9	18	54 53 40	54 53 38
Nov. 1829	Chiloé	☉	8	16	73 48 42	73 50 25
Jan. 1830	Valparaiso....	☉	16	32	71 35 10	71 34 12

* The longitude of Gorriti by Captain Stokes's lunars was 54° 57′ W; that of Monte Video (Rat Island) 56° 14′; of Port Famine old observatory (at the west side of the bay) 70° 57′; and of Villegagnon Island, at Rio de Janeiro, 43° 9′ W. (each to the nearest minute only).

Captain Stokes was an excellent observer, and used one of Troughton's best repeating reflecting circles. His lunar observations, which were very

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By referring these several observations to Port Famine by chronometrical differences, its longitude by observation will be 70° 54′ 11″ which is nearly identical with that produced by the chronometric chain from Plymouth, viz. 70° 54′ 01″ west. The last has, therefore, been taken for its longitude, and all the meridians of the coast, surveyed by the expedition under my command, depend upon that determination. PHILLIP PARKER KING.

After having perused Captain King's Report of the chronometrical observations made under his direction, I would ask the reader to turn to Dr. Tiarks's Report on Captain Foster's chronometrical observations in H.M.S. Chanticleer, published in the Appendix* to a "Narrative of a Voyage to the Southern Atlantic Ocean, in the years 1828, 29, 30, performed in H.M.S. Chanticleer, under the command of the late Captain Henry Foster, F.R.S.—By W. H. B. Webster, surgeon of the sloop."

It will also be useful to refer to a work on "Chronometers and Longitudes," by Captain Owen; and to the "Pilote du Brésil," by the Baron Roussin; as well as other works, before forming an opi-

very numerous, were chiefly computed by Lieutenant Skyring. During the years 1826 and 1827 Captain King considered the longitude of Villegagnon to be about 43° 9′, but afterwards he thought 43° 5′ more correct.

There is a striking accordance between the results of Captain Stokes's numerous lunar observations, and the late measurements by the Beagle's chronometers.

I was informed by Lieutenant Skyring, and by Mr. John L. Stokes, that the longitude of Villegagnon, by the Beagle's chronometers only, in 1826, was 43° 9′ (to the nearest minute).

In 1829, Mr. L. Stokes, a good observer even at that time, took many sets of lunar observations at San Carlos, in Chiloe; the mean result of which gave 73° 56′ for the longitude of Point Arena.

Now, these results are so close to those lately obtained in the Beagle—being within a mile in each case—that I should hesitate to give them without all their data, did I not know that the officers employed on board the Adventure and Beagle were aware of these determinations, and often discussed them, before the year 1836. Captain King and Lieutenant Stokes are more particularly acquainted with them.

ROBERT FITZROY.

* Vol. II. pp. 233-254.

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nion upon the degree of value that may be attached to the following remarks and results.

REMARKS on the Beagle's Chronometrical Measurements between 1831 and 1836; with their principal Results.

On the 14th of Nov., 1831, the following chronometers were embarked on board the Beagle, and placed in their permanent situations:—*

Letters.	Description.	Days.	Maker.	No.	Owner.	Remarks.
A	Box	8	Molyneux ..	1415	Fitz-Roy ..	Good.
†B	Do.	1	Gardner ..	24	Government ..	Bad.
C	Do.	1	Molyneux ..	1081	Molyneux ..	Rather good.
D	Do.	8	Murray ..	542	Murray ..	Do.
E	Do.	1	Eiffe ..	E	Government ..	Do.
F	Do.	2	Arnold & Dent	661	Arnold & Dent	Do.
G	Do.	1	Do. ..	633	Fitz-Roy ..	Do.
H	Pocket	1	Do. ..	261	Do. ..	Do.
K	Do.	1	Parkinson & Frodsham	1042	Government ..	Good.
L	Box	2	Arnold ..	634	Fitz-Roy ..	Rather good.
M	Do.	1	Frodsham ..	2	Government ..	Do.
N	Do.	2	Molyneux ..	1175	Fitz-Roy ..	Do.
O	Do.	1	Earnshaw ..	705	Government ..	Do.
‡P	Do.	1	Frodsham ..	1	Do. ..	Bad.
R	Do.	1	Murray ..	584	Murray ..	Very good.
S	Do.	1	Arnold ..	465	Government ..	Rather good.
T	Pocket	1	Molyneux ..	1326	Fitz-Roy ..	Indifferent.
V	Do.	1	Pennington ..	426	L^{d}. Ashburnham	Rather good.
W	Box	2	Molyneux ..	971	Government ..	Good.
X	Do.	1	Earnshaw ..	509	Do. ..	Rather good.
Y	Pocket	1	Morrice ..	6144	Do. ..	Do.
Z	Box	8	French ..	4214	Do. ..	Good.

These chronometers being embarked, and permanently fixed, more than a month previous to the Beagle's departure from England, sufficient time elapsed to ascertain their rates satisfactorily.

Suspended in gimbals, as usual, within a wooden box, each was placed in sawdust, divided and retained by partitions, upon one of two wide shelves. The sawdust was about three inches thick below, as well as at the sides of each box, and formed a bed for it which

* The 12 hour mark of each chronometer was invariably kept in one direction with respect to the ship.

† Never used after Feb. 1835. ‡ Never used after Sept. 1835.

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rose rather above the centre of gravity of the box and watch; so that they could not be displaced unless the ship were upset. The shelves, on which the sawdust and boxes were thus secured, were between decks, low down, and as near the vessel's centre of motion as could be contrived. Placed in this manner, neither the running of men upon deck, nor firing guns,* nor the running out of chain-cables, caused the slightest vibration in the chronometers, as I often proved by scattering powder upon their glasses and watching it with a magnifying glass, while the vessel herself was vibrating to some jar or shock.

All the watches were in one small cabin, into which no person entered, except to compare or wind them, and in which nothing else was kept. The greater number were never moved from their first places, after being secured there in 1831, until finally landed at Greenwich in 1836.

During eight years' observation of the movements of chronometers, I have become gradually convinced that the ordinary motions of a ship, such as pitching and rolling moderately, do not affect tolerably good timekeepers, which are fixed in one place, and defended from vibration as well as concussion. Frequently employing chronometers in boats, and in very small vessels, has strengthened my conviction that temperature is the chief, if not the only cause (generally speaking) of marked changes of rate. The balances of but few watches are so well compensated as to be proof against a long continuance of higher or lower temperature. It often happens that the air in port, or near the land, is at a temperature very different from that over the open sea—in the vicinity; and hence the difference sometimes found between harbour and sea rates. The changes so frequently noticed to take place in the rates of chronometers moved from the shore to the ship, and the reverse, are well known to be caused partly by change of temperature and partly by change of situation.† In the Beagle we never found the watches go better than when their boxes were bedded in saw-dust, and they themselves were moving freely in good gimbals.

Suspending chronometers, as on board the Chanticleer, not only alters their rate, but makes them go less regularly; and when fixed

* The Beagle's guns were long six and long nine pounders, of brass: they were only fired from the foremost ports.

† This may be connected with magnetism.

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to a solid substance, as on board the Adventure, they feel the vibrations caused by people running on the decks, by shocks, or by a chain cable running out. Cushions, hair, wool, or any such substance, is preferable to a solid bed; but, perhaps, there is nothing better than coarse dry saw-dust.

Some chronometrical measurements have erred, and caused much perplexity, in the following manner. The chronometers were rated in air whose average temperature was—let us suppose, for example, 70. They were then carried through air either considerably hotter, or considerably colder, and again rated in a temperature nearly equal to that specified. The rates were not found to differ much, and it was supposed that the chronometers had been going extremely well; though, in truth, the rates of most of the watches had differed extremely (from those found in port) during the voyage; but they had returned nearly to the old rates upon reaching nearly equal temperature. And this has happened, more or less, to every ship carrying chronometers across the Equator; especially when going to Rio de Janeiro with the sun to the northward of the Line.

How far, or in what manner, magnetism, or electrical influence, may affect chronometers, is hitherto unknown: but there is sufficient reason for suspecting considerable effects, under certain conditions, from one or both of these causes.

The Beagle's chronometers were all wound daily, at nine (except the eight-day watches, which were wound every Sunday morning), and compared at noon. Whatever other comparisons might be made, for equal or corresponding altitudes, sights for time, &c., the noon comparison was regularly made and forthwith examined, in order that any change might be at once detected. Whether at sea, or in harbour, this same method was punctually and accurately executed by one person only, under the inspection of Mr. Stokes and myself. This person, Mr. G. J. Stebbing, of Portsmouth—who was engaged for the purpose, as well as to keep our instruments in repair, take care of our collection of books,* assist in magnetic, and other observations, and write for me—was of invaluable assistance; and, I may well say, contributed largely to whatever was obtained by the Beagle's voyage.

In pages 74 and 75 of the second volume, I have mentioned a few

* Our books, which were not a few, considering the small size of the vessel, were collected in one cabin, under Mr. Stebbing's charge, and lent to the officers, without reserve, under certain regulations.

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reasons for preferring to give undivided attention to an unbroken series of chronometrical observations, rather than allot any portion of time to independent astronomical observations; which, to be really valuable, required what I could not command, namely—time; a well-placed and good transit instrument; skill in its use; and habits of observing, which are neither readily nor easily acquired. Besides which, there is always a degree of uncertainty involving the deductions from observations of any celestial phenomena, at a great distance from well-known observatories; even when the observer and his means are unexceptionable. The causes of this uncertainty are familiar to many, but, as these pages may meet the eye of a reader who is not aware of them, I will mention that the figure of the earth is not yet quite accurately known, that parallax and refraction cannot be allowed for with absolute certainty, that levels and plumb-lines are not everywhere exactly at right angles to, or coincident with, a line drawn from them to the earth's centre; and that tables, however excellent, are not perfect.

That able and indefatigable astronomer, Mr. Fallows, was a long time at the Cape of Good Hope before he could determine its longitude; and, after all his exertions, his successors have adopted a result differing from it half a mile.* There is reason to doubt whether Paramatta Observatory is well determined in longitude. To fix that of St. Helena, and that of the Mauritius, occupied much time and talent, aided by excellent instruments in well-built observatories. A great deal of time and pains, and ability, have been employed at Madras; yet, as far as chronometers can tell, there is a great discordance between the hitherto published longitudes of Madras, the Mauritius, and Paramatta, when viewed in connection with their respective meridian distances; such, at least, as have yet been measured.

Even on the coast of the Baltic, what differences were found by Lieutenant-General Schubert, in 1833, between the received positions of various observatories, and those which he deduced from the results of fifty-six chronometers;—placed at his disposal, with a steam-boat, by the Emperor of Russia.†

But, to return from this digression:—In the Beagle's measure-

* Mr. Fallows considered the longitude of the Cape observatory to be 1h. 13m. 53s. E. Mr. Henderson 1h. 13m. 55s. E.

† Journal of the Royal Geographical Society. Vol. VI. Part II. 1836, pp. 413-6.

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ments of meridian distances, time was invariably obtained by series of equal, or corresponding altitudes of the sun; observed by one and the same person with the same sextant, and the same artificial horizon, placed in the same manner, both before and after noon.

A very good pocket chronometer, carried by hand, in a box, was always used for taking time. In every instance, it was compared with the standard chronometers (the two supposed to be the best) immediately before the morning observation, and again immediately afterwards. It was also compared at noon, and before, as well as after the afternoon, observations. This watch* was so well constructed, that the intervals shown by it between morning and afternoon observations always agreed with those shown by the standards, (allowing for their respective rates).

Generally speaking, seven altitudes of one limb of the sun were taken, and then the same seven altitudes of the other limb, for one set of sights, or observations. Three such sets were usually taken, at short intervals, and the mean result used, unless any marked difference occurred, in which case the result of each separate pair of equal altitudes (morning and afternoon) was computed, and the erroneous ones were rejected. Those were considered erroneous which differed much from the majority. Generally, however, there was the closest agreement between the results of single pairs of sights, as well as between those of entire sets.

When clouds intervened the series was unavoidably irregular, but the pairs of equal altitudes were always numerous. In a very few instances the chronometers were rated by the results of absolute or independent altitudes, taken with every precaution at similar times of day with the same instruments, and by the same observer. In such cases the rates were obtained by comparing together the times obtained by morning observations, or those deduced from afternoon sights; not by morning and afternoon, or afternoon and morning observations. But the time, considered to be correct, was invariably deduced from equal altitudes, by the method of Professor Inman. At Paramatta, at the Cape of Good Hope, and under the walls of the Royal Observatory at Greenwich, we had opportunities of trying whether there was any difference between our time, thus obtained, and that of the respective astronomers; and I feel gratified in being able

* K. Parkinson and Frodsham. No. 1041

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to state, that in no one instance did it differ a quarter of a second from theirs; indeed the figures would bear me out in saying, that it did not differ even a tenth of a second! These facts are well known to Lieut. Stokes, Lieut. Sulivan, and Mr. Usborne.

The sextant used throughout the voyage for this purpose, and this alone, was a particularly good one, made expressly for me by Worthington and Allan. Its index error never varied, nor was it ever the least out of adjustment. Between morning and afternoon observations it was more than usually guarded, and on no account handled, or exposed to a change of temperature.

Latitudes were obtained by other sextants, and by circles. I was always anxious to get many results, not only by one observer, or instrument, but by several observers, and different instruments. It sometimes happened that there were six observers seated on the ground, with as many different instruments and horizons, taking the sun's circum-meridian altitudes, or observing stars at night. Where so many were working against one another, errors were soon detected, either in observation or in computing. I have already mentioned that Dr. Inman's method of calculation was followed; but it remains to be shown what mode of interpolation was adopted when, as was usually the case, most of the watches were found to be going at rates different from those ascertained at the preceding place of rating.

With very few exceptions, the method used by Dr. Tiarks* was practised; and, in the excepted cases, that used by Flinders, Owen, Foster, King, and others, was employed. The following are the principal results upon which all others obtained during the Beagle's last voyage (1831-6) depend. Want of room alone prevents my giving the minutest details upon which they depend; it would be of little use to give computations without comparisons, or comparisons without rates, or rates without the calculations and observations on which they depend; or any part of these without the whole, which constitutes a mass of figures filling several thick folio books. All these, however, will be deposited at the Hydrographical Office, so that any one who will take the trouble may, after obtaining the Hydrographer's permission, examine them to the fullest extent.

Our first station was at the Devonport Baths, exactly in the meri-

* Chanticleer's Voyage—Appendix, p. 226-8.

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dian of the centre of Government House. By the published survey of Plymouth and Devonport,* the Government-House at Devonport is 0° 1′ 48″ west of Plymouth old church, the longitude of which is given by Captain King in the preceding copy of his report.

This longitude, however, differs slightly from that obtained by the Beagle's chronometers carried from Devonport to Greenwich ; and as the longitude of Falmouth, by her chronometers, agrees with that determined by Dr. Tiarks, I have used in the construction of the table of positions (pp. 65-85) the result obtained directly by these chronometers, because so confirmed.

PRINCIPAL RESULTS of the Beagle's chronometrical measurements between 1831 and 1836; forming a connected chain of meridian distances around the globe, the first that has ever been completed, or even attempted, by means of chronometers alone.

DEVONPORT to PORT PRAYA.

Twenty Chronometers. Twenty-three Days.

	H. M.	S.	H. M.	S.		H. M.	S.	H. M.	S.
A	1 17	21,68			M	1 17	20,47	.....	20,47
B	.....	21,80			N	.....	24,42		
C	.....	20,69	.....	20,69	P	.....	17,73		
D	.....	17,03			R	.....	19,90	.....	19,90
E	.....	20,33	.....	20,33	S	.....	20,52	.....	20,52
F	.....	23,03			V	.....	22,23		
G	.....	21,43	.....	21,43	W	.....	20,93	.....	20,93
H	.....	17,16			X	.....	21,08		
K	.....	23,90			Y	.....	20,58	.....	20,58
L	.....	21,12	.....	21,12	Z	.....	21,43	.....	21,43
					Mean	...	20,87	.....	20,74

Preferred..... ..... 1 h. 17 m. 20,7s.

Places of observation :

The Baths, in the meridian of Government-house, at Devonport.

The landing-place at the west side of Quail Island, Port Praya, in the Cape Verde Islands.

* In the above-mentioned plan, published by the Admiralty, on a scale of 5,03 inches to a mile, the departure between Devonport Baths and Plymouth Old Church is 5,8 inches; which in latitude 50° 22′ represents 0° 1′ 48″1 of longitude.

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Port Praya to Bahia.

Twenty-one Chronometers. Twenty-six Days.

	H.	M.	S.	H.	M.	S.		H.	M.	S.	H.	M.	S.
A	1	00	04,67	1	00	04,67	O	0	59	49,87			
B	0	59	59,41				P	1	00	03,58	1	00	03,58
C	1	00	01,85	1	00	01,85	R	1	00	03,48	1	00	03,48
D	0	59	40,68				S	0	59	48,47			
E	0	59	52,21				T	0	59	41,47			
F	1	00	04,06	1	00	04,06	V	1	00	11,17			
G	1	00	06,00				W	1	00	03,91	1	00	03,91
K	1	00	17,99				X	1	00	02,19	1	00	02,19
L	1	00	01,60	1	00	01,60	Y	1	00	02,47	1	00	02,47
M	0	59	59,56	0	59	59,56	Z	1	00	04,69	1	00	04,69
N	1	00	03,95	1	00	03,95							
							Mean ...	1	00	00,16	1	00	03,00

Preferred..... 1h. 00m. 03,0s.

Places of observation:

At Port Praya, as before.

At Bahia, in Fort San Pedro, Gamboa.

Bahia to Rio de Janeiro.

Twenty Chronometers. Twenty-two Days.

	H.	M.	S.	H.	M.	S.		H.	M.	S.	H.	M.	S.
A	0	18	32,50	0	18	32,50	O	0	18	31,35	.....		31,35
C	.....		28,98				P	.....		32,06	0	18	32,06
D	.....		30,47	.....		30,47	R	.....		33,42	.....		33,42
F	.....		35,52				S	.....		27,13			
G	.....		33,90				T	.....		29,43			
H	.....		31,59	.....		31,59	V	.....		26,70			
K	.....		31,25	.....		31,25	W	.....		27,88			
L	.....		29,76				X	.....		30,63	.....		30,63
M	.....		38,23				Y	.....		38,79			
N	.....		30,98	.....		30,98	Z	.....		31,51	.....		31,51
							Mean ...			31,60	.....		31,58

Preferred..... 0h. 18m. 31,6s.

Places of observation:

At Bahia, as before stated.

At Rio de Janeiro, close to the well on Villegagnon Island.

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Rio de Janeiro to Bahia.

Twenty Chronometers. Six Days.

	H. M.	s.	H. M.	s.		H. M.	s.	H. M.	s.
A	0 18	29,58			N	0 18	29,60		
C	.....	31,50	... ..	31,50	O	.....	31,17	.....	31,17
D	.....	31,46	.....	31,46	P	.....	31,37	.....	31,37
E	.....	27,79			R	.....	31,61	.....	31,61
F	.....	31,87	.....	31,87	T	.....	31,44	.....	31,44
G	.....	30,89	.....	30,89	V	.....	29,71		
H	.....	29,92			W	.....	33,02		
K	.....	30,09			X	.....	31,83	.....	31,83
L	.....	30,22			Y	.....	32,57		
M	.....	29,68			Z	.....	31,18	.....	31,18
						Mean ...	30,82	.....	31,43

Preferred..... 0h. 18m. 31,4s.

Places of observation, as before stated.

Bahia to Rio de Janeiro.

Twenty Chronometers. Fourteen Days.

	H. M.	s.	H. M.	s.		H. M.	s.	H. M.	s.
A	0 18	31,17	0 18	31,17	O	0 18	29,49		
B	.....	42,45			P	.....	33,34	.....	33,34
C	.....	28,02			R	.....	33,09	.....	33,09
D	.....	28,65			S	.....	39,47		
E	.....	34,16			T	.....	31,33		
F	.....	31,79	.....	31,79	V	.....	31,21	.....	31,21
G	.....	30,42	.....	30,42	W	.....	32,13	.....	32,13
K	.....	28,02			X	.....	29,96	.....	29,96
L	.....	31,13	.....	31,13	Y	.....	27,55		
N	.....	33,41			Z	.....	30,91	.....	30,91
						Mean ...	31,89	.....	31,52

Preferred..... 0h. 18m. 31,5s.

First	0	18	31,6
Second.....	0	18	31,4
Mean of all	0	18	31,5

Places of observation, as before stated.

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Rio de Janeiro to Monte Video.

Twenty Chronometers. Twenty-four Days.

	H. M.	S.	H. M.	S.		H. M.	S.	H. M.	S.
A	0 52	16,19	.....	16,19	N	0 52	19,79	.....	19,79
B	.....	08,57			O	.....	14,14		
C	.....	09,75			P	.....	13,06		
D	.....	16,11	.....	16,11	R	.....	20,83	.....	20,83
E	.....	14,98	.....	14,98	S	.....	12,35		
F	.....	14,57	.....	14,57	T	.....	09,89		
G	.....	17,57	.....	17,57	W	.....	14,08		
H	.....	11,28			X	.....	14,42	.....	14,42
K	.....	27,36			Y	.....	40,60		
L	.....	22,89	.....	22,89	Z	.....	18,60	.....	18,60
					Mean ...		16,85	.....	17,60

Preferred 0h. 52m. 17,6s.

Places of observation:

At Rio de Janeiro, as before stated.

At Monte Video, on Rat Island.

Monte Video to Port Desire.

Seventeen Chronometers. Nineteen Days.

	H. M.	S.	H. M.	S.		H. M.	S.	H. M.	S.
A	0 38	46,88	.....	46,88	M	0 38	40,01		
C	.....	44,08			N	.....	42,75		
D	.....	50,17	.....	50,17	R	.....	45,65	.....	45,65
E	.....	50,30	.....	50,30	S	.....	51,49	.....	51,49
F	.....	46,01	.....	46,01	W	.....	45,45	.....	45,45
G	.....	48,37	.....	48,37	X	.....	39,95		
H	.....	43,01			Y	.....	27,14		
K	.....	56,56			Z	.....	47,32	.....	47,32
L	.....	48,04	.....	48,04	Mean ...		45,48	.....	47,97

Preferred..... 0h. 38m. 48,0s.

Places of observation:

Monte Video, as before.

Port Desire, at the Spanish Ruins.

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Port Desire to Port Famine

Sixteen Chronometers. Sixteen Days.

	H.	M.	s.	H.	M.	s.		H.	M.	s.	H.	M.	s.
A	0	20	10,57	.....		10,57	L	0	20	10,35	.....		10,35
B	0	20	09,39	.....		09,39	M	0	20	15,84			
C	0	20	10,65	.....		10,65	R	0	20	12,20	.....		12,20
D	0	20	09,03	.....		09,03	S	0	19	51,65			
F	0	20	10,70	.....		10,70	T	0	20	39,07			
G	0	20	05,07				W	0	20	14,22	.....		14,22
H	0	20	09,71	.....		09,71	X	0	20	07,31			
K	0	20	02,10				Z	0	20	10,29	.....		10,29
							Mean	0	20	10,51	.....		10,71

Preferred..... 0h. 20m. 10,7s.

Places of observation:

Port Desire, as before.

Port Famine, old Observatory at the west side of the port.

Port Famine to San Carlos.

Twenty Chronometers. Twenty-seven Days.

	H.	M.	s.	H.	M.	s.		H.	M.	s.	H.	M.	s.
A	0	12	08,12	0	12	08,12	N	0	12	06,37	0	12	06,37
B	0	12	37,16				P	0	12	18,26			
C	0	11	52,62	0	11	52,62	R	0	12	09,42			
D	0	11	54,60	0	11	54,60	S	0	11	51,87			
E	0	11	57,52	0	11	57,52	T	0	11	51,00			
G	0	12	10,02				V	0	11	42,42			
H	0	11	47,95				W	0	11	55,93	0	11	55,93
K	0	12	10,99				X	0	11	34,26			
L	0	12	03,68	0	12	03,68	Y	0	11	55,13	0	11	55,13
M	0	11	58,40	0	11	58,40	Z	0	12	01,42	0	12	01,42
							Mean	0	12	00,36	0	11	59,38

Preferred..... 0h. 11m. 59,4s.

Places of observation:

This measurement is made from a spot 5,9s. *east* of that used in the measure from Port Desire to Port Famine, this being the new and that the old Observatory.

San Carlos, at Point Arena.

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San Carlos to Valparaiso.

Eighteen Chronometers. Twelve Days.

	H. M.	S.	H. M.	S.		H. M.	S.	H. M.	S.
A	0 08	55,69	0 08	55,69	L	0 09	00,17	0 09	00,17
B	0 08	44,51			N	0 08	59,17	0 08	59,17
C	0 09	02,07	0 09	02,07	P	0 08	47,60		
D	0 09	06,01			R	0 08	55,64	0 08	55,64
E	0 09	06,72			V	0 09	09,05		
F	0 08	42,77			W	0 09	03,39	0 09	03,39
G	0 08	53,90	0 08	53,90	X	0 09	10,39		
H	0 09	08,10			Y	0 09	01,49	0 09	01,49
K	0 09	02,60	0 09	02,60	Z	0 08	58,34	0 08	58,34
					Mean	0 08	59,31	0 08	59,25

Preferred..... 0h. 8m. 59,2s.

Places of observation:

San Carlos, Chiloe, Point Arena. Valparaiso, Fort San Antonio.

Valparaiso to Callao.

Fourteen Chronometers. Twenty-five Days.

	H. M.	S.	H. M.	S.		H. M.	S.	H. M.	S.
A	0 22	07,74	.....	07,74	O	0 22	08,66	.....	08,66
B	.....	00,51			P	.....	08,97	.....	08,97
C	.....	07,31	.....	07,31	R	.....	11,33	.....	11,33
D	.....	06,86	.....	06,86	S	.....	11,39	.....	11,39
E	.....	04,42			W	.....	12,28	.....	12,28
F	.....	16,60			X	.....	03,30		
G	.....	05,90	.....	05,90	Z	.....	09,36	.....	09,36
					Mean	...	08,19	.....	08,98

Preferred..... 0h. 22m. 09,0s.

Places of observation:

Valparaiso, as before. Callao, the Arsenal.

Callao to the Galapagos Islands (Chatham Island).

Twelve Chronometers. Twelve Days.

	H. M.	S.	H. M.	S.		H. M.	S.	H. M.	S.
A	0 49	31,80	.....	31,80	O	0 49	33,15	.....	33,15
B	.....	32,30	.....	32,30	R	.....	32,16	.....	32,16
C	.....	33,90	.....	33,90	S	.....	32,56	.....	32,56
D	.....	33,49	.....	33,49	W	.....	35,21	.....	35,21
K	.....	30,39	.....	30,39	X	.....	29,44		
N	.....	36,74			Z	.....	32,90	.....	32,90
					Mean	...	32,84	.....	32,79

Preferred..... 0h. 49m. 32,8s.

Places of observation:

Callao, as before.

Chatham Island, Stephens Bay—landing-place at south-west side.

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Galapagos Islands (Chatham) to Charles Island.

Fourteen Chronometers. Four Days.

	H.	M.	S.	H.	M.	S.
A	0	03	39,49	.....		39,49
B	.....		37,29			
C	.....		39,11	.....		39,11
D	.....		39,23	.....		39,23
G	.....		44,81			
K	.....		36,67			
L	.....		38,23	.....		38,23

	H.	M.	S.	H.	M.	S.
N	0	03	41,69	.....		41,69
O	.....		39,36	.....		39,36
R	.....		39,40	.....		39,40
S	.....		39,44	.....		39,44
W	.....		39,19			
X	.....		39,28	.....		39,28
Z	.....		39,52	.....		39,52
Mean ...			39,48	.....		39,48

Preferred..... 0h. 03m. 39,5s.

Places of observation:

Chatham Island, as before.

Charles Island, landing-place at the south-east part of Post Office Bay.

Charles Island (Galapagos) to Otaheite.

Thirteen Chronometers. Thirty-one Days.

	H.	M.	S.	H.	M.	S.
A	3	56	11,67	.....		11,67
B	.....		07,07			
C	.....		07,53	.....		07,53
D	.....		05,43			
H	.....		14,04	.....		14,04
L	.....		20,65			
N	.....		14,57	.....		14,57

	H.	M.	S.	H.	M.	S.
O	3	56	14,19	.....		14,19
R	.....		14,91	.....		14,91
S	.....		11,35	.....		11,35
W	.....		08,27	.....		08,27
X	.....		09,35	.....		09,35
Z	.....		16,74	.....		16,74
Mean ...			11,98	.....		12,26

Preferred..... 3h. 56m. 12,3s.

Places of observation:

Charles Island, as before. Otaheite, Point Venus.

Otaheite to Bay of Islands, in New Zealand.

Sixteen Chronometers. Twenty-eight days.

	H.	M.	S.	H.	M.	S.
A	2	25	38,69	.....		38,69
B	.....		37,50	.....		37,50
C	.....		32,87	.....		32,87
D	.....		35,11	.....		35,11
G	.....		33,99	.....		33,99
H	.....		35,66	.....		35,66
K	.....		38,20	.....		38,20
L	.....		27,70			

	H.	M.	S.	H.	M.	S.
N	2	25	40,78			
O	.....		34,97	.....		34,97
R	.....		36,68	.....		36,68
S	.....		28,83			
V	.....		27,99			
W	.....		32,83	.....		32,83
X	.....		28,89			
Z	.....		40,48			
Mean ...			34,44	.....		35,65

Preferred..... 2h. 25m. 35,6s.

Places of observation:

Otaheite, as before. Bay of Islands, Paihia Islet.

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Bay of Islands in New Zealand to Sydney.

Fifteen Chronometers. Nineteen Days.

	H.	M.	S.	H.	M.	S.		H.	M.	S.	H.	M.	S.
A	1	31	33,50	.....		33,50	N	1	31	32,52	.....		32,52
B	.....		27,63				O	.....		29,29	.....		29,29
C	.....		33,64	.....		33,64	R	.....		30,69	.....		30,69
D	.....		31,84	.....		31,84	S	.....		30,17	.....		30,17
G	.....		27,41				W	.....		28,52	.....		28,52
H	.....		23,94				X	.....		26,82			
K	.....		44,60				Z	.....		32,36	.....		32,36
L	.....		32,09	.....		32,09							
							Mean ...			31,00	.....		31,46

Preferred..... 1h. 31m. 31,5s.

Places of observation:

New Zealand, as before.

Sydney, Fort Macquarrie.

From Macquarrie Fort to the Observatory at Paramatta, by three Chronometers,* 0h. 00m. 52,0s. (Paramatta west of Fort).

Sydney to Hobart Town.

Fifteen Chronometers. Eleven Days.

	H.	M.	S.	H.	M.	S.		H.	M.	S.	H.	M.	S.
A	0	15	29,40	.....		29,40	O	0	15	29,25	.....		29,25
B	.....		26,30	.....		26,30	R	.....		26,17			
C	.....		34,31				S	.....		32,01	.....		32,01
D	.....		35,28				V	.....		38,84			
G	.....		30,96	.....		30,96	W	.....		25,48			
K	.....		29,86	.....		29,86	X	.....		30,41	.....		30,41
L	.....		30,91	.....		30,91	Z	.....		32,31	.....		32,31
N	.....		30,83	.....		30,83							
							Mean ...			30,82	.....		30,22

Preferred..... 0h. 15m. 30,2s.

Places of observation:

Sydney, as before.

Hobart Town, east side of Sullivan Cove, in a small battery close to the water.

* These three Chronometers were carried by water to and from the Observatory on the same day.

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Hobart Town to King George Sound.

Fifteen Chronometers. Twenty days.

	H. M.	S.	H. M.	S.		H. M.	S.	H. M.	S.
A	1 57	48,75	.....	48,75	N	1 57	57,77	.....	57,77
B	.....	26,50			O	.....	51,26	.....	51,26
C	.....	59,28			R	.....	42,67	.....	42,67
D	.....	63,90			S	.....	52,67	.....	52,67
G	.....	54,15	.....	54,15	W	.....	36,04		
H	.....	54,31	.....	54,31	X	.....	47,47	.....	47,47
K	.....	42,94			Z	.....	50,96	.....	50,96
L	.....	55,21	.....	55,21	Mean	...	49,59	.....	51,53

Preferred..... 1h. 57m. 51,5s.

Places of observation:

Hobart Town, as before.

King George Sound, new Government Buildings, at the east side of Princess Royal Harbour, near the water.

King George Sound to the Keeling Islands.

Fifteen Chronometers. Twenty Days.

	H. M.	S.	H. M.	S.		H. M.	S.	H. M.	S.
A	1 24	07,62	.....	07,62	N	1 24	08,64	.....	08,64
B	.....	07,17	.....	07,17	O	.....	07,72	.....	07,72
C	.....	09,15	.....	09,15	R	.....	09,53	.....	09,53
D	.....	09,16	.....	09,16	S	.....	06,55	.....	06,55
G	.....	12,50			W	.....	00,06		
H	.....	05,60	.....	05,60	X	0 23	43,24		
K	.....	03,09			Z	0 24	07,44	.....	07,44
L	.....	23,16			Mean	0 24	06,04	.....	07,86

Preferred..... 1h. 24m. 07,9s.

Places of observation:

King George Sound, as before.

Keeling Islands, north-west part of Direction Islet.

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Keeling Islands to the Mauritius.

Fifteen Chronometers. Twenty-one Days.

	H. M.	S.	H. M.	S.		H. M.	S.	H. M.	S.
A	2 37	38,96	.....	38,96	O	2 37	32,54	.....	32,54
B	.....	36,30	.....	36,30	R	.....	37,62	.....	37,62
C	.....	35,05	.....	35,05	S	.....	31,94	.....	31,94
D	.....	31,87	.....	31,87	V	.....	25,55		
G	.....	17,34			W	.....	29,81	.....	29,81
K	.....	48,06			X	.....	27,70		
L	.....	43,18			Z	.....	34,42	.....	34,42
N	.....	33,17	.....	33,17					
						Mean ...	33,56	.....	34,17

Preferred..... 2h. 37m. 34,2s.

Places of observation:

Keeling Islands, as before.

Mauritius, Battery on Cooper's Island, Port Louis.

Mauritius to Simon's Bay.

Thirteen Chronometers. Twenty-five Days.

	H. M.	S.	H. M.	S.		H. M.	S.	H. M.	S.
A	2 36	25,12	.....	25,12	O	2 36	23,46	.....	23,46
C	.....	18,23	.....	18,23	R	.....	21,44	.....	21,44
D	.....	28,16			S	.....	18,82	.....	18,82
G	.....	32,50			W	.....	17,74	.....	17,74
K	.....	24,85	.....	24,85	X	.....	12,44		
L	.....	23,62	.....	23,62	Z	.....	19,68	.....	19,68
N	.....	24,93	.....	24,93					
						Mean ...	22,38	.....	21,79

Preferred..... 2h. 36m. 21,8s.

Places of observation:

Mauritius, as before.

Simon's Bay, south-east end of the Dock Yard, near high water mark.

Simon's Bay to the Observatory, by three Chronometers, carried to and from it the same day, 0h. 00m. 10,9s.

Observatory east of Simon's Bay.

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Simon's Bay to St. Helena.

Thirteen Chronometers. Twenty-one Days.

	H. M.	S.	H. M.	S.		H. M.	S.	H. M.	S.
A	1 36	38,39	.....	38,39	O	1 36	32,14	.....	32,14
C	.....	31,03	.....	31,03	R	.....	37,70	.....	37,70
D	.....	29,82	.....	29,82	S	.....	31,00	.....	31,00
G	.....	31,46	.....	31,46	V	.....	29,90		
K	.....	43,37			W	.....	37,24	.....	37,24
L	.....	30,34	.....	30,34	Z	.....	33,96	.....	33,96
N	.....	27,63							
						Mean ...	33,38	.....	33,31

Preferred..... 1h. 36m. 33,3s.

Places of observation:

Simon's Bay, as before.

St. Helena, James Valley, near high water mark, in the meridian of the Observatory on Ladder Hill.

St. Helena to Ascension.

Fourteen Chronometers. Seven Days.

	H. M.	S.	H. M.	S.		H. M.	S.	H. M.	S.
A	0 34	45,95	.....	45,95	L	0 34	48,23		
B	.....	44,18			N	.....	46,37		
C	.....	44,96	.....	44,96	O	.....	45,26	.....	45,26
D	.....	45,00	.....	45,00	R	.....	46,37	.....	46,37
G	.....	45,72	.....	45,72	S	.....	45,72	.....	45,72
H	.....	44,15			W	.....	45,93	.....	45,93
K	.....	45,42	.....	45,42	Z	.....	46,22	.....	46,22
						Mean ...	45,68	.....	45,65

Preferred..... 0h. 34m. 45,7s.

Places of observation:

St. Helena, as before.

Ascension, centre of the Barrack Square.

Ascension to Bahia.

Fifteen Chronometers. Ten Days.

	H. M.	S.	H. M.	S.		H. M.	S.	H. M.	S.
A	1 36	27,18	.....	27,18	N	1 36	29,92	.....	29,92
B	.....	20,25			O	.....	23,56		
C	.....	25,75	.....	25,75	R	.....	26,65	.....	26,65
D	.....	28,31	.....	28,31	S	.....	24,71	.....	24,71
G	.....	24,47	.....	24,47	W	.....	26,28	.....	26,28
H	.....	23,48			X	.....	32,50		
K	.....	22,36			Z	.....	26,12	.....	26,12
L	.....	28,76	.....	28,76					
						Mean ...	26,02	.....	26,70

Preferred..... 1h. 36m. 26,7s.

Places of observation:

Ascension, as before. Bahia, as before stated.

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Bahia to Pernambuco.

Fifteen Chronometers. Seven Days.

	H. M.	S.	H. M.	S.		H. M.	S.	H. M.	S.
A	0 14	35,82	.....	35,82	N	0 14	35,02		
B	.....	37,84			O	.....	36,23	.....	36,23
C	.....	36,03	.....	36,03	R	.....	36,19	.....	36,19
D	.....	34,89			S	.....	36,79	.....	36,79
G	.....	36,80	.....	36,80	V	.....	37,80		
H	.....	36,76	.....	36,76	W	.....	35,24	.....	35,24
K	.....	37,41	.....	37,41	Z	.....	36,97	.....	36,97
L	.....	34,85							
							Mean ... 36,31	.....	36,42

Preferred..... 0h. 14m. 36,4s.

Places of observation:

Bahia, as before.

Pernambuco, the south-west end of the Arsenal.

Pernambuco to Port Praya.

Fourteen Chronometers. Fourteen Days.

	H. M.	S.	H. M.	S.		H. M.	S.	H. M.	S.
A	0 45	23,77			L	0 45	30,95		
B	.....	28,32	.....	28,32	N	.....	25,03	.....	25,03
C	.....	27,40	.....	27,40	O	.....	28,89	.....	28,89
D	.....	27,29	.....	27,29	S	.....	28,38	.....	28,38
G	.....	28,04	.....	28,04	V	.....	29,40	.....	29,40
H	.....	28,71			W	.....	27,46	.....	27,46
K	.....	22,70			Z	.....	26,24	.....	26,24
							Mean ... 27,33	.....	27,64

Preferred..... 0h. 45m. 27,6s.

Places of observation:

Pernambuco, as before. Port Praya, as before stated.

Port Praya to Angra.

Thirteen Chronometers. Fifteen Days.

	H. M.	S.	H. M.	S.		H. M.	S.	H. M.	S.
A	0 14	50,08	.....	50,08	L	0 14	51,43	.....	51,43
B	.....	49,39			N	.....	49,26	.....	49,26
C	.....	48,93	.....	48,93	O	.....	49,88	.....	49,88
D	.....	51,46	.....	51,46	S	.....	48,52	.....	48,52
G	.....	52,59	.....	52,59	W	.....	50,43	.....	50,43
H	.....	50,39			Z	.....	50,88	.....	50,88
K	.....	49,20							
							Mean ... 50,09	.....	50,34

Preferred..... .....0h. 14m. 50,3s.

Places of observation:

Port Praya, as before.

Angra (in Terceira), close to the best landing-place.

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Angra to Falmouth.

Eleven Chronometers. Eleven Days

	H. M.	S.	H. M.	S.		H. M.	S.	H. M.	S.
A	1 28	38,61	.....	38,61	N	1 28	40,07	.....	40,07
C	.....	39,92	.....	39,92	O	.....	38,64	.....	38,64
D	.....	41,61	.....	41,61	S	.....	41,49	.....	41,49
G	.....	37,11	.....	37,11	V	.....	40,80	.....	40,80
H	.....	42,99			Z	.....	38,15	.....	38,15
L	.....	38,43	.....	38,43					
					Mean		39,80	.....	39,48

Preferred..... 1h. 28m. 39,5s.

Places of observation:

Angra, as before.

Falmouth, Pendennis Castle.

Angra to Devonport.

Eleven Chronometers. Fourteen Days.

	H. M.	S.	H. M.	S.		H. M.	S.	H. M.	S.
A	1 32	09,76	.....	09,76	N	1 32	08,95	.....	08,95
C	.....	08,60	.....	08,60	O	.....	07,35	.....	07,35
D	.....	10,62	.....	10,62	S	.....	10,29	.....	10,29
G	.....	07,15			V	.....	10,33	.....	10,33
H	.....	13,06	.....	13,06	Z	.....	09,52	.....	09,52
L	.....	08,82	.....	08,82					
					Mean		09,50	.....	09,73

Preferred..... 1h. 32m. 09,7s.

Places of observation, as before.

Devonport to the Royal Observatory at Greenwich.

Ten Chronometers. Eleven Days.

	H. M.	S.	H. M.	S.		H. M.	S.	H. M.	S.
A	0 16	34,9	.....	34,9	N	0 16	42,1	.....	42,1
C	.....	37,8	.....	37,8	O	.....	43,4	.....	43,4
D	.....	42,7	.....	42,7	S	.....	38,1	.....	38,1
G	.....	42,2	.....	42,2	V	.....	45,5	.....	45,5
L	.....	39,7	.....	39,7	Z	.....	36,3	.....	36,3
					Mean		40,27	.....	40,27

Preferred..... 0h. 16m. 40,3s.

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Observatory at the R. N. College at Portsmouth to Greenwich.

Eleven Chronometers. Eight Days.

	H. M.	S.	H. M.	S.		H. M.	S.	H. M.	S.
A	0 04	22,35	0 04	22,35	L	0 04	24,07	0 04	24,07
B	.....	24,57	.....	24,57	N	.....	26,63	.....	26,63
C	.....	22,63	.....	22,63	O	.....	29,17	.....	29,17
D	.....	26,73	.....	26,73	S	.....	23,29	.....	23,29
G	.....	26,46	.....	26,46	Z	.....	21,81	.....	21,81
H	.....	29,79							
					Mean ...		25,23	.....	24,77

Preferred..... 0h. 04m. 24,8s.

	H.	M.	S.
Angra to Devonport	1	32	09,7
Angra to Falmouth	1	28	39,5
Falmouth to Devonport	0	03	30,2
Devonport to Greenwich	0	16	40,3
Falmouth to Greenwich	0	20	10,5
Devonport to Greenwich	0	16	40,3
Portsmouth to Greenwich	0	04	24,8
Devonport to Portsmouth	0	12	15,5
Again	0	04	24,8
	0	12	15,5
	0	03	30,2
Greenwich to Falmouth	0	20	10,5

While looking over the preceding results, enquiry may be made for those of the other chronometers: I should, therefore, mention that the others were useless. Some of the watches stopped; others altered their rates suddenly; and in one case (R) a mainspring broke when the chronometer had been going admirably, till that moment. Four chronometers were left with Mr. Usborne, on the coast of Peru, and in consequence of these diminutions of our original number, there were but eleven watches in tolerably effective condition during the last two principal links of the chain, namely, from Port Praya to the Azores, and from the Azores to Devonport.

Five years is a long time for chronometers to preserve their capability of going steadily, under various changes of climate, without being examined, and perhaps cleaned or fresh oiled, by an experienced chronometer maker.

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Having given the principal results—those forming links of the chain of meridian distances carried round the globe—I have to mention that all others of a similar nature, obtained by the Beagle's officers, are based upon them, and that in no one instance do any of the longitudes given in the accompanying tables depend upon absolute or independent astronomical observations.

It ought to be clearly stated, however, that the sum of all the parts which form the chain amounts to more than twenty-four hours, therefore error must exist somewhere; but what has principally caused the error, or where it may be said to exist, I am unable to determine. The whole chain exceeds twenty-four hours, by about thirty-three seconds of time.

It appears very singular, that the more the various links of this chain are examined and compared with other authorities, the more reason there seems to be for believing them correct, at least to within a very small fraction of time; and even allowing that each link were one or two seconds of time wrong, it does not appear probable that all the errors would lie in one direction, unless some hitherto undetected cause affects chronometers when carried westward, which might affect them differently when carried eastward.

It would ill become me to speak of any value which may be attached to these chronometrical measures; even erroneous as they undoubtedly are in some part, if not to a certain degree almost every where. I can only lay the honestly-obtained results before persons who are interested in such matters, and request that they may be compared with those of the best authorities.

Callao, Sydney, and the Cape of Good Hope, are three remote points which might be selected rather than others, because generally supposed to be well determined. If the Beagle's position of Callao be proved incorrect, then must Humboldt's (calculated by Oltmanns), adopted by Daussy,* be also incorrect; and if her position of Sydney (reckoning eastward from Greenwich) be materially wrong, then must the best authorities for the longitude of that place be also in error, for they differ from the Beagle only about eight or ten seconds, which is but a minor part of thirty-three seconds.

The only idea I can dwell on, with respect to the cause of this error of thirty-three seconds, is, that chronometers may be affected by

* Connaissance des Tems.—1836.

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magnetic action in consequence of a ship's head being for a considerable time towards the east, or west: yet this is but a conjecture. In the measures between Bahia and Rio de Janeiro, and in those between Rio de Janeiro and Cape Horn, there is no evidence of any permanent cause of error; but the greater part of those measurements were made with the ship's head usually near the meridian.

Were I to select three measurements which I thought less trustworthy than others—I should decide on that from the Galapagos to Otaheite, from Otaheite to New Zealand, and from Hobart Town to King George Sound; but I do not think that either one of these can be five seconds of time in error, according to regular computation, without supposing some unknown cause of error to exist. If each of the three were five seconds wrong, and each error lay in the same direction, still there would only be fifteen seconds out of thirty-two accounted for. Such a supposition as this, however, that each of these three measurements is five seconds, or thereabouts, in error (referring only to error caused by known means) appears to be extremely improbable, I would almost say impossible.

It will naturally occur to the reader, that as error, undetected as to locality, exists, arbitrary correction must be made in order to reduce 24h. 0m. 33s. to 24h.

Otaheite has been selected as a point at which such a correction might be made with the least degree of inconvenience: to that place the longitudes in the accompanying tables are given as measured westward by Cape Horn, and eastward from Greenwich by the Cape of Good Hope; and there, as the two portions of the chain overlap, a mean has been taken between the resulting longitudes.

I will now recapitulate the principal measurements, and confront them with various other determinations. Limited space prevents my quoting many; but I trust that enough will be given to show that some weight may be attached to at least a proportion of the results obtained by the Beagle's officers.

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Beagle's Chain of Meridian Distances and Resulting Longitudes in the Atlantic Ocean.

1831—1836.

	H.	M.	S.	H.	M.	S.
Plymouth (Government House, Devonport)		—		0	16	40,3
Plymouth to Port Praya*	1	17	20,9	1	34	00,3
Port Praya to Fernando de Noronha ...	0	35	39,9	2	09	40,2
Fernando de Noronha to Bahia	0	24	23,6		—	
Port Praya to Bahia*	1	00	03,5	2	34	03,8
Bahia to Rio de Janeiro	0	18	31,4	2	52	35,2
Rio de Janeiro to Monte Video	0	52	17,6	3	44	52,8

Other Determinations.

Plymouth (or the Government House at Devonport) taken from the Ordnance Survey and Dr. Tiarks	0	16	41,4			
Captain W. F. W. Owen placed Port Praya in	1	34	04,8			
Dr. Tiarks's longitude of Madeira and Capt. P. P. King's meridian distance thence to the same spot in Port Praya placed it in	1	34	02,9			
Beagle—Plymouth to Port Praya	1	17	20,7			
Beagle—Port Praya to Plymouth	1	17	19,4			
Beagle—Port Praya to Bahia	1	00	03,0			
Beagle—Bahia to Port Praya	1	00	04,1			
Beagle—Bahia to Rio de Janeiro	0	18	31,6			
Beagle—Rio de Janeiro to Bahia	0	18	31,4			
Beagle—Bahia to Rio de Janeiro	0	18	31,5			
Captain Foster—Rio de Janeiro to Monte Video	0	52	19,0			
Captain King—Rio de Janeiro to Monte Video	0	52	17,8			
M. Barral—Rio de Janeiro to Monte Video	0	52	17,4			
Beagle in 1830—Monte Video to Rio de Janeiro	0	52	18,0			

The longitude of Rio de Janeiro given in this table is very near the latest determinations of the French, and almost identical with that which is stated, in the Ephemerides of Coimbra, to have been deduced from upwards of three thousand observations.

Note.—When more than one measurement is stated between the same two places, it is to be understood that the observations were taken at, or have been reduced to the same points.

* Using the mean of the measurements, outward and homeward.

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Beagle's Chain of Meridian Distances and Resulting Longitudes in the Atlantic Ocean.

1831—1836.

	H.	M.	S.	H.	M.	S.
Monte Video to Port Desire	0	38	48,0	4	23	40,8
Port Desire to Port Famine	0	20	10,7	4	43	51,5
Port Famine to Port Louis	0	51	22,0	3	52	29,5
Port Louis to Cape Horn	0	36	35,2	4	29	04,7
Bahia to Ascension	1	36	26,7	0	57	37,1
Ascension to St. Helena	0	34	45,7	0	22	51,4
St. Helena to Simon's Bay	1	36	33,3	1	13	41,9
Simon's Bay to the Observatory at the Cape of Good Hope	0	00	10,9	1	13	52,8

Other Determinations.

Beagle in 1829—Monte Video to Port Desire	0	38	47,7			
Beagle in 1830—Port Desire to Monte Video	0	38	45,9			
Adventure (tender)—Port Desire to Port Louis	0	31	11,0			
Adventure (tender)—Port Louis to Port Famine	0	51	21,9			
And, therefore, Port Desire to Port Famine	0	20	10,9			
Captain King's published result of all the measures made between 1826 and 1830 places Port Famine west of Monte Video	0	58	58,1			
The present result, as above stated, is	0	58	58,7			
Beagle in 1830—Cape Horn to Port Desire, by three short steps with intervening rates	0	05	23,7			
Which would place Cape Horn in longitude	4	29	04,5			
Beagle in 1832—Direct from Monte Video, made	4	29	08			
Captain Foster's meridian distance from Monte Video to St. Martin Cove, reduced to Cape Horn, and used with the Beagle's longitude of Monte Video, gives the longitude ...	4	29	04			
Coquille, M. Duperrey—St. Helena to Ascension	0	34	46,8			
Captain Foster—St. Helena to Ascension	0	34	48,3			
Captain Foster—St. Helena to the Cape Observatory ...	1	36	45,7			
Nautical Almanac—St. Helena to the Cape Observatory ...	1	36	45,0			
Mr. Fallows, 1828—Cape Observatory	1	13	53,2			
Mr. Henderson, 1832—Cape Observatory	1	13	55,6			
Mr. Maclear, 1836—Cape Observatory	1	13	55,0			

When the Beagle went to Rio de Janeiro in 1826, she made the longitude 2h. 52m. 36s. She stopped at Port Praya, for rates, by the way. Captain Stokes made the longitude of Rio de Janeiro nearly the same by lunars.

Malaspina and Espinosa made the longitude of Monte Video (Rat Island) nearly 3h. 44m. 58s. Captain Stokes made it 3h. 44m. 56s.

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Beagle's Chain of Meridian Distances and Resulting Longitudes in the Pacific Ocean, between Cape Horn and Otaheite.

1834—1835.

	H.	M.	S.	H.	M.	S.
Port Famine to San Carlos, Chiloe	0	11	53,5*	4	55	45,0
San Carlos to Valparaiso	0	08	59,2	4	46	45,8
Valparaiso to Callao	0	22	09,0	5	08	54,8
Callao to Chatham Island in the Galapagos	0	49	32,8	5	58	27,6
Chatham Island to Charles Island	0	03	39,5	6	02	07,1
Charles Island to Otaheite	3	56	12,3	9	58	19,4

Other Determinations.

Beagle 1830—Port Famine to Cape Horn, by true bearing of Sarmiento from Doris Peak	0	14	46,5
Beagle 1829-30—Cape Horn to San Carlos	0	26	39,9
Beagle 1829—Port Famine to San Carlos	0	11	54,0
Beagle 1829—San Carlos to Valparaiso	0	09	00,2
Malaspina and Espinosa had an observatory at San Carlos, whose longitude they considered	4	55	47,5
Their meridian distance † thence to Valparaiso was	0	08	59,8
Malaspina's and Espinosa's observations, calculated by Professor Oltmanns, give for Valparaiso	4	46	47,7
And for Callao Castle	5	08	57,1

Repeated examination of the successive differences of longitude given in these pages, and the data on which they rest, leads me to think that the alterations spoken of by Captain King, in page 493 of Volume I., were unnecessary.

By an unexceptionable true-bearing of Mount Sarmiento, from Doris Peak, I was enabled to connect the longitude of the outer coast with that of Port Famine in a most satisfactory manner.

M. Lartigue, in the French frigate Clorinde (see Connaissance des Tems, for 1836), made the meridian distance between Callao and Valparaiso almost identical with that of Espinosa and Malaspina, as well as the above stated result of the Beagle's measurement.

* oh. 11m. 59,4s. − 5,9s. =oh. 11m. 53,5s.

† In Malaspina's expedition there were at least four chronometers, made by Arnold, besides others.

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BEAGLE'S CHAIN OF MERIDIAN DISTANCES AND RESULTING LONGITUDES in the Indian and Pacific Oceans, between the Cape of Good Hope and Otaheite.

1835—6.

	H.	M.	S.	H.	M.	S.
Simon's Bay to Mauritius	2	36	21,8	3	50	03,7
Mauritius to Keeling Islands	2	37	34,2	6	27	37,9
Keeling Islands to King George Sound ...	1	24	07,9	7	51	45,8
King George Sound to Hobart Town ...	1	57	51,5	9	49	37,3
Hobart Town to Sydney	0	15	30,2	10	05	07,4
Sydney to Bay of Islands	1	31	31,5	11	36	39,0
Bay of Islands to Otaheite	2	25	35,6	14	02	14,6
				or 9	57	45,4
Otaheite by the west...				9	58	19,4
Mean of the two measures				9	58	02,4
Equal, in space, to			149°	30′	36″	

OTHER DETERMINATIONS.

Captain Owen—Simon's Bay to Mauritius	2	36	23,2	
Captain Lloyd—Mauritius Observatory	3	50	08	
Captain Flinders—Mauritius	3	50	00	
Flinders (by lunars) made the difference of meridians between King George Sound and Sydney	2	13	15,3	
Beagle's measurement gives	2	13	21,1	

Captain Cook and Mr. Wales placed Otaheite (Point Venus) in 149° 35′—but subsequently Mr. Wales considered 149° 30′ more correct.

In Cook's first voyage the longitude of Otaheite was made 149° 32′ 30″; in the second, Mr. Wales made it 149° 34′ 50″; and in the third voyage, Cook and his officers made it 149° 37′ 32″ w. (at Point Venus).

I was informed that M. Duperrey, in the Coquille, made the longitude of the Bay of Islands 174° 01′ 00″ E. Our observations were made at the same point, and, if such is the case, his result agrees with that of the Beagle, taken westward from Greenwich.

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SOME of the BEAGLE'S MEASUREMENTS during the years 1829 and 1830, which are here inserted, may serve to shew what accurate determinations may be obtained from even a few good chronometers, when often rated and carefully managed.

		H.	M.	S.	H.	M.	S.
Monte Video to Port Desire		0	38	47,7		—	
Port Desire to Port Famine		0	20	10,7	0	58	58,4
Port Famine to Cascade Harbour		0	02	22,0	1	01	20,4
Cascade Harbour to Port Gallant		0	01	50,2	1	03	10,6
Port Gallant to San Carlos de Chiloe ...		0	07	40,9	1	10	51,5
San Carlos de Chiloe is west of Monte Video by the chain of 1831-6				—	1	10	52,2
San Carlos to Harbour of Mercy ...	W.	0	02	53,6	0	02	53,6
Harbour of Mercy to Dislocation Harbour	E.	0	00	08,4		—	
Dislocation Harbour to Latitude Bay	E.	0	01	25,7		—	
Latitude Bay to the Basin near Cape Gloucester	E.	0	03	47,9		—	
The Basin to North Cove in the Barbara Channel	E.	0	04	02,3		—	
North Cove to Townshend Harbour	E.	0	01	30,6		—	
Townshend Harbour to Stewart Harbour	E.	0	01	45,9		—	
Stewart Harbour to Doris Cove ...	E.	0	01	17,0		—	
Doris Cove to March Harbour ...	E.	0	04	41,0		—	
March Harbour to Orange Bay ...	E.	0	07	37,1		—	
Orange Bay to St. Martin Cove ...	E.	0	02	05,1		—	
St. Martin Cove to Cape Horn ...	E.	0	01	12,1	0	29	33,1
					0	26	39,5
Cape Horn by chain east of San Carlos ...			...	...	0	26	40,3
Cape Horn to Lennox Harbour		0	01	47,7		—	
Lennox Harbour to Good Success Bay ...		0	06	19,9	0	08	07,6
Good Success Bay to Port Desire		0	02	43,9	0	05	23,7
Port Desire by chain is east of Cape Horn ...			...	...	0	05	23,9
Port Desire to Monte Video		0	38	45,9		—	
Monte Video to Sta. Catharina		0	30	35,0		—	
Sta. Catharina to Rio de Janeiro		0	21	43,0	1	31	03,9
Rio de Janeiro by chain is east of Port Desire			...	...	1	31	05,6

The measurements made in 1829-30, here given, may be compared with the charts or other documents deposited in the Hydrographical Office in 1831.

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Having thus endeavoured to give a view of the Beagle's principal measurements of meridian distances, with some of the collateral determinations which are at present within my reach, I willingly refrain from their discussion.

It is for those who have access to more extended information, and who are not personally interested in the question, by having assisted in making any of these measures themselves, to discuss and assign values to them.

For this reason, an intention which I entertained of attempting to make some enquiry into the grounds on which the longitudes of Jamaica, the Havannah, Chagres, Panama, &c. are by some persons considered to be well determined, has been relinquished.

I will conclude by remarking, that if so small a vessel as the Beagle, with so few chronometers going well, latterly, could attain, during a tedious and indirect voyage of five years, to within thirty-three seconds of the truth—a much nearer approach to exactness may be anticipated from measurements made in far less time, with a greater number of chronometers.

END OF THE APPENDIX.

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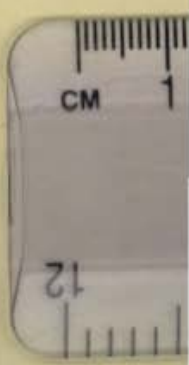

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GENERAL CHART shewing the PRINCIPAL TRACKS of H.M.S. BEAGLE. 1831-6.

NORTH AMERICA
ATLANTIC
OCEAN
PACIFIC
OCEAN
SOUTH AMERICA
AFRICA
EUROPE
ASIA
CHINA
HINDOOSTAN
ARABIA
INDIAN
OCEAN
NEW HOLLAND
NEW ZEALAND
BORNEO
Bay of Bengal
ARABIAN SEA
SPAIN
MEDITERRANEAN SEA
Madeira
Canary I.
Cape Verd Is.
Galapagos Archipelago
Marquesas
Low Archipelago
Society Islands
Tahiti
Pitcairn I.
Easter I.
Sala y Gomez
Juan Fernandez
Valparaiso
Santiago
Concepcion
Chiloe
Tierra del Fuego
Falkland Islands
Port Famine
Cape Horn
Staten I.
Sandwich Land
Georgia
Tristan d'Acunha
St Helena
Ascension
Fernando Noronha
Bahia
Rio Janeiro
Abrolhos
Trinidad
Cape Frio
Rio Negro
Bahia Blanca
Maldonado
Rio Plata
Cape Corrientes
Cape Colorado
Cape Blanco
Cape Verd
Cape Horn
Cape Town
Cape Agulhas
Cape Leeuwin
Cape Catastrophe
Van Diemens Land
Port Jackson
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Hobart Town
Port Stephens
Bass Strait
Keeling Island
Timor
Java
Sumatra
Celebes
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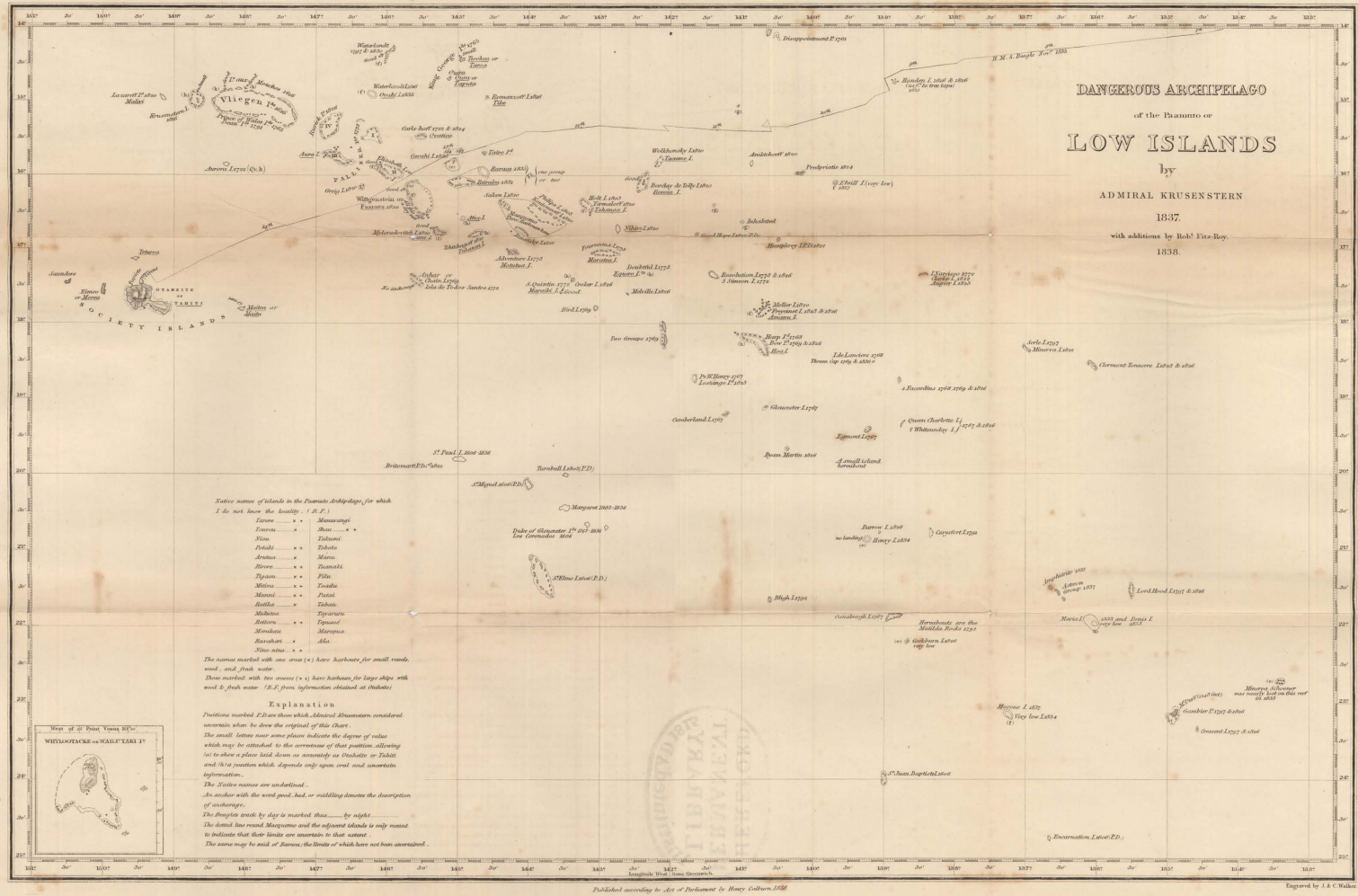
Coral Reefs



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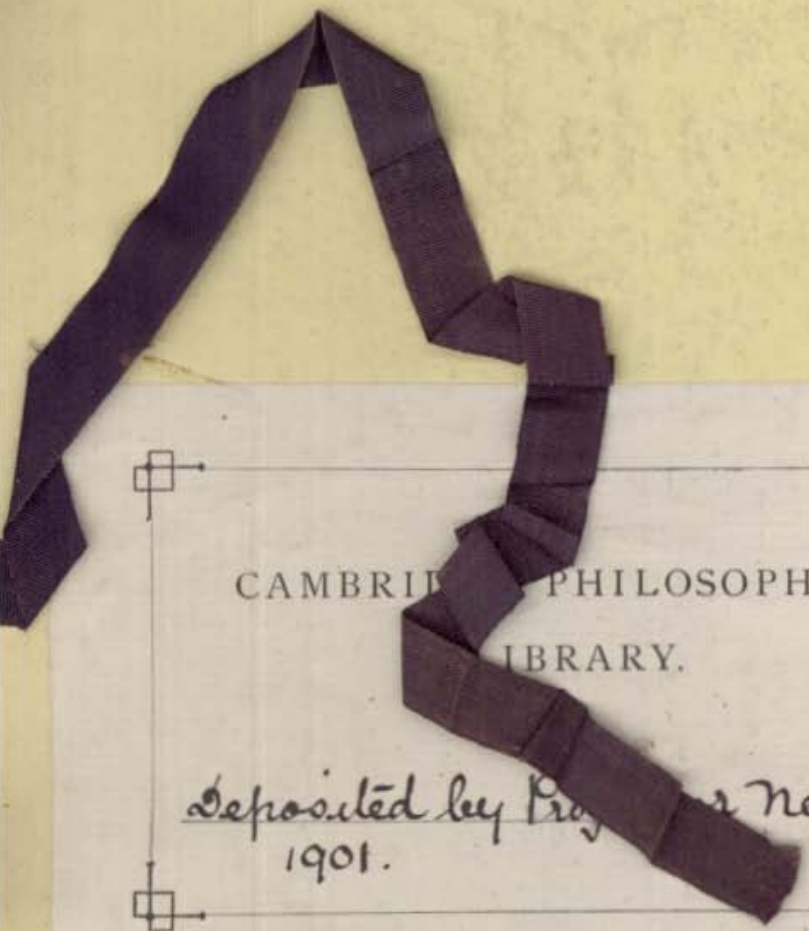

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VOLUME III.

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ADVENTURE AND BEAGLE,

BETWEEN

THE YEARS 1826 AND 1836,

DESCRIBING THEIR

EXAMINATION OF THE SOUTHERN SHORES

OF

SOUTH AMERICA,

AND

THE BEAGLE'S CIRCUMNAVIGATION OF THE GLOBE.

IN THREE VOLUMES.

VOL. III.

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VOLUME III.

JOURNAL AND REMARKS.

1832—1836.

BY

CHARLES DARWIN, ESQ., M.A.

SEC. GEOL. SOC.

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PREFACE.

I HAVE stated in the preface to the Zoology of the Voyage of the Beagle, that it was in consequence of a wish expressed by Captain FitzRoy, of having some scientific person on board, accompanied by an offer from him, of giving up part of his own accommodations, that I volunteered my services, which received, through the kindness of the hydrographer, Captain Beaufort, the sanction of the Lords of the Admiralty. As I feel that the opportunities, which I enjoyed of studying the Natural History of the different countries we visited, have been wholly due to Captain FitzRoy, I hope I may here be permitted to express my gratitude to him; and to add that, during the five years we were together, I received from him the most cordial friendship and steady assistance. Both to Captain FitzRoy and to all the Officers of the Beagle,*

* I must likewise take this opportunity of returning my sincere thanks to Mr. Bynoe, the surgeon of the Beagle, for his very kind attention to me when I was ill at Valparaiso.

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I shall ever feel most thankful for the undeviating kindness with which I was treated, during our long voyage.

The present volume contains in the form of a journal, a sketch of those observations in Geology and Natural History, which I thought would possess some general interest. As it was originally intended to have preceded any more detailed account, and as its publication has been unavoidably delayed, the briefness and imperfection of several parts, I hope, will be excused. I have given a list of those errata (partly caused by my absence from town when some of the sheets were in the press) which affect the sense; and have added an Appendix, containing some additional facts (especially on the theory of the transportation of erratic blocks) which I have accidentally met with during the past year. I hope shortly to publish my geological observations; the first Part of which will be on the Volcanic Islands of the Atlantic and Pacific Oceans, and on Coral Formations; and the second Part will treat of South America. Several numbers of the Zoology of the Voyage of the Beagle, due to the disinterested zeal of several of our first naturalists, have already appeared. These works could not have been undertaken, had it not been for the liberality of the Lords Commissioners of Her Majesty's Treasury, who, through the representation of the Right Honourable the Chancellor of the Exchequer, have been pleased to grant a sum of one

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thousand pounds towards defraying part of the expenses of publication. I have repeated in this volume my account of the habits of some of the birds and quadrupeds of South America, as I thought such observations might interest those readers who would not, probably, consult the larger work. But I trust that naturalists will remember, that mere sketches are here given on several subjects, which will hereafter be more fully entered on, or have already been so:—for instance, the notices of the strange fossil quadrupeds of the eastern plains of South America are exceedingly imperfect, whilst an admirable account of them by Mr. Owen now forms the first part of the Zoology of the Voyage of the Beagle.

I shall have the pleasure of acknowledging the great assistance I have received from several naturalists, in the course of this and the succeeding works; but I must be here allowed to return my most sincere thanks to the Reverend Professor Henslow, who, when I was an under-graduate at Cambridge, was one chief means of giving me a taste for Natural History, —who, during my absence, took charge of the collections I sent home, and by his correspondence directed my endeavours,—and who, since my return, has constantly rendered me every assistance which the kindest friend could offer.

C. D.

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JOURNAL

OF

CHARLES DARWIN, M.A.,

NATURALIST TO THE BEAGLE.

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ST. JAGO—CAPE DE VERD ISLANDS.

JAN. 16TH, 1832.—The neighbourhood of Porto Praya, viewed from the sea, wears a desolate aspect. The volcanic fire of past ages, and the scorching heat of a tropical sun, have in most places rendered the soil sterile and unfit for vegetation. The country rises in successive steps of table land, interspersed with some truncate conical hills, and the horizon is bounded by an irregular chain of more lofty mountains. The scene, as beheld through the hazy atmosphere of this climate, is one of great interest; if, indeed, a person, fresh from the sea, and who has just walked, for the first time, in a grove of cocoa-nut trees, can be a judge of any thing but his own happiness. The island would generally be considered as very uninteresting; but to any one accustomed only to an English landscape, the novel

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prospect of an utterly sterile land possesses a grandeur which more vegetation might spoil. A single green leaf can scarcely be discovered over wide tracts of the lava plains; yet flocks of goats, together with a few cows, contrive to exist. It rains very seldom, but during a short portion of the year heavy torrents fall, and immediately afterwards a light vegetation springs out of every crevice. This soon withers; and upon such naturally-formed hay the animals live. At the present time it has not rained for an entire year. The broad, flat-bottomed, valleys, many of which serve during a few days only in the season as a water-course, are clothed with thickets of leafless bushes. Few living creatures inhabit these valleys. The commonest bird is a kingfisher (*Dacelo jagoensis*), which tamely sits on the branches of the castor-oil plant, and thence darts on the grasshoppers and lizards. It is brightly coloured, but not so beautiful as the European species: in its flight, manners, and place of habitation, which is generally in the driest valleys, there is also a wide difference.

One day, two of the officers and myself rode to Ribeira Grande, a village a few miles to the eastward of Porto Praya. Until we reached the valley of St. Martin, the country presented its usual dull brown appearance; but there, a very small rill of water produces a most refreshing margin of luxuriant vegetation. In the course of an hour we arrived at Ribeira Grande, and were surprised at the sight of a large ruined fort and cathedral. The little town, before its harbour was filled up, was the principal place in the island: it now presents a melancholy, but very picturesque appearance. Having procured a black Padre for a guide, and a Spaniard, who had served in the Peninsular war, as an interpreter, we visited a collection of buildings, of which an ancient church formed the principal part. It is here the governors and captain-generals of the islands have been buried. Some of the tombstones recorded dates of the sixteenth century.*

* The Cape de Verd Islands were discovered in 1449.

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The heraldic ornaments were the only things in this retired place that reminded us of Europe. The church or chapel formed one side of a quadrangle, in the middle of which a large clump of bananas were growing. On another side was a hospital, containing about a dozen miserable-looking inmates.

We returned to the "Vênda" to eat our dinners. A considerable number of men, women, and children, all as black as jet, were collected to watch us. Our companions were extremely merry; and every thing we said or did was followed by their hearty laughter. Before leaving the town we visited the cathedral. It does not appear so rich as the smaller church, but boasts of a little organ, which sent forth most singularly inharmonious cries. We presented the black priest with a few shillings, and the Spaniard, patting him on the head, said, with much candour, he thought his colour made no great difference. We then returned, as fast as the ponies would go, to Porto Praya.

Another day we rode to the village of St. Domingo, situated near the centre of the island. On a small plain which we crossed, a few stunted acacias were growing; their tops, by the action of the steady trade-wind, were bent in a singular manner—some of them even at a right angle to the trunk. The direction of the branches was exactly N.E. by N., and S.W. by S. These natural vanes must indicate the prevailing direction of the force of the trade wind. The travelling had made so little impression on the barren soil, that we here missed our track, and took that to Fuentes. This we did not find out till we arrived there; and we were afterwards very glad of our mistake. Fuentes is a pretty village, with a small stream; and every thing appeared to prosper well, excepting, indeed, that which ought to do so most—its inhabitants. The black children, completely naked, and looking very wretched, were carrying bundles of firewood half as big as their own bodies.

Near Fuentes we saw a large flock of guinea-fowl—probably fifty or sixty in number. They were extremely wary,

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and could not be approached. They avoided us, like partridges on a rainy day in September, running with their heads cocked up; and if pursued, they readily took to the wing.

The scenery of St. Domingo possesses a beauty totally unexpected, from the prevalent gloomy character of the rest of the island. The village is situated at the bottom of a valley, bounded by lofty and jagged walls of stratified lava. The black rocks afford a most striking contrast with the bright green vegetation, which follows the banks of a little stream of clear water. It happened to be a grand feast-day, and the village was full of people. On our return we overtook a party of about twenty young black girls, dressed in most excellent taste; their black skins and snow-white linen being set off by their coloured turbans and large shawls. As soon as we approached near, they suddenly all turned round, and covering the path with their shawls, sung with great energy a wild song, beating time with their hands upon their legs. We threw them some vintéms, which were received with screams of laughter, and we left them redoubling the noise of their song.

It has already been remarked, that the atmosphere is generally very hazy; this appears chiefly due to an impalpable dust, which is constantly falling, even on vessels far out at sea. The dust is of a brown colour, and under the blowpipe easily fuses into a black enamel. It is produced, as I believe, from the wear and tear of volcanic rocks, and must come from the coast of Africa. One morning the view was singularly clear; the distant mountains being projected with the sharpest outline, on a heavy bank of dark blue clouds. Judging from the appearance, and from similar cases in England, I supposed that the air was saturated with moisture. The fact, however, turned out quite the contrary. The hygrometer gave a difference of 29.6 degrees, between the temperature of the air, and the point at which dew was precipitated. This difference was nearly double that which I had observed on the previous mornings.

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This unusual degree of atmospheric dryness was accompanied by continual flashes of lightning. Is it not an uncommon case, thus to find a remarkable degree of aerial transparency with such a state of weather?

The geology of this island is the most interesting part of its natural history. On entering the harbour, a perfectly horizontal white band, in the face of the sea cliff, may be seen running for some miles along the coast, and at the height of about forty-five feet above the water. Upon examination, this white stratum is found to consist of calcareous matter, with numerous shells embedded, such as now exist on the neighbouring coast. It rests on ancient volcanic rocks, and has been covered by a stream of basalt, which must have entered the sea, when the white shelly bed was lying at the bottom. It is interesting to trace the changes, produced by the heat of the overlying lava, on the friable mass. For a thickness of several inches it is converted, in some parts, into a firm stone, as hard as the best freestone; and the earthy matter, originally mingled with the calcareous, has been separated into little spots, thus leaving the limestone white and pure. In other parts a highly crystalline marble has been formed, and so perfect are the crystals of carbonate of lime, that they can easily be measured by the reflecting goniometer. The change is even more extraordinary, where the lime has been caught up by the scoriaceous fragments of the lower surface of the stream; for it is there converted into groups of beautifully radiated fibres resembling arragonite. The beds of lava rise in successive gently-sloping plains, towards the interior, whence the deluges of melted stone originally proceeded. Within historical times, no signs of volcanic activity have, I believe, been manifested in any part of St. Jago. This state of quiescence is, probably, owing to the neighbouring island of Fogo being frequently in eruption. Even the form of a crater can but rarely be discovered on the summits of any of the red cindery hills; yet the more recent streams can be distinguished on the coast, forming a line of cliffs of less height, but stretching out in advance of those belonging to an older

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series: the height of the cliff thus affording a rude measure of the age.

During our stay, I observed the habits of some marine animals. A large Aplysia is very common. This sea-slug is about five inches long; and is of a dirty yellowish colour, veined with purple. At the anterior extremity, it has two pair of feelers; the upper ones of which resemble in shape the ears of a quadruped. On each side of the lower surface, or foot, there is a broad membrane, which appears sometimes to act as a ventilator, in causing a current of water to flow over the dorsal branchiæ. It feeds on delicate sea-weeds, which grow among the stones in muddy and shallow water; and I found in its stomach several small pebbles, as in the gizzards of birds. This slug, when disturbed, emits a very fine purplish-red fluid, which stains the water for the space of a foot around. Besides this means of defence, an acrid secretion, which is spread over its body, causes a sharp, stinging sensation, similar to that produced by the Physalia, or Portuguese man-of-war.

I was much interested, on several occasions, by watching the habits of an Octopus or cuttle-fish. Although common in the pools of water left by the retiring tide, these animals were not easily caught. By means of their long arms and suckers, they could drag their bodies into very narrow crevices; and when thus fixed, it required great force to remove them. At other times they darted tail first, with the rapidity of an arrow, from one side of the pool to the other, at the same instant discolouring the water with a dark chestnut-brown ink. These animals also escape detection by a very extraordinary, chameleon-like, power of changing their colour. They appear to vary the tints, according to the nature of the ground over which they pass: when in deep water, their general shade was brownish purple, but when placed on the land, or in shallow water, this dark tint changed into one of a yellowish green. The colour, examined more carefully, was a French gray, with numerous minute spots of bright yellow: the former of these varied in intensity; the latter

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entirely disappeared and appeared again by turns. These changes were effected in such a manner, that clouds, varying in tint between a hyacinth red and a chestnut brown,* were continually passing over the body. Any part being subjected to a slight shock of galvanism, became almost black: a similar effect, but in a less degree, was produced by scratching the skin with a needle. These clouds, or blushes, as they may be called, when examined under a glass, are described as being produced by the alternate expansions and contractions of minute vesicles, containing variously-coloured fluids.†

This cuttle-fish displayed its chameleon-like power both during the act of swimming and whilst remaining stationary at the bottom. I was much amused by the various arts to escape detection used by one individual, which seemed fully aware that I was watching it. Remaining for a time motionless, it would then stealthily advance an inch or two, like a cat after a mouse; sometimes changing its colour: it thus proceeded, till having gained a deeper part, it darted away, leaving a dusky train of ink to hide the hole into which it had crawled.

While looking for marine animals, with my head about two feet above the rocky shore, I was more than once saluted by a jet of water, accompanied by a slight grating noise. At first I did not know what it was, but afterwards I found out that it was the cuttle-fish, which, though concealed in a hole, thus often led me to its discovery. That it possesses the power of ejecting water there is no doubt, and it appeared to me certain that it could, moreover, take good aim by directing the tube or siphon on the under side of its body. From the difficulty which these animals have in carrying their heads, they cannot crawl with ease when placed on the ground. I observed that one which I kept in the cabin was slightly phosphorescent in the dark.

St. Paul's Rocks.—In crossing the Atlantic we hove to,

* So named according to Pat. Symes's nomenclature.

† See Encyclo. of Anat. and Physiol., article *Cephalopoda*.

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during the morning of February 16th, close to the island of St. Paul. This cluster of rocks is situated in 0° 58′ north latitude, and 29° 15′ west longitude. It is 540 miles distant from the coast of America, and 350 from the island of Fernando Noronha. The highest point is only fifty feet above the level of the sea, and the entire circumference is under three-quarters of a mile. This small point rises abruptly out of the depths of the ocean. Its mineralogical constitution is not simple; in some parts, the rock is of a cherty, in others, of a felspathic nature; and in the latter case it contains thin veins of serpentine, mingled with calcareous matter.

The circumstance of these rocks not being of volcanic origin is of interest, because, with very few exceptions, the islands situated in the midst of the great oceans are thus constituted. As the highest pinnacles of the great mountain ranges probably once existed as islands distant from any continent, we are led to expect that they would frequently consist of volcanic rocks. It becomes, therefore, a curious point to speculate on the changes which many of the present islands would undergo, during the lapse of the countless ages, which would be required to elevate them into snow-clad summits. If we take the case of Ascension, or St. Helena, both of which have long existed in an extinct condition, we may feel assured, before so vast a period could elapse, during the whole of which the surface would be exposed to constant wear and tear, that the mere nucleus or core of the island would remain; perhaps, every fragment of cellular rock having been decomposed, a mass of some compact stone, as phonolite or greenstone, would crown our new Chimborazo.

The rocks of St. Paul appear from a distance of a brilliantly white colour. This is partly owing to the dung of a vast multitude of seafowl, and partly to a coating of a glossy white substance, which is intimately united to the surface of the rocks. This, when examined with a lens, is found to consist of numerous exceedingly thin layers, its total thickness being about the tenth of an inch. The surface is smooth

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and glossy, and has a pearly lustre; it is considerably harder than calcareous spar, although it can be scratched by a knife: under the blowpipe it decrepitates, slightly blackens, and emits a fetid odour. It consists of phosphate of lime, mingled with some impurities; and its origin without doubt is due to the action of the rain or spray on the bird's dung. I may here mention, that I found in some hollows in the lava rocks of Ascension considerable masses of the substance called *guano*, which on the west coast of the intertropical parts of South America occurs in great beds, some yards thick, on the islets frequented by seafowl. According to the analysis of Fourcroy and Vauquelin, it consists of the urates, phosphates, and oxalates of lime, ammonia, and potash, together with some other salts, and some fatty and earthy matter. I believe there is no doubt of its being the richest manure which has ever been discovered. At Ascension, close to the *guano*, stalactitic or botryoidal masses of impure phosphate of lime adhered to the basalt. The basal part of these had an earthy texture, but the extremities were smooth and glossy, and sufficiently hard to scratch common glass. These stalactites appeared to have shrunk, perhaps from the removal of some soluble matter, in the act of consolidation; and hence they had an irregular form. Similar stalactitic masses,* though I am not aware that they have ever been noticed, are, I believe, by no means of uncommon occurrence.

We only observed two kinds of birds—the booby and the noddy. The former is a species of gannet, and the latter a tern. Both are of a tame and stupid disposition, and are so unaccustomed to visiters, that I could have killed any number of them with my geological hammer. The booby lays her eggs on the bare rock; but the tern makes a very simple nest

* I may mention that I was shown, at Ascension, some very fine stalactites, composed of sulphate of lime, which had been taken out of a cavern. From their external appearance they would generally be mistaken for the ordinary calcareous kind. It was interesting to observe, in a fractured specimen, the double cleavage intersecting with its even planes, the irregular layers of successive deposition.

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with sea-weed. By the side of many of these nests a small flying-fish was placed; which, I suppose, had been brought by the male bird for its partner. It was amusing to watch how quickly a large and active crab (*Graspus*), which inhabits the crevices of the rock, stole the fish from the side of the nest, as soon as we had disturbed the birds. Not a single plant, not even a lichen, grows on this island; yet it is inhabited by several insects and spiders. The following list completes, I believe, the terrestrial fauna: a species of Feronia and an acarus, which must have come here as parasites on the birds; a small brown moth, belonging to a genus that feeds on feathers; a staphylinus (*Quedius*) and a woodlouse from beneath the dung; and lastly, numerous spiders, which I suppose prey on these small attendants on, and scavengers of the waterfowl. The often-repeated description of the first colonists of the coral islets in the South Sea, is not, probably, quite correct: I fear it destroys the poetry of the story to find, that these little vile insects should thus take possession before the cocoa-nut tree and other noble plants have appeared.

The smallest rock in the tropical seas, by giving a foundation, for the growth of innumerable kinds of sea-weed and compound animals, supports likewise a large number of fish. The sharks and the seamen in the boats maintained a constant struggle, who should secure the greater share of the prey caught by the lines. I have heard, that a rock near the Bermudas, lying many miles out at sea, and covered by a considerable depth of water, was first discovered by the circumstance of fish having been observed in the neighbourhood.

Fernando Noronha, Feb. 20th.—As far as I was enabled to observe, during the few hours we staid at this place, the constitution of the island is volcanic, but probably not of a recent date. The most remarkable feature is a conical hill, about one thousand feet high, the upper part of which is exceedingly steep, and on one side overhangs its base. The rock is phonolite, and is divided into irregular

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columns. From the first impression, on viewing one of these isolated masses, one is inclined to believe, that the whole has been suddenly pushed up in a semi-fluid state. At St. Helena, however, I ascertained that some pinnacles, of a nearly similar figure and constitution, had been formed by the injection of melted rock among the yielding strata; which thus formed the model for these gigantic obelisks. The whole island is covered with wood; but from the dryness of the climate there is no appearance of luxuriance. At some elevation great masses of the columnar rock, shaded by laurels, and ornamented by a tree covered by fine pink flowers like those of a foxglove, but without a single leaf, gave a pleasing effect to the nearer parts of the scenery.

Bahia, or San Salvador. Brazil, Feb. 29th.—The day has past delightfully. Delight itself, however, is a weak term to express the feelings of a naturalist who, for the first time, has been wandering by himself in a Brazilian forest. Among the multitude of striking objects, the general luxuuriance of the vegetation bears away the victory. The elegance of the grasses, the novelty of the parasitical plants, the beauty of the flowers, the glossy green of the foliage, all tend to this end. A most paradoxical mixture of sound and silence pervades the shady parts of the wood. The noise from the insects is so loud, that it may be heard even in a vessel anchored several hundred yards from the shore; yet within the recesses of the forest a universal silence appears to reign. To a person fond of natural history, such a day as this, brings with it a deeper pleasure than he ever can hope again to experience. After wandering about for some hours, I returned to the landing-place; but, before reaching it, I was overtaken by a tropical storm. I tried to find shelter under a tree which was so thick, that it would never have been penetrated by common English rain; but here, in a couple of minutes, a little torrent flowed down the trunk. It is to this violence of the rain we must attribute the verdure at the bottom of the thickest woods: if the showers were like those of a colder clime, the greater part would be

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absorbed or evaporated before it reached the ground. I will not at present attempt to describe the gaudy scenery of this noble bay, because, in our homeward voyage, we called here a second time, and I shall then have occasion to remark on it.

The geology of the surrounding country possesses little interest. Throughout the coast of Brazil, and certainly for a considerable space inland, from the Rio Plata to Cape St. Roque, lat. 5° S., a distance of more than 2000 geographical miles, wherever solid rock occurs, it belongs to a granitic formation. The circumstance of this enormous area being thus constituted of materials, which almost every geologist believes to have been crystallized by the action of heat under pressure, gives rise to many curious reflections. Was this effect produced beneath the depths of a profound ocean? or did a covering of strata formerly extend over it, which has since been removed? Can we believe that any power, acting for a time short of infinity, could have denuded the granite over so many thousand square leagues?

On a point not far from the city, where a rivulet entered the sea, I observed a fact connected with a subject discussed by Humboldt.* At the cataracts of the great rivers Orinoco, Nile, and Congo, the syenitic rocks are coated by a black substance, appearing as if they had been polished with plumbago. The layer is of extreme thinness; and on analysis by Berzelius it was found to consist of the oxides of manganese and iron. In the Orinoco it occurs on the rocks periodically washed by the floods, and in those parts alone, where the stream is rapid; or, as the Indians say, "the rocks are black, where the waters are white." The coating is here of a rich brown instead of a black colour, and seems to be composed of ferrugineous matter alone. Hand specimens fail to give a just idea of these brown, burnished, stones which glitter in the sun's rays.

* Pers. Narr., vol. v., pt. i., p. 18.

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They occur only within the limits of tidal action; and as the rivulet slowly trickles down, the surf must supply the polishing power of the cataracts in the great rivers. In the same manner, the rise and fall of the tide probably answers to the periodical inundations; and thus the same causes are present under apparently very different circumstances. The real origin, however, of these coatings of metallic oxides, which seem as if cemented to the rocks, is not understood; and no reason, I believe, can be assigned for their thickness remaining constant.

One day I was amused by watching the habits of a Diodon, which was caught swimming near the shore. This fish is well known to possess the singular power of distending itself into a nearly spherical form. After having been taken out of water for a short time, and then again immersed in it, a considerable quantity both of water and air was absorbed by the mouth, and perhaps likewise by the branchial apertures. This process is effected by two methods; the air is swallowed, and is then forced into the cavity of the body, its return being prevented by a muscular contraction which is externally visible; but the water, I observed, entered in a stream through the mouth, which was wide open and motionless: this latter action must, therefore, depend on suction. The skin about the abdomen is much looser than that of the back; hence, during the inflation, the lower surface becomes far more distended than the upper; and the fish, in consequence, floats with its back downwards. Cuvier doubts whether the Diodon, in this position, is able to swim; but not only can it thus move forward in a straight line, but likewise it can turn round to either side. This latter movement is effected solely by the aid of the pectoral fins; the tail being collapsed, and not used. From the body being buoyed up with so much air, the branchial openings were out of water; but a stream drawn in by the mouth, constantly flowed through them.

The fish, having remained in this distended state for a

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short time, generally expelled the air and water with considerable force from the branchial apertures and mouth. It could emit, at will, a certain portion of the water; and it appears, therefore, probable, that this fluid is taken in partly for the sake of regulating its specific gravity. This diodon possessed several means of defence. It could give a severe bite, and could eject water from its mouth to some distance, at the same time it made a curious noise by the movement of its jaws. By the inflation of its body, the papillæ, with which the skin is covered, became erect and pointed. But the most curious circumstance was, that it emitted from the skin of its belly, when handled, a most beautiful carmine red and fibrous secretion, which stained ivory and paper in so permanent a manner, that the tint is retained with all its brightness to the present day. I am quite ignorant of the nature and use of this secretion.

March 18th.—We sailed from Bahia. A few days afterwards, when not far distant from the Abrolhos islets, my attention was called to a discoloured appearance in the sea. The whole surface of the water, as it appeared under a weak lens, seemed as if covered by chopped bits of hay, with their ends jagged. One of the larger particles measured .03 of an inch in length, and .009 in breadth. Examined more carefully, each is seen to consist of from twenty to sixty cylindrical filaments, which have perfectly rounded extremities, and are divided at regular intervals by transverse septa, containing a brownish-green flocculent matter. The filaments must be enveloped in some viscid fluid, for the bundles adhered together without actual contact. I do not know to what family these bodies properly belong, but they have a close general resemblance in structure with the confervæ which grow in every ditch. These simple vegetables, thus constituted for floating in the open ocean, must in certain places exist in countless numbers. The ship passed through several bands of them, one of which was about ten yards wide, and, judging from the mud-like colour of the

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water, at least two and a half miles long. In almost every long voyage some account is given of these confervæ. They appear especially common in the sea near Australia. Off Cape Leeuwin, I found some very similar to those above described; they differed chiefly in the bundles being rather smaller, and being composed of fewer filaments. Captain Cook, in his third voyage, remarks, that the sailors gave to this appearance the name of sea-sawdust.

I may here mention that during two days preceding our arrival at the Keeling Islands in the Indian Ocean, I saw in many parts masses of flocculent matter, of a brownish-green colour, floating in the sea. They varied in size, from half to to three or four inches square; and were quite irregular in figure. In an opake vessel they could barely be distinguished, but in a glass one they were clearly visible. Under the microscope the flocculent matter was seen to consist of two kinds of confervæ, between which I am quite ignorant whether there exists any connexion. Minute cylindrical bodies, conical at each extremity, are involved in vast numbers, in a mass of fine threads. These threads have a diameter of about $\frac{2}{3000}$ of an inch; they possess an internal lining, and are divided at irregular and very wide intervals by transverse septa. Their length is so great, that I could never with certainty ascertain the form of the uninjured extremity; they are all curvilinear, and resemble in mass a handful of hair, coiled up and squeezed together. In the midst of these threads, and probably connected by some viscid fluid, the other kind, or the cylindrical transparent bodies, float in great numbers. These have their two extremities terminated by cones, produced into the finest points: their diameter is tolerably constant between .006 and .008 of an inch; but their length varies considerably from .04 to .06, and even sometimes to .08. Near one extremity of the cylindrical part, a green septum, formed of granular matter, and thickest in the middle, may generally be seen. This, I believe, is the bottom of a most delicate, colourless sack, composed of a pulpy substance, which lines the exterior case, but does

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not extend within the extreme conical points. In some, small but perfect spheres of brownish granular matter supplied the place of the septa; and I observed the curious process by which they were produced. The pulpy matter of the internal coating suddenly grouped itself into lines, some of which assumed a form radiating from a common centre; it then continued, with an irregular and rapid movement, to contract itself, so that, in the course of a second, the whole was united into a perfect little sphere, which occupied the position of the septum at one end of the now quite hollow case. The appearance was as if an elastic membrane, for instance a thin Indian-rubber ball, had been distended with air, and then burst, in which case the edges would instantly shrink up and contract towards a point. The formation of the granular sphere was hastened by any accidental injury. I may add, that frequently a pair of these bodies were attached to each other, as represented in the accompanying rude drawing, cone beside

cone, at that end where the septum occurs. When floating uninjured in the sea, the formation of the spherical gemmules perhaps only takes place, when two of the plants (or rather animals, according to Bory St. Vincent) thus become attached, and married to each other. Nevertheless, I certainly witnessed this curious process in several individuals, when separate, and where there was no apparent cause of disturbance. In any case it does not seem probable, from the fixed structure of the septum, that the whole of the granular matter is transferred from one to the other body, as with the true Conjugatæ.

I will here add a few other observations connected with the discoloration of the sea from organic causes. On the coast of Chile, a few leagues north of Concepcion, the Beagle one day passed through great bands of muddy water; and

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again, a degree south of Valparaiso, the same appearance was still more extensive. Although we were nearly fifty miles from the coast, I at first attributed this circumstance to real streams of muddy water brought down by the river Maypo. Mr. Sulivan, however, having drawn up some in a glass, thought he distinguished, by the aid of a lens, moving points. The water was slightly stained as if by red dust; and after leaving it for some time quiet, a cloud collected at the bottom. With a lens, of one-fourth of an inch focal distance, small hyaline points could be seen darting about with great rapidity, and frequently exploding. Examined with a much higher power, their shape was found to be oval, and contracted by a ring round the middle, from which line curved little setæ proceeded on all sides; and these were the organs of motion. One end of the body was narrower and more pointed than the other. According to the arrangement of Bory St. Vincent, they are animalcula, belonging to the family of Trichodes: it was, however, very difficult to examine them with care, for almost the instant motion ceased, even while crossing the field of vision, their bodies burst. Sometimes both ends burst at once, sometimes only one, and a quantity of coarse brownish granular matter was ejected, which cohered very slightly. The ring with the setæ sometimes retained its irritability for a little while after the contents of the body had been emptied, and continued a riggling, uneven motion. The animal an instant before bursting expanded to half again its natural size; and the explosion took place about fifteen seconds after the rapid progressive motion had ceased: in a few cases it was preceded for a short interval by a rotatory movement on the longer axis. About two minutes after any number were isolated in a drop of water, they thus perished. The animals move with the narrow apex forwards, by the aid of their vibratory ciliæ, and generally by rapid starts. They are exceedingly minute, and quite invisible to the naked eye, only covering a space equal to the square of the thousandth of an inch. Their numbers were infinite; for the smallest

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drop of water which I could remove contained very many. In one day we passed through two spaces of water thus stained, one of which alone must have extended over several square miles. What incalculable numbers of these microscopical animals! The colour of the water, as seen at some distance, was like that of a river which has flowed through a red clay district; but under the shade of the vessel's side, it was quite as dark as chocolate. The line where the red and blue water joined was distinctly defined. The weather for some days previously had been calm, and the ocean abounded, to an unusual degree, with living creatures. In Ulloa's voyage an account is given of crossing, in nearly the same latitude, some discoloured water, which was mistaken for a shoal: no soundings were obtained, and I have no doubt, from the description, that this little animalcule was the cause of the alarm.*

In the sea around Tierra del Fuego, and at no great distance from the land, I have seen narrow lines of water of a bright red colour, from the number of crustacea, which somewhat resemble in form large prawns. The sealers call them whale-food. Whether whales feed on them I do not know; but terns, cormorants, and immense herds of great unwieldly seals, on some parts of the coast, derive their chief sustenance from these swimming crabs. Seamen invariably attribute the discoloration of the water to spawn; but I found this to be the case only on one occasion. At the distance of several leagues from the Archipelago of the Galapagos, the ship sailed through three strips of a dark yel-

* M. Lesson (Voyage de la Coquille, vol. i., p. 255) mentions red water off Lima, apparently produced by the same cause. Peron, the distinguished naturalist, in the "Voyage Aux Terres Australes," gives no less than twelve references to voyagers who have alluded to the discoloured waters of the sea (vol. ii., p. 239). It was his intention to have written an essay on the subject. To the references given by Peron may be added, Humboldt's Pers. Narr., vol. vi., p. 804; Flinder's Voyage, vol. i., p. 92; Labillardiere, vol. i., p. 287; Ulloa's Voyage; Voyage of the Astrolabe and of the Coquille; Captain King's Survey of Australia, &c.

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lowish, or mud-like, water; these strips were some miles long, but only a few yards wide, and they were separated from the surrounding surface by a sinuous yet distinct margin. The colour was caused by little gelatinous balls, about the fifth of an inch in diameter, in which numerous minute spherical ovules were embedded: they were of two distinct kinds, one being of a reddish colour and of a different shape from the other. I cannot form a conjecture as to what two kinds of animals these belonged. Captain Colnett remarks, that this appearance is very common among the Galapagos Islands, and that the direction of the bands indicates that of the currents; in the described case, however, the line was caused by the wind. The only other appearance which I have to notice, is a thin oily coat on the surface which displays iridescent colours. I saw a considerable tract of the ocean thus covered on the coast of Brazil; the seamen attributed it to the putrefying carcass of some whale, which probably was floating at no great distance. I do not here mention the minute gelatinous particles which are frequently dispersed throughout the water, for they are not sufficiently abundant to create any change of colour.

There are two circumstances in the above accounts which appear very remarkable: first, how do the various bodies which form the bands with defined edges keep together? In the case of the prawn-like crabs, their movements were as coinstantaneous as in a regiment of soldiers; but this cannot happen from any thing like voluntary action with the ovules, or the confervæ, nor is it probable among the infusoria. Secondly, what causes the length and narrowness of the bands? The appearance so much resembles that which may be seen in every torrent, where the stream uncoils into long streaks, the froth collected in the eddies, that I must attribute the effect to a similar action either of the currents of the air, or sea. Under this supposition we must believe that the various organized bodies are produced in certain favourable places, and are thence removed by the set of either wind or water. I confess,

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however, there is a very great difficulty in imagining any one spot to be the birthplace of the millions of millions of animalcula and confervæ: for whence come the germs at such points?—the parent bodies having been distributed by the winds and waves over the immense ocean. But on no other hypothesis can I understand their linear grouping. I may add that Scoresby remarks, that green water abounding with pelagic animals, is invariably found in a certain part of the Arctic Sea.

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CHAPTER II.

Rio de Janeiro—Excursion north of Cape Frio—Great evaporation—Slavery—Botofogo Bay—Terrestrial Planariæ—Clouds on Corcovado—Heavy rain—Musical Hyla—Lampyris and its larvæ—Elater, springing powers—Blue haze—Noise of butterfly—Entomology—Ants—Wasp-killing spider—Parasitical spider—Artifices of Epeira—Gregarious spider—Spider with imperfect web.

RIO DE JANEIRO.

April 4th to July 5th, 1832.—A few days after our arrival I became acquainted with an Englishman who was going to visit his estate situated, rather more than a hundred miles from the capital, to the northward of Cape Frio. As I was quite unused to travelling, I gladly accepted his kind offer of allowing me to accompany him.

April 8th.—Our party amounted to seven. The first stage was very interesting. The day was powerfully hot, and as we passed through the woods, every thing was motionless, excepting the large and brilliant butterflies, which lazily fluttered about. The view seen when crossing the hills behind Praia Grande was most beautiful; the colours were intense, and the prevailing tint a dark blue; the sky and the calm waters of the bay vied with each other in splendour. After passing through some cultivated country, we entered a forest, which in the grandeur of all its parts could not be exceeded. We arrived by midday at Ithacaia; this small village is situated on a plain, and round the central house are the huts of the negroes. These, from their regular form and position, reminded me of the drawings of the Hottentot habitations in Southern Africa. As the moon rose early, we determined to start the same evening for our sleeping-place at the Lagoa Marica. As it was growing

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dark we passed under one of the massive, bare, and steep hills of granite which are so common in this country. This spot is notorious from having been, for a long time, the residence of some runaway slaves, who, by cultivating a little ground near the top, contrived to eke out a subsistence. At length they were discovered, and a party of soldiers being sent, the whole were seized with the exception of one old woman, who sooner than again be led into slavery, dashed herself to pieces from the summit of the mountain. In a Roman matron this would have been called the noble love of freedom: in a poor negress it is mere brutal obstinacy. We continued riding for some hours. For the few last miles the road was intricate, and it passed through a desert waste of marshes and lagoons. The scene by the dimmed light of the moon was most desolate. A few fireflies flitted by us; and the solitary snipe, as it rose, uttered its plaintive cry. The distant and sullen roar of the sea scarcely broke the stillness of the night.

April 9th.—We left our miserable sleeping-place before sunrise. The road passed through a narrow sandy plain, lying between the sea and the interior salt lagoons. The number of beautiful fishing birds, such as egrets and cranes, and the succulent plants assuming most fantastical forms, gave to the scene an interest which it would not otherwise have possessed. The few stunted trees were loaded with parasitical plants, among which the beauty and delicious fragrance of some of the orchideæ were most to be admired. As the sun rose, the day became extremely hot, and the reflection of the light and heat from the white sand was very distressing. We dined at Mandetiba; the thermometer in the shade being 84°. The beautiful view of the distant wooded hills, reflected in the perfectly calm water of an extensive lagoon, quite refreshed us. As the vênda* here was a very good one, and I have the pleasant, but rare remembrance, of an excellent dinner, I will be grateful and presently describe

* Vênda, the Portuguese name for an inn.

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it, as the type of its class. These houses are often large, and are built of thick upright posts, with boughs interwoven, and afterwards plastered. They seldom have floors, and never glazed windows; but are generally pretty well roofed. Universally the front part is open, forming a kind of verandah, in which tables and benches are placed. The bed-rooms join on each side, and here the passenger may sleep as comfortably as he can, on a wooden platform, covered by a thin straw mat. The vênda stands in a courtyard, where the horses are fed. On first arriving, it was our custom to unsaddle the horses and give them their Indian corn; then, with a low bow, to ask the senhôr to do us the favour to give us something to eat. "Any thing you choose, sir," was his usual answer. For the few first times, vainly I thanked Providence for having guided us to so good a man. The conversation proceeding, the case universally became deplorable. "Any fish can you do us the favour of giving?"—"Oh! no, sir."—"Any soup?"—"No, sir."—"Any bread?"—"Oh! no, sir."—"Any dried meat?"—"Oh! no, sir." If we were lucky, by waiting a couple of hours, we obtained fowls, rice, and farinha. It not unfrequently happened, that we were obliged to kill, with stones, the poultry for our own supper. When thoroughly exhausted by fatigue and hunger, we timorously hinted that we should be glad of our meal, the pompous, and (though true) most unsatisfactory answer was, "It will be ready when it is ready." If we had dared to remonstrate any further, we should have been told to proceed on our journey, as being too impertinent. The hosts are most ungracious and disagreeable in their manners; their houses and their persons are often filthily dirty; the want of the accommodation of forks, knives, and spoons is common; and I am sure no cottage or hovel in England could be found in a state so utterly destitute of every comfort. At Campos Novos, however, we fared sumptuously; having rice and fowls, biscuit, wine, and spirits, for dinner; coffee in the evening, and fish with coffee for breakfast. All this, with good food for the

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horses, only cost 2*s.* 6*d.* per head. Yet the host of this vênda, being asked if he knew any thing of a whip which one of the party had lost, gruffly answered, "How should I know? why did you not take care of it?—I suppose the dogs have eat it."

Leaving Mandetiba, we continued to pass through an intricate wilderness of lakes; in some of which were fresh, in others salt water shells. Of the former kind I found a Limnæa in great numbers in a lake, into which, the inhabitants assured me, the sea annually, and sometimes oftener, entered, and made the water quite salt. I have no doubt many interesting facts, in relation to marine and fresh water animals, might be observed in this chain of lagoons, which skirt the coast of Brazil. M. Gay* has stated that he found in the neighbourhood of Rio, shells of the marine genera solen and mytilus, and fresh water ampullariæ, living together in brackish water. I also frequently observed in the lagoon near the Botanic Garden, where the water is only a little less salt than in the sea, a species of hydrophilus, very similar to a species common in the ditches of England: in the same lake the only shell belonged to a genus generally found in estuaries.

Leaving the coast for a time, we again entered the forest. The trees were very lofty, and remarkable, compared to those of Europe, from the whiteness of their trunks. I see by my note-book, "wonderful and beautiful, flowering parasites," invariably struck me as the most novel object in these grand scenes. Travelling onwards we passed through tracts of pasturage, much injured by the enormous conical ants' nests, which were nearly twelve feet high. They gave to the plain exactly the appearance of the mud volcanoes at Jorullo, as figured by Humboldt. We arrived at Engenhodo after it was dark, having been ten hours on horseback. I never ceased, during the whole journey, to be surprised at the amount of labour which the horses were capable of enduring;

* Annales des Sciences Naturelles for 1833.

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they appeared also to recover from any injury much sooner than those of our English breed. The Vampire bat is often the cause of much trouble, by biting the horses on their withers. The injury is generally not so much owing to the loss of blood, as to the inflammation which the pressure of the saddle afterwards produces. The whole circumstance has lately been doubted in England; I was therefore fortunate in being present when one* was actually caught on a horse's back. We were bivouacking late one evening near Coquimbo, in Chile, when my servant, noticing that one of the horses was very restive, went to see what was the matter, and fancying he could distinguish something, suddenly put his hand on the beast's withers, and secured the vampire. In the morning, the spot, where the bite had been inflicted, was easily distinguished from being slightly swollen and bloody. The third day afterwards we rode the horse, without any ill effects.

April 13th.—After three days' travelling we arrived at Socêgo, the estate of Senhôr Manuel Figuireda, a relation of one of our party. The house was simple, and, though like a barn in form, was well suited to the climate. In the sitting-room gilded chairs and sofas were oddly contrasted with the whitewashed walls, thatched roof, and windows without glass. The house, together with the granaries, the stables, and workshops for the blacks, who had been taught various trades, formed a rude kind of quadrangle; in the centre of which a large pile of coffee was drying. These buildings stand on a little hill, overlooking the cultivated ground, and surrounded on every side by a wall of dark green luxuriant forest. The chief produce of this part of the country is coffee. Each tree is supposed to yield annually, on an average, two pounds; but some give as much as eight. Mandioca or cassada is likewise cultivated in great quantity. Every part of this plant is useful: the leaves and stalks are

* This bat belongs to the genus Edostoma of D'Orbigny, but is a new species.

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eaten by the horses, and the roots are ground into a pulp, which, when pressed dry and baked, forms the farinha, the principal article of sustenance in the Brazils. It is a curious, though well-known fact, that the expressed juice of this most nutritious plant is highly poisonous. A few years ago a cow died at this Fazênda, in consequence of having drunk some of it. Senhôr Figuireda told me that he had planted, the year before, one bag of feijaô or beans, and three of rice; the former of which produced eighty, and the latter three hundred and twenty fold. The pasturage supports a fine stock of cattle, and the woods are so full of game, that a deer had been killed on each of the three previous days. This profusion of food showed itself at dinner, where, if the tables did not groan, the guests surely did: for each person is expected to eat of every dish. One day, having, as I thought, nicely calculated so that nothing should go away untasted, to my utter dismay a roast turkey and a pig appeared in all their substantial reality. During the meals, it was the employment of a man to drive out of the room sundry old hounds, and dozens of little black children, which crawled in together, at every opportunity. As long as the idea of slavery could be banished, there was something exceedingly fascinating in this simple and patriarchal style of living: it was such a perfect retirement and independence of the rest of the world. As soon as any stranger is seen arriving, a large bell is set tolling, and generally some small cannon are fired. The event is thus announced to the rocks and woods, but to nothing else. One morning I walked out an hour before daylight to admire the solemn stillness of the scene; at last, the silence was broken by the morning hymn, raised on high by the whole body of the blacks; and in this manner, their daily work is generally begun. On such fazendas as these, I have no doubt the slaves pass happy and contented lives. On Saturday and Sunday they work for themselves, and in this fertile climate the labour of two days is sufficient to support a man and his family for the whole week.

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April 14th.—Leaving Socêgo, we rode to another estate on the Rio Macâe, which was the last patch of cultivated ground in that direction. The estate was two and a half miles long, and the owner had forgotten how many broad. Only a very small piece had been cleared, yet almost every acre was capable of yielding all the various rich productions of a tropical land. Considering the enormous area of Brazil, the proportion of cultivated ground can scarcely be considered as any thing, compared to that which is left in the state of nature: at some future age, how vast a population it will support! During the second day's journey we found the road so shut up, that it was necessary that a man should go ahead with a sword to cut away the creepers. The forest abounded with beautiful objects; among which the tree ferns, though not large, were, from their bright green foliage, and the elegant curvature of their fronds, most worthy of admiration. In the evening it rained very heavily, and although the thermometer stood at 65°, I felt very cold. As soon as the rain ceased, it was curious to observe the extraordinary evaporation which commenced over the whole extent of the forest. At the height of a hundred feet the hills were buried in a dense white vapour, which rose like columns of smoke from the most thickly-wooded parts, and especially from the valleys. I observed this phenomenon on several occasions: I suppose it is owing to the large surface of foliage, previously heated by the sun's rays.

While staying at this estate, I was very nearly being an eyewitness to one of those atrocious acts, which can only take place in a slave country. Owing to a quarrel and a lawsuit, the owner was on the point of taking all the women and children from the men, and selling them separately at the public auction at Rio. Interest, and not any feeling of compassion, prevented this act. Indeed, I do not believe the inhumanity of separating thirty families, who had lived together for many years, even occurred to the person. Yet I will pledge myself, that in humanity and good feeling, he

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was superior to the common run of men. It may be said there exists no limit to the blindness of interest and selfish habit. I may mention one very trifling anecdote, which at the time struck me more forcibly than any story of cruelty. I was crossing a ferry with a negro, who was uncommonly stupid. In endeavouring to make him understand, I talked loud, and made signs, in doing which I passed my hand near his face. He, I suppose, thought I was in a passion, and was going to strike him; for instantly, with a frightened look and half-shut eyes, he dropped his hands. I shall never forget my feelings of surprise, disgust, and shame, at seeing a great powerful man afraid even to ward off a blow, directed, as he thought, at his face. This man had been trained to a degradation lower than the slavery of the most helpless animal.

April 18th.—In returning we spent two days at Socêgo, and I employed them in collecting insects in the forest. The greater number of trees, although so lofty, are not more than three or four feet in circumference. There are, of course, a few of much greater dimension. Senhor Manuel, was then making a canoe seventy feet in length from a solid trunk, which had originally been 110 feet long, and of great thickness. The contrast of palm-trees, growing amidst the common branching kinds, never fails to give the scene an intertropical character. Here the woods were ornamented by the Cabbage Palm—one of the most beautiful of its family. With a stem so narrow that it might be clasped with the two hands, it waves its elegant head at the height of forty or fifty feet above the ground. The woody creepers, themselves covered by other creepers, were of great thickness: some which I measured were two feet in circumference. Many of the older trees presented a very curious appearance from the tresses of a liana depending from their boughs, and resembling bundles of hay. If the eye was turned from the world of foliage above, to the ground beneath, it was attracted by the extreme elegance of the leaves of the ferns

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and mimosæ. The latter, in some parts, covered the surface with a brushwood only a few inches high. In walking across these thick beds, a broad track was marked by the change of shade, produced by the drooping of their sensitive petioles. It is easy to specify the individual objects of admiration in these grand scenes; but it is not possible to give an adequate idea of the higher feelings of wonder, astonishment, and devotion, which fill and elevate the mind.

April 19th.—Leaving Socêgo, during the two first days, we retraced our steps. It was very wearisome work, as the road generally ran across a glaring hot sandy plain, not far from the coast. I noticed that each time the horse put its foot on the fine siliceous sand, a gentle chirping noise was produced. On the third day we took a different line, and passed through the gay little village of Madre de Deos. This is one of the principal lines of road in Brazil; yet it was in so bad a state, that no wheel vehicle, excepting the clumsy bullock-waggon, could pass along. In our whole journey we did not cross a single bridge built of stone; and those made of logs of wood were frequently so much out of repair, that it was necessary to go on one side to avoid them. All distances are inaccurately known. The road is often marked by crosses, in the place of milestones, to signify where human blood has been spilled. On the evening of the 23d we arrived at Rio, having finished our pleasant little excursion.

During the remainder of my stay at Rio, I resided in a cottage at Botofogo Bay. It was impossible to wish for any thing more delightful than thus to spend some weeks in so magnificent a country. In England any person fond of natural history enjoys in his walks a great advantage, by always having something to attract his attention; but in these fertile climates, teeming with life, the attractions are so numerous, that he is scarcely able to walk at all.

The few observations which I was enabled to make were almost exclusively confined to the invertebrate animals. The

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existence of a division of the genus Planaria, which inhabits the dry land, interested me much. These animals are of so simple a structure, that Cuvier has arranged them with the intestinal worms, though never found within the bodies of other animals. Numerous species inhabit both salt and fresh water; but those to which I allude were found beneath logs of rotten wood, even in the drier parts of the forest. In general form they resemble little slugs, but are very much narrower in proportion. I met with one specimen no less than five inches long. The lower surface, by which they crawl, is flat, the upper being convex: in this latter respect the terrestrial species all differ from the depressed forms of the aquatic. Their structure is very simple. Near the middle of the under surface, there are two small transverse slits, from the anterior one of which a funnel-shaped organ, or cup, can be protruded. This seems to act as the mouth. It is soft, highly irritable, and capable of various movements; when drawn within the body it is generally folded up like the bud of a plant. From the central position of the orifice, the animal has its mouth in the middle of what would commonly be called its stomach! For some time after the rest of the animal has become dead from the effects of salt water, or other cause, this organ still retains its vitality. The body is soft and parenchymatous; in the central part a transparent space, with lateral ramifications, appears to act as a system of circulation. Minute, black, eye-like specks are scattered round the margin of the crawling surface, and more abundantly close to the anterior extremity, which is constantly used as a feeler. In a marine species, I extracted from the central parts of the body vast numbers of little spherical eggs; they were .006 of an inch in diameter, and contained a central opake mass or yolk.

The terrestrial Planariæ, of which I have found no less than eight species, occur from within the tropic to lat. 47° south, and are common to South America, New Zealand, Van Diemen's Land, and Mauritius. Some of the species

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are longitudinally striped with several bands of gay colours. At first sight there is a remarkable false analogy between these animals and snails, although so widely separated from each other in all essential points of organization. I suppose these Planariæ feed on rotten wood, for they are always found crawling on the under surface of old decayed trees; and some small specimens being kept with no other food, rapidly increased in size. Although gaily-coloured little animals, they dislike, and are very sensitive to the light. Some specimens which I obtained at Van Diemen's Land, I kept alive for nearly two months. Having cut one of them transversely into two nearly equal parts, in the course of a fortnight both had the shape of perfect animals. I had, however, so divided the body, that one of the halves contained both the inferior orifices, and the other, in consequence, none. In the course of twenty-five days from the operation, the more perfect half could not have been distinguished from any other specimen. The other had increased much in size; and towards its posterior end, a clear space was formed in the parenchymatous mass, in which a rudimentary cup-shaped organ could clearly be distinguished; on the under surface, however, no corresponding slit was yet open. If the increased heat of the weather, as we approached the equator, had not destroyed all the individuals, there can be no doubt that this last step would have completed its structure. Although so well-known an experiment, it was interesting to watch the gradual production of every essential organ, out of the simple extremity of another animal. It is extremely difficult to preserve these Planariæ; immediately the cessation of life allows the ordinary laws of change to act, their entire bodies become soft and fluid, with a rapidity which I have never seen equalled. A method of preservation that I found answered pretty well, was to dry the whole animal rapidly on a thin plate of mica, for the body thus becomes transparent, and allows the internal structure to be seen.

I first visited the forest in which these Planariæ were

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found, in company with an old Portuguese priest who took me out to hunt with him. The sport consisted in turning into the cover a few dogs, and then patiently waiting to fire at any animal which might appear. We were accompanied by the son of a neighbouring farmer—a good specimen of a wild Brazilian youth. He was dressed in a tattered old shirt and trousers, and had his head uncovered: he carried an old-fashioned gun and a large knife. The habit of carrying the knife is universal; and in traversing a thick wood it is almost necessary, on account of the creeping plants. The frequent occurrence of murder may be partly attributed to this habit. The Brazilians are so dexterous with the knife, that they can throw it to some distance with precision, and with sufficient force to cause a fatal wound. I have seen a number of little boys practising this art as a game of play, and from their skill in hitting an upright stick, they promised well for more earnest attempts. My companion, the day before, had shot two large bearded monkeys. These animals have prehensile tails, the extremity of which, even after death, can support the whole weight of the body. One of them thus remained fast to a branch, and it was necessary to cut down a large tree to procure it. This was soon effected, and down came tree and monkey with an awful crash. Our day's sport, besides the monkey, was confined to sundry small green parrots and a few toucans. I profited, however, by my acquaintance with the Portuguese padre, for on another occasion he gave me a fine specimen of the Yaguarundi cat.

Every one has heard of the beauty of the scenery near Botofogo. The house in which I lived was seated close beneath the well-known mountain of the Corcovado. It has been remarked, with much truth, that abruptly conical hills are characteristic of the formation which Humboldt designates as gneiss-granite. Nothing can be more striking than the effect of these huge rounded masses of naked rock rising out of the most luxuriant vegetation.

I was often interested by watching the clouds, which,

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rolling in from seaward, formed a bank just beneath the highest point of the Corcovado. This mountain, like most others, when thus partly veiled, appeared to rise to a far prouder elevation than its real height of 2300 feet. Mr. Daniell has observed, in his meteorological essays, that a cloud sometimes appears fixed on a mountain summit, while the wind continues to blow over it. The same phenomenon here presented a slightly different appearance. In this case the cloud was clearly seen to curl over, and rapidly pass by the summit, and yet was neither diminished nor increased in size. The sun was setting, and a gentle southerly breeze, striking against the southern side of the rock, mingled its current with the colder air above; and the vapour was thus condensed: but as the light wreaths of cloud passed over the ridge, and came within the influence of the warmer atmosphere of the northern sloping bank, they were immediately redissolved.

The climate, during the months of May and June, or the beginning of winter, was delightful. The mean temperature, from observations taken at nine o'clock, both morning and evening, was only 72°. It often rained heavily, but the drying southerly winds soon again rendered the walks pleasant. One morning, in the course of six hours, 1.6 inches of rain fell. As this storm passed over the forests, which surround the Corcovado, the sound produced by the drops pattering on the countless multitude of leaves, was very remarkable; it could be heard at the distance of a quarter of a mile, and was like the rushing of a great body of water. After the hotter days, it was delicious to sit quietly in the garden and watch the evening pass into night. Nature, in these climes, chooses her vocalists from more humble performers than in Europe. A small frog, of the genus Hyla,* sits on a blade of glass about an inch above the surface of the

* I had some difficulty in catching a specimen of this frog. The genus Hyla has its toes terminated by small suckers; and I found this animal could crawl up a pane of glass, when placed absolutely perpendicular.

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water, and sends forth a pleasing chirp. When several were together they sung in harmony on different notes. Various cicadæ and crickets, at the same time, kept up a ceaseless shrill cry, but which, softened by the distance, was not unpleasant. Every evening after dark this great concert commenced; and often have I sat listening to it, until my attention has been drawn away by some curious passing insect.

At these times the fireflies are seen* flitting about from hedge to hedge. All that I caught belonged to the family of Lampyridæ, or glowworms, and the greater number were *Lampyris occidentalis*. I found that this insect emitted the most brilliant flashes when irritated: in the intervals the abdominal rings were obscured. The flash was almost coinstantaneous in the two rings, but it was first just perceptible in the anterior one. The shining matter was fluid and very adhesive: little spots, where the skin had been torn, continued bright with a slight scintillation, whilst the uninjured parts were obscured. When the insect was decapitated the rings remained uninterruptedly bright, but not so brilliant as before: local irritation with a needle always increased the vividness of the light. The rings in one instance retained their luminous property nearly twenty-four hours after the death of the insect. From these facts it would appear probable, that the animal has only the power of concealing or extinguishing the light for short intervals, and that at other times the display is involuntary. On the muddy and wet gravel-walks I found the larvæ of this lampyris in great numbers: they resembled in general form the female of the English glowworm. These larvæ possessed but feeble luminous powers; very differently from their parents, on the slightest touch they feigned death, and ceased to shine; nor did irritation excite any fresh display. I kept several of them alive for

* On a dark night the light could be seen at about two hundred paces distant. It is remarkable that in all the glowworms, shining elaters, and various marine animals, which I have observed (such as the crustacea, medusæ, nereidæ, a coralline of the genus Clytia, and Pyrosoma), the light has been of a well-marked green colour.

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some time: their tails are very singular organs, for they act, by a well-fitted contrivance, as suckers, or organs of attachment, and likewise as reservoirs for saliva, or some such fluid. I repeatedly fed them on raw meat; and I invariably observed, that every now and then the extremity of the tail was applied to the mouth, and a drop of fluid exuded on the meat, which was then in the act of being consumed. The tail, notwithstanding so much practice, does not seem to be able to find its way to the mouth; at least the neck was always touched first, and apparently as a guide.

When we were at Bahia, an elater (*Pyrophorus luminosus*, Illig.) seemed the most common luminous insect. The light in this case was also rendered more brilliant by irritation. I amused myself one day by observing the springing powers of this insect, which have not,* as it appears to me, been properly described. The elater, when placed on its back and preparing to spring, moved its head and thorax backwards, so that the pectoral spine was drawn out, and rested on the edge of its sheath. The same backward movement being continued, the spine, by the full action of the muscles, was bent like a spring; and the insect at this moment rested on the extremity of its head and elytra. The effort being suddenly relaxed, the head and thorax flew up, and, in consequence, the base of the elytra struck the supporting surface with such force, that the insect by the reaction was jerked upwards to the height of one or two inches. The projecting points of the thorax, and the sheath of the spine, served to steady the whole body during the spring. In the descriptions which I have read, sufficient stress does not appear to have been laid on the elasticity of the spine: so sudden a spring could not be the result of simple muscular contraction, without the aid of some mechanical contrivance.

On several occasions I enjoyed some short but most pleasant excursions in the neighbouring country. One day

* Kirby's Entomology, vol. ii., p. 317.

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I went to the Botanic Garden, where many plants, well known for their great utility, might be seen growing. The leaves of the camphor, pepper, cinnamon, and clove trees were delightfully aromatick; and the bread fruit, the jack, and the mango, vied with each other in the magnificence of their foliage. The landscape in the neighbourhood of Bahia almost takes its character from the two latter trees. Before seeing them, I had no idea that any trees could cast so black a shade on the ground. Both of them bear to the ever green vegetation of these climates, the same kind of relation which laurels and hollies in England do to the lighter green of the deciduous trees. It may be observed, that the houses within the tropics are surrounded by the most beautiful forms of vegetation, because many of them are at the same time most useful to man. Who can doubt that these qualities are united in the banana, the cocoa-nut, the many kinds of palm, the orange, and the bread-fruit tree?

During this day I was particularly struck with a remark of Humboldt's, who often alludes to "the thin vapour which, without changing the transparency of the air, renders its tints more harmonious, softens its effects," &c. This is an appearance which I have never observed in the temperate zones. The atmosphere, seen through a short space of half or three-quarters of a mile, was perfectly lucid, but at a greater distance all colours were blended into a most beautiful haze, of a pale French gray, mingled with a little blue. The condition of the atmosphere between the morning and about noon, when the effect was most evident, had undergone little change, excepting in its dryness. In the interval, the difference between the dew point and temperature had increased from 7°.5 to 17°.

On another occasion I started early and walked to the Gavia, or topsail mountain. The air was delightfully cool and fragrant; and the drops of dew still glittered on the leaves of the large liliaceous plants, which shaded the streamlets of clear water. Sitting down on a block of granite, it was delightful to watch the various insects and birds as they

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flew past. The humming-birds seem particularly fond of such shady retired spots. Whenever I saw these little creatures buzzing round a flower, with their wings vibrating so rapidly as to be scarcely visible, I was reminded of the sphinx moths: their movements and habits are indeed, in many respects, very similar.

Following a pathway I entered a noble forest, and from a height of five or six hundred feet, one of those splendid views was presented, which are so common on every side of Rio. At this elevation the landscape has attained its most brilliant tint; and every form, every shade, so completely surpasses in magnificence all that the European has ever beheld in his own country, that he knows not how to express his feelings. The general effect frequently recalled to my mind the gayest scenery of the Opera-house or the great theatres. I never returned from these excursions empty-handed. This day I found a specimen of a curious fungus, called Hymenophallus. Most people know the English Phallus, which in autumn taints the air with its odious smell: this, however, as the entomologist is aware, is to some of our beetles a delightful fragrance. So was it here; for a Strongylus, attracted by the odour, alighted on the fungus as I carried it in my hand. We here see in two distant countries a similar relation between plants and insects of the same families, though the species of both are different. When man is the agent in introducing into a country a new species, this relation is often broken: as one instance of this I may mention, that the leaves of the cabbages and lettuces, which in England afford food to such a multitude of slugs and caterpillars, in the gardens near Rio are untouched.

During our stay in Brazil I made a large collection of insects. A few general observations on the comparative importance of the different orders, may be interesting to the English entomologist. The large and brilliantly-coloured Lepidoptera bespeak the zone they inhabit, far more plainly than any other race of animals. I allude only to the butterflies; for the moths, contrary to what might have been expected from the rankness of the vegetation, certainly appeared in much

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fewer numbers than in our own temperate regions. I was much surprised at the habits of *Papilio feronia*. This butterfly is not uncommon, and generally frequents the orange-groves. Although a high flier, yet it very frequently alights on the trunks of trees. On these occasions its head is invariably placed downwards; and its wings are expanded in a horizontal plane, instead of being folded vertically, as is commonly the case. This is the only butterfly which I have ever seen that uses its legs for running. Not being aware of this fact, the insect, more than once, as I cautiously approached with my forceps, shuffled on one side just as the instrument was on the point of closing, and thus escaped. But a far more singular fact, is the power which this species possesses of making a noise.* Several times when a pair, probably male and female, were chasing each other in an irregular course, they passed within a few yards of me; and I distinctly heard a clicking noise, similar to that produced by a toothed wheel passing under a spring catch.† The noise was continued at short intervals, and could be distinguished at about twenty yards distance. I cannot form a conjecture how it is produced; but I am certain there is no error in the observation.

I was disappointed in the general aspect of the Coleoptera. The number of minute and obscurely-coloured beetles is exceedingly great.* The cabinets of Europe can, as yet, boast

* I find in Langsdorff's travels (in the years 1803-7, p. 74), it is said, that in the island of St. Catherine's, on the coast of Brazil, a butterfly called Februa Hoffmanseggi, makes a noise, when flying away, like a rattle.

† Mr. Waterhouse has had the kindness to examine this butterfly, but cannot discover any mechanism by which the noise is produced.

* I may mention, as a common instance of one day's (June 23d) collecting, when I was not attending particularly to the Coleoptera, that I caught sixty-eight species of that order. Among these, there were only two of the Carabidæ, four Brachelytra, fifteen Rhyncophora, and fourteen of the Chrysomelidæ. Thirty-seven species of Arachnidæ, which I brought home, will be sufficient to prove that I was not paying overmuch attention to the generally favoured order of Coleoptera.

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only of the larger species from tropical climates. It is sufficient to disturb the composure of an entomologist's mind, to look forward to the future dimensions of a complete catalogue. The Carabidæ appear in extremely few numbers within the tropics. This is the more remarkable when compared to the opposed case of the carnivorous mammalia, an order which they certainly represent among insects. I was struck with this observation both on entering Brazil, and when I saw the elegant and active forms of the Harpalidæ reappearing on the temperate plains of La Plata. Do the very numerous Arachnidæ and rapacious Hymenoptera supply the place of these carnivorous beetles? The carrion-feeders and Brachelytra are very uncommon; on the other hand, the Rhyncophora and Chrysomelidæ, all of which depend on the vegetable world for subsistence, are present in astonishing numbers. I do not here refer to the number of different species, but to that of the individual insects; for on this it is that the most striking character in the entomology of different countries depends. The orders Orthoptera and Hemiptera are particularly numerous; as likewise is the stinging division of the Hymenoptera; the bees, perhaps, being excepted. A person, on first entering a tropical forest, is astonished at the labours of the ants: well-beaten paths branch off in every direction, on which an army of never-failing foragers may be seen, some going forth, and others returning, burdened with pieces of green leaf, often larger than their own bodies.

A small dark-coloured species sometimes migrates in countless numbers. One day, at Bahia, my attention was drawn by observing many spiders, cockroaches, and other insects, and some lizards, rushing in the greatest agitation across a bare piece of ground. A little way behind, every stalk and leaf was blackened by a small ant. The swarm having crossed the bare space, divided itself, and descended an old wall. By this means many insects were fairly enclosed; and the efforts, which the poor little creatures made to extricate themselves from such a death, were wonderful.

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When the ants came to the road they changed their course, and in narrow files reascended the wall. Having placed a small stone, so as to intercept one of the lines, the whole body attacked it, and then immediately retired. Shortly afterwards another body came to the charge, and again having failed to make any impression, this line of march was entirely given up. By going an inch round, the file might have avoided the stone, and this doubtless would have happened, if it had been originally there: but having been attacked, the lion-hearted little warriors scorned the idea of yielding.

Certain wasp-like insects, which construct in the corners of the verandahs clay cells for their larvæ, are very numerous in the neighbourhood of Rio. These cells they stuff full of dead and dying spiders and caterpillars. I was much interested one day by watching a deadly contest between a Pepsis and a large spider of the genus Lycosa. The wasp made a sudden dash at its prey, and then flew away: the spider was evidently wounded, for trying to escape, it rolled down a little slope, but had still strength sufficient to crawl into a thick tuft of grass. The wasp soon returned, and seemed surprised at not immediately finding its victim. It then commenced as regular a hunt, as ever hound did after fox; making short semicircular casts, and all the time rapidly vibrating its wings and antennæ. The spider, though well concealed, was soon discovered; and the wasp, evidently still afraid of its adversary's jaws, after much manœuvring, inflicted two stings on the under side of its thorax. At last, carefully examining with its antennæ the now motionless spider, it proceeded to drag away the body. But I stopped both tyrant and prey.*

The number of spiders in proportion to other insects, is

* Don Felix Azara, vol. i., p. 175, mentioning a hymenopterous insect, probably of the same genus, says, he saw it dragging a dead spider through tall grass, in a straight line to its nest, which was one hundred and sixty-three paces distant. He adds that the wasp, in order to find the road, every now and then made "demi-tours d'environ trois palmes."

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here as compared to England very much increased; perhaps more so, than with any other division of the articulate animals. The variety of species among the saltigrade, or jumping spiders, appears almost infinite. The genus, or rather family of Epeira, is here characterized by many singular forms; some species have pointed coriaceous shells, others enlarged and spiny tibiæ. Every path in the forest is barricaded with the strong yellow web of a species, belonging to the same division with the *Epeira clavipes* of Fabricius, which was formerly said by Sloane to make, in the West Indies, webs so strong as to catch birds. A small and pretty kind of spider, with very long anterior legs, and which appears to belong to an undescribed genus, lives as a parasite on almost every one of these webs. I suppose it is too insignificant to be noticed by the great Epeira, and is therefore allowed to prey on the minute insects, which adhering to the lines, would otherwise be wasted. When frightened, this little spider either feigns death by extending its front legs, or suddenly drops from the web. A large Epeira of the same division with *Epeira tuberculata* and *conica* (with fleshy prominences on its abdomen) is extremely common, especially in dry situations. Its web, which is generally placed among the great leaves of the common agave, is sometimes strengthened near the centre by a pair or even four zigzag ribbons, which connect two adjoining rays. When any large insect, as a grasshopper or wasp, is caught, the spider, by quickly giving it a revolving movement, and at the same time emitting a band of threads from its spinners, soon envelops its prey in a case like the cocoon of a silkworm. The spider now examines the powerless victim, and gives the fatal bite on the hinder part of its thorax; then retreating, it patiently waits till the poison has taken effect. The virulence of this poison may be judged of, from the fact that in half a minute I opened the mesh, and found a large wasp quite lifeless. This Epeira always stands with its head downwards near the centre of the web. When disturbed, it acts differently according to circumstances: if

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there is a thicket below, it suddenly falls down. I may remark, that I have distinctly seen the thread from the spinners, lengthened by the will of the animal while yet stationary, as preparatory to its fall. If the ground is clear beneath, the Epeira seldom falls, but moves quickly through a central passage, from one to the other side. When still further disturbed, it practices a most curious manœuvre: standing in the middle, it violently jerks the web, which is attached to elastic twigs, till at last the whole acquires such a rapid vibratory movement, that even the outline of the spider's body becomes indistinct.

I will here just mention a gregarious Epeira found in great numbers near St. Fe Bajada, the capital of one of the provinces of La Plata. The spiders were of a large size, and of a black colour, with ruby marks on their backs. They were nearly all of one dimension, and therefore could not have been a few old individuals with their families. The webs were placed vertically, as is invariably the case with the genus Epeira: they were separated from each other by a space of about two feet, but were all attached to certain common lines, which were of great length, and extended to all parts of the community. In this manner the tops of some large bushes were encompassed by the united nets. Azara* has described a gregarious spider in Paraguay, which Walckenaer thinks must be a Theridion, but probably it is an Epeira, and perhaps even the same species as mine. I cannot, however, recollect seeing a central nest, as large as a hat, in which, during autumn when the spiders die, Azara says the eggs are deposited. These gregarious habits in so typical a genus as Epeira, present a singular case among insects, which are so bloodthirsty and solitary, that even the sexes attack each other.

In a lofty valley of the Cordillera, near Mendoza, I found another spider with a singularly-formed web. Strong lines radiated in a vertical plane from a common centre, where

* Azara's Voyage, vol. i., p. 213.

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the insect had its station; but only two of the rays were connected by a symmetrical mesh-work; so that the net, instead of being, as is generally the case, circular, consisted of a wedge-shaped segment. All the webs were similarly constructed.

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CHAPTER III.

Monte Video—Maldonado—Excursion to R. Polanco—Lazo and Bolas—Partridges—Geology—Absence of trees—Cervus campestris—River hog—Tucutuco—Molothrus, cuckoo-like habits—Tyrant-flycatcher—Mocking-bird—Carrion hawks—Tubes formed by lightning—House struck.

MALDONADO.

JULY 5TH, 1832.—In the morning we got under way, and stood out of the splendid harbour of Rio de Janeiro. In our passage to the Plata, we saw nothing particular, excepting on one day a great shoal of porpoises, many hundreds in number. The whole sea was in places furrowed by them; and a most extraordinary spectacle was presented, as hundreds, proceeding together by jumps, in which their whole bodies were exposed, thus cut the water. When the ship was running nine knots, these animals could cross and recross the bows with the greatest ease, and then dash away right ahead. As soon as we entered the estuary of the Plata, the weather was very unsettled. One dark night we were surrounded by numerous seals and penguins, which made such strange noises, that the officer on watch reported he could hear the cattle bellowing on shore. On a second night we witnessed a splendid scene of natural fireworks; the mast-head and yard-arm ends shone with St. Elmo's light; and the form of the vane could almost be traced, as if it had been rubbed with phosphorus. The sea was so highly luminous, that the tracks of the penguins were marked by a fiery wake, and lastly, the darkness of the sky was momentarily illuminated by the most vivid lightning.

When within the mouth of the river, I was interested by observing how slowly the waters of the sea and river mixed. The latter, muddy and discoloured, from its less specific gravity, floated on the surface of the salt water. This was

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curiously exhibited in the wake of the vessel, where a line of blue was seen mingling in little eddies, with the adjoining fluid.

JULY 26TH.—We anchored at Monte Video. The Beagle was employed in surveying the extreme southern and eastern coasts of America, south of the Plata, during the two succeeding years. To prevent useless repetitions, I will extract those parts of my journal which refer to the same districts, without always attending to the order in which we visited them.

MALDONADO is situated on the northern bank of the Plata, and not very far from the mouth of the estuary. It is a most quiet, forlorn, little town; built, as is universally the case in these countries, with the streets running at right angles to each other, and having in the middle a large plaza or square, which, from its size, renders the scantiness of the population more evident and more unsociable. It possesses scarcely any trade; the exports being confined to a few hides and living cattle. The inhabitants are chiefly landowners, together with a few shopkeepers and the necessary tradesmen, such as blacksmiths and carpenters, who do nearly all the business for a circuit of fifty miles round. The town is separated from the river by a band of sand-hillocks, about a mile broad: it is surrounded on all other sides, by an open slightly-undulating country, covered by one uniform layer of fine green turf, on which countless herds of cattle, sheep, and horses graze. There is very little land cultivated even close to the town. A few hedges, made of cacti and agave, mark out where some wheat or Indian corn has been planted. The features of the country are very similar along the whole northern bank of the Plata. The only difference is, that here the granitic hills are rather more boldly pronounced. The scenery is very uninteresting; there is scarcely a house, an enclosed piece of ground, or even a tree, to give it an air of cheerfulness. Yet, after being imprisoned for some time in a ship, there is a charm in the unconfined feeling of walking over boundless plains of turf. Moreover, if your view is

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limited to a small space, many objects possess beauty. Some of the smaller birds are brilliantly coloured; and the bright green sward, browsed short by the cattle, is ornamented by dwarf flowers, among which a plant, looking like the daisy, claimed the place of an old friend. What would a florist say to whole tracts so thickly covered by the *Verbena melindres*, as, even at a distance, to appear of the most gaudy scarlet?

I staid ten weeks at Maldonado, in which time a nearly perfect collection of the animals, birds, and reptiles, was procured. Before making any observations respecting them, I will give an account of a little excursion I made as far as the river Polanco, which is about seventy miles distant, in a northerly direction. I may mention, as a proof how cheap every thing is in this country, that I paid only two dollars a day, or eight shillings, for two men, together with a troop of about a dozen riding-horses. My companions were well armed with pistols and sabres; a precaution which I thought rather unnecessary; but the first piece of news we heard was, that, the day before, a traveller from Monte Video had been found dead on the road, with his throat cut. This happened close to a cross, the record of a former murder.

On the first night we slept at a retired little country-house; and there I soon found out, that I possessed two or three articles, especially a pocket compass, which created unbounded astonishment. In every house I was asked to show the compass, and by its aid, together with a map, to point out the direction of various places. It excited the liveliest admiration that I, a perfect stranger, should know the road (for direction and road are synonymous in this open country) to places where I had never been. At one house a young woman, who was ill in bed, sent to entreat me to come and show her the compass. If their surprise was great, mine was greater, to find such ignorance among people who possessed their thousands of cattle, and "estancias" of great extent. It can only be accounted for by the circumstance that this retired part of the country is seldom visited by

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foreigners. I was asked whether the earth or sun moved; whether it was hotter or colder to the north; where Spain was, and many other such questions. The greater number of the inhabitants had an indistinct idea that England, London, and North America, were different names for the same place; but the better informed well knew that London and North America were separate countries close together, and that England was a large town in London! I carried with me some promethean matches, which I ignited by biting; it was thought so wonderful that a man should strike fire with his teeth, that it was usual to collect the whole family to see it: I was once offered a dollar for a single one. Washing my face in the morning, caused much speculation at the village of Las Minas; a superior tradesman closely cross-questioned me about so singular a practice; and likewise why on board we wore our beards; for he had heard from my guide that we did so. He eyed me with much suspicion; perhaps he had heard of ablutions in the Mahomedan religion, and knowing me to be a heretick, probably he came to the conclusion that all hereticks were Turks. It is the general custom in this country to ask for a night's lodging at the first convenient house. The astonishment at the compass, and my other feats in jugglery, was to a certain degree advantageous, as with that, and the long stories my guides told of my breaking stones, knowing venemous from harmless snakes, collecting insects, &c., I repaid them for their hospitality. I am writing as if I had been among the inhabitants of central Africa: Banda Oriental would not be flattered by the comparison; but such were my feelings at the time.

The next day we rode to the village of Las Minas. The country was rather more hilly, but otherwise continued the same; an inhabitant of the Pampas no doubt would have considered it as truly Alpine. The country is so thinly inhabited, that during the whole day we scarcely met a single person. Las Minas is much smaller even than Maldonado. It is seated on a little plain, and is surrounded by low rocky

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mountains. It is of the usual symmetrical form; and with its whitewashed church standing in the centre, had rather a pretty appearance. The outskirting houses rose out of the plain like isolated beings, without the accompaniment of gardens or courtyards. This is generally the case in the country, and all the houses have, in consequence, an uncomfortable aspect. At night we stopped at a pulperia, or drinking-shop. During the evening a great number of Gauchos came in to drink spirits and smoke cigars: their appearance is very striking; they are generally tall and handsome, but with a proud and dissolute expression of countenance. They frequently wear their moustaches, and long black hair curling down their backs. With their brightly-coloured garments, great spurs clanking about their heels, and knives stuck as daggers (and often so used) at their waists, they look a very different race of men from what might be expected from their name of Gauchos, or simple countrymen. Their politeness is excessive: they never drink their spirits without expecting you to taste it; but whilst making their exceedingly graceful bow, they seem quite as ready, if occasion offered, to cuty our throat.

On the third day we pursued rather an irregular course, as I was employed in examining some beds of marble. On the fine plains of turf we saw many ostriches (*Struthio Rhea*). Some of the flocks contained as many as twenty or thirty birds. These, when standing on any little eminence, and seen against the clear sky, presented a very noble appearance. I never met with such tame ostriches in any other part of the country: it was easy to gallop up within a short distance of them; but then, expanding their wings, they made all sail right before the wind, and soon left the horse astern.

At night we came to the house of Don Juan Fuentes, a rich landed proprietor, but not personally known to either of my companions. On approaching the house of a stranger, it is usual to follow several little pieces of etiquette: riding

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up slowly to the door, the salutation of Ave Maria* is given, and until somebody comes out, and asks you to alight, it is not customary even to get off your horse. Having entered the house, some general conversation is kept up for a few minutes, till permission is asked to pass the night there. This is granted as a matter of course. The stranger then takes his meals with the family, and a room is assigned him, where with the horsecloths belonging to his recado (or saddle of the Pampas) he makes his bed. It is curious how similar circumstances produce such similar results in manners. At the Cape of Good Hope the same hospitality, and very nearly the same points of etiquette, are universally observed. The difference, however, between the character of the Spaniard and that of the Dutch boor is shown, by the former never asking his guest a single question beyond the strictest rule of politeness, whilst the honest Dutchman demands where he has been, where he is going, what is his business, and even how many brothers, sisters, or children he may happen to have.

Shortly after our arrival at Don Juan's, one of the large herds of cattle was driven in towards the house, and three beasts were picked out to be slaughtered for the supply of the establishment. These half-wild cattle are very active; and knowing full well the fatal lazo, they led the horses a long and laborious chase. After witnessing the rude wealth displayed in the number of cattle, men, and horses, Don Juan's miserable house was quite curious. The floor consisted of hardened mud, and the windows were without glass; the furniture of the sitting-room boasted only of a few of the roughest chairs and stools, with a couple of tables. The supper, although several strangers were present, consisted of two huge piles, one of roast beef, the other of boiled, with some pieces of pumpkin: besides this latter there was no other vegetable, and not even a morsel of bread. For drink-

* The formal answer of the owner of the place is, "sin pecado concebida"—(conceived without sin).

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ing, a large earthenware jug of water served the whole party. Yet this man was the owner of several square miles of land, of which nearly every acre would produce corn, and, with a little trouble, all the common vegetables. The evening was spent in smoking, with a little impromptu singing, accompanied by the guitar. The signoritas all sat together in one corner of the room, and did not sup with the men.

So many works have been written about these countries, that it is almost superfluous to describe either the lazo or the bolas. The former consists of a very strong, but thin, well-plaited rope, made of raw hide. One end is attached to the broad surcingle, which fastens together the complicated gear of the recado, or saddle used in the Pampas; the other is terminated by a small ring of iron or brass, by which a noose can be formed. The Gaucho, when he is going to use the lazo, keeps a small coil in his bridle hand, and in the other holds the running noose, which is made very large, generally having a diameter of about eight feet. This he whirls round his head, and by the dexterous movement of his wrist keeps the noose open; then, throwing it, he causes it to fall on any particular spot he chooses. The lazo, when not used, is tied up in a small coil to the after part of the recado. The bolas, or balls, are of two kinds: the simplest, which is chiefly used for catching ostriches, consists of two round stones, covered with leather, and united by a thin plaited thong, about eight feet long. The other kind differs only, in having three balls united by the thongs to a common centre. The Gaucho holds the smallest of the three in his hand, and whirls the other two round and round his head; then, taking aim, sends them like chain shot revolving through the air. The balls no sooner strike any object, than, winding round it, they cross each other, and become firmly hitched. The size and weight of the balls varies, according to the purpose for which they are made: when of stone, although not so large as a big apple, yet they are sent with such force as sometimes to break the leg even of a horse. I have seen the balls made

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of wood, and as large as a turnip, for the sake of catching these animals without injuring them. The balls are sometimes made of iron, and these can be hurled to the greatest distance. The main difficulty in using either lazo or bolas, is to ride so well, as to be able at full speed, and while suddenly turning about, to whirl them so steadily round the head, as to take aim: on foot any person would soon learn the art. One day, as I was amusing myself by galloping and whirling the balls round my head, by accident the free one struck a bush; and its revolving motion being thus destroyed, it immediately fell to the ground, and like magic caught one hind leg of my horse; the other ball was then jerked out of my hand, and the horse fairly secured. Luckily he was an old practised animal, and knew what it meant; otherwise he would probably have kicked till he had thrown himself down. The Gauchos roared with laughter; they cried they had seen every sort of animal caught, but had never before seen a man caught by himself.

During the two succeeding days, I reached the furthest point which I was anxious to examine. The country wore the same aspect, till at last the fine green turf became more wearisome than a dusty turnpike road. We every where saw great numbers of partridges (*Tinamus rufescens*). These birds do not go in coveys, nor do they conceal themselves like the English kind. It appears a very silly bird. A man on horseback by riding round and round in a circle, or rather in a spire, so as to approach closer each time, may knock on the head as many as he pleases. The more common method is to catch them with a running noose, or little lazo, made of the stem of an ostrich's feather, fastened to the end of a long stick. A boy on a quiet old horse will frequently thus catch thirty or forty in a day. The flesh of this bird, when cooked, is delicately white.

On our return to Maldonado, we followed rather a different line of road. Near Pan de Azucar, a landmark well known to all those who have sailed up the Plata, I stayed a day at the house of a most hospitable old Spaniard. Early

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in the morning we ascended the Sierra de las Animas. By the aid of the rising sun the scenery was almost picturesque. To the westward the view extended over an immense level plain as far as the mount, at Monte Video, and to the eastward, over the mammillated country of Maldonado. On the summit of the mountain there were several small heaps of stones, which evidently had lain there for many years. My companion assured me that they were the work of the Indians in the old time. The heaps were similar, but on a much smaller scale, to those so commonly found on the mountains of Wales. The desire to signalize any event, on the highest point of the neighbouring land, seems an universal passion with mankind. At the present day, not a single Indian, either civilized or wild, exists in this part of the province; nor am I aware that the former inhabitants have left behind them any more permanent records, than these insignificant piles on the summit of the Sierra de las Animas.

The geological structure of the country is very simple. On the crest of every hill, granitic or ancient schistose rocks protrude; the intervening spaces being concealed by a great thickness of a red argillaceous earth. This at first sight would be mistaken for ordinary detritus; but on closer examination it is found to contain small concretionary balls of a friable limestone or marl, and to possess other peculiar characters. It extends over the whole province, and in some places is very remarkable, from containing the remains of several great extinct animals. This red earthy substance is part of the formation which composes those immense plains of Buenos Ayres, denominated the Pampas. For its origin, we must look to a period when the estuary of the Plata, occupying far wider limits, covered all the surrounding low countries with its brackish waters. Signs of the gradual elevation of the land can in many places be discovered on the shores of the river; and it is probable that the red earthy mass is, geologically speaking, of no very ancient date.

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The general, and almost entire absence of trees in Banda Oriental is remarkable. Some of the rocky hills are partly covered by thickets, and on the banks of the larger streams, especially to the northward of the Las Minas, willow-trees are not uncommon. Near the Arroyo Tapes I heard of a wood of palms; and one of these trees, of considerable size, I saw near the Pan de Azucar, in lat. 35°. These, and the trees planted by the Spaniards, offer the only exceptions to the general scarcity of wood. Among the introduced kinds may be enumerated poplars, olives, peach, and other fruit-trees: the peaches succeed so well, that they afford the main supply of firewood to the city of Buenos Ayres. Extremely level countries, such as the Pampas, seldom appear favourable to the growth of trees. This may possibly be attributed either to the force of the winds, or the kind of drainage. In the nature of the land, however, around Maldonado, no such reason is apparent; the rocky mountains afford protected situations, enjoying various kinds of soil; streamlets of water are common at the bottoms of nearly every valley; and the clayey nature of the earth seems adapted to retain moisture. It has been inferred with much probability, that the presence of woodland is determined by the annual amount of moisture; yet in this province abundant and heavy rain falls during the winter; and the summer, though dry, is not so in any excessive degree.* We see nearly the whole of Australia covered by lofty trees, yet that country possesses a far more arid climate. Hence we must look to some other cause. The trees of Brazil cannot travel so far southward, on account of the colder climate; nor does there exist any other wooded country whence a migration could take place: we are therefore driven to the conclusion that herbaceous plants, instead of trees, were created to occupy that wide area, which within a period not very remote, has been raised above the waters of the sea.

* Azara says, "Je crois que la quantité annuelle des pluies est, dans toutes ces contrées, plus considérable qu'en Espagne."—Vol. i., p. 36.

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Considering South America alone, we should be tempted to believe that trees could not possibly flourish, excepting in a very humid climate. The limit of the forest land certainly follows, in a most remarkable manner, that of the damp winds.* In the southern part of the continent, where the western gales, charged with moisture from the Pacific, prevail, every island on the broken west coast, from lat. 38° to the extreme point of Tierra del Fuego is densely covered by impenetrable forest. On the eastern side of the Cordillera, over the same extent of latitude, where a blue sky and a fine climate prove that the atmosphere has been drained of its moisture, the arid plains of Patagonia support a scanty vegetation. Within the limits of the constant south-east trade wind, the bulk of the eastern parts of the continent is ornamented by magnificent forests: the west coast, however, from lat. 4° south to lat. 32°, may be described as a desert. In this case, as before, all the vapour has been condensed by the snow-clad pinnacles of the Andes. In these two areas, determined by the prevalent winds, the forest and desert lands occupy reversed positions with respect to the great mountain axis. Between their limits a broad intermediate band, which is neither desert nor woodland, stretches across the entire continent. Central Chile and the Provinces of La Plata are included in this division. On the west coast, about four degrees south of the equator, where the trade wind loses its regularity, and heavy torrents of rain periodically fall, the desert coast of Peru assumes near Cape Blanco the character of luxuriance so celebrated at Guayaquil and on the shores of Panama.

After these facts, it will perhaps appear a sufficient answer to the question, to state that according to the South American type of vegetation, the climate of Banda Oriental is too dry for the growth of trees. But this reasoning, I apprehend, must not be extended to a general statement including other countries. The Falklands offer a more per-

* Maclaren, art. *America*, Encyc. Britan.

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plexing case even than Maldonado. Situated under the same latitude with Tierra del Fuego, and only between two and three hundred miles distant from it, possessed of an entirely similar climate, with a geological formation almost identical, with favourable situations, and the same kind of peaty soil, yet these islands can scarcely boast of a plant deserving the title even of a bush; whilst in Tierra del Fuego, it is impossible to find an acre of land not covered by the densest forest. In this case, both the direction of the heavy gales of wind and of the currents of the sea are favourable to the transport of seeds. Canoes and other works of art, and trunks of trees, drifted from Tierra del Fuego, are frequently thrown on the shores of the Western Island. Hence perhaps it is that there are many plants common to the two countries: but with respect to trees, even some attempts which have been made to transplant them, have failed.

During our stay at Maldonado I paid particular attention to the mammalia and birds. Of the latter I procured, within the distance of a morning's walk, no less than eighty species, of which many were exceedingly beautiful—I think even more so than those of Brazil. The other orders were not neglected. Reptiles were numerous, and nine different kinds of snakes were taken. Of the indigenous mammalia, the only one now left of any size, which is common, is the *Cervus Campestris*. This deer is exceedingly abundant throughout the countries bordering the Plata. It is found in Northern Patagonia as far south as the Rio Negro (lat. 41°); but further southward none were seen by the officers employed in surveying the coast. It appears to prefer a hilly country; I saw very many small herds, containing from five to seven animals each, near the Sierra Ventana, and among the hills north of Maldonado. If a person crawling close along the ground, slowly advances towards a herd, the deer frequently, out of curiosity, approach to reconnoitre him. I have by this means killed, from one spot, three out of

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the same herd. Although so tame and inquisitive, yet when approached on horseback, they are exceedingly wary. In this country nobody goes on foot, and the deer knows man as its enemy, only when he is mounted and armed with the bolas. At Bahia Blanca, a recent establishment in Northern Patagonia, I was surprised to find how little the deer cared for the noise of a gun: one day I fired ten times, from within eighty yards, at one animal; and it was much more startled at the ball cutting up the ground than at the report of the rifle. My powder being exhausted, I was obliged (to my shame as a sportsman be it spoken), to get up and halloo till the deer ran away.

The most curious fact with respect to this animal, is the overpoweringly strong and offensive odour which proceeds from the buck. It is quite indescribable: several times whilst skinning the specimen which is now mounted at the Zoological Museum, I was almost overcome by nausea. I tied up the skin in a silk pocket-handkerchief, and so carried it home: this handkerchief, after being well washed, I continually used, and it was, of course, as repeatedly washed; yet every time, for a space of one year and seven months, when first unfolded, I distinctly perceived the odour. This appears an astonishing instance of the permanence of some matter, which in its nature, nevertheless, must be most subtile and volatile. Frequently, when passing at the distance of half a mile to leeward of a herd, I have perceived the whole air tainted with the effluvium. I believe the smell from the buck is most powerful at the period when its horns are perfect, or free from the hairy skin. When in this state the meat is, of course, quite uneatable; but the Gauchos assert, that if buried for some time in fresh earth, the taint is removed. I have somewhere read that the islanders in the north of Scotland treat the rank carcasses of the fish-eating birds in the same manner.

The order Rodentia is here very numerous in species: of

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mice alone I obtained no less than eight kinds.* The largest gnawing animal in the world, the *Hydrochærus Capybara* (the water-hog), is here also common. One which I shot at Monte Video weighed ninety-eight pounds: its length, from the end of the snout to the stump-like tail, was three feet two inches; and its girth, three feet eight. These great Rodents are generally called "carpinchos:" they occasionally frequent the islands in the mouth of the Plata, where the water is quite salt, but are far more abundant on the borders of fresh-water lakes and rivers. Near Maldonado three or four generally live together. In the daytime they either lie among the aquatic plants, or openly feed on the turf plain.† When viewed at a distance, from their manner of walking and colour, they resemble pigs: but when seated on their haunches, and attentively watching any object with one eye, they reassume the appearance of their congeners, the cavies. Both the front and side view of their head has quite a ludicrous aspect, from the great depth of their jaw. These animals, at Maldonado, were very tame; by cautiously walking, I approached within three yards of four old ones. This tameness may probably be accounted for, by the Jaguar having been banished for some years, and by the Gaucho not thinking it worth his while to hunt them. As I approached nearer and nearer they frequently made their peculiar noise, which is a low abrupt grunt; not having much actual sound,

* These have been named and described by Mr. Waterhouse at the meetings of the Zoological Society. I must be allowed to take this opportunity of returning my cordial thanks to Mr. Waterhouse, and to the other gentlemen attached to that Society, for their kind and most liberal assistance on all occasions.

† In the stomach and duodenum of a carpincho which I opened, I found a very large quantity of a thin yellowish fluid, in which scarcely a fibre could be distinguished. Mr. Owen informs me that a part of the œsophagus is so constructed, that nothing much larger than a crowquill can be passed down. Certainly the broad teeth and strong jaws of this animal are well fitted to grind into pulp the aquatic plants on which it feeds.

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but rather arising from the sudden expulsion of air: the only noise I know at all like it, is the first hoarse bark of a large dog. Having watched the four from almost within arm's length (and they me) for several minutes, they rushed into the water at full gallop, with the greatest impetuosity, and emitted, at the same time, their bark. After diving a short distance they came again to the surface, but only just showed the upper part of their heads. When the female is swimming in the water and has young ones, they are said to sit on her back. These animals are easily killed in numbers; but their skins are of trifling value, and the meat is very indifferent. I have never heard of the carpincho being found south of the Plata; but as I see in a map that there is a Laguna del Carpincho high up the Rio Salado, I suppose such must have occurred. On the islands in the Rio Parana they are exceedingly abundant, and afford the ordinary prey to the Jaguar.

The Tucutuco (*Ctenomys Braziliensis*) is a curious small animal, which may be briefly described as a Rodent, with the habits of a mole. It is extremely abundant in some parts of the country,* but is difficult to be procured, and still more difficult to be seen, when at liberty. It lives almost entirely under ground, and prefers a sandy soil with a gentle inclination. The burrows are said not to be deep, but of great length. They are seldom open; the earth being thrown up at the mouth into hillocks, not quite so large as those made by the mole. Considerable tracts of country are so completely undermined by these animals, that horses, in passing over, sink above their fetlocks. The tucutucos appear, to a certain degree, to be gregarious. The man who procured the specimens for me had caught six together, and he said this was a common occurrence. They are nocturnal

* The wide plains north of the Rio Colorado are undermined by these animals; and near the Strait of Magellan, where Patagonia blends with Tierra del Fuego, the whole sandy country forms a great warren for the tucutuco.

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in their habits; and their principal food is afforded by the roots of plants, which is the object of their extensive and superficial burrows. Azara says they are so difficult to be obtained, that he never saw more than one. He states that they lay up magazines of food within their burrows. This animal is universally known by a very peculiar noise, which it makes when beneath the ground. A person, the first time he hears it, is much surprised; for it is not easy to tell whence it comes, nor is it possible to guess what kind of creature utters it. The noise consists in a short, but not rough, nasal grunt, which is repeated about four times in quick succession; the first grunt is not so loud, but a little longer, and more distinct than the three following: the musical time of the whole is constant, as often as it is uttered.* The name Tucutuco is given in imitation of the sound. In all times of the day, where this animal is abundant, the noise may be heard, and sometimes directly beneath one's feet. When kept in a room, the tucutucos move both slowly and clumsily, which appears owing to the outward action of their hind legs; and they are likewise quite incapable of jumping even the smallest vertical height. Mr. Reid, who dissected a specimen which I brought home in spirits, informs me that the socket of the thigh-bone is not attached by a ligamentum teres; and this explains, in a satisfactory manner, the awkward movements of their hinder extremities. When eating, they rest on their hind legs and hold the piece in their fore paws; they appeared also to wish to drag it into some corner. They are very stupid in making any attempt to escape; when angry or

* At the R. Negro, in Northern Patagonia, there is an animal of the same habits, and probably a closely allied species, but which I never saw. Its noise is different from the Maldonado kind; it is repeated only twice instead of three or four times, and is more distinct and sonorous: when heard from a distance, it so closely resembles the sound made in cutting down a small tree with an axe, that I have sometimes remained in doubt concerning it.

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frightened, they uttered the tucu-tuco. Of those I kept alive, several, even the first day, became quite tame, not attempting to bite or to run away; others were a little wilder.

The man who caught them asserted that very many are invariably found blind. A specimen which I preserved in spirits was in this state; Mr. Reid considers it to be the effect of inflammation in the nictitating membrane. When the animal was alive I placed my finger within half an inch of its head, and not the slightest notice was taken: it made its way, however, about the room nearly as well as the others. Considering the subterranean habits of the tucutuco, the blindness, though so frequent, cannot be a very serious evil; yet it appears strange that any animal should possess an organ constantly subject to injury. The mole, whose habits in nearly every respect, excepting in the kind of food, are so similar, has an extremely small and protected eye, which, although possessing a limited vision, at once seems adapted to its manner of life.

Birds of many kinds are extremely abundant on the undulating grassy plains around Maldonado. Several species, of the genus Cassicus, allied to our starlings in habits and structure, and of Tyrant-flycatchers, and a mocking-bird, from their numbers, give a character to the ornithology. Some of the Cassici are very beautiful, black and yellow being the prevailing colours; but *Oriolus ruber*, Gme., offers an exception, in having its head, shoulders, and thighs of the most splendid scarlet. This bird differs from its congeners in being solitary. It frequents marshes; and, seated on the summit of a low bush, with its mouth wide open, utters a plaintive agreeable cry, which can be heard at a long distance.

Another species,* of a purplish-black colour, with a metallic lustre, feeds on the plain in large flocks, mingled

* Le Troupiale commun of Azara (vol. iii., p. 169)—a second species of Molothrus.

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with other birds. Several may often be seen standing on the back of a cow or horse. While perched on a hedge, and pluming themselves in the sun, they sometimes attempt to sing, or rather to hiss: the noise is very peculiar; it resembles that of bubbles of air passing rapidly from a small orifice under water, so as to produce an acute sound. Azara states that this bird, like the cuckoo, deposits its eggs in other birds' nests. I was several times told by the country people, that there was some bird with this habit; and my assistant in collecting, who is a very accurate person, found a nest of the sparrow* of the country, with one egg in it larger than the others, and of a different colour and shape. Mr. Swainson† has remarked that with the exception of the *Molothrus pecoris*, the cuckoos are the only birds which can be called truly parasitical; namely, such as "fasten themselves, as it were, on another living animal, whose animal heat brings their young into life, whose food they alone live upon, and whose death would cause theirs during the period of infancy." The *Molothrus pecoris* is a North-American bird, and is closely allied in general habits, even in such peculiarities as standing on the backs of cattle (as its name implies), and in appearance, with the species from the plains of La Plata; it only differs in being rather smaller and of a different colour, yet the two birds would be considered by every naturalist as distinct species. It is very interesting to see so close an agreement in structure, and in habits, between allied species coming from opposite parts of a great continent. It is also very remarkable, that the cuckoos and the molothri, although opposed to each other in almost every habit, should agree in the one strange one of their parasitical propagation. The molothrus, like our starling, is

* A Zonotrichia;—the *chingolo* of Azara. The egg is rather less than that of the missel-thrush; it is of a nearly globular form, but with one end rather smaller than the other. The ground colour is a pale pinkish-white, with irregular spots and blotches of a pinkish brown, and others less distinct of a grayish hue. The egg is now in the museum of the Zoological Society.

† Magazine of Zoology and Botany, vol. i., p. 217.

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eminently sociable, and lives on the open plains without art or disguise:* the cuckoo, as every one knows, is a singularly shy bird; it frequents the most retired thickets, and feeds on fruit and caterpillars. In structure these birds are likewise widely removed from each other.

I will only mention two other birds, which are very common, and render themselves prominent from their habits. The *Saurophagus sulphureus* is typical of the great American tribe of Tyrant-flycatchers. In its structure it closely approaches the true shrikes, but in its habits may be compared to many birds. I have frequently observed it, hunting a field, hovering over one spot like a hawk, and then proceeding on to another. When thus seen suspended in the air, it might very readily at a short distance be mistaken for one of the Rapacious order; its stoop, however, is very inferior in force and rapidity. At other times the Saurophagus haunts the neighbourhood of water, and there, like a kingfisher, remaining stationary, it catches any small fish which may come near the margin. These birds are not unfrequently kept either in cages, or in courtyards with their wings cut. They soon become tame, and are very amusing from their cunning odd manners, which were described to me, as being similar to those of the common magpie. Their flight is undulatory, for the weight of the head and bill appear too great for the body. In the evening the Saurophagus takes its stand on a bush, often by the road-side, and continually repeats, without change, a shrill and rather agreeable cry, which somewhat resembles articulate words. The Spaniards say it is like the words, "Bien te veo" (I see you well), and accordingly have given it this name.

A mocking-bird, *Orpheus modulator*, called by the inhabitants Calandria, is remarkable, from possessing a song far superior to that of any other bird in the country: indeed, it is nearly the only bird in South America which I have observed to take its stand for the purpose of singing. The

* See Azara, vol. iii., p. 170.

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song may be compared to that of the Sedge warbler, but is more powerful; some harsh notes and some very high ones, being mingled with a pleasant warbling. It is heard only during the spring. At other times its cry is harsh and far from harmonious. It frequents thickets and hedges, is very active, and whilst quickly hopping about, often expands its tail. Near Maldonado these birds were tame and bold; they constantly attended in numbers the country houses, to pick the meat which was hung up on the posts or walls: if any other small bird joined the feast, the Calandria directly chased it away. On the wide uninhabited plains of Patagonia another closely allied species, *O. Patagonica* of D'Orbigny, which frequents the valleys clothed with spiny bushes, is a wilder bird, and has a slightly different tone of voice. It appears to me a curious circumstance, as showing the fine shades of difference in habits, that, judging from this latter respect alone, when I first saw this second species, I thought it was different from the Maldonado kind. Having afterwards procured a specimen, and comparing the two without particular care, they appeared so very similar, that I changed my opinion; but now Mr. Gould* says that they are certainly distinct; a conclusion in conformity with the trifling difference of habit, of which, however, he was not aware.

I will conclude these few ornithological observations with an account of the various carrion-feeding hawks which frequent the extratropical parts of South America. The number, tameness, and disgusting habits of these birds, make them pre-eminently striking to any one accustomed only to the birds of Northern Europe. In this list may be included four species of the Caracara or Polyborus, the Turkey buzzard, the Gallinazo, and the Condor. The Caracaras are, from their structure, placed among the eagles: we shall soon see how ill they become so high a rank. In their habits they well supply the place of our carrion-crows, magpies, and ravens; a tribe of birds which is totally wanting in South

* Mr. Gould was not at the time aware that M. D'Orbigny had described them as different.

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America. To begin with the *Polyborus Braziliensis:* this is a common bird, and has a wide geographical range; it is most numerous on the grassy savannahs of La Plata (where it goes by the name of Carrancha), and is far from unfrequent throughout the sterile plains of Patagonia. In the desert between the rivers Negro and Colorado, numbers constantly attended the line of road to devour the carcasses of the exhausted animals which chanced to perish from fatigue and thirst. Although thus common in these dry and open countries, and likewise on the arid shores of the Pacific, it is nevertheless found inhabiting the damp impervious forests of West Patagonia and Tierra del Fuego. The Carranchas, together with the *Polyborus Chimango,* constantly attend in numbers the estancias and slaughtering-houses. If an animal dies on the plain the Gallinazo commences the feast, and then the two Caracaras pick the bones clean. These birds, although thus commonly feeding together, are far from being friends. When the Carrancha is quietly seated on the branch of a tree, or on the ground, the Chimango often continues for a long time flying backwards and forwards, up and down, in a semicircle, trying each time, at the bottom of the curve, to strike its larger relative. The Carrancha takes little notice, except by bobbing its head. Although the Carranchas frequently assemble in numbers, they are not gregarious; for in desert places they may be seen solitary, or more commonly by pairs. Besides the carrion of large animals, these birds frequent the borders of streams and sea beaches, to pick up whatever the waters may cast on shore. In Tierra del Fuego, and on the west coast of Patagonia, they must exclusively live on such supplies.

The Carranchas are said to be very crafty, and to steal great numbers of eggs. They attempt also, together with the Chimango, to pick off the scabs from the sore backs of the horses and mules. The poor animal, on the one hand, with its ears down and its back arched; and, on the other, the hovering bird, eyeing, at the distance of a yard, the disgusting morsel, form a picture, which has been described by

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Captain Head with his own peculiar spirit and accuracy. The Carranchas kill wounded animals; but Mr. Bynoe saw one seize in the air a live partridge, which escaped, and was for some time chased on the ground. I believe this circumstance is very unusual: at all events there is no doubt that the chief part of their sustenance is derived from carrion. A person will discover the *Necrophagous* habits of the Carrancha, by walking out on one of the desolate plains, and there lying down to sleep. When he awakes, he will see, on each surrounding hillock, one of these birds patiently watching him with an evil eye. It is a feature in the landscape of these countries, which will be recognised by every one who has wandered over them. If a party goes out hunting with dogs and horses, it will be accompanied, during the day, by several of these attendants. After feeding, the uncovered craw protrudes; at such times, and indeed generally, the Carrancha is an inactive, tame, and cowardly bird. Its flight is heavy and slow, like that of an English rook. It seldom soars; but I have twice seen one at a great height gliding through the air with much ease. It runs (in contradistinction to hopping), but not quite so quickly as some of its congeners. At times the Carrancha is noisy, but is not generally so: its cry is loud, very harsh and peculiar, and may be likened to the sound of the Spanish guttural *g*, followed by a rough double *r r*. Perhaps the Gauchos, from this cause, have called it Carrancha. Molina, who says it is called Tharu in Chile, states, that when uttering this cry, it elevates its head higher and higher, till at last, with its beak wide open, the crown almost touches the lower part of the back. This fact, which has been doubted, is quite true; I have seen them several times with their heads backwards in a completely inverted position. The Carrancha builds a large coarse nest, either in a low cliff, or in a bush or lofty tree. To these observations I may add, on the high authority of Azara, that the Carrancha feeds on worms, shells, slugs, grasshoppers, and frogs; that it destroys young lambs by tearing the umbilical cord; and that it pursues the Gallinazo,

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till that bird is compelled to vomit up the carrion it may have recently gorged. Lastly, Azara states that several Carranchas, five or six together, will unite in chase of large birds, even such as herons. All these facts show that it is a bird of very versatile habits and considerable ingenuity.

The *Polyborus Chimango* is considerably smaller than the last species. It is common on both sides of the continent, but does not appear to extend so far northward as the last species. It is found in Chiloe, and on the coast of Patagonia, and I have seen it in Tierra del Fuego. We have already remarked that it feeds on carrion, in common with the Carrancha. It is generally the last bird which leaves the skeleton; and may often be seen within the ribs of a cow or horse, like a bird in a cage. The Chimango often frequents the sea-coast and the borders of lakes and swamps, where it picks up small fish. It is truly omnivorous, and will eat even bread, when thrown out of a house with other offal: I was also assured that they materially injure the potato crops in Chiloe, by stocking up the roots when first planted. In the same island I myself saw them by scores following the plough, and feeding on the worms and larvæ of insects. I do not believe they ever kill birds or animals. They are more active than the Carranchas, but their flight is heavy; I never saw one soar; they are very tame; are not gregarious; commonly perch on stone walls, and not upon trees; and frequently utter a gentle, shrill scream.

The third species of Polyborus* is remarkable from the confined localities which it frequents: we met with it only in one valley in Patagonia. The last species which we have to mention is the *Polyborus Novæ Zelandiæ*. This bird is exceedingly numerous over the whole of the Falkland Islands, which appear to be its metropolis. I was informed by the sealers, that they are found in the Diego Ramirez rocks and the Ildefonso isles, but never on the mainland of Tierra del Fuego. Nor do they occur on Georgia or the more southern

* A species allied to "Montanus" of D'Orbigny, but distinct.

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islands. In many respects these hawks resemble in their habits the Carranchas. They live on the flesh of dead animals and on marine productions; and on the Ramirez rocks their whole sustenance must depend on the sea. They are extraordinarily tame and fearless, and haunt the neighbourhood of houses for offal. If a hunting party kills an animal, a number soon collect and patiently await, standing on the ground on all sides. After eating, their uncovered craws are largely protruded, giving them a disgusting appearance. They readily attack wounded birds: a cormorant in this state having taken to the shore, was immediately seized on by several, and its death hastened by their blows. The Beagle was at the Falklands only during the summer, but the officers of the Adventure, who were there in the winter, mention many extraordinary instances of the boldness and rapacity of these birds. They actually pounced on a dog that was lying fast asleep close by one of the party; and the sportsmen had difficulty in preventing the wounded geese from being seized before their eyes. It is said that several together (in this respect resembling the Carranchas) wait at the mouth of a rabbit-hole, and together seize on the animal when it comes out. They were constantly flying on board the vessel when in the harbour; and it was necessary to keep a good look out to prevent the leather being torn from the rigging, and the meat or game from the stern. These birds are very mischievous and inquisitive; they will pick up almost any thing from the ground; a large black glazed hat was carried nearly a mile, as was a pair of the heavy balls, used in catching cattle. Mr. Usborne experienced during the survey a more severe loss, in their stealing a small Kater's compass in a red morocco leather case, which was never recovered. These birds are, moreover, quarrelsome and very passionate; tearing up the grass with their bills from rage. They are not truly gregarious; do not soar; their flight is heavy and clumsy; on the ground they run with extreme quickness, very much like pheasants. They are noisy, uttering several harsh cries; one of which is like that of the English rook; hence the sealers

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always so call them. It is a curious circumstance that, when crying out, they throw their heads upwards and backwards, after the same manner as the Carrancha. They build on the rocky cliffs of the sea-coast, but only in the small islets, and not in the two main islands. This is a singular precaution in so tame and fearless a bird. The sealers say that the flesh of these birds when cooked, is quite white, and very good eating.

We have now only to mention the turkey-buzzard (*Vultur aura*), and the Gallinazo. The former is found wherever the country is moderately damp, from Cape Horn to North America. Differently from the *Polyborus Braziliensis* and *Chimango*, it has found its way to the Falkland Islands. The turkey-buzzard is a solitary bird, or at most goes in pairs. It may at once be recognised from a long distance, by its lofty, soaring, and most elegant flight. It is well known to be a true carrion feeder. On the west coast of Patagonia, among the thickly-wooded islets and broken land, it lives exclusively on what the sea throws up, and on the carcasses of dead seals. Wherever these animals are congregated on the rocks, there the vultures may be seen. The Gallinazo (*Cathartes atratus*) has a different range from the last species, as it never occurs to the southward of lat. 41°. Azara states that there existed a tradition that these birds, at the time of the conquest, were not to be found near Monte Video, but that they subsequently followed the inhabitants from more northern districts. At the present day they are numerous in the valley of the Colorado, which is three hundred miles due south of Monte Video. It seems probable that this additional migration has happened since the time of Azara. The Gallinazo generally prefers a humid climate, or rather the neighbourhood of fresh water; hence it is extremely abundant in Brazil and La Plata, while it is never found on the desert and arid plains of Northern Patagonia, excepting near some stream. These birds frequent the whole Pampas to the foot of the Cordillera, but I never saw or heard of one in Chile: in Peru they are preserved as

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scavengers. These vultures certainly may be called gregarious, for they seem to have pleasure in society, and are not solely brought together by the attraction of a common prey. On a fine day a flock may often be observed at a great height, each bird wheeling round and round without closing its wings, in the most graceful evolutions. This is clearly done for sport-sake, or perhaps is connected with their matrimonial alliances.

I have now mentioned all the carrion-feeders, excepting the condor, an account of which will be more appropriately introduced when we visit a country more congenial to its habits than the plains of La Plata.

In a broad band of sand-hillocks which separate the Laguna del Potrero from the shores of the Plata, at the distance of a few miles from Maldonado, I found a group of those vitrified, siliceous tubes, which are generally supposed to have been formed by lightning entering the loose sand. These tubes resemble in every particular those from Drigg, in Cumberland, described in the Geological Transactions.* The sand-hillocks of Maldonado, not being protected by vegetation, are constantly changing their position. From this cause the tubes projected above the surface; and numerous fragments lying near, showed that they had formerly been buried to a greater depth. Four sets entered the sand perpendicularly: by working with my hands I traced one of them two feet deep; and some fragments which evidently had belonged to the same tube, when added to the other part, measured five feet three inches. The diameter of the whole was nearly equal, and therefore we must suppose that originally it extended to a much greater depth. These dimensions are however small, compared to those of the tubes from Drigg, one of which was traced to a depth of not less than thirty feet.

The internal surface is completely vitrified, glossy, and smooth. A small fragment examined under the micro-

* Geolog. Transact., vol. ii., p. 528.

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scope, appeared, from the number of minute entangled air or perhaps steam bubbles, like an assay fused before the blowpipe. The sand is entirely, or in greater part, siliceous; but some points are of a black colour, and from their glossy surface possess a metallic lustre. The thickness of the wall of the tube varies from a thirtieth to a twentieth of an inch, and occasionally even equals a tenth. On the outside, the grains of sand are rounded, and have a slightly glazed appearance: I could not distinguish any sign of crystallization. In a similar manner to that described in the Geological Transactions, the tubes are generally compressed, and have deep longitudinal furrows, so as closely to resemble a shrivelled vegetable stalk, or the bark of the elm or cork tree. Their circumference is about two inches, but in some fragments which are cylindrical and without any furrows, it is double, or four inches. The compression from the surrounding loose sand, acting while the tube was still softened from the effects of the intense heat, has evidently caused the creases or furrows. Judging from the uncompressed fragments, the measure or bore of the lightning (if such a term may be used), must have been about one inch and a quarter. At Paris, M. Hachette and M. Beaudant* succeeded in making tubes, in most respects similar to these fulgurites, by passing very strong shocks of galvanism through finely-powdered glass: when salt was added, so as to increase its fusibility, the tubes were larger in every dimension. They failed both with powdered felspar and quartz. One tube, formed with pounded glass, was very nearly an inch long, namely, .982, and had an internal diameter of .019. When we hear that the strongest battery in Paris was used, and that the effect on a substance of such easy fusibility as glass, was to form tubes so diminutive, we must feel greatly astonished at the power of a shock of lightning, which, striking the sand in several places, has formed a cylinder, in one instance of at least thirty feet long, and

* Annales de Chimie et de Physique, tom. xxxvii., p. 319.

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having an internal bore, where not compressed, of full an inch and a half; and this in a material so extraordinarily refractory as quartz!

The tubes, as I have already remarked, enter the sand nearly in a vertical direction. One, however, which was less regular than the generality, had a deviation from a right line, which amounted, at the most considerable bend, to thirty-three degrees. From this same tube, two small branches, about a foot apart, were sent off; one pointed downwards, and the other upwards. This latter case is remarkable, as the electric fluid must have turned back at the acute angle of 26°, to the line of its main course. Besides the four tubes which I found vertical, and traced beneath the surface, there were several other groups of fragments, the original site of which without doubt was near. All occurred in a level area, sixty yards by twenty, of shifting sand, situated among some high sand-hillocks; and at the distance of about half a mile, from a chain of hills four or five hundred feet in height. The most remarkable circumstance, as it appears to me, in this case as well as in that of Drigg, and in one described by M. Ribbentrop in Germany, is the number of tubes found within such limited spaces. At Drigg, within an area of fifteen yards, three were observed, and the same number occurred in Germany. In the case which I have described, certainly more than four existed within the space of the sixty by twenty yards. As it does not appear probable that the tubes are produced by successive and distinct shocks, we must believe that the lightning, shortly before entering the ground, divides itself into separate branches.

The neighbourhood of the Rio Plata seems peculiarly subject to electric phenomena. In the year 1793,* one of the most destructive thunderstorms perhaps on record happened at Buenos Ayres: thirty-seven places within the city were struck by lightning, and nineteen people killed. From facts stated in several books of travels, I am inclined to suspect

* Azara's Voyage, vol. i., p. 36.

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that thunderstorms are very common near the mouths of great rivers. Is it not possible that the mixture of large bodies of fresh water with the salt may disturb the electrical equilibrium? Even during our occasional visits to this part of South America, we heard of a ship, two churches, and a house, having been struck. Both the church and the house I saw shortly afterwards: the house belonged to Mr. Hood, the consul-general at Monte Video. Some of the effects were curious: the paper, for nearly a foot on each side of the line where the bell-wires had run, was blackened. The metal had been fused, and although the room was at least fifteen feet high, the globules dropping on the chairs and furniture, had drilled in them a chain of minute holes. A part of the wall was shattered as if by gunpowder, and the fragments had been blown off with force sufficient to dent the walls on the opposite side of the room. The frame of a looking-glass was blackened, and the gilding must have been volatilized, for a smelling-bottle, which stood on the chimney-piece, was coated with bright metallic particles, which adhered as firmly as if they had been enamelled.

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CHAPTER IV.

Rio Negro—Estancias attacked by Indians—Salt lakes, geological position of—Flamingoes—R. Negro to Colorado—Sacred tree—Patagonian hare—Indian families—General Rosas—Proceed to Bahia Blanca—Sand dunes—Negro lieutenant—Bahia Blanca—Ground incrusted with Glauber salt—Punta Alta—Zorillo.

RIO NEGRO TO BAHIA BLANCA.

JULY 24TH, 1833.—The Beagle sailed from Maldonado, and on August the 3d she arrived off the mouth of the Rio Negro. This is the principal river on the whole line of coast between the Straits of Magellan and the Plata. It enters the sea about three hundred miles south of the estuary of the latter. About fifty years since, under the old Spanish government, a small colony was established here; and it is still the most southern position (lat. 41°) on this eastern coast of America which is inhabited by civilized man.

The country near the mouth of the river is wretched in the extreme: on the south side a long line of perpendicular cliffs commences, which exposes a section of the geological nature of the country. The strata are of sandstone, and one layer was remarkable, from being composed of a firmly-cemented conglomerate of pumice pebbles, which must have travelled more than four hundred miles, from the Andes. The surface is every where covered up by a thick bed of gravel, which extends far and wide over the open plain. Water is extremely scarce, and, where found, is almost invariably brackish. The vegetation is scanty; and although there are bushes of many kinds, all are armed with formidable thorns, which seem to warn the stranger not to enter on these inhospitable regions.

The settlement is situated eighteen miles up the river. The road follows the foot of the sloping cliff, which forms

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the northern boundary of the great valley, in which the Rio Negro flows. On the way we passed the ruins of some fine "estancias," which a few years since were destroyed by the Indians. They withstood several attacks. A man present at one gave me a very lively description of what took place. The inhabitants had sufficient notice to drive all the cattle and horses into the "corral"* which surrounded the house, and likewise to mount some small cannon. The Indians were Araucanians from the south of Chile; several hundreds in number, and highly disciplined. They first appeared in two bodies on a neighbouring hill; having there dismounted, and taken off their fur mantles, they advanced naked to the charge. The only weapon of an Indian is a very long bamboo or chuzo, ornamented with ostrich feathers, and pointed by a sharp spear head. My informer seemed to remember with the greatest horror the quivering of these chuzos as they approached near. When close, the cacique Pincheira hailed the besieged to give up their arms, or he would cut all their throats. As this would probably have been the result of their entrance under any circumstances, the answer was given by a volley of musketry. The Indians, with great steadiness, came to the very fence of the corral: but to their surprise they found the posts fastened together by iron nails instead of leather thongs, and, of course, in vain attempted to cut them with their knives. This saved the lives of the Christians: many of the wounded Indians were carried away by their companions; and at last one of the under caciques being wounded, the bugle sounded a retreat. They retired to their horses, and seemed to hold a council of war. This was an awful pause for the Spaniards, as all their ammunition, with the exception of a few cartridges, was expended. In an instant the Indians mounted their horses, and galloped out of sight. Another attack was still more quickly repulsed. A cool Frenchman managed the gun; he

* The corral is an enclosure made of tall and strong stakes. Every estancia, or farming estate, has one attached to it.

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stopped till the Indians approached close, and then raked their line with grape-shot: he thus laid thirty-nine of them on the ground; and, of course, such a blow immediately routed the whole party.

The town is indifferently called El Carmen or Patagones. It is built on the face of a cliff which fronts the river, and many of the houses are excavated even in the sandstone. The river is about two or three hundred yards wide, and is deep and rapid. The many islands, with their willow-trees, and the flat headlands, seen one behind the other on the northern boundary of the broad green valley, forms, by the aid of a bright sun, a view almost picturesque. The number of inhabitants does not exceed a few hundreds. These Spanish colonies do not, like our British ones, carry within themselves the elements of growth. Many Indians of pure blood reside here: the tribe of the Cacique Lucanee constantly have their Toldos* on the outskirts of the town. The local government partly supplies them with provisions, by giving them all the old, worn out horses, and they earn a little by making horse-rugs and other articles of riding gear. These Indians are considered civilized; but what their character may have gained by a lesser degree of ferocity, is almost counterbalanced by their entire immorality. Some of the younger men are, however, improving; they are willing to labour, and a short time since a party went on a sealing voyage, and behaved very well. They were now enjoying the fruits of their labour, by being dressed in very gay, clean clothes, and by being very idle. The taste they showed in their dress was admirable; if you could have turned one of these young Indians into a statue of bronze, his drapery would have been perfectly graceful.

One day I rode to a large salt lake, or Salina, which is distant fifteen miles from the town. During the winter it consists of a shallow lake of brine, which in summer is converted into a field of snow-white salt. The layer near the

* The hovels of the Indians are thus called.

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margin is from four to five inches thick, but towards the centre its thickness increases. This lake was two and a half miles long, and one broad. Others occur in the neighbourhood many times larger, and with a floor of salt, two and three feet in thickness, even when under water during the winter. One of these brilliantly-white and level expanses, in the midst of the brown and desolate plain, offers an extraordinary spectacle. A large quantity of salt is annually drawn from the salina; and great piles, some hundred tons in weight, were lying ready for exportation. It is singular that the salt, although well crystallized, and appearing quite pure, does not answer so well for preserving meat as sea salt from the Cape de Verd Islands. Although the latter is necessarily much dearer, it is constantly imported and mixed with the salt procured from these salinas. A merchant at Buenos Ayres told me that he considered the Cape de Verd salt worth fifty per cent. more than that from the Rio Negro. The season for working the salinas forms the harvest of Patagones; for on it, the prosperity of the place depends. Nearly the whole population encamps on the banks of the river, and the people are employed in drawing out the salt in bullock-waggons.

The border of the lake is formed of mud: and in this numerous large crystals of gypsum, some of which are three inches long, lie embedded; whilst on the surface, others of sulphate of magnesia lie scattered about. The Gauchos call the former the "Padre del sal," and the latter the "Madre"; they state that these progenitive salts always occur on the borders of the salinas, when the water begins to evaporate. The mud is black, and has a fetid odour. I could not, at first, imagine the cause of this, but I afterwards perceived that the froth, which the wind drifted on shore was coloured green, as if by confervæ: I attempted to carry home some of this green matter, but from an accident failed. Parts of the lake seen from a short distance appeared of a reddish colour, and this, perhaps, was owing to some infusorial animalcula. The mud in many places was thrown up by numbers of

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some kind of worm, or annelidous animal. How surprising it is that any creatures should be able to exist in a fluid, saturated with brine, and that they should be crawling among crystals of sulphate of soda and lime! And what becomes of these worms when, during a long summer, the surface at least is hardened into a solid layer of salt? Flamingoes* in considerable numbers inhabit this lake; they breed here, and their bodies are sometimes found by the workmen, preserved in the salt. I saw several wading about in search of food,—probably for the worms which burrow in the mud; and these latter, perhaps, feed on infusoria or confervæ. Thus we have a little world within itself, adapted to these little inland seas of brine.†

With respect to the geological position of the salinas, they occur either in the plains composed of shingle, and overlying various deposits, or within the grand calcareo-argillaceous formation of the Pampas. The only rule I can discover, is, that they do not occur where the substratum is granitic, as in Brazil and Banda Oriental. I know of their occasional existence over the immense territory extending from lat. 23°, near the Rio Vermejo, to 50° south. The climate may generally be considered as rather dry; at least, such is the case in Patagonia, where the salinas are most numerous. Those which I saw occurred in depressions,

* Throughout South America, the flamingo appears singularly attached to salt lakes. I saw instances of this throughout Patagonia, in the Cordillera of Northern Chile, and at the Galapagos Islands.

† In the Linnæan Transactions, vol. xi., p. 205, a minute crustaceous animal is described, under the name of *Cancer salinus*. It is said to occur in countless numbers in the brine pans at Lymington; but only in those in which the fluid has attained, from evaporation, considerable strength; namely, about a quarter of a pound of salt to a pint of water. This cancer is said, also, to inhabit the salt lakes of Siberia. Well may we affirm, that every part of the world is habitable! Whether lakes of brine, or those subterranean ones hidden beneath volcanic mountains—warm mineral springs; the wide expanse and depths of the ocean; the upper regions of the atmosphere; and even the surface of perpetual snow;—all support organic beings.

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whence there was no exit; in a more humid climate the water flowing from the lake would soon have hollowed a channel in the soft strata, and thus converted the depression of the soil into an ordinary valley. There is reason to believe that the whole of these great plains have been raised above the level of the sea within a recent geological period. May we not then consider the salinas as the receptacles of the washings of the sedimentary strata? On this idea we understand their absence where the land is granitic. It is manifest that these great natural evaporating dishes can only occur where the amount of annual rain is small.*

To the northward of the Rio Negro, between it and the inhabited country near Buenos Ayres, the Spaniards have only one small settlement, recently established at Bahia Blanca. The distance in a straight line to the capital is very nearly five hundred British miles. The wandering tribes of horse Indians, which have always occupied the greater part of this country, having of late much harassed the outlying estancias, the government at Buenos Ayres equipped some time since an army under the command of General Rosas for the purpose of exterminating them. The troops were now encamped on the banks of the Colorado; a river lying about eighty miles to the northward of the Rio Negro. When General Rosas left Buenos Ayres, he struck in a direct line across the unexplored plains: and as the country was thus pretty well cleared of Indians, he left behind him, at wide

* Almost every circumstance here mentioned, occurs in the salt lakes near the borders of the Caspian. That country, like Patagonia, appears to have been recently elevated above the waters of the sea. Pallas states that the salt lakes occupy shallow depressions in the steppes; that the mud on the borders in every case is black and fetid; that beneath the crust of sea salt, sulphate of magnesia occurs, imperfectly crystallized; that the muddy sand is mixed with lentils of gypsum. We have before stated that these lakes are inhabited by small crustaceous animals; and flamingoes (Edin. New Philos. Jour., Jan. 1830) likewise frequent them. As these circumstances, apparently so trifling, occur in two distant continents, we may feel sure they are the necessary results of some common cause.—See *Pallas's Travels*, 1793 to 1794, p. 129—134.

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intervals, a small party of soldiers, with a troop of horses (a *posta*), so as to be enabled to keep up a communication with the capital. As the Beagle intended to call at Bahia Blanca, I determined to proceed there by land; and ultimately I extended my plan so as to travel the whole way by the postas to Buenos Ayres.

August 11th.—Mr. Harris, an Englishman residing at Patagones, a guide, and five Gauchos, who were proceeding to the army on business, were my companions on the journey. The Colorado, as I have already said, is nearly eighty miles distant: and as we travelled slowly, we were two days and a half on the road. The whole line of country deserves scarcely a better name than that of a desert. Water is found only in two small wells: it is called fresh; but even at this time of the year, during the rainy season, it was quite brackish. In the summer this must be a distressing passage; for now it was sufficiently desolate. The valley of the Rio Negro, broad as it is, has merely been excavated out of the sandstone plain; for immediately above the bank on which the town stands, a level country commences, which is interrupted only by a few trifling valleys and depressions. Every where the landscape wears the same sterile aspect; a dry gravelly soil supports tufts of brown withered grass, and low scattered bushes, armed with thorns.

Shortly after passing the first spring we came in sight of a famous tree, which the Indians reverence as the altar of Walleechu. It is situated on a high part of the plain, and hence is a landmark visible at a great distance. As soon as a tribe of Indians come in sight of it, they offer their adorations by loud shouts. The tree itself is low, much branched, and thorny. Just above the root it has a diameter of about three feet. It stands by itself without any neighbour, and was indeed the first tree we saw; afterwards we met with a few others of the same kind, but they were far from common. Being winter the tree had no leaves, but in their place numberless threads, by which the various offerings, such as cigars, bread, meat, pieces of cloth, &c.,

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had been suspended. Poor people not having any thing better, only pulled a thread out of their ponchos, and fastened it to the tree. The Indians, moreover, were accustomed to pour spirits and maté into a certain hole, and likewise to smoke upwards, thinking thus to afford all possible gratification to Walleechu. To complete the scene, the tree was surrounded by the bleached bones of the horses which had been slaughtered as sacrifices. All Indians of every age and sex, made their offerings; they then thought that their horses would not tire, and that they themselves should be prosperous. The Gaucho who told me this, said that in the time of peace he had witnessed this scene, and that he and others used to wait till the Indians had passed by, for the sake of stealing their offerings from Walleechu.

The Gauchos think that the Indians consider the tree as the god itself; but it seems far more probable that they regard it as the altar. The only cause which I can imagine for this choice, is its being a landmark in a dangerous passage. The Sierra de la Ventana is visible at an immense distance; and a Gaucho told me that he was once riding with an Indian a few miles to the north of the Rio Colorado, when the latter commenced making the same loud noise, which is usual at the first sight of the distant tree; putting his hand to his head, and then pointing it in the direction of the Sierra. Upon being asked the reason of this, the Indian said in broken Spanish, "First see the Sierra." This likewise would render it probable that the utility of a distant landmark is the first cause of its adoration. About two leagues beyond this curious tree we halted for the night: at this instant an unfortunate cow was spied by the lynx-eyed Gauchos. Off they set in chase, and in a few minutes she was dragged in by the lazo, and slaughtered. We here had the four necessaries of life "en el campo,"—pasture for the horses, water (only a muddy puddle), meat, and firewood. The Gauchos were in high spirits at finding all these luxuries; and we soon set to work at the poor cow. This was the first night which I had ever passed

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under the open sky, with the gear of the recado for my bed. There is high enjoyment in the independence of the Gaucho life—to be able at any moment to pull up your horse, and say, "Here we will pass the night." The deathlike stillness of the plain, the dogs keeping watch, the gipsy-group of Gauchos making their beds round the fire, have left in my mind a strongly-marked picture of this first night, which will not soon be forgotten.

The next day the country continued similar to that above described. It is inhabited by few birds or animals. Occasionally a deer, or a Guanaco (wild Llama) may be seen; but the Agouti (*Cavia Patagonica*) is the commonest quadruped. This animal here represents our hares. It differs, however, from that genus in many essential respects; for instance, it has only three toes behind. It is also nearly twice the size, weighing from twenty to twenty-five pounds. The Agouti is a true friend to the desert; it is a common feature in the landscape to see two or three hopping quickly one after the other in a straight line across these wild plains. On the eastern side of America their northern limit is formed by the Sierra Tapalguen (lat. 37° 30′), where the plains rather suddenly become greener and more humid. The limit certainly depends on this change, for near Mendoza (lat. 33° 30′), which is much further north, but where the country is very sterile, I again met the Agouti. It is not evident by what circumstances their southern limit is governed; it occurs between Port Desire and St. Julian (about 48° 30′), where there is no change in the kind of land, and only a trifling and gradual one of temperature. It is a singular fact, that although the Agouti is not now found so far south as Port St. Julian, yet that Captain Wood, in his voyage in 1670, talks of them as being numerous there. What cause can have altered, in a wide, uninhabited, and rarely-visited country, the range of an animal like this? It appears, also, from the number shot in one day at Port Desire, that they must have been considerably more abundant there formerly than at present. Azara states that the Agouti never ex-

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cavates its own burrow, but uses that of the Bizcacha. Wherever this animal is present, without doubt this is true; but on the sandy plains of Bahia Blanca, where the Bizcacha is not found, the Gauchos maintain that the Agouti is its own workman. The same thing occurs with the little owls of the Pampas (*Noctua cunicularia*), which have so often been described as standing like sentinels at the mouths of the burrows; for in Banda Oriental, owing to the absence of the Bizcacha, they are obliged to hollow out their own habitations. Azara also says that the Agouti, except when pressed by danger, does not enter its burrow: on this point I must again differ from that high authority. At Bahia Blanca I have repeatedly seen two or three of these animals sitting on their haunches by the mouths of their holes, which, as I passed by at a distance, they quietly entered. Daily in the neighbourhood of these spots the Agouti were abundant: but differently from most burrowing animals, it wanders, commonly two or three together, to miles or leagues from its home; nor do I know whether it returns at night. The Agouti feeds and roams about by day; is shy and watchful; does not squat, or so rarely that I never saw an instance of this; it cannot run very fast; and, therefore, is frequently caught by a couple of dogs, even of mixed breed. Its manner of running more resembles that of a rabbit than of a hare. The Agouti generally produces two young ones at a birth, which are brought forth within the burrow. The flesh, when cooked, is very white; it is, however, rather tasteless and dry.

The next morning, as we approached the Rio Colorado, the appearance of the country changed; we soon came on a plain covered with turf, which, from its flowers, tall clover, and little owls, resembled the Pampas. We passed also a muddy swamp of considerable extent, which in summer dries, and becomes incrusted with various salts; and hence is called a salitral. It was covered by low succulent plants, of the same kind with those growing on the sea-shore. The Colorado, at the pass where we crossed it, is only about

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sixty yards wide; generally it must be nearly double that width. Its course is very tortuous, being marked by willow-trees and beds of reeds: in a direct line the distance to the mouth of the river is said to be nine leagues, but by water twenty-five. We were delayed crossing in the canoe by some immense troops of mares, which were swimming the river in order to follow a division of troops into the interior. A more ludicrous spectacle I never beheld, than the hundreds of heads, all directed one way, with pointed ears and distended nostrils, appearing just above the water like a great shoal of some amphibious animals. Mare's flesh is the only food which the soldiers have when on an expedition. This gives them a very great facility of movement; for the distance to which horses can be driven over these plains is quite surprising: I have been assured that an unloaded horse can travel a hundred miles a day for many days successively.

The encampment of General Rosas was close to the river. It consisted of a square formed by waggons, artillery, straw huts, &c. The soldiers were nearly all cavalry; and I should think such a villanous, banditti-like army, was never before collected together. The greater number of men were of a mixed breed, between Negro, Indian, and Spaniard. I know not the reason, but men of such origin seldom have a good expression of countenance. I called on the secretary to show my passport. He began to cross-question me in the most dignified and mysterious manner. By good luck I had a letter of recommendation from the government of Buenos Ayres* to the commandant of Patagones. This was taken to General Rosas, who sent me a very obliging message; and the secretary returned all smiles and graciousness. We took up our residence in the *rancho*, or hovel, of a curious old Spaniard, who had served with Napoleon in the expedition against Russia.

We staid two days at the Colorado; I had little to do, for

* I am bound to express, in the strongest terms, my obligation to the Government of Buenos Ayres for the obliging manner in which passports to all parts of the country were given me, as naturalist of the Beagle.

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the surrounding country was a swamp, which in summer, (December) when the snow melts on the Cordillera, is overflowed by the river. My chief amusement was watching the Indian families as they came to buy little articles at the rancho, where we staid. It was supposed that General Rosas had about six hundred Indian allies. The men were a tall, fine race, yet it was afterwards easy to see in the Fuegian savage the same countenance rendered hideous by cold, want of food, and less civilization. Some authors, in defining the primary races of mankind, have separated these Indians into two classes; but I cannot think this is correct. Among the young women or chinas, some deserve to be called even beautiful. Their hair was coarse, but bright and black; and they wore it in two plaits hanging down to the waist. They had a high colour, and eyes that glistened with brilliancy; their legs, feet, and arms were small and elegantly formed; their ankles, and sometimes their waists, were ornamented by broad bracelets of blue beads. Nothing could be more interesting than some of the family groups. A mother with one or two daughters would often come to our rancho, mounted on the same horse. They ride like men, but with their knees tucked up much higher. This habit, perhaps, arises from their being accustomed, when travelling, to ride the loaded horses. The duty of the women is to load and unload the horses; to make the tents for the night; in short to be, like the wives of all savages, useful slaves. The men fight, hunt, take care of the horses, and make the riding gear. One of their chief indoor occupations is to knock two stones together till they become round. The bolas is a very important weapon to the Indian; for with it he catches his game, and also his horse which roams free over the plain. In fighting, his first attempt is to throw the horse of his adversary with the bolas, and when entangled by the fall to kill him with the chuzo. If the balls only catch the neck or body of an animal, they are often carried away and lost. As the making the stones round is the labour of two days, the manufacture of the balls is a very common employment.

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Several of the men and women had their faces painted red, but I never saw the horizontal bands which are so common among the Fuegians. Their chief pride consists in having every thing made of silver; I have seen a cacique with his spurs, stirrups, handle of his knife, and bridle made of this metal: the head-stall and reins being of wire, were not thicker than whipcord; and to see a fiery steed, wheeling about under the command of so light a chain, gave to the horsemanship a remarkable character of elegance.

General Rosas intimated a wish to see me; a circumstance which I was afterwards very glad of. He is a man of an extraordinary character, and has a most predominant influence in the country, which it seems probable he will use to its prosperity and advancement. He is said to be the owner of seventy-four square leagues of land, and to have about three hundred thousand head of cattle. His estates are admirably managed, and are far more productive of corn than any others. He first gained his celebrity by his laws for his own estancias, and by disciplining several hundred men, so as to resist with success the attacks of the Indians. There are many stories current about the rigid manner in which his laws were enforced. One of these was, that no man, on penalty of being put into the stocks, should carry his knife on a Sunday: this day being the principal one for gambling and drinking, many quarrels arose, which from the general manner of fighting with the knife often proved fatal. One Sunday the Governor came in great form to pay the Estancia a visit, and General Rosas, in his hurry, walked out to receive him with his knife, as usual, stuck in his belt. The steward touched his arm, and reminded him of the law; upon which turning to the Governor, he said he was extremely sorry, but that he must go into the stocks, and that till let out, he possessed no power even in his own house. After a little time the steward was persuaded to open the stocks, and to let him out, but no sooner was this done, than he turned to the steward and said, "You now have broken the laws, so you must take my place in the stocks."

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Such actions as these delighted the Gauchos, who all possess high notions of their own equality and dignity.

General Rosas is also a perfect horseman—an acomplishment of no small consequence in a country where an assembled army elected its general by the following trial: A troop of unbroken horses being driven into a corral, were let out through a gateway, above which was a cross-bar: it was agreed, whoever should drop from the bar on one of these wild animals, as it rushed out, and should be able without saddle or bridle, not only to ride it, but also to bring it back to the door of the corral, should be their general. The person who succeeded was accordingly elected; and doubtless made a fit general for such an army. This extraordinary feat has also been performed by Rosas.

By these means, and by conforming to the dress and habits of the Gauchos, he has obtained an unbounded popularity in the country, and in consequence a despotic power. I was assured by an English merchant, that a man who had murdered another, when arrested and questioned concerning his motive, answered, "He spoke disrespectfully of General Rosas, so I killed him." At the end of a week the murderer was at liberty. This doubtless was the act of the general's party, and not of the general himself.

In conversation he is enthusiastic, sensible, and very grave. His gravity is carried to a high pitch: I heard one of his mad buffoons (for he keeps two, like the barons of old) relate the following anecdote: "I wanted very much to hear a certain piece of music, so I went to the general two or three times to ask him; he said to me, 'Go about your business, for I am engaged.' I went a second time; he said, 'If you come again I will punish you.' A third time I asked, and he laughed. I rushed out of the tent, but it was too late; he ordered two soldiers to catch and stake me. I begged by all the Saints in heaven, he would let me off; but it would not do;—when the general laughs he spares neither mad man or sound." The poor flighty gentleman looked quite dolorous, at the very recollection of the staking. This

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is a very severe punishment; four posts are driven into the ground, and the man is extended by his arms and legs horizontally, and there left to stretch for several hours. The idea is evidently taken from the usual method of drying hides. My interview passed away without a smile, and I obtained a passport and order for the government post-horses, and this he gave me in the most obliging and ready manner.

In the morning we started for Bahia Blanca, which we reached in two days. Leaving the regular encampment, we passed by the toldos of the Indians. These are round like ovens, and covered with hides; by the mouth of each a tapering chuzo was stuck in the ground. The toldos were divided into separate groups, which belonged to the different caciques' tribes, and the groups were again divided into smaller ones, according to the relationship of the owners. For several miles we travelled along the valley of the Colorado. The alluvial plains on the side appeared fertile, and it is supposed that they are well adapted to the growth of corn. Turning northward from the river, we soon entered on a country, differing from those plains that extend south of the river. The land still continued dry and sterile; but it supported many different kinds of plants, and the grass, though brown and withered, was more abundant, as the thorny bushes were less so. These latter in a short space entirely disappeared, and the plains were left without a thicket to cover their nakedness. This change in the vegetation marks the commencement of the grand calcareo-argillaceous deposit, which I have already noticed as forming the wide extent of the Pampas, and as covering the granitic rocks of Banda Oriental. From the Strait of Magellan to the Colorado, a distance of about eight hundred miles, the face of the country is every where composed of shingle: the pebbles are chiefly of porphyry, and probably owe their origin to the rocks of the Cordillera. North of the Colorado the bed thins out, and the pebbles become exceedingly small, and here the characteristic vegetation of Patagonia ceases.

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Having ridden about twenty-five miles, we came to a broad belt of sand-dunes, which stretch, as far as the eye can reach, to the east and west. The sand-hillocks resting on the clay, allow small pools of water to collect, and thus afford, in this dry country, an invaluable supply of fresh water. The great advantage arising from depressions and elevations of the soil, is not often brought home to the mind. The two miserable springs in the long passage between the Rio Negro and Colorado were caused by trifling inequalities in the plain; without them not a drop of water would have been found. The belt of sand-dunes is about eight miles wide; at some former period, it probably formed the margin of a grand estuary, where the Colorado now flows. In this district, where absolute proofs of the recent elevation of the land occur, such speculations can hardly be neglected by any one, although merely considering the physical geography of the country. Having crossed the sandy tract, we arrived in the evening at one of the post-houses; and, as the fresh horses were grazing at a distance, we determined to pass the night there.

The house was situated at the base of a ridge, between one and two hundred feet high—a most remarkable feature in this country. This posta was commanded by a negro lieutenant, born in Africa: to his credit be it said, there was not a rancho between the Colorado and Buenos Ayres in nearly such neat order as his. He had a little room for strangers, and a small corral for the horses, all made of sticks and reeds; he had also dug a ditch round his house, as a defence in case of being attacked. This would, however, have been of little avail, if the Indians had come; but his chief comfort seemed to rest in the thought of selling his life dearly. A short time before, a body of Indians had travelled past in the night; if they had been aware of the posta, our black friend and his four soldiers, would assuredly have been slaughtered. I did not any where meet a more civil and obliging man, than this negro; it was therefore the more painful to see that he would not sit down and eat with us.

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In the morning we sent for the horses very early, and started for another exhilarating gallop. We passed the Cabeza del Buey, an old name given to the head of a large marsh, which extends from Bahia Blanca. Here we changed horses, and passed through some leagues of swamps and saltpetre marshes. Changing horses for the last time, we again began wading through the mud. My animal fell, and I was well soused in black mire—a very disagreeable accident, when one does not possess a change of clothes. Some miles from the fort we met a man, who told us that a great gun had been fired, which is a signal that Indians are near. We immediately left the road, and followed the edge of a marsh, which when chased offers the best mode of escape. We were glad to arrive within the walls, when we found all the alarm was about nothing, for the Indians turned out to be friendly ones, who wished to join General Rosas.

Bahia Blanca scarcely deserves the name of a village. A few houses and the barracks for the troops are enclosed by a deep ditch and fortified wall. The settlement is only of recent standing (since 1828); and its growth has been one of trouble. The government of Buenos Ayres did not follow the wise example of the Spanish viceroys in purchasing the land from the Indians, as they did with the Rio Negro, but unjustly occupied it by force. Hence the need of the fortifications; hence the few houses and little cultivated land without the limits of the walls: even the cattle are not safe from the attacks of the Indians beyond the boundaries of the plain, on which the fortress stands.

The part of the harbour where the Beagle intended to anchor being distant twenty-five miles, I obtained from the Commandant a guide and horses, to take me to see whether she had arrived. Leaving the plain of green turf, which followed the course of the little brook, we soon entered on a wide level waste, consisting either of sand, saline marshes, or bare mud. Some parts were clothed by low thickets, and others with those succulent plants, which luxuriate only

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where salt abounds. Bad as the country was, ostriches, deer, cavies, and armadilloes, were abundant. My guide told me, that two months before he had a most narrow escape of his life: he was out hunting, at no great distance from this part of the country, with two other men, when they were suddenly met by a party of Indians, who giving chase, soon overtook and killed his two friends. His own horse's legs were also caught by the bolas; but he jumped off, and with his knife cut them free: while doing this he was obliged to dodge round his horse, and received two severe wounds from their chuzos. Springing on the saddle, he managed, by a most wonderful exertion, just to keep ahead of the long spears of his pursuers, who followed him to within sight of the fort. From that time there was an order that no one should stray far from the settlement. I did not know of this when I started, and was surprised to observe how earnestly my guide watched a deer, which appeared to have been frightened from a distant quarter.

We found the Beagle had not arrived, and consequently set out on our return, but the horses soon tiring, we were obliged to bivouac on the plain. In the morning we had caught an armadillo, which, although a most excellent dish when roasted in its shell, did not make a very substantial breakfast and dinner for two hungry men. The ground at the place where we stopped for the night, was incrusted with a layer of Glauber salt, and hence, of course, was without water. Yet many of the smaller rodents managed to exist even here, and the tucutuco was making its odd little grunt beneath my head, during half the night. Our horses were very poor ones, and in the morning they were soon exhausted from not having had any thing to drink, so that we were obliged to walk. About noon the dogs killed a kid, which we roasted. I eat some of it, but it made me intolerably thirsty. This was the more distressing as the road, from some recent rain, was full of little puddles of clear water, yet not a drop was drinkable. I had scarcely

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been twenty hours without water, and only part of the time under a hot sun, yet the thirst rendered me very weak. How people survive two or three days under such circumstances, I cannot imagine: at the same time, I must confess that my guide did not suffer at all, and was astonished that one day's deprivation should be so troublesome to me.

I have several times alluded to the surface of the ground being incrusted with salt. This phenomenon is quite different from that of the salinas, and much more extraordinary. In many parts of South America, wherever the climate is moderately dry, these incrustations occur; but I have nowhere seen them so abundant as near Bahia Blanca. The salt here consists of a large proportion of sulphate of soda mixed with a very little of the common muriate. As long as the ground remains moist in these salitrales (as the Spaniards improperly call them, mistaking this substance for saltpetre), nothing is to be seen but an extensive plain composed of a black, muddy soil, supporting scattered tufts of succulent plants. I was therefore much surprised, after a week's hot weather, when I first saw square miles of country, that I had previously ridden over in the former condition, white, as if from a slight fall of snow which the wind had heaped up into partial drifts. This latter appearance is chiefly due to the tendency which the salt has to crystallize, like hoar-frost, round the blades of grass, stumps of wood, or on the top of the broken ground, in lieu of the bottoms of the puddles of water. The salinas, as a general rule, occur in depressions on the more elevated plains; the salitrales, either on level tracts elevated a few feet above the level of the sea, and appearing as if lately inundated, or on alluvial land bordering rivers. In this latter case, although I am not absolutely certain, I have strong reasons for believing that the salt is often removed by the waters of the river, and is again reproduced. Several circumstances incline me to think that the black, muddy soil, generates the sulphate of soda. The whole phenomenon is well worthy the

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attention of naturalists: what can be more singular than thus to see square miles of country thinly crusted over with Glauber salt? It may be asked whether plants do not decompose the muriate of soda? but whence comes the sulphuric acid? In Peru, nitrate of soda occurs in beds far thicker than these of the sulphate. Both cases are equally mysterious. I suspect that, as a general rule, the salts of soda are infinitely more common in South America than those of potash.

Two days afterwards, I again rode to the harbour, but to a nearer part of it. When not far from our destination, my companion, the same man as before, spied three people hunting on horseback. He immediately dismounted, and watching them intently, said, "They don't ride like Christians, and nobody can leave the fort." The three hunters joined company, and likewise dismounted from their horses. At last one mounted again and rode over the hill out of sight. My companion said, "We must now get on our horses: load your pistol;" and he looked to his own sword. I asked, "Are they Indians?"—"Quien sabe? (who knows?) if there are no more than three, it does not signify." It then struck me, that the one man had gone over the hill to fetch the rest of his tribe. I suggested this; but all the answer I could extort was, "Quien sabe?" His head and eye never for a minute ceased scanning slowly the distant horizon. I thought his uncommon coolness too good a joke, and asked him why he did not return home. I was startled when he answered, "We are returning, but in a line so as to pass near a swamp, into which we can gallop the horses as far as they can go, and then trust to our own legs; so that there is no danger." I did not feel quite so confident of this, and wanted to increase our pace. He said, "No, not until they do." When any little inequality concealed us, we galloped; but when in sight continued walking. At last we reached a valley, and turning to the left, galloped quickly to the foot of a hill, he gave me his horse to hold, made the dogs lie down, and then crawled on his hands and knees to reconnoitre. He re-

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mained in this position for some time, and at last, bursting out in laughter, exclaimed, "Mugeres!" (women!) He knew them to be the wife and sister-in-law of the major's son, hunting for ostrich's eggs. I have described this man's conduct, because he acted under the full impression that they were Indians. As soon, however, as the absurd mistake was found out, he gave me a hundred reasons, why they could not have been Indians; but all these were forgotten at the time. We then rode on in peace and quietness to a low point called Punta Alta, whence we could see nearly the whole of the great harbour of Bahia Blanca.

The wide expanse of water is choked up by numerous great mud-banks, which the inhabitants call Cangrejales, or *crabberies*, from the number of small crabs. The mud is so soft, that it is impossible to walk over them, even for the shortest distance. Many of the banks have their surfaces covered with long rushes, the tops of which alone are visible at high water. On one occasion, when in a boat, we were so entangled by these shallows, that we could hardly find our way. Nothing was visible, but the flat beds of mud: the day was not very clear, and there was much refraction, or as the sailors expressed it, "things loomed high." The only object within our view, which was not level, was the horizon; rushes looked like bushes unsupported in the air, and water like mud-banks, and mud-banks like water.

We passed the night in Punta Alta, and I employed myself in searching for fossil bones; this point, being a perfect catacomb for monsters of extinct races. The evening was perfectly calm and clear; the extreme monotony of the view gave it an interest, even in the midst of mud-banks and gulls, sand-hillocks, and solitary vultures. In riding back in the morning, we came across a very fresh track of a Puma, but did not succeed in finding him. We saw also a couple of Zorillos, or skunks,—odious animals, which are far from uncommon. In general appearance the Zorillo resembles a polecat, but it is rather larger, and much thicker in proportion. Conscious of its power, it roams by day about

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the open plain, and fears neither dog nor man. If a dog is urged to the attack, its courage is instantly checked by a few drops of the fetid oil, which brings on violent sickness and running at the nose. Whatever is once polluted by it, is for ever useless. Azara says the smell can be perceived at a league distant; more than once, when entering the harbour of Monte Video, the wind being off shore, we have perceived the odour on board the Beagle. Certain it is, that every animal most willingly makes room for the Zorillo.

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CHAPTER V.

Bahia Blanca — Geology — Extinct quadrupeds, four Edentata, horse, ctenomys—Recent extinction—Longevity of species—Large animals do not require luxuriant vegetation—Southern Africa—Siberian fossils—Catalogue of extinct quadrupeds in South America—Two species of Ostrich, habits of—Tinochorus—Oven-bird—Armadilloes—Venomous snake, toad, lizard—Hybernation of animals—Habits of sea-pen—Indian wars and massacres—Arrow-head, antiquarian relic.

BAHIA BLANCA.

THE Beagle arrived on the 24th of August, and a week afterwards sailed for the Plata. With Captain Fitzroy's consent I was left behind, to travel by land to Buenos Ayres. I will here add some observations, which were made during this visit, and on a previous occasion, when the Beagle was employed in surveying the harbour. Not much can be made out respecting the geology. At the distance of some miles inland, an escarpment of a great argillaceo-calcareous formation of rock extends. The space near the coast consists of plains of hardened mud, and broad bands of sand-dunes, which present appearances, that can easily be accounted for by a rise of the land; and of this phenomenon,* although to a trifling amount, we have other proofs.

At Punta Alta, a low cliff, about twenty feet high, exposes a mass of partly consolidated shingle, irregularly interstratified with a reddish muddy clay, and containing numerous recent shells. We may believe a similar accumulation would now take place, on any point, where tides and waves were opposed. In the gravel a considerable number of bones were embedded. Mr. Owen, who has undertaken the description of these remains, has not yet examined them

* A few leagues further south, near the Bay of San Blas, M. D'Orbigny found great beds of recent shells elevated between 25 and 30 feet above the level of the sea.—Vol. ii., p. 43.

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with care; but the following list may give some idea of their nature: 1st, a tolerably perfect head of a megatherium, and a fragment and teeth of two others; 2d, an animal of the order Edentata, as large as a pony, and with great scratching claws; 3d and 4th, two great Edentata related to the megatherium, and both fully as large as an ox or horse; 5th, another equally large animal, closely allied or perhaps identical with the Toxodon (hereafter to be described), which had very flat grinding teeth, somewhat resembling those of a rodent; 6th, a large piece of the tesselated covering like that of the armadillo, but of gigantic size; 7th, a tusk which in its prismatic form, and in the disposition of the enamel, closely resembles that of the African boar; it is probable that it belonged to the same animal with the singular flat grinders. Lastly, a tooth in the same state of decay with the others: its broken condition does not allow Mr. Owen, without further comparison, to come to any definite conclusion; but the part that is perfect, resembles in every respect the tooth of the common horse.* All these remains were found embedded in a beach which is covered at spring tides; and the space in which they were collected could not have exceeded one hundred and fifty yards square. It is a remarkable circumstance that so many different species should be found together; and it proves how numerous in kind the ancient inhabitants of this country must have been.

At the distance of about thirty miles, in another cliff of red earth, I found several fragments of bones. Among them were the teeth of a rodent, much narrower, but even larger than those of the *Hydrochœrus capybara;* the animal which has been mentioned as exceeding in dimensions every existing member of its order. There was

* With respect to the remains of the last animal, as some doubt may be entertained by others, respecting its origin; it must be remarked, that it was fairly embedded in the gravel with the other bones; and that its state of decay was equal. To this circumstance it may be added, that the surrounding country is without fresh water, and is uninhabited, and that the settlement, itself only of five years standing, is twenty-five miles distant.

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also part of the head of a Ctenomys; the species being different from the Tucutuco, but with a close general resemblance.

The remains at Punta Alta were associated, as before remarked, with shells of existing species. These have not as yet been examined with scrupulous care, but it may be safely asserted, that they are most closely similar to the species now living in the same bay: it is also very remarkable, that not only the species, but the proportional numbers of each kind, are nearly the same with those now cast up on the pebble beaches. There are eleven marine species (some in an imperfect state), and one terrestrial. If I had not collected living specimens from the same bay, some of the fossils would have been thought extinct; for Mr. Sowerby, who was kind enough to look at my collection, had not previously seen them. We may feel certain that the bones have not been washed out of an older formation, and embedded in a more recent one, because the remains of one of the Edentata were lying in their proper relative position (and partly so in a second case); which could not have happened, without the carcass had been washed to the spot where the skeleton is now entombed.

We here have a strong confirmation of the remarkable law so often insisted on by Mr. Lyell, namely, that the "longevity of the species in the mammalia, is upon the whole inferior to that of the testacea."* When we proceed to the southern part of Patagonia, I shall have occasion to describe the case of an extinct camel, from which the same result may be deduced.

From the shells being littoral species (including one terrestrial), and from the character of the deposit, we may feel absolutely certain that the remains were embedded in a shallow sea, not far from the coast. From the position of the skeleton being undisturbed, and likewise from the fact that full-grown serpulæ were attached to some of the bones,

* Principles of Geology, vol. iv., p. 40.

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we know that the mass could not have been accumulated on the beach itself. At the present time, part of the bed is daily washed by the tide, while another part has been raised a few feet above the level of the sea. Hence we may infer, that the elevation has here been trifling, since the period when the mammalia, now extinct, were living. This conclusion is in harmony with several other considerations (such as the recent character of the beds underlying the Pampas deposit), but which I have not space in this work to enter on.

From the general structure of the coast of this part of South America, we are compelled to believe, that the changes of level have all (at least of late) been in one direction, and that they have been very gradual. If, then, we look back to the period when these quadrupeds lived, the land probably stood at a level, less elevated only by a few fathoms than at present. Therefore, its general configuration since that epoch cannot have been greatly modified; a conclusion which certainly would be drawn from the close similarity in every respect, between the shells now living in the bay (as well as in the case of the one terrestrial species) with those which formerly lived there.

The surrounding country, as may have been gathered from this journal, is of a very desert character. Trees nowhere occur, and only a few bushes, which are chiefly confined to depressions among the sand-hillocks, or to the borders of the saline marshes. Here, then, is an apparent difficulty: we have the strongest evidence that there has occurred no great physical change to modify the features of the country, yet in former days, numerous large animals were supported on the plains now covered by a thin and scanty vegetation.

That large animals require a luxuriant vegetation, has been a general assumption, which has passed from one work to another. I do not hesitate, however, to say that it is completely false; and that it has vitiated the reasoning of geologists, on some points of great interest in the ancient history of the world. The prejudice has probably been derived

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from India, and the Indian islands, where troops of elephants, noble forests, and impenetrable jungles, are associated together in every account. If, on the other hand, we refer to any work of travels through the southern parts of Africa, we shall find allusions in almost every page either to the desert character of the country, or to the numbers of large animals inhabiting it. The same thing is rendered evident by the many sketches which have been published of various parts of the interior. When the Beagle was at Cape Town, I rode a few leagues into the country, which at least was sufficient to render that which I had read more fully intelligible.

Dr. Andrew Smith, who, at the head of his adventurous party, has so lately succeeded in passing the Tropic of Capricorn, informs me that, taking into consideration the whole of the southern part of Africa, there can be no doubt of its being sterile country. On the southern and south-eastern coasts there are some fine forests, but with these exceptions, the traveller may pass, for days together, through open plains, covered by a poor and scanty vegetation. It is difficult to convey any accurate idea of degrees of comparative fertility; but it may be safely said, that the amount of vegetation supported at any one time* by Great Britain, exceeds, perhaps even tenfold, the quantity on an equal area, in the interior parts of Southern Africa. The fact that bullock-waggons can travel in any direction, excepting near the coast, without more than occasionally half an hour's delay, gives, perhaps, a more definite notion of its scantiness. Now if we look to the animals inhabiting these wide plains, we shall find their numbers extraordinarily great, and their bulk immense. We must enumerate the elephant, three species of rhinoceros, and as Dr. Smith is convinced two others also, the hippopotamus, giraffe, the bos caffer—as large as a full-grown bull, and the elan—but little less, two

* I mean by this to exclude the total amount, which may have been successively produced and consumed during a given period.

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zebras, and the quaccha, two gnus, and several antelopes even larger than these latter animals. It may be supposed that although the species are numerous, the individuals of each kind are few. By the kindness of Dr. Smith, I am enabled to show that the case is very different. He informs me, that in lat. 24°, in one day's march with the bullock-waggons, he saw, without wandering to any great distance on either side, between one hundred and one hundred and fifty rhinoceroses, which belonged to three species. That the same day he saw several herds of giraffes, amounting together to nearly a hundred; and that, although no elephant was observed, yet they are found in this district. At the distance of a little more than one hour's march from their place of encampment on the previous night, his party actually killed at one spot eight hippopotamoses, and saw many more. In this same river there were likewise crocodiles. Of course it was a case quite extraordinary, to see so many great animals crowded together, but it evidently proves that they must exist in great numbers. Dr. Smith describes the country passed through that day, as "being thinly covered with grass, and bushes about four feet high, and still more thinly with mimosa-trees." The waggons were not prevented travelling in a nearly direct line.

Besides these large animals, every one the least acquainted with the natural history of the Cape, has read of the herds of antelopes, which can be compared only to flocks of migratory birds. The numbers indeed of the lion,* panther, and hyæna, and the multitude of birds of prey, plainly tell of the abundance of the smaller quadrupeds. As Dr. Smith remarked to me, the carnage each day in Southern Africa must indeed be terrific! I confess it is truly surprising, how such a number of animals can find support in a country producing so little food. The larger quadrupeds no doubt roam over wide extents in search of it; and their food chiefly con-

* Dr. Smith mentioned to me, that one evening seven lions were counted at one time walking on the plain, round the encampment.

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sists of underwood, which probably contains much nutriment in a small bulk. Dr. Smith also informs me that the vegetation has a rapid growth; no sooner is a part consumed, than its place is supplied by a fresh stock. I apprehend, however, that our ideas respecting the quantity necessary for the support of large quadrupeds are exaggerated. It should have been remembered that the camel, an animal of no mean bulk, has always been considered as the emblem of the desert.

The belief that where large quadrupeds exist, the vegetation must necessarily be luxuriant, is the more remarkable, because the converse is far from true. Mr. Burchell observed to me that when entering Brazil, nothing struck him more forcibly than the splendour of the South American vegetation, contrasted with that of South Africa, together with the absence of all large quadrupeds. In his Travels,* he has suggested that the comparison of the respective weights (if there were sufficient data) of an equal number of the largest herbivorous quadrupeds of each country would be extremely curious. If we take on the one side the elephant,† hippopotamus, giraffe, bos caffer, elan, certainly three species of rhinoceros, and probably five; and on the

* Travels in the interior of South Africa, vol. ii., p. 207.

† The elephant which was killed at Exeter Change, was estimated (being partly weighed) at five tons and a half. The elephant actress, as I was informed, weighed one ton less; so that we may take five as the average of a full-grown elephant. I was told at the Surrey Gardens, that a hippopotamus which was sent to England cut up into pieces, was estimated at three tons and a half; we will call it three. From these premises we may give three tons and a half to each of the five rhinoceroses; perhaps a ton to the giraffe, and half to the bos caffer as well as the elan, (a large ox weighs from 1200 to 1500 pounds). This will give an average (from the above conjectures) of 2.7 of a ton for the ten largest herbivorous animals of Southern Africa. In South America, allowing 1200 pounds for the two tapirs together, 550 for the guanaco and vicuna, 500 for three deer, 300 for capybara, peccari, and a monkey, we shall have an average of 250 pounds, which I believe is overstating the result. The ratio will therefore be, as 6048 to 250, for the ten largest animals from the two countries.

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other side, two tapirs, the guanaco, three deer, the vicuna, peccari, capybara (after which we must choose from the monkeys to complete the number), and then place these two groups alongside each other, it is not easy to conceive ranks more disproportionate. After the above facts, we are compelled to conclude, against anterior probability,* that among the mammalia there exists no close relation between the *bulk* of the species, and the *quantity* of the vegetation, in the countries they inhabit.

With regard to the number of large quadrupeds, there certainly exists no quarter of the globe which will bear comparison with Southern Africa. After the different statements which have been given, the extremely desert character of that region will not be disputed. In the European division of the world, we must look back to the tertiary epochs, to find a condition of things among the mammalia resembling that which is now found at the Cape of Good Hope. That tertiary epoch, which we are apt to consider as abounding to an astonishing degree with large animals, because we find the remains of many ages accumulated at certain spots, could boast of but few more of the large quadrupeds, than Southern Africa does at present. If we speculate on the condition of the vegetation during that epoch, we are at least bound so far to consider existing analogies, as not to urge as absolutely necessary a luxuriant vegetation, when we see a state of things so totally different in the region to which we refer.

We know† that the extreme regions of North America,

* If we suppose the case of the discovery of a skeleton of a Greenland whale in a fossil state, not a single cetaceous animal being known to exist, what naturalist would even conjecture on the possibility of a carcass so gigantic, being supported on the minute crustacea and mollusca, living in the frozen seas of the extreme North?

† See Zoological Remarks to Capt. Back's Expedition, by Dr. Richardson. He says, "The subsoil north of latitude 56° is perpetually frozen, the thaw on the coast not penetrating above three feet, and at Bear Lake, in latitude 64°, not more than twenty inches. The frozen substratum does not of itself destroy vegetation, for forests flourish on the surface, at a distance from the coast."

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many degrees beyond the limit where the ground at the depth of a few feet remains perpetually congealed, are covered by forests of large and tall trees. In a like manner, in Siberia, we have woods of birch, fir, aspen, and larch, growing in a latitude* (64°), where the mean temperature of the air falls below the freezing point, and where the earth is so completely frozen, that the carcass of an animal embedded in it is perfectly preserved. With these facts we must grant, as far as *quantity alone* of vegetation is concerned, that the great quadrupeds of the later tertiary epochs might, in most parts of Northern Europe and Asia, have lived on the spots where their remains are now found. I do not here speak of the *kind* of vegetation necessary for their support; because, as there is evidence of physical changes, and as the animals have become extinct, so may we suppose that the species of plants have likewise been changed.

These remarks directly bear on the case of the Siberian animals preserved in ice. The firm conviction of the necessity of a vegetation, possessing a character of tropical luxuriance, to support such large animals, and the impossibility of reconciling this with the proximity of perpetual congelation, was one chief cause of the several theories of sudden revolutions of climate, and of overwhelming catastrophes, which were invented to account for their entombment. I am far from supposing that the climate has not changed since the period when those animals lived, which now lie buried in the ice. At present I only wish to show, that as far as *quantity* of food *alone* is concerned, the ancient rhinoceroses might have roamed over the *steppes* of central Siberia (the northern parts probably being under water) even in their present condition, as well as the living rhi-

* See Humboldt Fragmens Asiatiques, p. 386: Barton's Geography of Plants: and Malte Brun. In the latter work it is said, that the limit of the growth of trees in Siberia may be drawn under the parallel of 70°.

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noceroses and elephants over the *Karros* of Southern Africa.

After our long digression, if we return to the case of the fossil animals at Bahia Blanca, there is a difficulty from our not knowing on what food the great Edentata probably lived. If on insects and larvæ, like their nearest representatives the armadilloes and anteaters, there is an end to all conjecture. But as vegetation is the first source of life in every part of the world, I think we may safely conclude that the country around Bahia Blanca, with a very little increase of fertility, would support large animals. The plains of the Rio Negro, thickly scattered over with thorny bushes, I do not doubt would supply sufficient food equally well with the *Karros* of Africa. As there is evidence of a physical change to a small amount, so may we allow it to be probable that the productiveness of the soil has decreased in an equally small degree. With this concession I apprehend every difficulty is removed. On the other hand, if we imagine a luxuriant vegetation to be necessary for the support of these animals, we become involved in a series of contradictions and improbabilities.

As the notices of the remains of several quadrupeds, which I discovered in South America, are scattered in different parts of this volume, I will here give a catalogue of them. After having enlarged on the diminutive size of the present races, it may be of interest to see that formerly a very different order of things prevailed. First, the megatherium, and the four or five other large edentata, already alluded to; 6th, an immense mastodon, which must have abounded over the whole country; 7th, the horse (I do not now refer to the broken tooth at Bahia Blanca, but to more certain evidence); 8th, the toxodon, an extraordinary animal as large as a hippopotamus; 9th, a fragment of the head of an animal larger than a horse, and of a very singular character; 10th, 11th, and 12th, parts of rodents—one of considerable size; lastly, a llama or *guanaco*, fully as large as the camel. All these animals coexisted during an epoch

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which, geologically speaking is so recent, that it may be considered as only just gone by. These remains have been presented to the College of Surgeons, where they are now in the hands of those best qualified to appreciate whatever value they may possess.

I will now give an account of the habits of some of the more interesting birds, which are common on these wild plains; and first of the *Struthio Rhea*, or South American ostrich. This bird is well known to abound over the plains of Northern Patagonia, and the united provinces of La Plata. It has not crossed the Cordillera; but I have seen it within the first range of mountains on the Uspallata plain, elevated between six and seven thousand feet. The ordinary habits of the ostrich are familiar to every one. They feed on vegetable matter; such as roots and grass; but at Bahia Blanca, I have repeatedly seen three or four come down at low water to the extensive mud-banks which are then dry, for the sake, as the Gauchos say, of catching small fish. Although the ostrich in its habits is so shy, wary, and solitary, and although so fleet in its pace, it falls a prey, without much difficulty, to the Indian or Gaucho armed with the bolas. When several horsemen appear in a semicircle, it becomes confounded, and does not know which way to escape. They generally prefer running against the wind; yet at the first start they expand their wings, and like a vessel make all sail. On one fine hot day I saw several ostriches enter a bed of tall rushes, where they squatted concealed, till quite closely approached. It is not generally known that ostriches readily take to the water. Mr. King informs me that at the Bay of San Blas, and at Port Valdes in Patagonia, he saw these birds swimming several times from island to island. They ran into the water both when driven down to a point, and likewise of their own accord when not frightened: the distance crossed was about 200 yards. When swimming, very little of their bodies appear above water, and their necks are extended a little forward: their progress is slow. On two occasions, I saw some ostriches swimming across the Santa

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Cruz river, where its course was about four hundred yards wide, and the stream rapid. Captain Sturt, when descending the Murrumbidgee, in Australia, saw two emus in the act of swimming.

The inhabitants who live in the country readily distinguish, even at a distance, the cock bird from the hen. The former is larger and darker-coloured,* and has a bigger head. The ostrich, I believe the cock, emits a singular deep-toned, hissing note. When first I heard it, standing in the midst of some sand-hillocks, I thought it was made by some wild beast, for it is a sound that one cannot tell whence it comes, or from how far distant. When we were at Bahia Blanca in the months of September and October, the eggs, in extraordinary numbers, were found all over the country. They either lie scattered single, in which case they are never hatched, and are called by the Spaniards, huachos; or they are collected together into a shallow excavation, which forms the nest. Out of the four nests which I saw, three contained twenty-two eggs each, and the fourth twenty-seven. In one day's hunting on horseback sixty-four eggs were found; forty-four of these were in two nests, and the remaining twenty scattered huachos. The Gauchos unanimously affirm, and there is no reason to doubt their statement, that the male bird alone hatches the eggs, and for some time afterwards accompanies the young. The cock when on the nest lies very close; I have myself almost ridden over one. It is asserted that at such times they are occasionally fierce, and even dangerous, and that they have been known to attack a man on horseback, trying to kick and leap on him. My informer pointed out to me an old man, whom he had seen much terrified by one chasing him. I observe in Burchell's travels in South Africa, that he remarks, "having killed a male ostrich, and the feathers being dirty, it was said by the Hottentots to be a nest bird." I understand that the

* A Gaucho assured me, that he had once seen a snow-white, or Albino variety, and that it was a most beautiful bird.

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male emu, in the Zoological Garden, takes charge of the nest: this habit, therefore, is common to the family.

The Gauchos unanimously affirm that several females lay in one nest. I have been positively told, that four or five hen birds have been seen to go, in the middle of the day, one after the other, to the same nest. I may add, also, that it is believed in Africa, that two females lay in one nest.* Although this habit at first appears very strange, I think the cause may be explained in a simple manner. The number of eggs in the nest varies from twenty to forty, and even to fifty; and according to Azara to seventy or eighty. Now although it is most probable, from the number of eggs found in one district being so extraordinarily great, in proportion to that of the parent birds, and likewise from the state of the ovarium of the hen, that she may in the course of the season lay a large number, yet the time required must be very long. Azara states,† that a female in a state of domestication laid seventeen eggs, each at the interval of three days one from another. If the hen were obliged to hatch her own eggs, before the last was laid the first probably would be addled; but if each laid a few eggs at successive periods, in different nests, and several hens, as is stated to be the case, combined together, then the eggs in one collection would be nearly of the same age. If the number of eggs in one of these nests is, as I believe, not greater on an average than the number laid by one female in the season, then there must be as many nests as females, and each cock bird will have its fair share of the labour of incubation; and that during a period when the females could not sit, on account of not having finished laying. I have before mentioned the great numbers of huachos, or scattered eggs; so that in one day's hunting the third part were found in this state. It appears odd that so many should be wasted. Does it not arise from the difficulty of several females associating together, and persuading an old cock to undertake the office

* Burchell's Travels, vol. i., p. 280. † Azara, vol. iv., p. 173.

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of incubation? It is evident that there must at first be some degree of association, between at least two females; otherwise the eggs would remain scattered over the wide plains, at distances far too great to allow of the male collecting them into one nest. Some have believed that the scattered eggs were deposited for the young birds to feed on. This can hardly be the case in America, because the huachos, although oftentimes found addled and putrid, are generally whole.

When at the Rio Negro, in Northern Patagonia, I repeatedly heard the Gauchos talking of a very rare bird which they called Avestruz Petise. They described it as being less than the common ostrich (which is there abundant), but with a very close general resemblance. They said its colour was dark and mottled, and that its legs were shorter, and feathered lower down than those of the common ostrich. It is more easily caught by the bolas than the other species. The few inhabitants who had seen both kinds, affirmed they could distinguish them apart from a long distance. The eggs of the small species appeared, however, more generally known; and it was remarked, with surprise, that they were very little less than those of the Rhea, but of a slightly different form, and with a tinge of pale blue. Some eggs, picked up on the plains of Patagonia, agree pretty well with this description, and I do not doubt are those of the Petise. This species occurs most rarely on the plains bordering the Rio Negro; but about a degree and a half further south they are tolerably abundant. One Gaucho, however, said he distinctly recollected having seen one, many years before, near the mouth of the Rio Colorado, which is to the north of the Rio Negro. They are said to prefer the plains near the sea. When at Port Desire, in Patagonia (lat. 48°), Mr. Martens shot an ostrich; and I looked at it, forgetting at the moment, in the most unaccountable manner, the whole subject of the Petises, and thought it was a two-third grown one of the common sort. The bird was cooked and eaten before my memory returned. Fortunately the head, neck, legs, wings, many of the larger feathers, and a large part of the skin, had

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been preserved. From these a very nearly perfect specimen has been put together, and is now exhibited in the museum of the Zoological Society. Mr. Gould, who in describing this new species did me the honour of calling it after my name, states, that besides the smaller size and different colour of the plumage, the beak is of considerably less proportional dimensions than in the common Rhea; that the tarsi are covered with differently-shaped scales, and that they are feathered six inches beneath the knee. In this latter respect, and in the broader feathers of the wing, this bird perhaps shows more affinity to the gallinaceous family than any other of the Struthionidæ.

Among the Patagonian Indians in the Strait of Magellan, we found a half Indian, who had lived some years with the tribe, but had been born in the northern provinces. I asked him if he had ever heard of the Avestruz Petise? He answered by saying, "Why there are none others in these southern countries." He informed me that the number of eggs in the nest of the petise is considerably less than with the other kind, namely, not more than fifteen on an average; but he asserted that more than one female deposited them. At Santa Cruz we saw several of these birds. They were excessively wary: I think they could see a person approaching when he was so far off as not to distinguish the ostrich. In ascending the river few were seen; but in our quiet and rapid descent, many, in pairs and by fours or fives, were observed. It was remarked, and I think with truth, that this bird did not expand its wings, when first starting at full speed, after the manner of the northern kind. The fact of these ostriches swimming across the river has been mentioned. In conclusion, I may repeat that the *Struthio Rhea* inhabits the country of La Plata as far as a little south of the Rio Negro, in lat. 41°, and that the petise takes its place in Southern Patagonia; the part about the Rio Negro being neutral territory. Wallis saw ostriches at Batchelor's river (lat. 53° 54′), in the Strait of Magellan, which must be the extreme southern possible range of the petise. M. D'Or-

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bigny, when at the Rio Negro, made great exertions to procure this bird, but never had the good fortune to succeed. He mentions it in his Travels,* and proposes (in case, I presume, of a specimen being obtained) to call it *Rhea pennata:* a fuller notice was given long before in Dobrizhoffer's Account of the Abipones† (A.D. 1749). He says, "You must know, moreover, that Emus differ in size and habits in different tracts of land; for those that inhabit the plains of Buenos Ayres and Tucuman are larger, and have black, white, and gray feathers; those near to the Strait of Magellan are smaller and more beautiful, for their white feathers are tipped with black at the extremity, and their black ones in like manner terminate in white."

A very singular little bird, lately described by St. Hilaire and Lesson under the name of *Tinochorus Eschscholtzii*, is here common. In its habits, general appearance, and structure, it nearly equally partakes of the character of a quail and a snipe. Yet these two birds are widely contrasted in the form of their beaks, wings, and legs. The Tinochorus is found in the whole of southern South America, wherever there are sterile plains, or open dry pasture-land. We saw it as far south as the inland plains of Patagonia at Santa Cruz, in lat. 50°. On the western side of the Cordillera near Concepcion, where the forest land changes into an open country, this bird is found: from that point throughout Chile, as far as Copiapó, it frequents the most desolate places, where scarcely another living creature can exist. They are found either in pairs or small flocks of five or six; but near the Sierra Ventana I saw as many as thirty or forty together. Upon being

* Vol. ii., p. 76.—When at the Rio Negro, we heard much of the indefatigable labours of this naturalist. M. D'Alcide D'Orbigny, during the years 1826 to 1833, traversed several large portions of South America, and has made a collection, and is now publishing the results on a scale of magnificence, which at once places him in the list of American travellers second only to Humboldt.

† Vol. i. (English translation), p. 314.

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approached they squat close, and then are very difficult to be distinguished; so that they often rise quite unexpectedly. When feeding they walk rather slowly, with their legs wide apart. They dust themselves in roads and sandy places. They frequent particular spots, and may be found there day after day. When a pair are together, if one is shot the other seldom rises; for these birds, like partridges, only take wing in a flock. In all these respects, in the muscular gizzard adapted for vegetable food, in the arched beak and fleshy nostrils, short legs and form of foot, the Tinochorus has a close affinity with quails. But directly the bird is seen flying, one's opinion is changed; the long, pointed wings, so different from those in the gallinaceous order, the irregular manner of flight, and plaintive cry uttered at the moment of rising, recal the idea of a snipe. The sportsmen of the Beagle unanimously called it the shortbilled snipe. To this genus, or rather to that of the sandpiper, it approaches, as Mr. Gould informs me, in the shape of its wing, the length of the scapulars, the form of the tail, which closely resembles that of *Tringa hypoleucos*, and in the general colour of the plumage. The male bird, however, has a black mark on its breast, in the form of a yoke, which may be compared to the horseshoe on the breast of the English partridge. The nest is said to be placed on the borders of lakes, although the bird itself is an inhabitant of the parched desert.

The Tinochorus is closely related to some other South American birds. Two species of the genus Attagis, are in almost every respect ptarmigans in their habits; one in Tierra del Fuego, above the limits of forest land; the other just beneath the snow line on the Cordillera of Central Chile. A bird of another closely-allied genus, *Chionis alba*, which solitary species was long thought to form a family by itself, is an inhabitant of the antarctic regions; it feeds on sea-weed and shells on the tidal rocks. Although not web-footed, from some unaccountable taste it is frequently met with far out at sea. This small family of birds is one of

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those which, from its varied relations, although at present offering only difficulties to the systematic naturalist, ultimately may assist in revealing the grand scheme, common to the present and past ages, on which organized beings have been created.

I may also briefly notice the genus Furnarius. It contains several species, all small birds, living on the ground, and inhabiting open, dry countries. In structure they cannot be compared to any European form. Ornithologists have generally included them among the creepers, although opposed to that family in every habit. The best known species is the common oven-bird of La Plata, the Casara or housemaker of the Spaniards, and *Furnarius rufus* of Viell. The nest, whence it takes its name, is placed in the most exposed situations, as on the top of a post, a bare rock, or on a cactus. It is composed of mud and bits of straw, and has strong thick walls: in shape it precisely resembles an oven, or depressed beehive. The opening is large and arched, and directly in front, within the nest, there is a partition, which reaches nearly to the roof, thus forming a passage or antechamber to the true nest.

Another and smaller species of Furnarius, something like a lark in appearance, resembles the oven-bird in many points, as in the general reddish tint of its plumage, a peculiar shrill reiterated cry, an odd manner of running by starts, &c. From its affinity, the Spaniards call it Casarita (or little housebuilder), although its nidification is quite different. The Casarita builds its nest at the bottom of a narrow cylindrical hole, which is said to extend horizontally to nearly six feet under ground. Several of the country people told me, that when boys they had attempted to dig out the nest, but had scarcely ever succeeded in getting to the end. The bird chooses any low bank of firm sandy soil by the side of a road or stream. Here (at Bahia Blanca) the walls are built of hardened mud; and I noticed that one, which enclosed a courtyard where I lodged, was penetrated by round holes in a score of places. On asking the owner

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the cause of this, he bitterly complained of the little casarita, several of which I afterwards observed at work. It is rather curious, that although they were constantly flitting over the low wall, they must be quite incapable of gaining an idea of thickness even after the shortest circuitous route, for otherwise they would not have made so many vain attempts. I do not doubt that each bird, as often as it came to daylight on the opposite side, was greatly surprised at the marvellous fact.

I have already mentioned nearly all the mammalia common in this country. Of armadilloes three species occur, namely, the Dasypus minutus or *pichy*, the Villosus or *peludo*, and the *apar*. The first extends as far south as lat. 50°, which is about ten degrees further than any other kind. A fourth species, the *Mulita*, only extends as far south as the Sierra Tapalguen, lat. 37° 30′, which is north of Bahia Blanca. The four species have nearly similar habits; the *peludo*, however, is nocturnal, while the others wander by day over the open plains, feeding on beetles, larvæ, roots, and even small snakes. The *apar*, commonly called *mataco*, is remarkable by having only three moveable bands; the rest of its tesselated covering being nearly inflexible. It has the power of rolling itself into a perfect sphere, like one kind of English woodlouse. In this state it is safe from the attack of dogs; for the dog not being able to take the whole in its mouth, tries to bite one side, and the ball slips away. The smooth hard covering of the *mataco* offers a better defence than the sharp spines of the hedgehog. The *pichy* prefers a very dry soil, and the sand-dunes near the coast, where for many months it can never taste water, is its favourite resort. In the course of a day's ride, near Bahia Blanca, several were generally met with. The instant one was perceived, it was necessary in order to catch it, almost to tumble off one's horse; for if the soil was soft, the animal burrowed so quickly, that its hinder quarters had almost disappeared before one could alight. The *pichy* likewise often tries to escape notice, by squatting close to the ground. It appears almost

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a pity to kill such nice little animals, for as a Gaucho said, while sharpening his knife on the back of one, "Son tan mansos" (they are so quiet).

Of reptiles there are many kinds: one snake (a Trigonocephalus, or more properly a Cophias), from the size of the poison channel in its fangs, must be very deadly. Cuvier, in opposition to some other naturalists, makes this a sub-genus of the rattlesnake, and intermediate between it and the viper. In confirmation of this opinion, I observed a fact, which appears to me very curious and instructive, as showing how every character, even though it may be in some degree independent of structure, has a tendency to vary by slow degrees. The extremity of the tail of this snake is terminated by a point, which is very slightly enlarged; and as the animal glided along, it constantly vibrated the last inch; and this part striking against the dry grass and brushwood, produced a rattling noise, which could be distinctly heard at the distance of six feet. As often as the animal was irritated or surprised, its tail was shaken; and the vibrations were extremely rapid. Even as long as the body retained its irritability, a tendency to this habitual movement was evident. This Trigonocephalus has, therefore, in some respects the structure of Vipera, with the habits of a Crotalus; the noise, however, being produced by a simpler device. The expression of this snake's face was hideous and fierce; the pupil consisted of a vertical slit in a mottled and coppery iris; the jaws were broad at the base, and the nose terminated in a triangular projection. I do not think I ever saw any thing more ugly, excepting, perhaps, in some of the vampire bats. I imagine this repulsive aspect originates from the features being placed in positions, with respect to each other, somewhat proportional to those of the human face; and thus we obtain a scale of beauty.

Amongst the Batrachian reptiles, I found only one little toad, which was most singular from its colour. If we imagine, first, that it had been steeped in the blackest ink, and then when dry, allowed to crawl over a board, freshly painted

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with the brightest vermilion, so as to colour the soles of its feet and parts of its stomach, a good idea of its appearance will be gained. If it is an unnamed species, surely it ought to be called *diabolicus*, for it is a fit toad to preach in the ear of Eve. Instead of being nocturnal in its habits, as other toads are, and living in damp obscure recesses, it crawls during the heat of the day about the dry sand-hillocks and arid plains, where not a single drop of water can be found. It must necessarily depend on the dew for its moisture; and this probably is absorbed by the skin, for it is known, that these reptiles possess great powers of cutaneous absorption. At Maldonado, I found one in a situation nearly as dry as at Bahia Blanca, and thinking to give it a great treat, carried it to a pool of water; not only was the little animal unable to swim, but, I think, without help would soon have been drowned.

Of lizards there were many kinds, but only one remarkable, from its habits. It lives on the bare sand near the sea coast, and from its mottled colour, the brownish scales being speckled with white, yellowish red, and dirty blue, can hardly be distinguished from the surrounding surface. When frightened it attempts to avoid discovery by feigning death, with outstretched legs, depressed body, and closed eyes: if further molested, it buries itself with great quickness in the loose sand. This lizard, from its flattened body and short legs, cannot run quickly. It belongs to the genus Ophryessa.

I will here add a few remarks on the hybernation of animals in this part of South America. When we first arrived at Bahia Blanca, September 7th, 1832, we thought nature had granted scarcely a living creature to this sandy and dry country. By digging, however, in the ground, several insects, large spiders, and lizards were found in a half torpid state. On the 15th, a few animals began to appear, and by the 18th (three days from the equinox), every thing announced the commencement of spring. The plains were ornamented by the flowers of a pink wood sorrel, wild peas, œnotheræ, and geraniums; and the birds began to lay their

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eggs. Numerous Lamellicorn and Heteromerous insects, the latter remarkable for their deeply sculptured bodies, were slowly crawling about; while the Saurian tribe, the constant inhabitants of a sandy soil, darted in every direction. During the first eleven days, whilst nature was dormant, the mean temperature taken from observations made every two hours on board the Beagle, was 51°; and in the middle of the day the thermometer seldom ranged above 55°. On the eleven succeeding days, in which all living things became so animated, the mean was 58°, and the range in the middle of the day between sixty and seventy. Here then an increase of seven degrees in mean temperature, but a greater one of extreme heat, was sufficient to awake the functions of life. At Monte Video, from which we had just before sailed, in the twenty-three days included between the 26th of July and the 19th of August, the mean temperature from 276 observations was 58°.4; the mean hottest day being 65°.5, and the coldest 46°. The lowest point to which the thermometer fell was 41°.5, and occasionally in the middle of the day it rose to 69° or 70°. Yet with this elevated temperature, almost every beetle, several genera of spiders, snails, and land shells, toads, and lizards were all lying torpid beneath stones. But we have seen that at Bahia Blanca, which is four degrees to the southward, and therefore with a climate only a very little colder, this same temperature with a rather less extreme heat, was sufficient to awake all orders of animated beings. This shows how nicely the required degree of stimulus is adapted to the general climate of the place, and how little it depends on absolute temperature. It is well known that within the tropics, the hybernation, or more properly estivation, of animals is governed by the times of drought. Near Rio de Janeiro, I was at first surprised to observe, that, a few days after some little depressions had been changed into pools of water by the rain, they were peopled by numerous full-grown shells and beetles. Humboldt has related the strange accident of a hovel having been erected over a spot, where a young crocodile lay buried in

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the hardened mud. He adds "The Indians often find enormous boas; which they call Uji, or water serpents, in the same lethargic state. To reanimate them, they must be irritated or wetted with water."

I will only mention one other animal, a zoophyte allied to Virgularia,* a kind of sea-pen. It consists of a thin, straight, fleshy stem, with alternate rows of polypi on each side, and surrounding an elastic stony axis. It varies in length from eight inches to two feet. The stem at one extremity is truncate, but at the other is terminated by a vermiform fleshy appendage, which is separated into two compartments; and in these, small, yellow, spherical ova are contained. The stony axis which gives strength to the stem, may be traced at this extremity into a mere vessel filled with granular matter. This undeveloped portion is enclosed in a transparent, elastic, irritable bag, containing a fluid in which a very distinct circulation of particles could be seen. This bag floats in one of the compartments of the fleshy terminal appendage. At low water hundreds of these zoophytes might be seen, projecting like stubble, with the truncate end upwards, a few inches above the surface of the muddy sand. When touched or pulled, they drew themselves in, suddenly and with force, so as nearly or quite to disappear. By this action, the highly elastic axis must be bent at the lower extremity, where it is naturally slightly curved; and I imagine it is by this elasticity that the zoophyte is enabled to rise again through the mud. Each polypus, though closely united to its brethren, has a distinct mouth, body, and tentacula. Of these polypi, in a large specimen, there must be many thousands; yet we see that they act by one movement; that they have one central axis connected with a system of obscure circulation; and that the ova are produced in an organ distinct from the separate individuals. Well may one be allowed to ask, what is an individual? I will add only one other observation on this zoophyte. The cavities leading from the fleshy compartments of the extremity, were filled

* I believe *Virgularia Patagonica* of D'Orbigny.

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with a yellow pulpy matter, which, examined under a microscope, presented an extraordinary appearance. The mass consisted of rounded, semi-transparent, irregular grains, aggregated together into particles of various sizes. All such particles, and the separate grains, possessed the power of rapid movement; generally revolving around different axes, but sometimes progressive. The movement was visible with a very weak power, but with the highest its cause could not be perceived. It was very different from the circulation of the fluid in the elastic bag, containing the thin extremity of the axis. On other occasions, when dissecting small marine animals beneath the microscope, I have seen particles of pulpy matter, some of large size, immediately they were disengaged, commence revolving. I have imagined, I know not with how much truth, that this granulo-pulpy matter was in process of being converted into ova. Certainly in this zoophyte such appeared to be the case.

During my stay at Bahia Blanca, while waiting for the Beagle, the place was in a constant state of excitement, from rumours of wars and victories, between the troops of Rosas and the wild Indians. One day an account came, that a small party forming one of the postas on the line to Buenos Ayres, had been found all murdered. The next day, three hundred men arrived from the Colorado, under the command of Commandant Miranda. A large portion of these men were Indians (*mansos*, or tame), belonging to the tribe of the Cacique Bernantio. They passed the night here; and it was impossible to conceive any thing more wild and savage than the scene of their bivouac. Some drank till they were intoxicated; others swallowed the steaming blood of the cattle slaughtered for their suppers, and then, being sick from drunkenness, they cast it up again, and were besmeared with filth and gore.

> Nam simul expletus dapibus, vinoque sepultus
> Cervicem inflexam posuit, jacuitque per antrum
> Immensus, saniem eructans, ac frusta cruenta
> Per somnum commixta mero.

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In the morning they started for the scene of the murder, with orders to follow the "rastro," or track, even if it led them to Chile. We subsequently heard that the wild Indians had escaped into the great Pampas, and from some cause the track had been missed. One glance at the rastro tells these people a whole history. Supposing they examine the track of a thousand horses, they will soon guess by seeing how many have cantered the number of men; by the depth of the other impressions, whether any horses were loaded with cargoes; by the irregularity of the footsteps, how far tired; by the manner in which the food has been cooked, whether the pursued travelled in haste; by the general appearance, how long it has been since they passed. They consider a rastro of ten days or a fortnight, quite recent enough to be hunted out. We also heard that Miranda struck from the west end of the Sierra Ventana, in a direct line to the island of Cholechel, situated seventy leagues up the Rio Negro. This is a distance of between two and three hundred miles, through a country completely unknown. What other troops in the world are so independent? With the sun for their guide, mares' flesh for food, their saddle-cloths for beds,—as long as there is a little water, these men would penetrate to the land's end.

A few days afterwards I saw another troop of these banditti-like soldiers start on an expedition against a tribe of Indians at the small salinas, who had been betrayed by a prisoner cacique. The Spaniard who brought the orders for this expedition was a very intelligent man. He gave me an account of the last engagement at which he was present. Some Indians, who had been taken prisoners, gave information of a tribe living north of the Colorado. Two hundred soldiers were sent; and they first discovered the Indians by a cloud of dust from their horses' feet, as they chanced to be travelling. The country was mountainous and wild, and it must have been far in the interior, for the Cordillera was in sight. The Indians, men, women, and children, were about one hundred and ten in number, and they were nearly all

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taken or killed, for the soldiers sabre every man. The Indians are now so terrified, that they offer no resistance in a body, but each flies, neglecting even his wife and children; but when overtaken, like wild animals, they fight against any number to the last moment. One dying Indian seized with his teeth the thumb of his adversary, and allowed his own eye to be forced out, sooner than relinquish his hold. Another, who was wounded, feigned death, keeping a knife ready to strike one more fatal blow. My informer said, when he was pursuing an Indian, the man cried out for mercy, at the same time that he was covertly loosing the bolas from his waist, meaning to whirl it round his head and so strike his pursuer. "I however struck him with my sabre to the ground, and then got off my horse, and cut his throat with my knife." This is a dark picture; but how much more shocking is the unquestionable fact, that all the women who appear above twenty years old, are massacred in cold blood. When I exclaimed that this appeared rather inhuman, he answered, "Why, what can be done? they breed so!"

Every one here is fully convinced that this is the most just war because it is against barbarians. Who would believe in this age, in a Christian civilized country, that such atrocities were committed? The children of the Indians are saved, to be sold or given away as servants, or rather slaves, for as long a time as the owners can deceive them; but I believe in this respect there is little to complain of.

In the battle four men ran away together. They were pursued, and one was killed, but the other three were taken alive. They turned out to be messengers or ambassadors from a large body of Indians, united in the common cause of defence, near the Cordillera. The tribe to which they had been sent was on the point of holding a grand council; the feast of mare's flesh was ready, and the dance prepared: in the morning the ambassadors were to have returned to the Cordillera. They were remarkably fine men, very fair, above six feet high, and all under thirty years of age. The three survivors of course possessed very valuable information; and

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to extort this they were placed in a line. The two first being questioned, answered, "No se" (I do not know), and were one after the other shot. The third also said "No se;" adding, "Fire, I am a man, and can die!" Not one syllable would they breathe to injure the united cause of their country! The conduct of the cacique was very different: he saved his life by betraying the intended plan of warfare, and the point of union in the Andes. It was believed that there were already six or seven hundred Indians together, and that in summer their numbers would be doubled. Ambassadors were to have been sent to the Indians at the small salinas, near Bahia Blanca, whom I mentioned that a cacique, this same man, had betrayed. The communication, therefore, extends from the Cordillera to the east coast.

General Rosas's plan is to kill all stragglers, and having driven the remainder to a common point, in the summer, with the assistance of the Chilenos, to attack them in a body. This operation is to be repeated for three successive years. I imagine the summer is chosen as the time for the main attack, because the plains are then without water, and the Indians can only travel in particular directions. The escape of the Indians to the south of the Rio Negro, where in such a vast unknown country they would be safe, is prevented by a treaty with the Tehuelches to this effect;—that Rosas pays them so much to slaughter every Indian who passes to the south of the river, but if they fail in so doing, they themselves are to be exterminated. The war is waged chiefly against the Indians near the Cordillera; for many of the tribes on this eastern side are fighting with Rosas. The general, however, like Lord Chesterfield, thinking that his friends may in a future day become his enemies, always places them in the front ranks, so that their numbers may be thinned. Since leaving South America we have heard that this war of extermination completely failed.

Among the captive girls taken in the same engagement, there were two very pretty Spanish ones, who had been car-

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ried away by the Indians when young, and could now only speak the Indian tongue. From their account, they must have come from Salta, a distance in a straight line of nearly one thousand miles. This gives one a grand idea of the immense territory over which the Indians roam: yet, great as it is, I think there will not, in another half-century, be a wild Indian northward of the Rio Negro. The warfare is too bloody to last; the Christians killing every Indian, and the Indians doing the same by the Christians. It is melancholy to trace how the Indians have given way before the Spanish invaders. Schirdel* says, that in 1535, when Buenos Ayres was founded, there were villages containing two and three thousand inhabitants. Even in Falconer's time (1750) the Indians made inroads as far as Lucan, Areco, and Arrecife, but now they are driven beyond the Salado. Not only have whole tribes been wholly exterminated, but the remaining Indians have become more barbarous: instead of living in large villages, and being employed in the arts of fishing, as well as of the chase, they now wander about the open plains, without home or fixed occupation.

I heard also some account of an engagement which took place, a few weeks previously to the one mentioned, at Cholechel. This is a very important station, on account of being a pass for horses; and it was, in consequence, for some time the head-quarters of a division of the army. When the troops first arrived there, they found a tribe of Indians, of whom they killed twenty or thirty. The cacique escaped in a manner which astonished every one. The chief Indians always have one or two picked horses, which they keep ready for any urgent occasion. On one of these, an old white horse, the cacique sprung, taking with him his little son. The horse had neither saddle nor bridle. To avoid the shots, the Indian rode in the peculiar method of his nation; namely, with an arm round the horse's neck, and one leg only on its back. Thus hanging on one side, he was

* Purchas's Collection of Voyages.

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seen patting the horse's head, and talking to him. The pursuers urged every effort in the chase; the Commandant three times changed his horse, but all in vain. The old Indian father and his son escaped, and were free. What a fine picture one can form in one's mind,—the naked bronze-like figure of the old man with his little boy, riding like a Mazeppa on the white horse, thus leaving far behind him the host of his pursuers!

I saw one day a soldier striking fire with a piece of flint, which I immediately recognised as having been a part of the head of an arrow. He told me it was found near the island of Cholechel, and that they are frequently picked up there. It was between two and three inches long, and therefore twice as large as those now used in Tierra del Fuego: it was made of opake cream-coloured flint, but the point and barbs had been intentionally broken off. It is well known that no Pampas Indians now use bows and arrows. I believe a small tribe in Banda Oriental must be excepted; but they are widely separated from the Pampas Indians, and border close on those tribes that inhabit the forest, and live on foot. It appears, therefore, that these arrow-heads are antiquarian* relics of the Indians, before the great change in habits consequent on the introduction of the horse into South America.

* Azara has even doubted whether the Pampas Indians ever used bows.

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CHAPTER VI.

Set out for Buenos Ayres—Rio Sauce—Sierra Ventana—Transportal of pebbles—Third posta—Driving horses—Bolas—Partridges and foxes—Features of country—Long-legged plover—Teru-tero—Hailstorm—Natural enclosures in Sierra Tapalguen—Flesh of puma—Meat diet—Guardia del Monte—Effects of cattle on the vegetation—Cardoon—Buenos Ayres—Corral where animals are slaughtered.

BAHIA BLANCA TO BUENOS AYRES.

SEPTEMBER 8TH.—Having with some difficulty hired a Gaucho to accompany me, on my ride to Buenos Ayres, we started early in the morning. The distance is about four hundred miles, and nearly the whole way through an uninhabited country. Ascending a few hundred feet from the basin of green turf on which Bahia Blanca stands, we entered on a wide desolate plain. It consists of a crumbling argillaceo-calcareous rock, which, from the dry nature of the climate, supports only scattered tufts of withered grass, without a single bush or tree to break the monotonous uniformity. The weather was fine, but the atmosphere remarkably hazy; I thought the appearance foreboded a gale, but the Gauchos said it was owing to the plain, at some great distance in the interior, being on fire. After a long gallop, having changed horses twice, we reached the Rio Sauce. It is a deep, rapid, little stream, but not above twenty-five feet wide. The second posta on the road to Buenos Ayres stands on its banks; a little above there is a pass for horses, where the water does not reach to the horse's belly; but from that point, in its course to the sea, it is quite impassable, and hence makes a most useful barrier against the Indians.

Insignificant as this stream is, the Jesuit Falconer, whose information is generally so very correct, figures it as a considerable river, rising at the foot of the Cordillera. With respect to its source, I do not doubt this is the case; for the

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Gauchos assured me, that in the middle of the dry summer, this stream, at the same time with the Colorado, has periodical floods; which can only originate in the snow melting on the Andes. It is extremely improbable that a stream, so small as the Sauce then was, should traverse the entire width of the continent; and indeed, if it were the residue of a large river, its waters, as in other ascertained cases, would be saline. During the winter we must look to the springs round the Sierra Ventana as the source of its pure and limpid stream. I suspect the plains of Patagonia, like those of Australia, are traversed by many water-courses, which only perform their proper parts at certain periods. Probably this is the case with the water which flows into the head of Port Desire, and likewise with the Rio Chupat, on the banks of which masses of highly cellular scoriæ were found by the officers employed in the survey.

As it was early in the afternoon when we arrived, we took fresh horses, and a soldier for a guide, and started for the Sierra de la Ventana. This mountain is visible from the anchorage at Bahia Blanca; and Capt. FitzRoy calculates its height to be 3500 feet;—an altitude very remarkable on this eastern side of the continent. I am not aware that any foreigner, previous to my visit, had ascended this mountain; and indeed very few of the soldiers at Bahia Blanca knew any thing about it. Hence we heard of beds of coal, of gold and silver, of caves, and of forests, all of which inflamed my curiosity, only to disappoint it. The distance from the posta was about six leagues, over a level plain of the same character as before. The ride was, however, interesting, as the mountain began to show its true form. When we reached the foot of the main ridge, we had much difficulty in finding any water, and we thought we should have been obliged to have passed the night without any. At last we discovered some, by looking close to the mountain, for at the distance even of a few hundred yards, the streamlets were buried and entirely lost in the friable calcareous stone, and loose detritus. I do not think nature ever made a more solitary,

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desolate pile of rock;—it well deserves its name of *Hurtado*, or separated. The mountain is steep, extremely rugged, and broken, and so entirely destitute of trees and even bushes, that we actually could not find a skewer to stretch out our meat over the fire made of thistle* stalks. The strange aspect of this mountain is contrasted by the sea-like plain, which not only abuts against its steep sides, but likewise separates the parallel ranges. The uniformity of the colouring gives, also, an extreme quietness to the view;—the whitish gray of the quartz rock, and the light brown of the withered grass of the plain, being unrelieved by any brighter tint. From custom, one expects to see in the neighbourhood of a lofty and bold mountain a broken country, strewed over with huge fragments. Here nature shows, that the last movement before the bed of the sea is changed into dry land, may sometimes be one of tranquillity. Under these circumstances, I was curious to observe how far from the parent rock any pebbles could be found. On the shores of Bahia Blanca, and near the settlement, there were some of quartz, which certainly must have come from this source: the distance is forty-five miles.

The dew, which in the early part of the night wetted the saddle-cloths, under which we slept, was in the morning frozen. From the sharpness of the cold, I supposed we were already at a considerable elevation, although, to the eye, the plain had appeared horizontal. In the morning (9th September) the guide told me to ascend the nearest ridge, which he thought would lead me to the four peaks that crown the summit. The climbing up such rough rocks was very fatiguing, the sides were so indented, that, what was gained in one five minutes, was often lost in the next. At last, when I reached the ridge, my disappointment was extreme in finding a precipitous valley as deep as the plain, which cut the chain transversely in two, and separated me from the four

* I call these thistle stalks for the want of a more correct name. I believe it is a species of Eryngium.

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points. This valley is very narrow, but flatbottomed, and it forms a fine horse-pass for the Indians, as it connects the plains on the northern and southern sides of the range. Having descended, and while crossing it, I saw two horses grazing: I immediately hid myself in the long grass, and began to reconnoitre; but as I could see no signs of Indians, I proceeded cautiously on my second ascent. It was late in the day, and this part of the mountain, like the other, was steep and rugged. I was on the top of the second peak by two o'clock, but got there with extreme difficulty; every twenty yards I had the cramp in the upper part of both thighs, so that I was afraid I should not have been able to have descended. It was also necessary to return by another road, as it was out of the question to pass over the saddle-back. I was therefore obliged to give up the two higher peaks. Their altitude was but little greater, and every purpose of geology had been answered; so that the attempt was not worth the hazard of any further exertion. I presume the cause of the cramp was the great change in the kind of muscular action, from that of hard riding to that of still harder climbing. It is a lesson worth remembering, as in some cases it might cause much difficulty.

I have already said the mountain is composed of white quartz rock, and with it a little glossy clay-slate is associated. At the height of a few hundred feet above the plain, patches of conglomerate adhered in several places to the solid rock. They resembled in hardness, and in the nature of the cement, the masses which may be seen daily forming on some coasts. I do not doubt these pebbles were, in a similar manner, aggregated, at a period when the great calcareous formation was depositing beneath the surrounding sea. We may believe that the jagged and battered forms of the hard quartz yet show the effects of the waves of an open ocean.

I was, on the whole, disappointed with this ascent. Even the view was insignificant;—a plain like the sea, but without its beautiful colour and defined outline. The scene, however, was novel, and a little danger, like salt to meat, gives it

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a relish. That the danger was very little was certain, for my two companions made a good fire—a thing which is never done when it is suspected that Indians are near. I reached the place of our bivouac by sunset, and drinking much maté, and smoking several cigaritos, soon made up my bed for the night. The wind was very strong and cold, but I never slept more comfortably.

September 10th.—In the morning, having fairly scudded before the gale, we arrived by the middle of the day at the Sauce posta. On the road we saw great numbers of deer, and near the mountain a guanaco. The plain, that abuts against the Sierra, is traversed by some curious gullies, of which one was about twenty feet wide, and at least thirty deep; we were obliged in consequence to make a considerable circuit, before we could find a pass. We staid the night at the posta, the conversation, as was generally the case, being about the Indians. The Sierra Ventana was formerly a great place of resort; and three or four years ago there was much fighting here. My guide had been present when many men were killed: the women escaped to the top of the ridge, and fought most desperately with big stones; many thus saving themselves.

September 11th.—Proceeded to the third posta in company with the lieutenant who commanded it. The distance is called fifteen leagues; but it is only guess-work and is generally overstated. The road was uninteresting, over a dry grassy plain; and on our left hand at a greater or less distance there were some low hills; a chain of which, we crossed close to the posta. Before our arrival, we met a large herd of cattle and horses, guarded by fifteen soldiers; but we were told many had been lost. It is very difficult to drive animals across the plains; for if in the night a lion, or even a fox, approaches, nothing can prevent the horses dispersing in every direction; and a storm will have the same effect. A short time since, an officer left Buenos Ayres with 500 horses, and when he arrived at the army he had under twenty.

Soon afterwards we perceived by the cloud of dust, that a

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party of horsemen were coming towards us; when far distant my companions knew them to be Indians, by their long hair streaming behind their backs. The Indians generally have a fillet round their heads, but never any covering; and their black hair blowing across their swarthy faces, heightens to an uncommon degree, the wildness of their appearance. They turned out to be a party of Bernantio's friendly tribe, going to a salina for salt. The Indians eat much salt, their children sucking it like sugar. This habit is very different from that of the Spanish Gauchos, who, leading the same kind of life, eat scarcely any. The Indians gave us good-humoured nods as they passed at full gallop, driving before them a troop of horses, and followed by a train of lanky dogs.

SEPTEMBER 12TH and 13TH.—I staid at this posta two days, waiting for a troop of soldiers, which, General Rosas had the kindness to send to inform me, would shortly travel to Buenos Ayres; and he advised me to take the opportunity of such an escort. In the morning we rode to some neighbouring hills to view the country, and to examine the geology. After dinner the soldiers divided themselves into two parties for a trial of skill with the bolas. Two spears were stuck in the ground thirty-five yards apart, but they were struck and entangled only once in four or five times. The balls can be thrown fifty or sixty yards, but with little certainty. This, however, does not apply to a man on horseback; for when the speed of the horse is added to the force of the arm, it is said, that they can be whirled with effect to the distance of eighty yards.* In the middle of the day two men had ar-

* As a proof of the force with which the balls are hurled, I may mention an anecdote that happened at the Falkland Islands. At the time the Spaniards murdered some of their own countrymen, and all the Englishmen, a young Spaniard was running away, when a great tall Indian, by name Luciano, came at full gallop after him, shouting to him to stop, and saying that he only wanted to speak to him. Just as the Spaniard was on the point of reaching the boat, Luciano threw the balls: they struck him on the legs, with such a jerk, as to throw him down and to render him for some time insensible. The man, after Luciano had had his talk, was al-

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rived, who brought a parcel from the next posta to be forwarded to the general; so that besides these two, our party consisted of myself and guide, the lieutenant and his four soldiers. The latter were strange beings; the first a fine young negro; the second half Indian and negro; and the two others nondescripts; namely, an old Chilian miner, the colour of mahogany, and another partly a mulatto; but two such mongrels, with such detestable expressions, I never saw before. At night, when they were sitting round the fire, and playing at cards, I retired to view such a Salvator Rosa scene. They were seated under a low cliff, so that I could look down upon them; around the party were lying dogs, arms, remnants of deer and ostriches; and their long spears were stuck in the turf. Further in the dark background, their horses were tied up, ready for any sudden danger. If the stillness of the desolate plain was broken by one of the dogs barking, a soldier, leaving the fire, would place his head close to the ground, and thus slowly scan the horizon. Even if the noisy teru-tero uttered its scream, there would be a pause in the conversation, and every head, for a moment a little inclined.

What a life of misery these men appear to us to lead! They were at least ten leagues from the Sauce posta, and since the murder committed by the Indians, twenty from another. The Indians are supposed to have made their attack in the middle of the night; for very early in the morning after the murder, they were luckily seen approaching this posta. The whole party, however, escaped, together with the troop of horses; each one taking a line for himself, and driving with him as many animals as he was able to manage.

The little hovel, built of thistle-stalks, in which they slept, neither kept out the wind or rain; indeed in the latter case the only effect the roof had, was to condense it into larger

lowed to escape. He told us that his legs were marked by great weals, where the thong had wound round, as if he had been flogged with a whip.

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drops. They had nothing to eat excepting what they could catch, such as ostriches, deer, armadilloes, &c., and their only fuel was the dry stalks of a small plant, somewhat resembling an aloe. The sole luxury which these men enjoyed was smoking the little paper cigars, and sucking maté. I used to think the carrion vulture, man's constant attendant on these dreary plains, while seated on some little eminence, seemed by its very patience to say, "Ah! when the Indians come we shall have a feast."

In the morning we all sallied forth to hunt, and although we had not much success, there were some animated chases. Soon after starting the party separated, and so arranged their plans, that at a certain time of the day (in guessing which they show much skill) they should all meet from different points of the compass on a plain piece of ground, and thus drive together the wild animals. One day I went out hunting at Bahia Blanca, but the men there merely rode in a crescent, each being about a quarter of a mile apart from the other. A fine male ostrich being turned by the headmost riders, tried to escape on one side. The Gauchos pursued at a reckless pace, twisting their horses about with the most admirable command, and each man whirling the balls round his head. At length the foremost threw them, revolving through the air: in an instant the ostrich rolled over and over, its legs fairly lashed together by the thong.

The plains abound with three kinds of partridge,* two of which are as large as hen pheasants. Their destroyer, a small and pretty fox, was also singularly numerous; in the course of the day we could not have seen less than forty or fifty. They were generally near their earths, but the dogs killed one. When we returned to the posta, we found two of the party returned who had been hunting by themselves. They had killed a puma, and had found an ostrich's nest with twenty-seven eggs in it. Each of these is said to equal in

* Two species of Tinamus, and *Eudromia elegans* of D'Orbigny, which can only be called a partridge with regard to its habits.

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weight eleven hens' eggs; so that we obtained from this one nest as much food as 297 hens' eggs would have yielded.

SEPTEMBER 14TH.—As the soldiers belonging to the next posta meant to return, and we should together make a party of five, and all armed, I determined not to wait* for the expected troops. After galloping some leagues, we came to a low swampy country, which extends for nearly eighty miles to the northward, as far as the Sierra Tapalguen. In some parts there were fine damp plains, covered with grass, while others had a soft, black, and peaty soil. There were also many extensive but shallow lakes, and large beds of reeds. The country on the whole resembled the better parts of the Cambridgeshire fens. At night we had some difficulty in finding, amidst the swamps, a dry place for our bivouac.

SEPTEMBER 15TH.—Rose very early in the morning, and shortly after passed the posta, where the Indians had murdered the five soldiers. The officer had eighteen chuzo wounds in his body. By the middle of the day, after a hard gallop, we reached the fifth posta: on account of some difficulty in procuring horses we staid there the night. As this point was the most exposed on the whole line, twenty-one soldiers were stationed there; at sunset they returned from hunting, bringing with them seven deer, three ostriches, and many armadilloes and partridges. When riding through the country, it is a common practice to set fire to the plain; and hence at night, as on this occasion, the horizon was illuminated in several places by brilliant conflagrations. This is done partly for the sake of puzzling any stray

* The lieutenant pressed me much to stop. As he had been very obliging—not only providing me with food, but lending me his private horses—I wanted to make him some remuneration. I asked my guide whether I might do so, but he told me certainly not; that the only answer I should receive, probably would be, "We have meat for the dogs in our country, and therefore do not grudge it to a Christian." It must not be supposed that the rank of lieutenant in such an army, would at all prevent the acceptance of payment: it was only the high sense of hospitality, which every traveller is bound to acknowledge as nearly universal throughout these provinces.

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Indians, but chiefly for improving the pasture. In grassy plains unoccupied by the larger ruminating quadrupeds, it seems necessary to remove by fire the superfluous vegetation, so as to render serviceable the new year's growth.

The rancho at this place did not boast even of a roof, but merely consisted of a ring of thistle-stalks, to break the force of the wind. It was situated on the borders of an extensive but shallow lake, swarming with wild fowl, among which the black-necked swan was conspicuous.

The kind of plover, which appears is if mounted on stilts, (*Himantopus melanura*) is here common in flocks of considerable size. It has been wrongfully accused of inelegance; when wading about in shallow water, which is its favourite resort, its gait is far from awkward. These birds in a flock utter a noise, that singularly resembles the cry of a pack of small dogs in full chase: waking in the night, I have more than once been for a moment startled at the distant sound. The teru-tero (*Vanellus cayanensis*), is another bird, which often disturbs the stillness of the night. In appearance and habits it resembles in many respects our peewits; its wings, however, are armed with sharp spurs, like those on the legs of the common cock. As our peewit takes its name from the sound of its voice, so does the teru-tero. While riding over the grassy plains, one is constantly pursued by these birds, which appear to hate mankind, and I am sure deserve to be hated, for their never-ceasing, unvaried, harsh screams. To the sportsman they are most annoying, by telling every other bird and animal of his approach: to the traveller in the country, they may possibly, as Molina says, do good, by warning him of the midnight robber. During the breeding season, they attempt, like our peewits, by feigning to be wounded, to draw away from their nests dogs and other enemies. The eggs of this bird are esteemed a great delicacy.

September 16th.—To the seventh posta at the foot of the Sierra Tapalguen. The country was quite level, with a coarse herbage and a soft peaty soil. The hovel was there remarkably neat, the posts and rafters being made of about a

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dozen dry thistle-stalks bound together with thongs of hide; and by the aid of these Ionic-like columns the roof and sides were thatched with reeds. We were here told a fact, which I would not have credited, if I had not had partly ocular proof of it; namely, that, during the previous night, hail as large as small apples, and extremely hard, had fallen with such violence, as to kill the greater number of the wild animals. One of the men had already found thirteen deer (*Cervus campestris*) lying dead, and I saw their *fresh* hides; another of the party, a few minutes after my arrival, brought in seven more. Now I well know, that one man without dogs, would hardly have killed seven deer in a week. The men believed they had seen about fifteen dead ostriches (part of one of which we had for dinner); and they said that several were running about evidently blind in one eye. Numbers of smaller birds, as ducks, hawks, and partridges, were killed. I saw one of the latter with a black mark on its back, as if it had been struck with a paving-stone. A fence of thistle-stalks round the hovel, was nearly broken down, and my informer putting his head out to see what was the matter, received a severe cut, and now wore a bandage. The storm was said to have been of limited extent: we certainly saw from our last night's bivouac a dense cloud and lightning in this direction. It is marvellous how such strong animals as deer could thus have been killed; but I have no doubt, from the evidence I have given, that the story is not in the least exaggerated. I am glad, however, to have its credibility supported by the Jesuit Drobrizhoffer,* who, speaking of a country much to the northward, says, hail fell of an enormous size and killed vast numbers of cattle: the Indians hence called the place *Lalegraicavalca*, meaning "The little white things."

Having finished our dinner of hail-stricken meat, we crossed the Sierra Tapalguen; a low range of hills, a few hundred feet in height, which commences at Cape Corrientes.

* History of the Abipones, vol. ii., p. 6.

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The rock in this part is pure quartz; further eastward I understand it is granitic. The hills are of a remarkable form; they consist of flat patches of table-land, surrounded by low but perpendicular cliffs, like the outliers of a sedimentary deposit. The hill which I ascended was very small, not above a couple of hundred yards in diameter; but I saw others larger. One which goes by the name of the "Corral," is said to be two or three miles in diameter, and encompassed on all sides by perpendicular cliffs, between thirty and forty feet high, excepting at one spot, where the entrance lies. Falconer* gives a curious account of the Indians driving within it troops of wild horses, and then by guarding the entrance, keeping them secure. I have never heard of any other instance of table-land in a formation of quartz, and which, in the hill I examined, had neither cleavage or stratification. I was told that the rock of the "Corral" was white, and would strike fire.

We did not reach the posta on the Rio Tapalguen till after it was dark. At supper, from something which was said, I was suddenly struck with horror at thinking that I was eating one of the favourite dishes of the country, namely, a half-formed calf, long before its proper time of birth. It turned out to be Puma; the meat is very white, and remarkably like veal in taste. Dr. Shaw was laughed at for stating that, "the flesh of the lion is in great esteem, having no small affinity with veal, both in colour, taste, and flavour." Such certainly is the case with the Puma. The Gauchos differ in their opinion, whether the Jaguar is good eating, but are unanimous in saying that cat is excellent.

SEPTEMBER 17TH.—We followed the course of the Rio Tapalguen, through a very fertile country, to the ninth posta. Tapalguen itself, or the town of Tapalguen, if it may be so called, consists of a perfectly level plain, studded over as far as the eye can reach, with the toldos, or oven-

* Falconer's Patagonia, p. 70.

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shaped huts of the Indians. The families of the friendly Indians, who were fighting on the side of Rosas, resided here. We met and passed many young Indian women, riding by two or three together on the same horse: they, as well as many of the young men, were strikingly handsome,—their fine ruddy complexions being the picture of health. Besides the toldos, there were three ranchos; one inhabited by the Commandant, and the two others by Spaniards with small shops.

We were here able to buy some biscuit. I had now been several days without tasting any thing besides meat: I did not at all dislike this new regimen; but I felt as if it would only have agreed with very hard exercise. I have heard that patients in England, when desired to confine themselves exclusively to an animal diet, even with the hope of life before their eyes, have hardly been able to endure it. Yet the Gaucho in the Pampas, for months together, touches nothing but beef. But they eat, I observe, a very large proportion of fat, which is of a less animalized nature; and they particularly dislike dry meat, such as that of the Agouti. It is, perhaps, from this regimen that the Gauchos, like other carnivorous animals, can abstain long from food. I was told that at Tandeel, some troops voluntarily pursued a party of Indians for three days, without eating or drinking.

We saw in the shops, many articles, such as horsecloths, belts, and garters, woven by the Indian women. The patterns were very pretty, and the colours brilliant; the workmanship of the garters was so good, that an English merchant at Buenos Ayres, maintained they must have been manufactured in England, till he found the tassels had been fastened by split sinew.

September 18th.—We had a very long ride this day. At the twelfth posta, which is seven leagues south of Rio Salado, we came to the first estancia with cattle and white women. Afterwards we had to ride for many miles through a country flooded with water above our horses' knees. By crossing the stirrups, and riding Arab-like with our legs bent up, we

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contrived to keep tolerably dry. It was nearly dark when we arrived at the Salado; the stream was deep, and about forty yards wide; in summer, however, its bed becomes almost dry, and the little remaining water nearly as salt as that of the sea. We slept at one of the great estancias of General Rosas. It was fortified, and of such an extent, that arriving in the dark I thought it was a town and fortress. In the morning we saw immense herds of cattle, as well we might, the general here having seventy-four square leagues of land. Formerly nearly three hundred men were employed about this estate, and they defied all the attacks of the Indians.

SEPTEMBER 19TH.—Passed the Guardia del Monte. This is a nice scattered little town, with many gardens, full of peach and quince trees. The plain here looked like that around Buenos Ayres; the turf being short and bright green, with beds of clover and thistles, and with bizcacha holes. I was very much struck with the marked change in the aspect of the country after having crossed the Salado. From a coarse herbage we passed on to a carpet of fine green verdure. I at first attributed this to some change in the nature of the soil, but the inhabitants assured me that in this part, as well as in Banda Oriental, where there was as great a difference between the country around Monte Video and the thinly-inhabited savannahs of Colonia, that the whole was to be attributed to the manuring and grazing of the cattle. I am not botanist enough to say, whether the change is owing to the introduction of new species, to the altered growth of the same, or to a difference in their proportional numbers. Azara has also observed with astonishment this change: he is likewise much perplexed by the immediate appearance of plants not occurring in the neighbourhood, on the borders of any track that leads to a newly-constructed hovel. In another part he says,* "Ces chevaux (sauvages) ont la manie de préférer les chemins, et le bord des routes pour déposer leurs excrémens, dont on trouve des monceaux dans ces endroits." Does this not

* Azara's Voyage, vol. i., p. 373.

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partly explain the circumstance? We thus have lines of richly-manured land serving as channels of communication across wide districts.

Near the Guardia we find the southern limit of two European plants, now become excessively common. The fennel in great profusion covers the ditch banks in the neighbourhood of Buenos Ayres, Monte Video, and other towns. But the cardoon (*Cynara cardunculus*)* has a far wider range: it occurs in these latitudes on both sides of the Cordillera, across the continent. I saw it in unfrequented spots in Chile, Entre Rios, and Banda Oriental. In the latter country alone, very many (probably several hundred) square miles are covered by one mass of these prickly plants, and are impenetrable by man or beast. Over the undulating plains, where these great beds occur, nothing else can live. Before their introduction, however, I apprehend the surface supported as in other parts a rank herbage. I doubt whether any case is on record, of an invasion on so grand a scale of one plant over the aborigines. As I have already said, I nowhere saw the cardoon south of the Salado; but it is probable that in proportion as that country becomes inhabited, the cardoon will extend its limits. The case is different with the giant thistle (with variegated leaves) of the Pampas, for I met with it in the valley of the Sauce. According to the principles so well laid down by Mr. Lyell,

* D'Orbigny (vol. i., p. 474), says that the cardoon and artichoke are both found wild. Dr. Hooker (Botanical Magazine, vol. lv., p. 2862), has described a variety of the Cynara from this part of South America under the name of *inermis*. He states that botanists are now generally agreed that the cardoon and the artichoke are varieties of one plant. I may add, that an intelligent farmer assured me, he had observed in a deserted garden, some artichokes changing into the common cardoon. Dr. Hooker believes that Head's vivid description of the thistle of the Pampas applies to the cardoon; but this is a mistake. Captain Head referred to the plant, which I have mentioned a few lines lower down, under the title of giant thistle. Whether it is a true thistle I do not know; but it is quite different from the cardoon, and more like a thistle properly so called.

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few countries have undergone more remarkable changes, since the year 1535, when the first colonist of La Plata landed with seventy-two horses. The countless herds of horses, cattle, and sheep, not only have altered the whole aspect of the vegetation, but they have almost banished the guanaco, deer, and ostrich. Numberless other changes must likewise have taken place; the wild pig in some parts probably replaces the peccari; packs of wild dogs may be heard howling on the wooded banks of the less frequented streams; and the common cat, altered into a large and fierce animal, inhabits rocky hills. I have alluded to the invasion of the cardoon: in a like manner, the islands near the mouth of the Parana, are thickly clothed with peaches and orange-trees, springing from seeds carried there by the waters of the river.

While changing horses at the Guardia, several people questioned us much about the army,—I never saw any thing like the enthusiasm for Rosas, and for the success of the "most just of all wars, because against barbarians." This expression it must be confessed is very natural, for till lately, neither man, woman, nor horse, was safe from the attacks of the Indians. We had a long day's ride over the same rich green plain abounding with various flocks, and with here and there a solitary estancia, and its one *ombu* tree. In the evening it rained heavily: on arriving at a post-house, we were told by the owner that if we had not a regular passport we must pass on, for there were so many robbers he would trust no one. When he read, however, my passport, which began with "El Naturalista Don Carlos, &c." his respect and civility were as unbounded, as his suspicions had been before. What a naturalist may be, neither he nor his countrymen, I suspect, had any idea; but probably my title lost nothing of its value from that cause.

September 20th.—We arrived by the middle of the day at Buenos Ayres. The outskirts of the city looked quite pretty, with the agave hedges, and groves of olive, peach, and willow trees, all just throwing out their fresh green leaves. I rode to the house of Mr. Lumb, an English merchant, to

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whose kindness and hospitality, during my stay in the country, I was greatly indebted.

The city of Buenos Ayres is large*; and I should think one of the most regular in the world. Every street is at right angles to the one it crosses, and the parallel ones being equidistant, the houses are collected into solid squares of equal dimensions, which are called quadras. On the other hand, the houses themselves are hollow squares; all the rooms opening into a neat little courtyard. They are generally only one story high, with flat roofs, which are fitted with seats, and are much frequented by the inhabitants in summer. In the centre of the town is the Plaza, where the public offices, fortress, cathedral, &c., stand. Here also, the old viceroys, before the revolution, had their palaces. The general assemblage of buildings possesses considerable architectural beauty, although none individually can boast of any.

The great *corral* where the animals are kept for slaughter to supply food to this beef-eating population, is one of the spectacles best worth seeing. The strength of the horse as compared to that of the bullock is quite astonishing: a man on horseback having thrown his lazo round the horns of a beast, can drag it any where he chooses. The animal having ploughed up the ground with outstretched legs, in vain efforts to resist the force, generally dashes at full speed to one side; but the horse immediately turning to receive the shock, stands so firmly, that the bullock is almost thrown down, and one would think, would certainly have its neck dislocated. The struggle is not, however, one of fair strength; the horse's girth being matched against the bullock's extended neck. In a similar manner a man can hold the wildest horse, if caught with the lazo, just behind the ears. When the bullock has been dragged to the spot where it is to be slaughtered, the *matador* with great caution cuts the hamstrings. Then is given the death bellow; a noise more

* Is said to contain 60,000 inhabitants. Monte Video, the second town of importance on the banks of the Plata, has 15,000.

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expressive of fierce agony than any I know: I have often distinguished it from a long distance, and have always known that the struggle was then drawing to a close. The whole sight is horrible and revolting, the ground is almost made of bones; and the horses, and riders are drenched with gore.

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CHAPTER VII.

Excursion to St. Fe—Thistle beds—Habits and range of Bizcacha—Little owl—Saline streams—Level plains—Mastodon—St. Fe—Change in landscape—Geology—Tooth of extinct horse—Range of fossil quadrupeds—Pampas full of remains—Effects of great droughts—Droughts periodical—Parana—Habits of Jaguar—Scissor-beak—Kingfisher, parrot, and scissor-tail—Revolution—Buenos Ayres—State of government.

BUENOS AYRES TO ST. FE.

SEPTEMBER 27TH.—In the evening I set out on an excursion to St. Fe, which is situated nearly three hundred English miles from Buenos Ayres, on the banks of the Parana. The roads in the neighbourhood of the city, after the rainy weather were extraordinarily bad. I should never have thought it possible for a bullock waggon to have crawled along: as it was, they scarcely went at the rate of a mile an hour, and a man was kept ahead, to survey the best line for making the attempt. The bullocks were terribly jaded: it is a great mistake to suppose that with improved roads, and an accelerated velocity of travelling, the sufferings of the animals increase in the same proportion. We passed a train of waggons and a troop of beasts on their road to Mendoza. The distance is about 580 geographical miles, and the journey is generally performed in fifty days. These waggons are very long, narrow, and thatched with reeds; they have only two wheels, the diameter of which in some cases is even ten feet. Each is drawn by six bullocks which are urged on by a goad at least twenty feet long: this is suspended from within the roof; for the wheel bullocks a smaller one is kept; and for the intermediate pair, a point projects at right angles from the middle of the long one. The whole apparatus looked like some implement of war.

SEPTEMBER 28TH.—We passed the small town of Luxan,

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where there is a wooden bridge over the river—a most unusual convenience in this country. We passed also Areco. The plains appeared level, but were not so in fact; for in various places the horizon was distant. The estancias are here wide apart; for there is little good pasture, owing to the land being covered by beds either of an acrid clover, or of the great thistle. The latter, well known from the animated description given by Sir F. Head, were at this time of the year two-thirds grown; in some parts they were as high as the horse's back, but in others they had not yet sprung up, and the ground was bare and dusty as on a turnpike road. The clumps were of the most brilliant green, and they made a pleasing miniature-likeness of broken forest land. When the thistles are fully grown, the great beds are impenetrable, except by a few tracks, as intricate as those in a labyrinth. These are only known to the robbers, who at this season inhabit them, and sally forth at night to rob, and cut throats, with impunity. Upon asking at a house whether robbers were numerous, I was answered, "The thistles are not up yet;"—the meaning of which reply was not at first very obvious. There is little interest in passing over these tracts, for they are inhabited by few animals or birds, excepting the bizcacha and its friend the little owl.

The bizcacha* is well known to form a prominent feature in the zoology of the Pampas. It is found as far south as the Rio Negro, in lat. 41°, but not beyond. It cannot, like the agouti, subsist on the gravelly and desert plains of Patagonia, but prefers a clayey or sandy soil, which produces a different and more abundant vegetation. Near Mendoza, at the foot of the Cordillera, it occurs in close neighbourhood with the allied alpine species. It is a very curious circumstance in its geographical distribution, that it has never been seen, fortunately for the inhabitants, in Banda Oriental, to the eastward of the river Uruguay: yet in that province

* The bizcacha (*Calomys bizcacha*) somewhat resembles a large rabbit, but with bigger gnawing teeth and a long tail: it has, however, only three toes behind, like the agouti. During the last three or four years, the skins of these animals have been sent to England for the sake of the fur.

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there are plains which appear admirably adapted to its habits. That river has formed an insuperable obstacle to its migration; although the broader barrier of the Parana has been passed, and the bizcacha is common in Entre Rios (the province between the two rivers), directly on the opposite shore of the Uruguay. Near Buenos Ayres these animals are exceedingly common. Their most favourite resort appears to be those parts of the plain, which during one half the year are covered with giant thistles, to the exclusion of other plants. The Gauchos affirm that it lives on roots; which, from the great strength of its gnawing teeth, and the kind of localities frequented by it, seems probable. As in the case of the rabbit, a few holes are commonly placed together. In the evening the bizcachas come out in numbers, and there quietly sit on their haunches. They are at such times very tame, and a man on horseback passing by, seems only to present an object for their grave contemplation. They do not wander far from their burrows. They run very awkwardly, and, when hurrying out of danger, from their elevated tails and short front legs much resemble great rats. Their flesh, when cooked, is very white and good, but it is seldom used.

The bizcacha has one very singular habit; namely, dragging every hard object to the mouth of its burrow. Around each group of holes many bones of cattle, stones, thistle-stalks, hard lumps of earth, dry dung, &c., are collected into a scattered heap, which frequently amounts to as much as a wheelbarrow would contain. I was credibly informed that a gentleman, when riding on a dark night, dropped his watch; he returned in the morning, and by searching the neighbourhood of every bizcacha hole on the line of road, as he expected, soon found it. This habit of picking up whatever may be lying on the ground any where near its habitation, must cost much trouble. For what purpose it is done I am quite unable to form even the most remote conjecture: it cannot be for defence, because the rubbish is chiefly placed above the mouth of the burrow, which enters the ground at a very small inclination. No doubt there must exist some good

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reason; but the inhabitants of the country are quite ignorant respecting it.

The little owl (*Noctua cunicularia*), which has been so often mentioned, on the plains of Buenos Ayres exclusively inhabits the holes of the bizcacha; but in Banda Oriental it is its own workman. During the open day, but more especially in the evening, these birds may be seen in every direction standing frequently by pairs on the hillock near their burrows. If disturbed they either enter the hole, or, uttering a shrill harsh cry, move with a remarkably undulatory flight to a short distance, and then turning round, steadily gaze at their pursuer. Occasionally in the evening they may be heard hooting. I found in the stomachs of two which I opened the remains of mice, and I one day saw a small snake killed and carried away. It is said these latter animals are their common prey during the daytime. I may here mention, as showing on what various kinds of food owls subsist, that a species that was killed among the islets of the Chonos Archipelago, had its stomach full of good-sized crabs.

In the evening we crossed the Rio Arrecife, on a simple raft made of barrels lashed together, and slept at the post-house on the other side. I this day paid horse hire for thirty-one leagues; and although the sun was glaring hot I was but very little fatigued. When Captain Head talks of riding fifty leagues a day, I do not imagine the distance is equal to 150 English miles. At all events the thirty-one leagues was only 76 miles in a straight line, and in an open country I should think four additional miles for turnings would be a sufficient allowance.

29TH AND 30TH.—We continued to ride over plains of the same character. At San Nicholas I first saw the noble river of the Parana. At the foot of the cliff on which the town stands, some large vessels were at anchor. Before arriving at Rozario, we crossed the Saladillo, a stream of fine clear running water, but too saline to drink. Rozario is a large town built on a dead level plain, which forms

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a cliff about sixty feet high over the Parana. The river here is very broad, with many islands, which are low and wooded, as is also the coast of the opposite shore. The view would resemble that of a great lake, if it were not for the linear-shaped islets, which alone give the idea of running water. The cliffs are the most picturesque part; sometimes they are absolutely perpendicular, and of a red colour; at other times in large broken masses, covered with cacti and mimosa-trees. The real grandeur, however, of an immense river like this, is derived from reflecting how important a means of communication and commerce, it forms between one nation and another; to what a distance it travels; and from how vast a territory it drains the great body of fresh water which flows past your feet.

For many leagues north and south of San Nicholas and Rozario, the country is really level. Scarcely any thing which travellers have written about its extreme flatness, can be considered as exaggeration. Yet I could never find a spot, where, by slowly turning round, objects were not seen at greater distances in some directions than in others; and this manifestly proves inequality in the plain. At sea, a person's eye being six feet above the surface of the water, his horizon is two miles and four-fifths distant. In like manner, the more level the plain, the more nearly does the horizon approach within these narrow limits: and this, in my opinion, entirely destroys that grandeur, which one would have imagined that a vast level plain would have possessed.

October 1st.—We started by moonlight and arrived at the Rio Tercero by sunrise. This river is also called the Saladillo, and it deserves the name, for the water is brackish.

I staid here the greater part of the day, searching for fossil bones. Falconer mentions having seen, in the bed of this river, great bones, and the case of a giant armadillo. By good fortune, I discovered a tooth embedded in a layer of rock marl, which was afterwards found exactly to fit the socket in the head of a strange animal, the Toxodon, which

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will presently be mentioned. Hearing also of the remains of one of the old giants, which a man told me he had seen on the banks of the Parana, I procured a canoe, and proceeded to the place. Two groups of immense bones projected in bold relief from the perpendicular cliff. They were, however, so completely decayed, that I could only bring away small fragments of one of the great molar-teeth; but these were sufficient to show that the remains belonged to a species of Mastodon. The men who took me in the canoe, said they had long known of them, and had often wondered how they had got there: the necessity of a theory being felt, they came to the conclusion, that, like the bizcacha, the mastodon formerly was a burrowing animal! In the evening we rode another stage, and crossed the Monge, another brackish stream, bearing the dregs of the washings of the Pampas.

October 2d. — We passed through Corunda, which, from the luxuriance of its gardens, was one of the prettiest villages I saw. From this point to St. Fe the road is not very safe. The western side of the Parana further northward, ceases to be inhabited; and hence the Indians sometimes come down, and waylay travellers. The nature of the country also favours this, for instead of a grassy plain, there is an open woodland, composed of low prickly mimosas. We passed some houses that had been ransacked and since deserted; we saw also a spectacle, which my guides viewed with high satisfaction; it was the skeleton of an Indian with the dried skin hanging on the bones, suspended to the branch of a tree.

In the morning we arrived at St. Fe. I was surprised to observe how great a change of climate a difference of only three degrees of latitude between this place and Buenos Ayres had caused. This was evident from the dress and complexion of the men—from the increased size of the ombu-trees—the number of new cacti and other plants—and especially from the birds. In the course of an hour I remarked

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half-a-dozen of the latter, which I had never seen at Buenos Ayres. Considering that there is no natural boundary between the two places, and that the character of the country is nearly similar, the difference was much greater than I should have expected.

October 3d and 4th.—I was confined to my bed by a headach for these two days. A goodnatured old woman, who attended me, wished me to try many odd remedies. A common practice is, to bind an orange-leaf, or a bit of black plaster, to each temple; and a still more general plan is, to split a bean into halves, moisten them, and place one on each temple, where they will easily adhere. It is not thought proper ever to remove the beans or plaster, but to allow them to drop off; and sometimes, if a man, with patches on his head, is asked, what is the matter? he will answer, "I had a headache the day before yesterday."

St. Fe is a quiet little town, and is kept clean, and in good order. The governor, Lopez, was a common soldier at the time of the revolution; but has now been seventeen years in power. This stability of government is owing to his tyrannical habits; for tyranny seems as yet better adapted to these countries, than republicanism. The governor's favourite occupation is hunting Indians: a short time since he slaughtered forty-eight, and sold the children at the rate of three or four pounds apiece.

October 5th.—We crossed the Parana to St. Fe Bajada, a town on the opposite shore. The passage took some hours, as the river here consisted of a labyrinth of small streams, separated by low wooded islands. I had a letter of introduction to an old Catalonian Spaniard, who treated me with the most uncommon hospitality. The Bajada is the capital of Entre Rios. In 1825 the town contained 6000 inhabitants, and the province 30,000; yet, few as they are, none have suffered more from bloody and desperate revolutions. They boast here of representatives, ministers, a standing army, and governors: so it is no wonder that they have

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their revolutions. At some future day this must be one of the richest countries of La Plata. The soil is varied and productive, and its almost insular form gives it two grand lines of communication by the rivers Parana and Uruguay.

I was delayed here five days, and employed myself in examining the geology of the surrounding country, which was very interesting. We here see beds of sand, clay, and limestone, containing sea-shells and sharks' teeth, passing above into an indurated marl, and from that into the red clayey earth of the Pampas, with its calcareous concretions and the bones of terrestrial animals. This vertical section clearly tells us, of a large bay of pure salt-water, gradually encroached on, and at last becoming the bed of a muddy estuary, into which floating carcasses were swept. I found near the Bajada a large piece, nearly four feet across, of the giant armadillo-like case; also a molar tooth of a mastodon, and fragments of very many bones, the greater number of which were rotten, and as soft as clay.

A tooth which I discovered by one point projecting from the side of a bank, interested me much, for I at once perceived that it had belonged to a horse. Feeling much surprise at this, I carefully examined its geological position, and was compelled to come to the conclusion,* that a horse, which cannot from a comparison of the tooth alone, be distinguished from the existing species,† lived as a contemporary with the various great monsters that formerly inhabited South America. Mr. Owen and myself, at the College of Surgeons, compared this tooth with a fragment of another, probably belonging to the Toxodon, which was embedded at the dis-

* The broken tooth mentioned at Bahia Blanca must not be forgotten.

† As this horse existed at the same time with animals now extinct, it is not probable, that it is the same species with the recent kind, although from the similarity of the teeth it must have been closely allied. Cuvier, talking of the remains of the horse, found fossil under similar conditions in Europe, remarks, " It is not possible to say whether it was one of the species now existing or not, because the skeletons of these species are so like each other, that they cannot be distinguished by the mere comparison of isolated fragments."—*Theory of the Earth*, English translation, p. 285.

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tance only of a few yards in the same earthy mass. No sensible difference in their state of decay could be perceived; they were both tender, and partially stained red. If the horse did not coexist with the Toxodon, the tooth must by some accident, not very easily understood, have been embedded within the last three centuries (the period of the introduction of the horse), with the remains of those animals, which ages since perished, when the Pampas was covered by the waters of the sea. Now, I may ask, will any one credit that two teeth of nearly equal size, buried in the same substance close together, after a period of so vast an inequality, could exist in the same condition of decay? We must conclude otherwise. Certainly it is a marvellous event in the history of animals, that a native kind should have disappeared* to be succeeded in after ages by the countless herds introduced with the Spanish colonist! But our surprise should be modified when it is already known, that the remains of the *Mastodon angustidens* (the tooth formerly alluded to as embedded near that of the horse, probably belonged to this species) have been found both in South America, and in the southern parts of Europe.

With regard to North America, Cuvier says† the *Elephas primigenius* "has left thousands of its carcasses from Spain to the shores of Siberia, and it has been found in the whole of North America." The fossil ox, in a like manner, he writes,‡ is buried "dans toute la partie boréale des deux continens, puisque on en a d'Allemagne, d'Italie, de Prussie, de la Sibérie occidentale et orientale, et de l'Amérique." I may here add that horses' bones, mingled with those of the mastodon, have several times been transmitted for sale from North America to England; but it has always been imagined, from the simple fact of their being horses' bones, that they had been accidentally mingled with the fossils. Among the

* I need not here state, that there is no kind of evidence to support the belief, that a horse existed in America previously to the age of Columbus.

† Theory of the Earth, p. 281 (English translation).

‡ Ossemens Fossiles, vol. iv., p. 147.

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remains brought home by Captain Beechey from the west coast of the same continent, in the frozen region of 66° north, Dr. Buckland* has described the astragalus metacarpus, and metatarsus of the horse, which were associated with the remains of the *Elephas primigenius*, and of the fossil ox. Thus we have an elephant, an ox, and a horse (the species of the latter is only presumed to be identical), common to Europe and to North America.

Very few species of living quadrupeds,† which are altogether terrestrial in their habits, are common to the two continents, and these few are chiefly confined to the extreme frozen regions of the north. The separation, therefore, of the Asiatic and American zoological provinces appears formerly to have been less perfect than at present. The remains of the elephant and of the ox have been found on the banks of the Anadir (long. 175° E.), on the extreme part of Siberia, nearest the American coast: and the former remains, according to Chamisso, are common in the peninsula of Kamtschatka. On the opposite shores, likewise, of the narrow strait which divides these two great continents, we know, from the discoveries of Kotzebue and Beechey, that the remains of both animals occur abundantly: and as Dr. Buckland has shown they are associated with the bones of the horse, the teeth of which animal in Europe, according to Cuvier, accompany by thousands the remains of the pachydermata of the later periods. With these facts, we may safely look at this quarter, as the line of communication (now interrupted by the steady progress of geological change) by which the elephant, the ox, and the horse, entered America, and peopled its wide extent.‡

* See the admirable Appendix to Beechey's Voyage, p. 592 (quarto edition).

† See Dr. Richardson's very interesting Report on North American Zoology for the British Association of 1836.

‡ I do not here mean to fix on the more northern parts of the old world as the parent country of these two animals. I only want to point out the channel of communication—not the course of the stream—

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The occurrence of the fossil horse and of *Mastodon angustidens* in South America, is a much more remarkable circumstance than that of the animals mentioned above in the northern half of the continent; for if we divide America, not by the Isthmus of Panama, but by the southern part of Mexico,* in lat. 20°, where the great table-land presents an obstacle to the migration of species, by affecting the climate, and by forming, with the exception of some valleys and of a fringe of low land on the coast, a broad barrier; we shall then have two zoological provinces strongly contrasted with each other. Some few species alone have passed the barrier, and may be considered as wanderers, such as the puma, opossum, kinkajou, and peccari. The mammalogy of South America is characterized by possessing several species of the genera of llama, cavy (and the allied animals), tapir, peccari, opossum, anteater, sloth, and armadillo. If North America had possessed species of these genera proper to it, the distinction of the two provinces could not have been drawn; but the presence of a few wanderers scarcely affects the case. North America, on the other hand, is characterized by its numerous rodents,† and by four genera of solid horned ruminants,‡ of which section the southern half does not possess a single species.

whether from west to east, or the reverse. Perhaps, when we recollect how extraordinarily the Pachydermata abounded during the Tertiary epochs in the Old World, and that the representatives of these animals now only exist in that quarter, it may seem most probable that the migration took place from Asia to America.

* This is the division followed by Lichtenstein, Swainson, and Richardson. The section from Vera Cruz to Acapulco, given by Humboldt in the Atlas to Polit. Essay on Kingdom of N. Spain, will show how immense a barrier the Mexican table-land forms.

† Dr. Richardson (Report to Brit. Assoc., p. 157), talking of the identification of a Mexican animal with the *Synetheres prehensilis*, says, "We do not know with what propriety, but, if correct, it is, if not a solitary instance, at least very nearly so, of a rodent animal being common to North and South America."

‡ *Dicranocerus furcifer, Capra Americana, Ovis montana, Bos Americana,* and *Moschatus*.—Report to Brit. Assoc., p. 159.

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This distinction of the two zoological provinces does not appear always to have existed. At the present day the order of Edentata is much more strongly developed in South America, than in any other part of the world: and concluding from the fossil remains, which were discovered at Bahia Blanca, such must have been the case during a former epoch. In America, north of Mexico, not one of this order is now found: yet, as is well known, the gigantic megalonyx, considered by Cuvier as a species of Megatherium, has been found only in that country; and as it appears from recent observations,* the Megatherium Cuvierii itself likewise occurs there. Mr. Owen showed me the tibia of some large animal, which Sir Philip Egerton had purchased out of a collection of the remains of the mastodon brought from North America. Mr. Owen says it certainly belongs to one of the Edentata, and it so closely resembles a bone which I found embedded, together with fragments of the great armadillo-like covering, in Banda Oriental, that it probably forms a species of the same genus. Lastly, among the fossils brought home by Captain Beechey from the N.W. coast, there was a cervical vertebra, which, when compared by Mr. Pentland† with the skeletons at Paris, was found to resemble that of the sloth and anteater more than that of any other animal, although having some points of essential difference.

Of the Pachydermata four or five species are now found in America; but, as in the case of the Edentata, none are peculiar to the continent north of Mexico; and one alone seems to exist there as a wanderer. Yet the account of the multitude of bones of the mastodon and elephant, which have been discovered in the salt-licks of North America, is familiar to every one. The remains of the *Mastodon giganteum* have been found nowhere else; but those of the *Elephas primigenius* are common to a large part of the

* Ed. New Phil. Journal. July, 1828, p. 327. From a paper by Mr. Cooper in the Lyceum of Natural History of New York.

† See Dr. Buckland. Appendix to Beechey's Voyage, p. 597.

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terrestrial globe.* This elephant must have existed in Mexico; and Cuvier,† judging from a fragment of a tusk, thinks it even extended to the neighbourhood of Quito in South America. In the latter country three species of Mastodon have been discovered. One of these, *M. angustidens*, is common to Europe. It is singular that its remains, as yet, have never been brought from North America; nevertheless, considering that it was a contemporary of the extinct animals above mentioned, it seems highly probable that it arrived by the same line of communication on the N.W. coast. As its remains have frequently been found at a great elevation in the Cordillera, perhaps its habits led it to follow that chain of mountains from north to south.

After these facts, it is only in conformity with what we might almost have expected, that the horse, belonging to the same order of Pachydermata, should formerly have inhabited both North and South America. It is interesting thus to discover an epoch anterior to the division, as far at least as two important orders among the mammalia are concerned, of the continent into two separate zoological provinces. The geologist who believes in considerable oscillations of level in the crust of the globe within recent periods, will not fear to speculate either on the elevation of the Mexican platform, as a cause of the distinction, or on the submergence of land in the West Indian seas,—a circumstance which is perhaps indicated by the zoology of those islands.‡

* I may observe that at the present day both species of elephants have wide ranges. The African one is found from the Senegal to the Cape of Good Hope, a distance of about 3000 miles. The Asiatic kind formerly had an equal range, namely, from the banks of the Indus to the East Indian Isles. The hippopotamus is believed to have reached from the Cape to Egypt.

† Ossemens Fossiles, vol. i., p. 158. Cuvier says he cannot decide positively, not having seen a molar tooth.

‡ Dr. Richardson (Report for 1836, to Brit. Assoc., p. 157) says, "the spotted cavy (*cælogenys*), and perhaps a species of *cavia*, and one *dasyprocta*, extend from South America to the West Indies and Mexico." Cuvier says the Kinkajou is found in the larger Antilles, but others

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The number of bones embedded in the grand estuary deposit of the Pampas must he very great; I myself heard of, and saw many groups. The names of such places as "the stream of the animal," "the hill of the giant," tell the same story. At other times I heard of the marvellous property of certain rivers, which had the power of changing small bones into large; or as some maintained, the bones themselves grew. As far as I am aware, not one of these animals, as was formerly supposed, perished in the marshes, or muddy river-beds of the present land, but their bones have been exposed by the streams intersecting the deposit in which their remains were formerly buried. We may therefore conclude that the whole area of the Pampas is one wide sepulchre for these extinct quadrupeds.

While travelling through the country, I received several vivid descriptions of the effect of a great drought; and the account of this may throw some light on the cases, where vast numbers of animals of all kinds, have been embedded together. The period included between the years 1827 and 1830 is called the "gran seco" or the great drought. During this time, so little rain fell, that the vegetation, even to the thistles, failed; the brooks were dried up, and the whole country assumed the appearance of a dusty high-road. This was especially the case in the northern part of the province of Buenos Ayres, and the southern part of St. Fe. Very great numbers of birds, wild animals, cattle, and horses, perished from the want of food and water. A man told me, that the deer* used to come into his courtyard to the well,

affirm that this is an error: according to M. Gervais, the *Didelphis crancrivora* inhabits the Antilles. A tooth of the Mastodon has been brought from Bahama (Ed. New Phil. Journal, July, 1826, p. 395). We cannot, however, from this conclude, that the Mastodon formerly inhabited those islands, for the carcass might have been floated there. Some mammalia certainly are peculiar to the Archipelago.

* In Capt. Owen's Surveying Voyage (vol. ii., p. 274) there is a curious account of the effects of a drought on the elephants, at Benguela (west coast of Africa). "A number of these animals had sometime since entered the

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which he had been obliged to dig to supply his own family with water; and that the partridges had hardly strength to fly away when pursued. The lowest estimation of the loss of cattle in the province of Buenos Ayres alone, was taken at one million head. A proprietor at San Pedro had previously to these years 20,000 cattle; at the end not one remained. San Pedro is situated in the middle of the finest country; and even now again abounds with animals; yet, during the latter part of the "gran seco," live cattle were brought in vessels for the consumption of the inhabitants. The animals roamed from their estancias, and wandering far to the southward, were mingled together in such multitudes, that a government commission was sent from Buenos Ayres to settle the disputes of the owners. Sir Woodbine Parish informed me of another and very curious source of dispute; the ground being so long dry, such quantities of dust were blown about, that in this open country the landmarks became obliterated, and people could not tell the limits of their estates.

I was informed by an eyewitness, that the cattle in herds of thousands rushed into the Parana,* and being exhausted by hunger they were unable to crawl up the muddy banks, and thus were drowned. The arm which runs by San Pedro was so full of putrid carcasses, that the master of a vessel told me, that the smell rendered it quite impossible to pass that way. Without doubt several hundred thousand animals thus perished in the river. Their bodies when putrid floated down the stream, and many in all probability were deposited

town, in a body, to possess themselves of the wells, not being able to procure any water in the country. The inhabitants mustered, when a desperate conflict ensued, which terminated in the ultimate discomfiture of the invaders, but not until they had killed one man, and wounded several others." The town is said to have a population of nearly three thousand!

* Azara talks of the fury of the wild horses rushing into the marshes during a dry season: "et les premiers arrivés sont foulés, et écrasés par ceux, qui les suivent. Il m'est arrivé plus d'une fois de trouver plus de mille cadavres de chevaux sauvages morts de cette façon."—Vol. i., p. 374.

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in the estuary of the Plata. All the small rivers became highly saline, and this caused the death of vast numbers in particular spots; for when an animal drinks of such water it does not recover. I noticed, but probably it was the effect of a gradual increase, rather than of any one period, that the smaller streams in the Pampas were paved with a breccia of bones.* Subsequently to this unusual drought a very rainy season commenced, which caused great floods. Hence it is almost certain, that some thousands of these skeletons were buried by the deposits of the very next year. What would be the opinion of a geologist, viewing such an enormous collection of bones, of all kinds of animals and of all ages, thus embedded in one thick earthy mass? Would he not attribute it to a flood having swept over the surface of the land, rather than to the common order of things?

These droughts to a certain degree seem to be periodical; I was told the dates of several others, and the intervals were about fifteen years. A tendency to periodical droughts is, I believe, common in most dry climates :† such certainly is the case in Australia. Captain Sturt says they return after every ten and twelve years, and are then followed by excessive rains, which gradually become less and less, till another drought is the consequence. The year 1826 and the two following were singularly dry in Australia, and the latter were the first of the "gran seco." I mention this, because

* In the neighbourhood of the great towns on the shores of the Plata, the number of bones strewed over the ground is truly astonishing. Since our return I have been informed, that ships have been freighted to this country with a cargo of bones. That cattle should be fattened on turnips manured with the bones of animals that lived in the southern hemisphere, is a curious fact in the commerce of the world In the East Indies the luxurious drink wine cooled with North-American ice, which in its journey has twice crossed the equator!

† Perhaps in every country, but the effect is more marked where the mean annual quantity of rain is small. I have seen the trunk of an old tree in England, in which the successive rings showed a tendency to periodical increase and diminution of size; about every tenth ring being small. See Mr. Babbage's Ninth Bridgewater Treatise. Note M.

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General Beatson in his account of the island of St. Helena, has remarked that variations in climate sometimes appear to be the effect of the operation of some very general cause. He says (page 43), "The severe drought felt here in 1791 and 1792, was far more calamitous in India. Doctor Anderson states, in a letter to Colonel Kyd, dated the 9th of August, 1792, that, owing to a failure of rain, during the above two years, one half of the inhabitants in the northern provinces had perished by famine; and the remainder were so feeble and weak, that on the report of rice coming from the Malabar coast, 5000 poor people left Rajamundy, and very few of them reached the sea-side, although the distance is only 50 miles. It appears by Mr. Bryan Edwards's History of the West Indies, that the seasons 1791-2 were unusually dry at the island of Montserrat." Barrow* in the latter part of 1792, when at the Cape de Verd islands says, "In fact a drought of three years' continuance, and consequent famine for almost the same period, had nearly desolated the island."

October 12th.—I had intended to have pushed my excursion further, but not being quite well, I was compelled to return by a balandra, or one-masted vessel of about a hundred tons burden, which was bound to Buenos Ayres. As the weather was not fair, we moored early in the day to a branch of a tree on one of the islands. The Parana is full of islands, which undergo a constant round of decay and renovation. In the memory of the master several large ones had disappeared, and others again had been formed and protected by vegetation. They are composed of muddy sand, without even the smallest pebble, and were then about four feet above the level of the river; but during the periodical floods they are inundated. They all present one character; numerous willows and a few other trees are bound together by a great variety of creeping plants, thus forming a thick jungle. These thickets afford a retreat for carpinchos and jaguars.

* Voyage to Cochin China, p. 67.

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The fear of the latter animal, quite destroyed all pleasure in scrambling through the woods. This evening I had not proceeded a hundred yards, before finding indubitable signs of the recent presence of the tiger, I was obliged to come back. On every island there are tracks; and as on the former excursion "el rastro de los Indios" had been the subject of conversation, so in this was "el rastro del tigre."

The wooded banks of the great rivers appear to be the favourite haunt of the jaguar; but south of the Plata, I was told, they frequented the reeds bordering lakes: wherever they are, they seem to require water. The jaguar has been killed on the banks of the Rio Negro, in lat. 41°; and Falconer states that the lake Nahuel-huapi, takes its name from the Indian word for tiger: the latitude of this lake is about 42°; which corresponds to the situation of the Pyrenees in the northern hemisphere. These animals are particularly abundant on the isles of the Parana; their common prey is the carpincho, so that it is generally said, where the carpinchos are plentiful there is little danger of the jaguar. Falconer states, that near the mouth of the Plata, on the southern side, the jaguars are numerous, and that they chiefly live on fish; this account I have heard repeated. On the Parana they have killed many wood-cutters, and have even entered vessels at night. There is a man now living in the Bajada, who, coming up from below when it was dark, was seized on the deck; he escaped, however, with the loss of the use of one arm. When the floods drive these animals from the islands they are most dangerous. I was told, that a few years since, a very large one found its way into a church at St. Fe: two padres entering one after the other were killed, and a third, who came to see what was the matter, escaped with difficulty. The beast was destroyed by being shot from a corner of the building which was unroofed. They commit also at these times great ravages among the cattle and horses. It is said they kill their prey by breaking the vertebræ of the neck. If driven from the carcass they seldom return to it. The Gauchos say that the jaguar, when

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wandering about at night, is much tormented by the foxes yelping as they follow him. This is a curious coincidence with the fact which is generally affirmed of the jackals accompanying, in a similarly officious manner, the East Indian tiger. The jaguar is a noisy animal, roaring much by night, and especially before bad weather.

One day, when hunting on the banks of the Uruguay, I was shown certain trees, to which these animals are said constantly to recur, for the purpose of sharpening their claws. I saw three well-known trees; in front the bark was worn smooth, and on each side there were deep scratches, or rather grooves, extending in an oblique line, nearly a yard in length. The scars were of different ages. A common method of ascertaining whether a jaguar is in the neighbourhood, is to examine these trees. I imagine this habit of the jaguar is exactly similar to one, which may any day be seen in the common cat, as with outstretched legs and exserted claws it scrapes the leg of a chair. Some such habit must be also common to the puma, for on the bare hard soil of Patagonia I have frequently seen scores so deep, that no other animal could have made them. The object of this practice is, I should think, to blunt rather than to sharpen (as the Gauchos say), the points of their claws, which are so seldom used. The jaguar is killed, without much difficulty, by the aid of dogs baying and driving him up a tree, where he is despatched with bullets.

Owing to bad weather we remained two days at our moorings. Our only amusement was catching fish for our dinner: there were several kinds, and all good eating. A fish called the "armado" (a Silurus), is remarkable from a harsh grating noise it makes when caught by hook and line, and which can be distinctly heard when the fish is beneath the water. This same fish has the power of firmly catching hold of any object, such as the blade of an oar or the fishing-line, with the strong spine both of its pectoral and dorsal fin. In the evening the weather was quite tropical, the thermometer standing at 79°. Numbers of fireflies were hovering about,

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and the musquitoes were very troublesome. I exposed my hand for five minutes, and it was soon black with them; I do not suppose there could have been less than fifty, all busy sucking.

October 15th.—We got under way and passed Punta Gorda, where there is a colony of tame Indians, from the province of Missiones. We sailed rapidly down the current, but before sunset, from a silly fear of bad weather, we brought to in a narrow arm of the river. I took the boat and rowed some distance up this creek. It was very narrow, winding, and deep; on each side, a wall thirty or forty feet high, formed by trees intwined with creepers, gave to the canal a singularly gloomy appearance. I here saw a very extraordinary bird, called the Scissor-beak (*Rhyncops nigra*). It has short legs, web feet, extremely long-pointed wings, and is of about the size of a tern. The beak is flattened laterally, that is, in a plane at right angles to that of a spoon-bill, or duck. It is as flat and elastic as an ivory paper-cutter, and the lower mandible, differently from every other bird, is an inch and a half longer than the upper. I will here detail all I know of the habits of the scissor-beak. It is found both on the east and west coasts, between lat. 30° and 45°, and frequents either salt or fresh water. The specimen now at the Zoological Society was shot at a lake near Maldonado, from which the water had been nearly drained, and which, in consequence, swarmed with small fry. I there saw several of these birds, generally in small flocks, flying backwards and forwards, close to the surface of the lake. They kept their bills wide open, and with the lower mandible half buried in the water. Thus skimming the surface, they ploughed it in their course: the water was quite smooth, and it formed a most curious spectacle to behold a flock, each bird leaving its narrow wake on the mirror-like surface. In their flight they frequently twist about with extreme rapidity, and so dexterously manage, that with their projecting lower mandible they plough up small fish, which are secured by the upper half of their scissor-like bills. This fact I repeatedly saw, as,

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like swallows, they continued to fly backwards and forwards, close before me. Occasionally when leaving the surface of the water their flight was wild, irregular, and rapid; they then also uttered loud harsh cries. When these birds are fishing, the length of the primary feathers of the wings is seen to be quite necessary, in order to keep the latter dry. When thus employed, their forms resemble the symbol by which many artists represent marine birds. The tail is much used in steering their irregular course.

These birds are common far inland along the course of the Rio Parana; it is said they remain during the whole year, and breed in the marshes. During the day they rest in flocks on the grassy plains, at some distance from the water. Being at anchor, as I have said, in one of the deep creeks between the islands of the Parana, as the evening drew to a close, one of these scissor-beaks suddenly appeared. The water was quite still, and many little fish were rising. The bird continued for a long time to skim the surface, flying in its wild and irregular manner up and down the narrow canal, now dark with the growing night and the shadows of the overhanging trees. At Monte Video I observed that some large flocks during the day remained on the mud-banks at the head of the harbour, in the same manner as on the grassy plains near the Parana; and every evening they took flight direct to seaward. From these facts, I suspect that the Rhyncops generally fishes by night, at which time many of the lower animals come most abundantly to the surface. M. Lesson states that he has seen these birds opening the shells of the mactræ, buried in the sand-banks on the coast of Chile: from their weak bills, with the lower mandible so much produced, their short legs and long wings, it is very improbable that this can be a general habit.

In our course down the Parana, I only observed three other birds, whose habits are worth mentioning. One is a small kingfisher (*Alcedo Americana*); it has a longer tail than the European species, and hence does not sit in so stiff and upright a position. Its flight also, instead of being direct

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and rapid, like the course of an arrow, is weak and undulatory, as among the soft-billed birds. It utters a low note, like the clicking together of two small stones. A small green parrot,* with a gray breast, appears to prefer the tall trees on the islands, to any other situation, for its building-place. A number of nests are placed so close together, as to form one great mass of sticks. These parrots always live in flocks, and commit great ravages on the corn-fields. I was told, that near Colonia 2500 were killed in the course of one year. A bird (*Milvulus forficatus*) with a forked tail, terminated by two long feathers, and named by the Spaniards scissor-tail, is very common near Buenos Ayres. It commonly sits on a branch of the *ombu* tree, near the house, and thence takes a short flight in pursuit of insects, and returns to the same spot. When on the wing, it presents, in its manner of flight and general appearance, a caricature-likeness of the common swallow. It has the power in the air of turning very shortly, and in so doing, opens and shuts its tail, sometimes in a horizontal or lateral, and sometimes in a vertical direction, just like a pair of scissors. In structure, this bird is a true tyrant-flycatcher, although in its habits certainly allied to the swallows.

October 16th.—Some leagues above Rozario the western shore was bounded by perpendicular cliffs, which extended in a long line to below San Nicholas. Hence the coast more resembled that of the sea, than that of a fresh-water river. It is a great drawback to the scenery of the Parana, that, from the soft nature of its banks, the water is very muddy. The Uruguay, flowing through a granitic country, is much clearer; and I am told, that where the two channels unite at the head of the Plata, the waters may for a long distance be distinguished by their black and red colours. In the evening, the wind not being quite fair, as usual we immediately moored, and the next day, as it blew rather freshly, though

* *La jeune Veuve* of Azara. Latham Gen. Hist., vol. ii., p. 192.

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with a favouring current, the master was much too indolent to think of starting. At Bajada, he was described to me as "hombre muy aflicto,"—a man always miserable to get on; but certainly he bore all delays with admirable resignation. He was an old Spaniard, and had been many years in this country. He professed a great liking to the English, but stoutly maintained that the battle of Trafalgar was merely won by the Spanish captains having been all bought over; and that the only really gallant action on either side was performed by the Spanish admiral. It struck me as rather characteristic, that this man should prefer his countrymen being thought the worst of traitors, rather than unskilful or cowardly.

18TH AND 19TH.—We continued slowly to sail down the noble stream: the current helped us but little. Azara has estimated that even near the sources between latitudes 16° 24′ and 22° 57′, the river has only a fall of one foot for each mile of latitude; lower down, this must be much diminished. It is stated that a rise of seven feet at Buenos Ayres can be perceived sixty leagues up the course of the Parana. We met, during our descent, very few vessels. One of the best gifts of nature seems here wilfully thrown away, in so grand a channel of communication being left unoccupied. A river in which ships might navigate from a temperate country, as surprisingly abundant in certain productions as destitute of others, to another possessing a tropical climate, and a soil which, according to the best of judges, M. Bonpland, is perhaps unequalled in fertility, in any part of the world. How different would have been the aspect of this river, if English colonists had by good fortune first sailed up the Plata! What noble towns would now have occupied its shores! Till the death of Francia, the Dictator of Paraguay, these two countries must remain distinct, as if placed on opposite sides of the globe. And when the old, bloody-minded tyrant is gone to his long account, Paraguay will be torn by revolutions, violent in proportion to the previous unnatural calm. That country

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will have to learn, like every other South American state, that a republic cannot succeed, till it contains a certain body of men imbued with the principles of justice and honour.

October 20th.—Being arrived at the mouth of the Parana, and as I was very anxious to reach Buenos Ayres, I went on shore at Las Conchas, with the intention of riding there. Upon landing, I found to my great surprise, that I was to a certain degree a prisoner. A violent revolution having broken out, all the ports were laid under an embargo. I could not return to my vessel, and as for going by land to the city, it was out of the question. After a long conversation with the Commandant, I obtained permission to go, the next day, to General Rolor, who commanded a division of the rebels, on this side of the capital. In the morning I rode to the encampment. The general, officers, and soldiers, all appeared, and I believe really were, great villains. The general the very evening before he left the city, voluntarily went to the governor, and with his hand to his heart, pledged his word of honour, that he would remain faithful to the last. The general told me, that the city was in a state of close blockade, and that all he could do was to give me a passport to the commander-in-chief of the rebels at Quilmes. We had, therefore, to take a great sweep round the city, and it was with much difficulty that we procured horses. My reception at the encampment was quite civil, but I was told it was impossible that I could be allowed to enter the city. I was very anxious about this, as I anticipated the Beagle's departure from the Rio Plata, earlier than it took place. Having mentioned, however, General Rosas's obliging kindness to me when at the Colorado, magic itself could not have altered circumstances quicker than did this conversation. I was instantly told that though they could not give me a passport, if I chose to leave my guide and horses, I might pass their sentinels. I was too glad to accept of this, and an officer was sent with me to give directions, that I might not be stopped at the bridge. The road for the space of a league was quite deserted. I met one party of

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soldiers, who were satisfied by gravely looking at an old passport: and at length I was not a little pleased, to find myself within the city.

This revolution was supported by scarcely any pretext of grievances. But in a state which, in the course of nine months (from February to October, 1820), underwent fifteen changes in its government—each governor, according to the constitution, being elected for three years—it would be the height of illiberality, to ask for pretexts. In this case a party of men, who being attached to Rosas, were disgusted with the governor Balcarce, to the number of seventy left the city, and with the cry of Rosas, the whole country took arms. The city was then blockaded, no provisions, cattle, or horses, were allowed to enter; besides this, there was only a little skirmishing, and a few men daily killed. The outside party well knew, that by stopping the supply of meat, they would certainly be victorious. General Rosas could not have known of this rising; but it appears to me quite consonant with the plans of his party. A year ago he was elected governor, but he refused it, without the Sala would also confer on him extraordinary powers. This was refused, and since then his party have shown, that no other governor can keep his place. The warfare on both sides was avowedly protracted, till it was possible to hear from Rosas. A note arrived a few days after I left Buenos Ayres, which stated that the General disapproved of peace having been broken, but that he thought the outside party had justice on their side. On the bare reception of this, the Governor, ministers, and part of the military, to the number of some hundreds, fled from the city. The rebels entered, elected a new governor, and were paid for their services to the number of 5500 men. From these proceedings, it was clear that Rosas ultimately would become the dictator: to the term king, the people in this, as in other republics, have a particular dislike. Since leaving South America, we have heard that Rosas has been elected, with powers, and for a time altogether opposed to the constitutional principles of the republic.

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CHAPTER VIII.

Monte Video—Excursion to Colonia del Sacramiento—Horse swimming—Value of an Estancia—Cattle, how counted—Geology—Great thistle-beds—Rio Negro—Perforated pebbles—Shepherd dogs—Horses broken in, Gauchos riding, feats with lazo—Toxodon—Armadillo-like gigantic covering—Great tail—Return to Monte Video—Character of inhabitants.

BANDA ORIENTAL.

HAVING been delayed for nearly a fortnight in the city, I was glad to escape on board a packet bound for Monte Video. A town in a state of blockade must always be a disagreeable place of residence; in this case moreover there were constant apprehensions from robbers within. The sentinels were the worst of all; for, from their office and from having arms in their hands, they robbed with a degree of authority, which other men could not imitate.

Our passage was a very long and tedious one. The Plata looks like a noble estuary on the map; but it is in truth a poor affair. A wide expanse of muddy water, has neither grandeur nor beauty. At one time of the day the two shores, both of which are extremely low, could just be distinguished from the deck. On arriving at Monte Video I found the Beagle would not sail for some time, so I prepared for a short excursion in this part of Banda Oriental. Every thing which I said about the country near Maldonado is applicable to this; the land, however, with the one exception of the Green Mount, 450 feet high, from which it takes its name, is far more level. Very little of the undulating grassy plain is enclosed; but near the town there are a few hedge banks, covered with agaves, cacti, and fennel.

NOVEMBER 14TH.—We left Monte Video in the afternoon. I intended to proceed to Colonia del Sacramiento, situated on the northern bank of the Plata and opposite to

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Buenos Ayres, and thence following up the Uruguay, to the village of Mercedes on the Rio Negro (one of the many rivers of this name in South America), and from this point to return direct to Monte Video. We slept at the house of my guide at Canelones. In the morning we rose early in the hopes of being able to ride a good distance; but it was a vain attempt, for all the rivers were flooded. We passed in boats the streams of Canelones, St. Lucia, and San Josè, and thus lost much time. On a former excursion I crossed the Lucia, near its mouth, and I was surprised to observe how easily our horses, although not used to swim, passed over a width of at least six hundred yards. On mentioning this at Monte Video I was told that a vessel containing some mountebanks and their horses, being wrecked in the Plata, one horse swam seven miles to the shore. In the course of the day I was amused by the dexterity with which a Gaucho forced a restive horse to swim a river. He stripped off his clothes, and jumping on its back, rode into the water till it was out of its depth; then slipping off over the crupper, he caught hold of the tail, and as often as the horse turned round, the man frightened it back, by splashing water in its face. As soon as the horse touched the bottom on the other side, the man pulled himself on, and was firmly seated, bridle in hand, before the horse gained the bank. A naked man, on a naked horse, is a fine spectacle; I had no idea how well the two animals suited each other. The tail of a horse is a very useful appendage; I have passed a river in a boat with four people in it, which was ferried across in the same way as the Gaucho. If a man and horse have to cross a broad river, the best plan is for the man to catch hold of the pummel or mane, and help himself with the other arm.

We slept, and staid the following day at the post of Cufre. In the evening the postman or letter-carrier arrived. He was a day after his time, owing to the Rio Rozario being flooded. It would not, however, be of much consequence; for, although he had passed through some of the principal

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towns in Banda Oriental, his luggage consisted of two letters. The view from the house was pleasing; an undulating green surface, with distant glimpses of the Plata. I find I look at this province with very different eyes, from what I did upon my first arrival. I recollect I then thought it singularly level; but now, after galloping over the Pampas, my only surprise is, what could have induced me ever to have called it level. The country is a series of undulations, in themselves perhaps not absolutely great, but as compared to the plains of St. Fe, real mountains. From these inequalities, there is an abundance of small rivulets, and the turf is green and luxuriant.

November 17th.—We crossed the Rozario, which was deep and rapid, and passing the village of Colla, arrived at mid-day at Colonia del Sacramiento. The distance is twenty leagues, through a country covered with fine grass, but poorly stocked with cattle or inhabitants. I was invited to sleep at Colonia, and to accompany on the following day a gentleman to his estancia, where there were some limestone rocks. The town is built on a stony promontory something in the same manner as at Monte Video. It is strongly fortified; but both fortifications and town suffered much from the Brazilian war. It is very ancient; and the irregularity of the streets, and the surrounding groves of old orange and peach trees gave it a pretty appearance. The church is a curious ruin; it was used as a powder-magazine, and was struck by lightning in one of the ten thousand thunder-storms of the Rio Plata. Two-thirds of the building were blown away to the very foundation; and the rest stands a shattered and curious monument, of the united powers of lightning and gunpowder. In the evening I wandered about the half-demolished walls of the town. It was the chief seat of the Brazilian war;—a war most injurious to this country, not so much in its immediate effects, as in being the origin of a multitude of generals and all other grades of officers. More generals are numbered (but not paid) in the United Provinces of la Plata, than in the United Kingdom of Great

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Britain. These gentlemen have learned to like power, and do not object to a little skirmishing. Hence there are many, always on the watch to create disturbance and to overturn a government, which as yet has never rested on any stable foundation. I noticed however, both here and in other places, a very general interest in the ensuing election for the President; and this appears a good sign for the prosperity of this little country. The inhabitants do not require much education in their representatives; I heard some men discussing the merits of those for Colonia; and it was said that, "although they were not men of business, they could all sign their names:" with this every reasonable man was satisfied.

18TH.—Rode with my host to his estancia, at the Arroyo de San Juan. In the evening we took a ride round the estate. It contained two square leagues and a half; and was situated in what is called a rincon; that is, one side was fronted by the Plata, and the two others guarded by impassable brooks. There was an excellent port for little vessels, and an abundance of small wood, which is valuable as supplying fuel to Buenos Ayres. I was curious to know the value of so complete an estancia. Of cattle there were 3000, and it would well support three or four times that number; of mares 800, together with 150 broken horses, and 600 sheep. There was plenty of water and limestone, a rough house, excellent corrals, and a peach orchard. For all this he had been offered 2000*l.*, and only wanted 500*l.* additional, and probably would sell it for less. The chief trouble with an estancia, is driving the cattle twice a week to a central spot, in order to make them tame, and to count them. This latter operation would be thought difficult, where there are ten or fifteen thousand head together. It is managed on the principle that the cattle invariably divide themselves into little troops of from forty to one hundred. Each troop is recognised by a few peculiarly marked animals, and its number is known: so that, one being lost out of ten thousand, it is perceived by its absence from one of the tropillas.

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During a stormy night the cattle all mingle together; but the next morning the tropillas separate as before.

November 19th.—Passing the village of Las Vacas, we slept at a house of a North American, who worked a lime-kiln on the Arroyo de las Vivoras. In the morning we rode to a projecting headland on the banks of the river, called Punta Gorda. On the way we tried to find a jaguar. There were plenty of fresh tracks, and we visited the trees, on which they are said to sharpen their claws; but we did not succeed in disturbing one. From this point the Rio Uruguay presented to our view a noble volume of water. From the clearness and rapidity of the stream, its appearance was far superior to that of its neighbour the Parana. On the opposite coast, several branches from the latter river entered the Uruguay. As the sun was shining, the two colours of the waters could be seen quite distinct. The geological section presented by the cliffs was interesting. At St. Fe, a stratum with marine remains was seen gradually passing into an estuary deposit. Here we have an alternation of action;—a circumstance no ways improbable in a great bay. A formation of red earthy clay, with nodules of marl, and in every respect identical with that of the Pampas, is covered by a white limestone, containing large extinct oysters, and other marine shells; and over this again, is placed the reddish earthy matter, as in the rest of Banda Oriental.

In the evening we proceeded on our road towards Mercedes on the Rio Negro. At night we asked permission to sleep at an estancia, at which we happened to arrive. It was a very large estate, being ten leagues square, and the owner is one of the greatest landowners in the country. His nephew had charge of it, and with him there was a captain in the army, who the other day ran away from Buenos Ayres. Considering their station, their conversation was rather amusing. They expressed, as was usual, unbounded astonishment at the globe being round, and could scarcely credit that a hole would, if deep enough, come out on the other side. They had, however, heard of a

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country where there were six months light and six of darkness, and where the inhabitants were very tall and thin! They were curious about the price and condition of horses and cattle in England. Upon finding out we did not catch our animals with the lazo, they cried out, "Ah then, you use nothing but the bolas:" the idea of an enclosed country was quite novel to them. The captain at last said, he had one question to ask me, which he should be very much obliged if I would answer with all truth. I trembled to think how deeply scientific it would be: it was, "Whether the ladies of Buenos Ayres were not the handsomest in the world." I replied, "Charmingly so." He added, I have one other question: "Do ladies in any other part of the world wear such large combs?" I solemnly assured him they did not. They were absolutely delighted. The captain exclaimed, "Look there! a man who has seen half the world says it is the case; we always thought so, but now we know it." My excellent judgment in beauty procured me a most hospitable reception; the captain forced me to take his bed, and he would sleep on his recado.

21st.—Started at sunrise, and rode slowly during the whole day. The geological nature of this part of the province was different from the rest, and closely resembled that of the Pampas. In consequence, there were immense beds of the thistle, as well as of the cardoon: the whole country, indeed, may be called one great bed. The two sorts grow separate, each plant in company with its own kind. The cardoon is as high as a horse's back, but the Pampas thistle is often higher than the crown of the rider's head. To leave the road for a yard is out of the question; and the road itself is partly, and in some cases entirely, closed. Pasture, of course, there is none; if cattle or horses once enter the bed, they are for the time completely lost. Hence it is very hazardous to attempt to drive cattle at this season of the year; for when jaded enough to face the thistles, they rush among them, and are seen no more. In these districts there are very few estancias, and these few are situated in the

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neighbourhood of damp valleys, where fortunately neither of these overwhelming plants can exist. As night came on before we arrived at our journey's end, we slept at a miserable little hovel, inhabited by the poorest people. The extreme, though rather formal courtesy, of our host and hostess, considering their grade of life, was quite delightful.

November 22d.—Arrived at an estancia on the Berquelo belonging to a very hospitable Englishman, to whom I had a letter of introduction from my friend Mr. Lumb. I staid here three days. One morning I rode with my host to the Sierra del Pedro Flaco, about twenty miles up the Rio Negro. Nearly the whole country was covered with good, though coarse grass, which was as high as a horse's belly; yet there were square leagues without a single head of cattle. The province of Banda Oriental, if well stocked, would support an astonishing number of animals; at present the annual export of hides from Monte Video amounts to three hundred thousand; and the home consumption, from waste, is very considerable. The view of the Rio Negro from the Sierra was the most picturesque which I any where saw. The river, broad, deep, and rapid, wound at the foot of a rocky precipitous cliff: a belt of wood followed its course, and the horizon was terminated by the distant undulations of the plain of turf.

When in this neighbourhood I several times heard of the Sierra de las Cuentas; a hill distant many miles to the northward. The name signifies hill of beads. I was assured that vast numbers of little round stones, of various colours, each with a small cylindrical hole, are found there. Formerly the Indians used to collect them, for the purpose of making necklaces and bracelets — a taste, I may observe, which is common to all savage nations, as well as to the most polished. I did not know what to understand from this story, but upon mentioning it at the Cape of Good Hope to Dr. Andrew Smith, he told me that he recollected finding on the south-eastern coast of Africa, about one hundred miles to the eastward of St. John's river, some

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quartz crystals with their edges blunted from attrition, and mixed with gravel on the sea-beach. Each crystal was about five lines in diameter, and from an inch to an inch and a half in length. Many of them had a small canal extending from one extremity to the other, perfectly cylindrical, and of a size that readily admitted a coarse thread, or a piece of fine catgut. Their colour was red or dull white. The natives were acquainted with this structure in crystals. I have mentioned these circumstances, because, although no crystallized body is at present known to assume this form, it may lead some future traveller to investigate the real nature of such stones.

While staying at this estancia, I was amused with what I saw and heard of the shepherd dogs of the country.* When riding, it is a common thing to meet a large flock of sheep guarded by one or two dogs, at the distance of some miles from any house or man. I often wondered how so firm a friendship had been established. The method of education consists in separating the puppy, while very young, from the bitch, and in accustoming it to its future companions. An ewe is held three or four times a day for the little thing to suck; and a nest of wool is made for it in the sheep-pen; at no time is it allowed to associate with other dogs, or with the children of the family. The puppy is, moreover, generally castrated; so that, when grown up, it can scarcely have any feelings in common with the rest of its kind. From this education it has no wish to leave the flock, and just as another dog will defend its master, man, so will these, the sheep. It is amusing to observe, when approaching a flock, how the dog immediately advances barking, and the sheep all close in his rear, as if round the oldest ram. These dogs are also easily taught to bring home the flock, at a certain hour in the evening. Their most troublesome fault, when young, is their desire of playing with the sheep; for

* M. D'Orbigny has given nearly a similar account of these dogs, vol. i., p. 175.

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in their sport they sometimes gallop their poor subjects most unmercifully.

The shepherd dog comes to the house every day for some meat, and immediately it is given him, he skulks away as if ashamed of himself. On these occasions the house-dogs are very tyrannical, and the least of them will attack and pursue the stranger. The minute, however, the latter has reached the flock, he turns round, and begins to bark, and then all the house-dogs take very quickly to their heels. In a similar manner a whole pack of the hungry wild dogs will scarcely ever (and I was told by some, never) venture to attack a flock guarded even by one of these faithful shepherds. The whole account appears to me a curious instance of the pliability of the affections in the dog race; and yet, whether wild, or however educated, with a mutual feeling of respect or fear for those that are fulfilling their instinct of association. For we can understand on no principle, the wild dogs being driven away by the single one with its flock, except that they consider, from some confused notion, that the one thus associated gains power, as if in company with its own kind. F. Cuvier has observed, that all animals that readily enter into domestication, consider man as a member of their society, and thus fulfil their instinct of association. In the above case the shepherd dogs rank the sheep as their fellow brethren; and the wild dogs, though knowing that the individual sheep are not dogs, but are good to eat, yet partly consent to this view, when seeing them in a flock with a shepherd dog at their head.

One evening a "domidor" (a subduer of horses) came for the purpose of breaking in some colts. I will describe the preparatory steps, for I believe they have not been mentioned by other travellers. A troop of wild young horses is driven into the corral, or large enclosure of stakes, and the door is shut. We will suppose that one man alone has to catch and mount a horse, which as yet had never felt bridle or saddle. I conceive, except by a Gaucho, such a feat would

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be utterly impracticable. The Gaucho picks out a full-grown colt; and as the beast rushes round the circus, he throws his lazo so as to catch both the front legs. Instantly the horse rolls over with a heavy shock, and, whilst struggling on the ground, the Gaucho, holding the lazo tight, makes a circle, so as to catch one of the hind legs, just beneath the fetlock, and draws it close to the two front. He then hitches the lazo, so that the three legs are bound together. Then sitting on the horse's neck, he fixes a strong bridle, without a bit, to the lower jaw. This he does by passing a narrow thong through the eye-holes, at the end of the reins, and several times round both jaw and tongue. The two front legs are now tied closely together with a strong leathern thong, fastened by a slip-knot. The lazo, which bound the three together, being then loosed, the horse rises with difficulty. The Gaucho now holding fast the bridle fixed to the lower jaw, leads the horse outside the corral. If a second man is present (otherwise the trouble is much greater) he holds the animal's head, whilst the first puts on the horsecloths and saddle, and girths the whole together. During this operation, the horse, from dread and astonishment at thus being bound round the waist, throws himself, over and over again, on the ground, and, till beaten, is unwilling to rise. At last, when the saddling is finished, the poor animal can hardly breathe from fear, and is white with foam and sweat. The man now prepares to mount, by pressing heavily on the stirrup, so that the horse may not lose its balance; and at the moment he throws his leg over the animal's back he pulls the slip-knot, and the beast is free. Some "domidors" pull the knot while the animal is lying on the ground, and, standing over the saddle, allow it to rise beneath them. The horse, wild with dread, gives a few most violent bounds, and then starts off at full gallop: when quite exhausted, the man, by patience, brings him back to the corral, where reeking hot, and scarcely alive, the poor beast is let free. Those animals which will not gallop away, but obstinately throw

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themselves on the ground, are by far the most troublesome. This process is tremendously severe,* but in two or three trials the horse is tamed. It is not, however, for some weeks that the animal is ridden with the iron bit and solid ring; for it must learn to associate the will of its rider with the feel of the rein, before the most powerful bridle can be of any service.

The Gauchos are well known to be perfect riders. The idea of being thrown, let the horse do what it likes, never enters their head. Their criterion of a good rider, is a man who can manage an untamed colt, or who, if his horse falls, alights on his own feet, or can perform other such exploits. I have heard of a man betting that he would throw his horse down twenty times, and that nineteen out of these he would not fall himself. I recollect seeing a Gaucho riding a very stubborn horse, which three times successively reared so high as to fall backwards with great violence. The man judged with uncommon coolness the proper moment for slipping off, not an instant before or after the right time. Directly the horse rose the man jumped on his back, and at last they started at a gallop. The Gaucho never appears to exert any muscular force. I was one day watching a good rider, as we were galloping along at a rapid pace, and thought to myself, "surely if the horse starts, you appear so careless on your seat you must fall." At this moment, a male ostrich sprang from its nest right beneath the horse's nose. The young colt bounded on one side, like a stag; but as for the man, all that

* Animals are so abundant in these countries that humanity and self-interest are not closely united; therefore the former is scarcely known. One day, riding in the Pampas with a very respectable "Estanciero," my horse, being tired, lagged behind. The man often shouted to me to spur him. When I remonstrated that it was a pity, for the horse was quite exhausted, he cried out, "Why not?—never mind—spur him—it is *my* horse." I had then some difficulty in making him comprehend that it was for the horse's sake, and not on his account, that I did not choose to use my spurs. He exclaimed, with a look of great surprise, "Ah Don Carlos que cosa!" It was clear that such an idea had never before entered his head.

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could be said, was, that he started and took fright, as part of his horse.

In Chile and Peru more pains are taken with the mouth of the horse than in La Plata, and this is evidently a consequence of the more intricate nature of the country. In Chile a horse is not considered perfectly broken till he can be brought up standing, in the midst of his full speed, on any particular spot,—for instance, on a cloak thrown on the ground: or, again, will charge a wall, and rearing, scrape the surface with his hoofs. I have seen an animal bounding with spirit, yet merely reined by a fore-finger and thumb, taken at full gallop across a courtyard, and then made to wheel round the post of a verandah with great speed, but at so equal a distance, that the rider, with outstretched arm, all the while kept one finger rubbing the post. Then making a demi-volte in the air, with the other arm outstretched in a like manner, he wheeled round, with astonishing force, in an opposite direction.

Such a horse is well broken; and although this at first may appear useless, it is far otherwise. It is only carrying that which is daily necessary into perfection. When a bullock is checked and caught by the lazo, it will sometimes gallop round and round in a circle, and the horse being alarmed at the great strain, if not well broken, will not readily turn like the pivot of a wheel. In consequence many men have been killed; for if the lazo once takes a twist round a man's body, it will instantly, from the power of the two opposed animals, almost cut him in twain. On the same principle the races are managed; the course is only two or three hundred yards long, the desideratum being to have horses that can make a rapid dash. The race-horses are trained not only to stand with their hoofs touching a line, but to draw all four feet together, so as at the first spring to bring into play the full action of the hind quarters. In Chile I was told an anecdote, which I believe was true; and it offers a good illustration of the use of a well-broken animal. A respectable man riding one day met two others, one of

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whom was mounted on a horse, which he knew to have been stolen from himself. He challenged them; they answered him by drawing their sabres and giving chase. The man, on his good and fleet beast kept just ahead: as he passed a thick bush he wheeled round it, and brought up his horse to a dead check. The pursuers were obliged to shoot on one side and ahead. Then instantly dashing on, right behind them, he buried his knife in the back of one, wounded the other, recovered his horse from the dying robber, and rode home. For these feats of horsemanship two things are necessary: a most severe bit, like the Mameluke, the power of which though seldom used, the horse knows full well; and large blunt spurs, that can be applied either as a mere touch, or as an instrument of extreme pain. I conceive that with English spurs, the slightest touch of which pricks the skin, it would be impossible to break in a horse after the South-American fashion.

At an estancia near Las Vacas, large numbers of mares, are weekly slaughtered for the sake of their hides, although worth only five paper dollars, or about half-a-crown apiece. It seems at first strange that it can answer to kill mares for such a trifle; but as it is thought ridiculous in this country, ever to break in, or to ride a mare, they are of no value, except for breeding. The only thing for which I ever saw mares used was to tread out wheat from the ear; for which purpose they were driven round a circular enclosure, where the wheat-sheaves were strewed. The man employed for slaughtering the mares, happened to be celebrated for his dexterity with the lazo. Standing at the distance of twelve yards from the mouth of the corral, he has laid a wager that he would catch by the legs every animal, without missing one, as it rushed past him. There was another man who said he would enter the corral on foot, catch a mare, fasten her front legs together, drive her out, throw her down, kill, skin, and stake the hide for drying (which latter is a tedious job); and he engaged that he would perform this whole operation on twenty-two animals in one day. Or, he would

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kill and take the skin off fifty in the same time. This would have been a prodigious task, for it is considered a good day's work to skin and stake the hides of fifteen or sixteen animals.

November 26th.—I set out on my return in a direct line for Monte Video. Having heard of some giant's bones at a neighbouring farm-house on the Sarandis, a small stream entering the Rio Negro, I rode there accompanied by my host, and purchased for the value of eighteen pence, the head of an animal equalling in size that of the hippopotamus. Mr. Owen in a paper read before the Geological Society,* has called this very extraordinary animal, Toxodon, from the curvature of its teeth. The following notice is taken from the proceedings of that society: Mr. Owen says, judging from the portion of the skeleton preserved, the Toxodon, as far as dental characters have weight, must be referred to the rodent order. But from that order it deviates in the relative position of its supernumerary incisors, in the number and direction of the curvature of its molars, and in some other respects. It again deviates, in several parts of its structure which Mr. Owen enumerated, both from the *Rodentia*, and the existing *Pachydermata*, and it manifests an affinity to the *Dinotherium* and the *Cetaceous* order. Mr. Owen, however, observed, that "the development of the nasal cavity and the presence of frontal sinuses, renders it extremely improbable that the habits of the *Toxodon* were so exclusively aquatic as would result from the total absence of hinder extremities; and concludes, therefore, that it was a quadruped, and not a Cetacean; and that it manifested an additional step in the gradation of mammiferous forms leading from the *Rodentia*, through the *Pachydermata* to the *Cetacea*; a gradation of which the water-hog of South America (*Hydrochærus capybara*) already indicates the commencement amongst existing *Rodentia*, of which order it is interesting to observe this species is the largest, while at

* Read, April 19th, 1837. A detailed account will appear in the first part of the zoology of the voyage of the Beagle.

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the same time it is peculiar to the continent in which the remains of the gigantic *Toxodon* were discovered."

The people at the farm-house told me that the remains were exposed, by a flood having washed down part of a bank of earth. When found, the head was quite perfect; but the boys knocked the teeth out with stones, and then set up the head as a mark to throw at. By a most fortunate chance, I found a perfect tooth, which exactly fits one of the sockets in this skull, embedded by itself on the banks of the Rio Tercero, at the distance of about 180 miles from this place. Near the Toxodon I found the fragments of the head of an animal, rather larger than the horse, which has some points of resemblance with the Toxodon, and others perhaps with the Edentata. The head of this animal, as well as that of the Toxodon, and especially the former, appear so fresh, that it is difficult to believe they have lain buried for ages under ground. The bone contains so much animal matter, that when heated in the flame of a spirit-lamp, it not only exhales a very strong animal odour, but likewise burns with a slight flame.*

At the distance of a few leagues I visited a place where the remains of another great animal, associated with large pieces of armadillo-like covering, had been found. Similar pieces were likewise lying in the bed of the stream, close to the spot where the skeleton of the Toxodon had been exposed. These portions are dissimilar from those mentioned at Bahia Blanca. It is a most interesting fact thus to discover, that more than one gigantic animal in former ages was protected by a coat of mail,† very similar to the kind now

* I must express my obligation to Mr. Keane, at whose house I was staying on the Berquelo, and to Mr. Lumb at Buenos Ayres, for without their assistance, these valuable remains would never have reached England.

† I may here just mention, that I saw in the possession of a clergyman near Monte Video, the terminal portion of a tail, which precisely resembled, but on a gigantic scale, that of the common armadillo. The fragment was 17 inches long, 11½ in circumference at the upper end, and 8½ at the *extreme* point. As we do not know what proportion the tail

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found on the numerous species of armadillo, and exclusively confined to that South-American genus.

By the middle of the day on the 28th we arrived at Monte Video, having been two days and a half on the road. The country for the whole way was of a very uniform character, some parts being rather more rocky and hilly than near the Plata. Not far from Monte Video we passed through the village of Las Pietras, so named from some large rounded masses of syenite. Its appearance was rather pretty. In this country, a few fig-trees around the houses, and a site elevated a hundred feet above the general level, ought always to be called picturesque.

During the last six months, I have had an opportunity of seeing a little of the character of the inhabitants of these provinces. The Gauchos, or countrymen, are very superior to those who reside in the towns. The Gaucho is invariably most obliging, polite, and hospitable. I did not meet even with one instance of rudeness or inhospitality. He is modest, both respecting himself and country, at the same time being a spirited, bold fellow. On the other hand, there is much blood shed, and many robberies committed. The constant presence of the knife is the chief cause of the former. It is lamentable to hear how many lives are lost in trifling quarrels. In fighting, each party tries to mark the face of his adversary, by slashing his nose or eyes; as is often attested by deep and horrid-looking scars. Robberies are a natural consequence of universal gambling, much drinking, and extreme indolence. At Mercedes, I asked two men why they did not work. One gravely said the days were too long, the other that he was too poor. The number of horses, and the profusion of food, are the destruction of all industry. Moreover, there are so many feast-days; and then nothing can succeed without it is begun

bore to the body of the animal, we cannot compare it with that of any living species. But at the same time we may conjecture that, in all probability, this extinct monster was from six to ten feet long.

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when the moon is on the increase; so that half the month is lost from these two causes.

Police and justice are quite inefficient. If a man who is poor, commits murder, and is taken, he will be imprisoned, and perhaps even shot; but if he is rich and has friends, he may rely on it, no very severe consequence will ensue. It is curious that the most respectable people in the country invariably assist a murderer to escape. They seem to think the individual sins against the governing powers and not against the state. A traveller has no protection besides his fire-arms: and the constant habit of carrying them, is the main check to a more frequent occurrence of robbery.

The character of the higher and more educated classes, who reside in the towns, partakes, but perhaps in a lesser degree, of the good parts of the Gaucho, but is I fear stained by many vices of which he is free. Sensuality, mockery of all religion, and the grossest corruption, are far from uncommon. Nearly every public officer can be bribed. The head man in the post-office sold forged government franks. The governor and prime minister openly combined to plunder the state. Justice, where gold came into play, was hardly expected by any one. I knew an Englishman, who went to the chief-justice (he told me that not understanding the ways of the place, he trembled as he entered the room), and said, "Sir, I have come to offer you 200 dollars (value about five pounds sterling) if you will arrest before a certain time a man who has cheated me. I know it is against the law, but my lawyer (naming him) recommended me to take this step." The chief justice smiled acquiescence, thanked him, and the man before night was safe in prison. With this entire want of principle in many of the leading men, with the country full of ill-paid turbulent officers, the people yet hope that a democratic form of government can succeed!

On first entering society in these countries, two or three features strike one as particularly remarkable. The polite and dignified manners pervading every grade of life; the excellent

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taste displayed by the women in their dresses; and the equality amongst all ranks. At the Rio Colorado some men who kept the humblest shops, used to dine with General Rosas. A son of a major at Bahia Blanca gained his livelihood by making paper cigars, and he wished to accompany me, as guide or servant, to Buenos Ayres, but his father objected on the score of the danger alone. Many officers in the army can neither read nor write, yet all meet in society as equals. In Entre Rios, the Sala consisted of only six representatives. One of them kept a common shop, and evidently was not degraded by the office. All this is what would be expected in a new country; nevertheless, the absence of gentlemen by profession appears to an Englishman something strange.

When speaking of these countries, the manner in which they have been brought up by their unnatural parent, Spain, should always be borne in mind. On the whole, perhaps, more credit is due for what has been done, than blame for that which may be deficient. It is impossible to doubt but that the extreme liberalism of these countries, must ultimately lead to good results. The very general toleration of foreign religions, the regard paid to the means of education, the freedom of the press, the facilities offered to all foreigners, and especially, as I am bound to add, to every one professing the humblest pretensions to science, should be recollected with gratitude, by those who have visited Spanish South America.*

* I cannot conclude without adding my testimony to the spirit and accuracy of "Head's Rough Notes." I do not think the picture is at all more exaggerated than every good one must be—that is, by taking the strong examples, and neglecting those of lesser interest.

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CHAPTER IX.

Rio Plata—Flocks of butterflies—Beetles alive in the sea—Aeronaut spiders—Pelagic animals—Phosphorescence of sea—Port Desire—Spanish settlements—Zoology—Guanaco—Excursion to head of harbour—Indian grave—Port St. Julian—Geology of Patagonia, successive terraces, transport of pebbles—Fossil gigantic llama—Types of organization constant—Change in zoology of America—Causes of extinction.

PATAGONIA.

DECEMBER 6TH, 1833.—The Beagle sailed from the Rio Plata, never again to enter its muddy stream. Our course was directed to Port Desire, on the coast of Patagonia. Before proceeding any further, I will here put together a few observations made at sea.

Several times when the ship has been some miles off the mouth of the Plata, and at other times when off the shores of Northern Patagonia, we have been surrounded by insects. One evening, when we were about ten miles from the Bay of San Blas, vast numbers of butterflies, in bands or flocks of countless myriads, extended as far as the eye could range. Even by the aid of a glass it was not possible to see a space free from butterflies. The seamen cried out "it was snowing butterflies," and such in fact was the appearance. More species than one were present, but the main part belonged to a kind very similar to, but not identical with, the common English *Colias edusa*.* Some moths and hymenoptera accompanied the butterflies; and a fine Calosoma flew on board. Other instances are known of this beetle having been caught far out at sea; and this is the more remarkable, as the greater number of the Carabidæ seldom or never take wing. The day had been

* I am indebted to Mr. Waterhouse for naming these and other insects.

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fine and calm, and the one previous to it equally so, with light and variable airs. Hence we cannot suppose that the insects were blown off the land, but we must conclude that they voluntarily took flight. The great bands of the Colias seem at first to afford an instance like those on record of the migrations of *Vanessa cardui;** but the presence of other insects makes the case distinct, and not so easily intelligible. Before sunset, a strong breeze sprung up from the north, and this must have been the cause of tens of thousands of the butterflies and other insects having perished.

On another occasion, when seventeen miles off Cape Corrientes, I had a net overboard to catch pelagic animals. Upon drawing it up, to my surprise I found a considerable number of beetles in it, and although in the open sea, they did not appear much injured by the salt water. I lost some of the specimens, but those which I preserved, belonged to the genera, colymbetes, hydroporus, hydrobius (two species), notaphus, cynucus, adimonia, and scarabæus. At first, I thought that these insects had been blown from the shore; but upon reflecting that out of the eight species, four were aquatic, and two others partly so in their habits, it appeared to me most probable that they were floated into the sea, by a small stream which drains a lake near Cape Corrientes. On any supposition, it is an interesting circumstance to find insects, quite alive, swimming in the open ocean, seventeen miles from the nearest point of land. There are several accounts of insects having been blown off the Patagonian shore. Captain Cook observed it, as did more lately Captain King in the Adventure. The cause probably is due to the want of shelter, both of trees and hills, so that an insect on the wing with an off-shore breeze, would be very apt to be blown out to sea. The most remarkable instance I ever knew of an insect being caught far from the land, was that of a large grasshopper (*Acrydium*), which flew on board, when the

* Lyell's Geology, vol. iii., p. 63.

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Beagle was to windward of the Cape de Verd Islands, and when the nearest point of land, not directly opposed to the trade-wind, was Cape Blanco on the coast of Africa, 370 miles distant.*

On several occasions, when the vessel has been within the mouth of the Plata, the rigging has been coated with the web of the Gossamer Spider. One day (November 1st, 1832) I paid particular attention to the phenomenon. The weather had been fine and clear, and in the morning the air was full of patches of the flocculent web, as on an autumnal day in England. The ship was sixty miles distant from the land, in the direction of a steady though light breeze. Vast numbers of a small spider, about one-tenth of an inch in length, and of a dusky red colour were attached to the webs. There must have been, I should suppose, some thousands on the ship. The little spider when first coming in contact with the rigging, was always seated on a single thread, and not on the flocculent mass. This latter seems merely to be produced by the entanglement of the single threads. The spiders were all of one species, but of both sexes, together with young ones. These latter were distinguished by their smaller size, and more dusky colour. I will not give the description of this spider, but merely state that it does not appear to me to be included in any of Latreille's genera. The little aeronaut as soon as it arrived on board, was very active, running about; sometimes letting itself fall, and then reascending the same thread; sometimes employing itself in making a small and very irregular mesh in the corners between the ropes. It could run with facility on the surface of water. When disturbed it lifted up its front legs, in the attitude of attention. On its first arrival it appeared very thirsty, and with exserted maxillæ drank eagerly of the fluid; this same circumstance

* The flies which frequently accompany a ship for some days on its passage from harbour to harbour, wandering from the vessel, are soon lost, and all disappear.

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has been observed by Strack: may it not be in consequence of the little insect having passed through a dry and rarefied atmosphere? Its stock of web seemed inexhaustible. While watching some that were suspended by a single thread, I several times observed that the slightest breath of air bore them away out of sight, in a horizontal line. On another occasion (25th) under similar circumstances, I repeatedly observed the same kind of small spider, either when placed, or having crawled, on some little eminence, elevate its abdomen, send forth a thread, and then sail away in a lateral course, but with a rapidity which was quite unaccountable. I thought I could perceive that the spider before performing the above preparatory steps, connected its legs together with the most delicate threads, but I am not sure, whether this observation is correct.

One day, at St. Fe, I had a better opportunity of observing some similar facts. A spider which was about three-tenths of an inch in length, and which in its general appearance resembled a Citigrade (therefore quite different from the gossamer), while standing on the summit of a post, darted forth four or five threads from its spinners. These glittering in the sunshine, might be compared to rays of light; they were not, however, straight, but in undulations like a film of silk blown by the wind. They were more than a yard in length, and diverged in an ascending direction from the orifices. The spider then suddenly let go its hold, and was quickly borne out of sight. The day was hot and apparently quite calm; yet under such circumstances the atmosphere can never be so tranquil, as not to affect a vane so delicate as the thread of a spider's web. If during a warm day we look either at the shadow of any object cast on a bank, or over a level plain at a distant landmark, the effect of an ascending current of heated air will almost always be evident. And this probably would be sufficient to carry with it so light an object as the little spider on its thread. The circumstance of spiders of the same species but of different sexes and ages, being found on several occasions at the distance of many leagues from the

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land, attached in vast numbers to the lines, proves that they are the manufacturers of the mesh, and that the habit of sailing through the air, is probably as characteristic of some tribe, as that of diving is of the Argyroneta. We may then reject Latreille's supposition, that the gossamer owes its origin to the webs of the young of several genera, as Epeira or Thomisa: although, as we have seen that the young of other spiders do possess the power of performing aerial voyages.*

During our different passages south of the Plata, I often towed astern a net made of bunting, and thus caught many curious animals. The structure of the Beroe (a kind of jelly fish) is most extraordinary, with its rows of vibratory ciliæ, and complicated though irregular system of circulation. Of Crustacea, there were many strange and undescribed genera. One, which in some respects is allied to the Notopods (or those crabs which have their posterior legs placed almost on their backs, for the purpose of adhering to the under side of ledges), is very remarkable from the structure of its hind pair of legs. The penultimate joint, instead of being terminated by a simple claw, ends in three bristle-like appendages of dissimilar lengths,—the longest equalling that of the entire leg. These claws are very thin, and are serrated with teeth of an excessive fineness, which are directed towards the base. The curved extremities are flattened, and

* I was not at the time aware of M. Virey's very curious observations, (Bulletin des Sciences Natur., tom. xix., p. 130) which seem to prove that small spiders, in an atmosphere perfectly tranquil, and without the aid of any web, have the power of darting through the air. M. Virey, believes that by means of a rapid vibration of their feet, they *walk the air*. Although in his case, the conclusion seems almost inevitable, yet in the one I have described, we must suppose that the several threads which were sent forth, served as sails for the atmospheric currents to act on. After reading M. Virey's account, it appears to me far from improbable, that the little aeronaut actually did unite, as was suspected, its feet together by some fine lines; thus forming artificial wings. I regret I did not determine this point with accuracy; for it would be a curious fact, that a spider should thus be able to take flight by the aid of temporary wings.

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on this part five most minute cups are placed, which seem to act in the same manner as the suckers on the arms of the cuttle-fish. As the animal lives in the open sea, and probably wants a place of rest, I suppose this beautiful structure is adapted to take hold of the globular bodies of the Medusæ, and other floating marine animals.

In deep water, far from the land, the number of living creatures is extremely small: south of the latitude 35°, I never succeeded in catching any thing besides some beroe, and a few species of minute crustacea belonging to the Entomostraca. In shoaler water, at the distance of a few miles from the coast, very many kinds of crustacea and some other animals were numerous, but only during the night. Between latitudes 56° and 57° south of Cape Horn the net was put astern several times; it never, however, brought up any thing besides a few of two extremely minute species of Entomostraca. Yet whales and seals, petrels and albatross, are exceedingly abundant throughout this part of the ocean. It has always been a source of mystery to me, on what the latter, which live far from the shore, can subsist. I presume the albatross, like the condor, is able to fast long; and that one good feast on the carcass of a putrid whale lasts for a long siege of hunger. It does not lessen the difficulty to say, they feed on fish; for on what can the fish feed? It often occurred to me, when observing how the waters of the central and intertropical parts of the Atlantic,* swarmed with Pteropoda, Crustacea, and Radiata, and with their devourers the flying-fish, and again with *their* devourers the bonitos and albicores, that the lowest of these pelagic animals perhaps possess the power of decomposing carbonic acid gas, like the members of the vegetable kingdom.

While sailing in these latitudes on one very dark night,

* From my experience, which has been but little, I should say that the Atlantic was far more prolific than the Pacific, at least, than in that immense open area, between the west coast of America and the extreme eastern isles of Polynesia.

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the sea presented a wonderful and most beautiful spectacle. There was a fresh breeze, and every part of the surface, which during the day is seen as foam, now glowed with a pale light. The vessel drove before her bows two billows of liquid phosphorus, and in her wake she was followed by a milky train. As far as the eye reached, the crest of every wave was bright, and the sky above the horizon, from the reflected glare of these livid flames, was not so utterly obscure, as over the rest of the heavens.

As we proceed further southward, the sea is seldom phosphorescent; and off Cape Horn, I do not recollect more than once having seen it so, and then it was far from being brilliant. This circumstance probably has a close connexion with the scarcity of organic beings in that part of the ocean. After the elaborate paper* by Ehrenberg, on the phosphorescence of the sea, it is almost superfluous on my part to make any observations on the subject. I may however add, that the same torn and irregular particles of gelatinous matter, described by Ehrenberg, seem in the southern as well as in the northern hemisphere, to be the common cause of this phenomenon. The particles were so minute as easily to pass through fine gauze; yet many were distinctly visible by the naked eye. The water when placed in a tumbler and agitated gave out sparks, but a small portion in a watch-glass, scarcely ever was luminous. Ehrenberg states, that these particles all retain a certain degree of irritability. My observations, some of which were made directly after taking up the water, would give a different result. I may also mention, that having used the net during one night I allowed it to become partially dry, and having occasion twelve hours afterwards, to employ it again, I found the whole surface sparkled as brightly as when first taken out of the water. It does not appear probable in this case, that the particles could have remained so long alive. I remark

* An abstract is given in No. IV. of the Magazine of Zoology and Botany.

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also in my notes, that having kept a Medusa of the genus Dianæa, till it was dead, the water in which it was placed became luminous. When the waves scintillate with bright green sparks, I believe it is generally owing to minute crustacea. But there can be no doubt that very many other pelagic animals, when alive, are phosphorescent.

On two occasions I have observed the sea luminous at considerable depths beneath the surface. Near the mouth of the Plata some circular and oval patches, from two to four yards in diameter, and with defined outlines, shone with a steady, but pale light; while the surrounding water only gave out a few sparks. The appearance resembled the reflection of the moon, or some luminous body; for the edges were sinuous from the undulation of the surface. The ship, which drew thirteen feet water, passed over, without disturbing, these patches. Therefore we must suppose that some animals were congregated together at a greater depth than the bottom of the vessel.

Near Fernando Noronha the sea gave out light in flashes. The appearance was very similar to that which might be expected from a large fish moving rapidly through a luminous fluid. To this cause the sailors attributed it; at the time, however, I entertained some doubts, on account of the frequency and rapidity of the flashes. With respect to any general observations, I have already stated that the display is very much more common in warm than in cold countries. I have sometimes imagined that a disturbed electrical condition of the atmosphere was most favourable to its production. Certainly I think the sea is most luminous after a few days of more calm weather than ordinary, during which time it has swarmed with various animals. Observing that the water charged with gelatinous particles is in an impure state, and that the luminous appearance in all common cases is produced by the agitation of the fluid in contact with the atmosphere, I have always been inclined to consider that the phosphorescence was the result of the decomposition of the organic particles, by which process (one is tempted

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almost to call it a kind of respiration) the ocean becomes purified.

DECEMBER 23D.—We arrived at Port Desire, situated in lat. 47°, on the coast of Patagonia. The creek runs for about twenty miles inland, with an irregular width. The Beagle anchored a few miles within the entrance in front of the ruins of an old Spanish settlement.

The same evening I went on shore. The first landing in any new country is very interesting, and especially when, as in this case, the whole aspect bears the stamp of a marked and individual character. At the height of between two and three hundred feet, above some masses of porphyry, a wide plain extends, which is truly characteristic of Patagonia. The surface is quite level, and is composed of well-rounded shingle mixed with a whitish earth. Here and there scattered tufts of brown wiry grass are supported, and still more rarely some low thorny bushes. The weather is dry and pleasant, for the fine blue sky is but seldom obscured. When standing in the middle of one of these desert plains, the view on one side is generally bounded by the escarpment of another plain, rather higher, but equally level and desolate; and on the other side it becomes indistinct from the trembling mirage which seems to rise from the heated surface.

The plains are traversed by many broad, flat-bottomed valleys, and in these the bushes grow rather more abundantly. The present drainage of the country is quite insufficient to excavate such large channels. In some of the valleys ancient stunted trees, growing in the very centre of the dry watercourse, seem as if placed to prove how long a time had elapsed, since any flood had passed that way. We have evidence, from shells lying on the surface, that the plains of gravel have been elevated within a recent epoch above the level of the sea; and we must look to that period for the excavation of the valleys by the slowly-retiring waters. From the dryness of the climate, a man may walk for days together over these plains without finding a single drop of water. Even at the base of the porphyry hills, there

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are only a few small wells containing but little water, and that rather saline and half putrid.

In such a country the fate of the Spanish settlement was soon decided; the dryness of the climate during the greater part of the year, and the occasional hostile attacks of the wandering Indians, compelled the colonists to desert their half-finished buildings. The style, however, in which they were commenced, showed the strong and liberal hand of Spain in the old time. The end of all the attempts to colonize this side of America south of 41°, have been miserable. At Port Famine, the name expresses the lingering and extreme sufferings of several hundred wretched people, of whom one alone survived to relate their misfortunes. At St. Joseph's bay, on the coast of Patagonia, a small settlement was made; but during one Sunday the Indians made an attack and massacred the whole party, excepting two men, who were led captive many years among the wandering tribes. At the Rio Negro I conversed with one of these men, now in extreme old age.

The zoology of Patagonia is as limited as its Flora.* On the arid plains a few black beetles (Heteromera) might be seen slowly crawling about, and occasionally a lizard darting from side to side. Of birds we have three carrion hawks, and in the valleys a few finches and insect feeders. The *Ibis malanops* (a species said to be found in central Africa) is not uncommon on the most desert parts. In the stomachs of these birds I found grasshoppers, cicadæ, small lizards, and even scorpions.† At one time of the year they go in flocks, at another in pairs: their cry is very loud and singular, and resembles the neighing of the guanaco.

* I found here a species of cactus, described by Professor Henslow under the name of *Opuntia Darwinii* (Magazine of Zoology and Botany, vol. i., p. 466), which was remarkable by the irritability manifested by the stamens, when I inserted in the flower either a piece of stick, or the end of my finger. The segments of the periant also closed on the pistil, but more slowly than the stamens.

† These insects were not uncommon beneath stones. I found one cannibal scorpion quietly devouring another.

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I will here give an account of this latter animal, which is very common, and is the characteristic quadruped of the plains of Patagonia. The Guanaco, which by some naturalists is considered as the same animal with the Llama, but in its wild state, is the South American representative of the camel of the East. In size it may be compared to an ass, mounted on taller legs, and with a very long neck. The guanaco abounds over the whole of the temperate parts of South America, from the wooded islands of Tierra del Fuego, through Patagonia, the hilly parts of La Plata, Chile, even to the Cordillera of Peru. Although preferring an elevated site, it yields in this respect to its near relative the Vicuna. On the plains of Southern Patagonia, we saw them in greater numbers than in any other part. Generally they go in small herds, from half a dozen to thirty together; but on the banks of the St. Cruz we saw one herd which must have contained at least five hundred. On the northern shores of the Strait of Magellan they are also very numerous.

Generally the guanacoes are wild and extremely wary. Mr. Stokes told me, that he one day saw through a glass a herd of these beasts, which evidently had been frightened, running away at full speed, although their distance was so great that they could not be distinguished by the naked eye. The sportsman frequently receives the first intimation of their presence, by hearing, from a long distance, the peculiar shrill neighing note of alarm. If he then looks attentively, he will perhaps see the herd standing in a line on the side of some distant hill. On approaching them, a few more squeals are given, and then off they set at an apparently slow, but really quick canter, along some narrow beaten track to a neighbouring hill. If, however, by chance he should abruptly meet a single animal, or several together, they will generally stand motionless, and intently gaze at him; then perhaps move on a few yards, turn round, and look again. What is the cause of this difference in their shiness? Do they mistake a man in the distance for their chief enemy the puma? Or does curiosity overcome their timidity? That they are curious is certain; for if a person lies on the ground, and

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plays strange antics, such as throwing up his feet in the air, they will almost always approach by degrees to reconnoitre him. It was an artifice that was repeatedly practised by our sportsmen with success, and it had moreover the advantage of allowing several shots to be fired, which were all taken as parts of the performance. On the mountains of Tierra del Fuego, and in other places, I have more than once seen a guanaco, on being approached, not only neigh and squeal, but prance and leap about in the most ridiculous manner, apparently in defiance as a challenge. These animals are very easily domesticated, and I have seen some thus kept near the houses, although at large on their native plains. They are in this state very bold, and readily attack a man, by striking him from behind with both knees. It is asserted, that the motive for these attacks is jealousy on account of their females. The wild guanacoes, however, have no idea of defence; even a single dog will secure one of these large animals, till the huntsman can come up. In many of their habits they are like sheep in a flock. Thus when they see men approaching in several directions on horseback, they soon became bewildered, and know not which way to run. This greatly facilitates the Indian method of hunting, for they are thus easily driven to a central point, and are encompassed.

The guanacoes readily take to the water: several times at Port Valdes they were seen swimming from island to island. Byron, in his voyage, says he saw them drinking salt water. Some of our officers likewise saw a herd apparently drinking the briny fluid from a salina near Cape Blanco. I imagine in several parts of the country, if they do not drink salt water, they drink none at all. In the middle of the day, they frequently roll in the dust, in saucer-shaped hollows. The males fight together; two one day passed quite close to me, squealing and trying to bite each other; and several were shot with their hides deeply scored. Herds sometimes appear to set out on exploring-parties: at Bahia Blanca, where, within thirty miles of the coast, these animals are extremely unfrequent, I one day saw the tracks of thirty or forty, which had come in a direct line

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to a muddy salt-water creek. They then must have perceived that they were approaching the sea, for they had wheeled with the regularity of cavalry, and had returned back in as straight a line as they had advanced. The guanacoes have one singular habit, which is to me quite inexplicable; namely, that on successive days they drop their dung in the same defined heap. I saw one of these heaps which was eight feet in diameter, and necessarily was composed of a large quantity. Frezier remarks on this habit as common to the guanaco as well as to the llama;* he says it is very useful to the Indians, who use the dung for fuel, and are thus saved the trouble of collecting it.

The guanacoes appear to have favourite spots for dying in. On the banks of the St. Cruz, the ground was actually white with bones, in certain circumscribed spaces, which were generally bushy and all near the river. On one such spot I counted between ten and twenty heads. I particularly examined the bones; they did not appear, as some scattered ones which I had seen, gnawed or broken, as if dragged together by beasts of prey. The animals in most cases, must have crawled, before dying, beneath and amongst the bushes. Mr. Bynoe informs me that during the last voyage, he observed the same circumstance on the banks of the Rio Gallegos. I do not at all understand the reason of this, but I may observe, that the wounded guanacoes at the St. Cruz, invariably walked towards the river. At St. Jago in the Cape de Verd islands I remember having seen in a retired ravine a corner under a cliff, where numerous goats' bones were collected: we at the time exclaimed, that it was the burial-ground of all the goats in the island. I mention these trifling circumstances, because in certain cases they might explain the occurrence of a number of uninjured bones in a cave, or buried under alluvial accumulations; and likewise the cause, why certain mammalia are more commonly embedded than others in sedimentary deposits. Any great

* D'Orbigny says (vol. ii., p. 69) that all the species of the genus have this habit.

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flood of the St. Cruz, would wash down many bones of the guanaco, but probably not a single one of the puma, ostrich, or fox. I may also observe, that almost every kind of waterfowl when wounded takes to the shore to die; so that the remains of birds, from this cause alone and independently of other reasons, would but rarely be preserved in a fossil state.

One day the yawl was sent under the command of Mr. Chaffers with three days' provisions to survey the upper part of the harbour. In the morning we searched for some watering-places, mentioned in an old Spanish chart. We found one creek, at the head of which there was a trickling rill (the first we had seen) of brackish water. Here the tide compelled us to wait several hours; and in the interval I walked some miles into the interior. The plain as usual, consisted of gravel, mingled with soil resembling chalk in appearance, but very different from it in nature. From the softness of these materials it was worn into many gullies. There was not a tree, and excepting the guanaco, which stood on the hill-top a watchful sentinel over its herd, scarcely an animal or a bird. All was stillness and desolation. One reflected how many ages the plain had thus lasted, and how many more it was doomed thus to continue. Yet in passing over these scenes, without one bright object near, an ill-defined but strong sense of pleasure is vividly excited.

In the evening we sailed a few miles further up, and then pitched the tents for the night. By the middle of the next day, the yawl was aground, and from the shoalness of the water could not proceed any higher. The water being found partly fresh Mr. Chaffers took the dingey, and went up two or three miles further, where she also grounded, but in a fresh-water river. The water was muddy, and though the stream was most insignificant in size, it would be difficult to account for its source, except from the melting snow on the the Cordillera. At the spot where we bivouacked, we were surrounded by bold cliffs and steep pinnacles of porphyry. I do not think I ever saw a spot, which appeared more

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secluded from the rest of the world, than this rocky crevice in the wide plain.

The second day after our return to the anchorage, a party of officers and myself went to ransack an old Indian grave, which I had found on the summit of a neighbouring hill. Two immense stones, each probably weighing at least a couple of tons, had been placed in front of a ledge of rock, about six feet high. At the bottom of the grave on the hard rock, there was a layer of earth about a foot deep, which must have been brought up from the plain below. Above it a pavement of flat stones was placed, on which others were piled, so as to fill up the space between the ledge and the two great blocks. To complete the grave, the Indians had contrived to detach from the same ledge a huge fragment, and to throw it over the pile so as to rest on the two blocks. We undermined the grave on both sides, but could not find any relics, or even bones. The latter probably had decayed long since (in which case the grave must have been of extreme antiquity), for I found in another place some smaller heaps, beneath which a very few crumbling fragments could yet be distinguished, as having belonged to a man. Falconer states, that where an Indian dies he is buried, but that subsequently his bones are carefully taken up and carried, let the distance be ever so great, to be deposited near the sea-coast. This custom, I think, may be accounted for, by recollecting that before the introduction of horses, these Indians must have led nearly the same life as the Fuegians, and therefore generally resided in the neighbourhood of the sea. The common prejudice of lying where one's ancestors have lain, would make the now roaming Indians bring the less perishable part of their dead to their ancient burial-grounds.

JANUARY 9TH, 1834.—Before it was dark the Beagle anchored in the fine spacious harbour of Port St. Julian, situated about one hundred and ten miles to the south of Port Desire. We remained here eight days. The country is nearly similar to that of Port Desire, but, perhaps, rather more sterile. One day a party accompanied Captain Fitz-

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Roy on a long walk round the head of the harbour. We were eleven hours without tasting any water, and some of the party were quite exhausted. From the summit of a hill (since well named Thirsty Hill) a fine lake was spied, and two of the party proceeded with concerted signals to show whether it was fresh water. What was our disappointment to find a snow-white expanse of salt, crystallized in great cubes! We attributed our extreme thirst to the dryness of the atmosphere; but whatever the cause might be, we were exceedingly glad late in the evening to get back to the boats. Although we could nowhere find, during our whole visit, a single drop of fresh water, yet some must exist; for by an odd chance I found on the surface of the salt water, near the head of the bay, a Colymbetes not quite dead, which in all probability had lived in some not far distant pool. Three other kinds of insects,—a Cincindela, like *hybrida*, Cymindis, and a Harpalus, which all live on muddy flats occasionally overflowed by the sea, and one other beetle found dead on the plain,—completes the list of coleoptera. A good-sized fly (Tabanus) was extremely numerous, and tormented us by its painful bite. The common horsefly, which is so troublesome in the shady lanes of England, belongs to this genus. We here have the puzzle, that so frequently occurs in the case of musquitoes; on the blood of what animals do these insects commonly feed? The guanaco is nearly the only warmblooded quadruped, and they are present in numbers quite inconsiderable, compared to the multitude of flies.

The foundation of porphyry is not here present, as it was at Port Desire, and in consequence the tertiary deposits are arranged with greater regularity. Five successive plains of different altitudes are very distinct. The lower one is a mere fringe nearly on a level with the sea, but the upper one is elevated 950 feet. This latter is represented in this neighbourhood only by a few truncate conical hills, of exactly the same height. It was very interesting to stand on one of these flat patches of gravel, and viewing the wide surrounding country, to speculate on the enormous quantity of matter which must

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have been removed, thus to leave these mere points, as meaures of the former table-land.

I will now give a brief sketch of the geology of the grand tertiary formation of Patagonia, which extends from the Strait of Magellan to the Bay of S. Antonio. In Europe, deposits of the more recent eras have generally been accumulated in small basins or trough-shaped hollows. In South America, however, the entire plains of Patagonia extending seven hundred miles in length, and backed on the one hand by the chain of the Andes, and fronted on the other by the shores of the Atlantic, are thus constituted. Moreover the northern boundary is merely assumed in consequence of a mineralogical change in the strata: if organic remains were present, it probably would be found to be only an artificial limit. Again to the northward (1300 miles distant from the Strait of Magellan) we have the Pampas deposit, which though very different in composition, belongs to the same epoch with the superficial covering of the plains of Patagonia.

The cliffs on the coast give the following section: The lower part consists of a soft sandstone, containing large concretions of a harder nature. These strata contain many organic remains—immense oysters nearly a foot in diameter, curious pectens, echini, turritellæ, and other shells, of which the greater portion are extinct, but a few resemble those now existing on the coast.* Above these fossiliferous beds, a mass of soft friable stone or earth is superimposed, which, from its extreme whiteness, has been mistaken for chalk. It is, however, quite different; and closely resembles the less argillaceous varieties of decomposed felspar. This substance never contains organic remains. Lastly, the cliff is surmounted by a thick bed of gravel, almost exclusively derived from porphyritic rocks. For the sake of making the following description more easily intelligible, I have subjoined an imaginary section of the plains near the coast.

* The geologist must recollect this is a mere sketch, and that the fossil shells have not yet been carefully examined.

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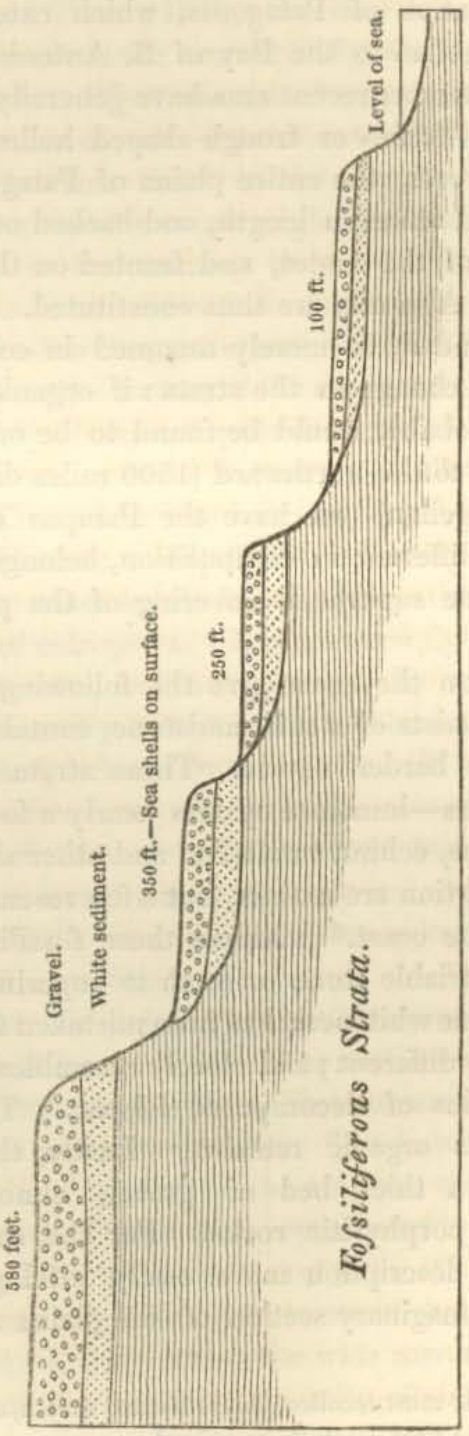
It must be observed, that the width of each plain is in nature *very much* greater in proportion to the height, than here represented.



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The whole series is horizontally stratified, and I do not recollect ever seeing any signs of violence, not even such as a fault. The gravel covers the entire surface of the land, from the Rio Colorado to the Strait of Magellan, a space of 800 miles, and is one chief cause of the desert character of Patagonia. Judging from a section across the continent at the St. Cruz river, and from some other reasons, I believe the gravel beds gradually thickening as they ascend, every where reach the base of the Cordillera. It is to these mountains we must look for the parent rocks, of at least a large portion of the well-rounded fragments. I apprehend so great an area covered by shingle, could scarcely be pointed out in any other part of the world.

Having said thus much of the constitution, let us look at the external configuration of the mass. The level plains are cut off along the whole line of coast by perpendicular cliffs, which are necessarily of different altitudes, because any one of the successive terraces, which, as I have already noticed, rise like steps one above the other, may form the sea cliff. These steps are often several miles broad; but from one point of view I have seen four very distinct lines of escarpment abutting one over the other. Having observed that the plains appeared to run for great distances along the coast at the same level, I measured barometrically the elevation of some of them, and compared these measurements, and took all those made by the officers employed in the survey. I was astonished to find at how great distances, even of 600 miles, plains occurred that had, within a few feet of difference, the same elevation. I believe I can distinguish seven or eight distinct terraces which occur along the line of coast, and which include heights between 1200 feet and the level of the sea. It will be understood that they are not always present, for the lower ones have in some parts been removed by the action of the sea sooner than in others. When any broad valley enters the country, the terraces sweep round and run up on each side; in which case, the correspondence on the opposite sides is beautifully illustrated.

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I have called these step-like plains level, because they appear to be absolutely so to the eye, but in truth they rise a little between the edge of one line of cliff and the base of the next above it. Their slope is about the same as that of the gradually shoaling bottom of the neighbouring sea. The elevation of 350 feet is gained by three steps; one of about 100 feet, the second 250, and the third 350. Over these three plains marine remains are frequently scattered, but they are especially abundant on the lower one. The shells are the same as the now existing littoral species, and the muscle and turbo yet partially retain their blue and purple colours.

We have now stated the problem, which is to be explained so as to connect together these various phenomena. At first I could only understand the grand covering of gravel, by the supposition of some epoch of extreme violence, and the successive lines of cliff, by as many great elevations, the precise action of which I could not however follow out. Guided by the "Principles of Geology," and having under my view the vast changes going on in this continent, which at the present day seems the great workshop of nature, I came to another, and I hope more satisfactory conclusion. The importance of any view which may explain the agency by which such vast beds of shingle have been transported over the surface of the successive plains, cannot be doubted. Whatever the cause may have been, it has determined the condition of this desert country, with respect to its form, nature, and capabilities of supporting life.

There are proofs, that the whole coast has been elevated to a considerable height within the recent period; and on the shores of the Pacific, where successive terraces likewise occur, we know that these changes have latterly been very gradual. There is indeed reason for believing, that the uplifting of the ground during the earthquakes in Chile, although only to the height of two or three feet, has been a disturbance which may be considered as a great one, in comparison to the series of lesser and scarcely sensible movements which are likewise in progress. Let us then imagine

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the consequence of the shoaling bed of an ocean, elevated at a perfectly equable rate, so that the same number of feet should be converted into dry land in each succeeding century. Every part of the surface would then have been exposed for an equal length of time to the action of the beach-line, and the whole in consequence equally modified. The shoaling bed of the ocean would thus be changed into a sloping land, with no marked line on it. If, however, there should occur a long period of repose in the elevations, and the currents of the sea should tend to wear away the land (as happens along this whole coast), then there would be formed a line of cliff. Accordingly as the repose was long, so would be the quantity of land consumed, and the consequent height of such cliffs. Let the elevations recommence, and another sloping bank (of shingle, or sand, or mud, according to the nature of the successive beach-lines) must be formed, which again will be broken by as many lines of cliff, as there shall be periods of rest in the action of the subterranean forces. Now this is the structure of the plains of Patagonia; and such gradual changes harmonize well with the undisturbed strata, extending over so many hundred miles.

I must here observe, that I am far from supposing that the entire coast of this part of the continent has ever been lifted up, to the height of even a foot, at any one moment of time; but, drawing our analogies from the shores of the Pacific, that the whole may have been insensibly rising, with every now and then a paroxysmal or accelerated movement in certain spots. With respect to the alternation of the periods of such continued rise and those of quiescence, we may grant that they are probable, because such alternation agrees with what we see in the action, not only of a single volcano, but likewise of the disturbances affecting whole regions of the earth. At the present day, to the north of the parallel 44°, the subterranean forces are constantly manifesting their power over a space of more than one thousand miles. But to the southward of that line, as far as Cape Horn, an earthquake is seldom or never experienced, and

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there is not a single point of eruption; yet in former ages, as we shall hereafter show, deluges of lava flowed from that very part. It is in conformity with our hypothesis that this southern region of repose, is at present suffering from the inroads of the ocean, as attested by the long line of cliff on the Patagonian coast. Such we believe to have been the causes of this singular configuration of the land. Nevertheless, we confess that it at first appears startling, that the most marked intervals between the heights of the successive plains should, instead of some great and sudden action of the subterranean forces, only indicate a longer period of repose.

In explaining the widely-spread bed of gravel, we must first suppose a great mass of shingle to be collected by the action of innumerable torrents, and the swell of an open ocean, at the submarine basis of the Andes, prior to the elevation of the plains of Patagonia. If such a mass should then be lifted up, and left exposed during one of the periods of subterranean repose; a certain breadth, for instance a mile, would be washed down, and spread out over the bottom of the invading waters. (That the sea near the coast can carry out pebbles, we may feel sure from the circumstance of their gradual decrease in size, according to the distance from the coast-line.)

If this part of the sea should now be elevated, we should have a bed of gravel, but it would be of less thickness than in the first mass, both because it is spread over a larger area, and because it has been much reduced by attrition. This process being repeated, we might carry beds of gravel, always decreasing in thickness (as happens in Patagonia) to a considerable distance from the line of parent rock.* For instance, on the banks of the St. Cruz at the distance of one hundred

* It is needless to point out to the geologist, that this view, if correct, will account, without the necessity of any sudden rush of water, for the general covering of mixed shingle, so common in many parts of Europe, and likewise for the occurrence of widely-extended strata of conglomerate; for the superficial beds might, during a period of subsidence, be covered by fresh deposits.

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miles above the mouth of the river, the bed of gravel is 212 feet thick, whereas, near the coast, it seldom exceeds 25 or 30 feet; the thickness being thus reduced to nearly one-eighth.

I have already stated that the gravel is separated from the fossiliferous strata by some white beds of a friable substance, singularly resembling chalk, but which cannot be compared, as far as I am aware, with any formation in Europe. With respect to its origin, I may observe that the well-rounded pebbles all consist of various felspathic porphyries; and that, from their prolonged attrition, during the successive re-modellings of the whole mass, much sediment must have been produced. I have already remarked that the white earthy matter more closely resembles decomposed felspar, than any other substance. If such is its origin, it would always, from its lightness, be carried further to seaward than the pebbles. But as the land was elevated, the beds would be brought nearer the coast-line, and so become covered by the fresh masses of gravel which were travelling outwards. When these white beds were themselves elevated, they would hold a position intermediate between the gravel and the common foundation, or the fossiliferous strata. To explain my meaning more clearly, let us suppose the bottom of the present sea covered to a certain distance from the coast-line, with pebbles gradually decreasing in size, and beyond it by the white sediment. Let the land rise, so that the beach-line, by the fall of the water, may be carried outwards; then likewise the gravel, by the same agency as before, will be transported so much further from the coast, and will cover the white sediment, and these beds again will invade the more distant parts of the bottom of the sea. By this outward progress, the order of superposition must always be gravel, white sediment, and the fossiliferous strata.

Such is the history of the changes by which the present condition of Patagonia has, I believe, been determined. These changes all result from the assumption of a steady but very gradual elevation, extending over a wide area, and

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interrupted at long intervals by periods of repose. But we must now return to Port St. Julian. On the south side of the harbour, a cliff of about ninety feet in height intersects a plain constituted of the formations above described; and its surface is strewed over with recent marine shells. The gravel, however, differently from that in every other locality, is covered by a very irregular and thin bed of a reddish loam, containing a few small calcareous concretions. The matter somewhat resembles that of the Pampas, and probably owes its origin either to a small stream having formerly entered the sea at that spot, or to a mud-bank similar to those now existing at the head of the harbour. In one spot this earthy matter filled up a hollow, or gully, worn quite through the gravel, and in this mass a group of large bones was embedded. The animal to which they belonged, must have lived, as in the case at Bahia Blanca, at a period long subsequent to the existence of the shells now inhabiting the coast. We may feel sure of this, because the formation of the lower terrace or plain, must necessarily have been posterior to those above it, and on the surface of the two higher ones, sea-shells of recent species are scattered. From the small physical change, which the last one hundred feet elevation of the continent could have produced, the climate, as well as the general condition of Patagonia, probably was nearly the same, at the time when the animal was embedded, as it now is. This conclusion is moreover supported by the identity of the shells belonging to the two ages. Then immediately occurred the difficulty, how could any large quadruped have subsisted on these wretched deserts in lat. 49° 15′? I had no idea at the time, to what kind of animal these remains belonged. The puzzle, however, was soon solved when Mr. Owen examined them; for he considers that they formed part of an animal allied to the guanaco or llama, but fully as large as the true camel. As all the existing members of the family of Camelidæ are inhabitants of the most sterile countries, so may we suppose was this extinct kind. The structure of the cervical vertebræ, the transverse processes

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not being perforated for the vertebral artery, indicates its affinity: some other parts, however, of its structure, probably are anomalous.

The most important result of this discovery, is the confirmation of the law that existing animals have a close relation in form with extinct species. As the guanaco is the characteristic quadruped of Patagonia, and the vicuna of the snow-clad summits of the Cordillera, so in bygone days, this gigantic species of the same family must have been conspicuous on the southern plains. We see this same relation of type between the existing and fossil Ctenomys, between the capybara (but less plainly, as shown by Mr. Owen) and the gigantic Toxodon; and lastly, between the living and extinct Edentata. At the present day, in South America, there exist probably nineteen species of this order, distributed into several genera; while throughout the rest of the world there are but five. If, then, there is a relation between the living and the dead, we should expect that the Edentata would be numerous in the fossil state. I need only reply by enumerating the megatherium, and the three or four other great species, discovered at Bahia Blanca; the remains of some of which are also abundant over the whole immense territory of La Plata. I have already pointed out the singular relation between the armadilloes and their great prototypes, even in a point apparently of so little importance as their external covering.

The order of rodents at the present day, is most conspicuous in South America, on account of the vast number* and size of the species, and the multitude of individuals: according to the same law, we should expect to find their representatives in a fossil state. Mr. Owen has shown how far the Toxodon is thus related; and it is moreover not

* In my collection Mr. Waterhouse distinguishes twenty-seven species of mice; to these must be added about thirteen more, known from the works of Azara, and other naturalists; so that we have forty species, which have actually been described as coming from between the Tropic and Cape Horn.

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improbable that another large animal has likewise a similar affinity.

The teeth of the rodent nearly equalling in size those of the Capybara, which were discovered near Bahia Blanca, must also be remembered.

The law of the succession of types, although subject to some remarkable exceptions, must possess the highest interest to every philosophical naturalist, and was first clearly observed in regard to Australia, where fossil remains of a large and extinct species of Kangaroo and other marsupial animals were discovered buried in a cave. In America the most marked change among the mammalia has been the loss of several species of Mastodon, of an elephant, and of the horse. These Pachydermata appear formerly to have had a range over the world, like that which deer and antelopes now hold. If Buffon had known of these gigantic armadilloes, llamas, great rodents, and lost pachydermata, he would have said with a greater semblance of truth, that the creative force in America had lost its vigour, rather than that it had never possessed such powers.

It is impossible to reflect without the deepest astonishment, on the changed state of this continent. Formerly it must have swarmed with great monsters, like the southern parts of Africa, but now we find only the tapir, guanaco, armadillo, and capybara; mere pigmies compared to the antecedent races. The greater number, if not all, of these extinct quadrupeds lived at a very recent period; and many of them were contemporaries of the existing molluscs. Since their loss, no very great physical changes can have taken place in the nature of the country. What then has exterminated so many living creatures? In the Pampas, the great sepulchre of such remains, there are no signs of violence, but on the contrary, of the most quiet and scarcely sensible changes. At Bahia Blanca I endeavoured to show the probability that the ancient Edentata, like the present species, lived in a dry and sterile country, such as now is found in that neighbourhood. With respect to the camel-like llama of Patagonia,

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the same grounds which, before knowing more than the size of the remains, perplexed me, by not allowing any great change of climate, now that we can guess the habits of the animal, are strangely confirmed. What shall we say of the death of the fossil horse? Did those plains fail in pasture, which afterwards were overrun by thousands and tens of thousands of the successors of the fresh stock introduced with the Spanish colonist? In some countries, we may believe, that a number of species subsequently introduced, by consuming the food of the antecedent races, may have caused their extermination; but we can scarcely credit that the armadillo has devoured the food of the immense Megatherium, the capybara of the Toxodon, or the guanaco of the camel-like kind. But granting that all such changes have been small, yet we are so profoundly ignorant concerning the physiological relations, on which the life, and even health (as shown by epidemics) of any existing species depends, that we argue with still less safety about either the life or death of any extinct kind.

One is tempted to believe in such simple relations, as variation of climate and food, or introduction of enemies, or the increased numbers of other species, as the cause of the succession of races. But it may be asked whether it is probable than any such cause should have been in action during the same epoch over the whole northern hemisphere, so as to destroy the *Elephas primigenus*, on the shores of Spain, on the plains of Siberia, and in Northern America; and in a like manner, the *Bos urus*, over a range of scarcely less extent? Did such changes put a period to the life of *Mastodon angustidens*, and of the fossil horse, both in Europe and on the Eastern slope of the Cordillera in Southern America? If they did, they must have been changes common to the whole world; such as gradual refrigeration, whether from modifications of physical geography, or from central cooling. But on this assumption, we have to struggle with the difficulty that these supposed changes, although scarcely sufficient to affect molluscous

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animals either in Europe or South America, yet destroyed many quadrupeds in regions now characterized by *frigid*, *temperate*, and *warm** climates! These cases of extinction forcibly recal the idea (I do not wish to draw any close analogy) of certain fruit-trees, which, it has been asserted, though grafted on young stems, planted in varied situations, and fertilized by the richest manures, yet at one period, have all withered away and perished. A fixed and determined length of life has in such cases been given to thousands and thousands of buds (or individual germs), although produced in long succession. Among the greater number of animals, each individual appears nearly independent of its kind; yet all of one kind may be bound together by common laws, as well as a certain number of individual buds in the tree, or polypi in the Zoophyte.

I will add one other remark. We see that whole series of animals, which have been created with peculiar kinds of organization, are confined to certain areas; and we can hardly suppose these structures are only adaptations to peculiarities of climate or country; for otherwise, animals belonging to a distinct type, and introduced by man, would not succeed so admirably, even to the extermination of the aborigines. On such grounds it does not seem a necessary conclusion, that the extinction of species, more than their creation, should exclusively depend on the nature (altered by physical changes) of their country. All that at present can be said with certainty, is that, as with the individual, so with the species, the hour of life has run its course, and is spent.

* The *Elephas primigenus* is thus circumstanced, having been found in Yorkshire (associated with recent shells: Lyell, vol. i., chap. vi.), in Siberia, and in the warm regions of lat. 31°, in North America. The remains of the Mastodon occur in Paraguay (and I believe in Brazil, in lat. 12°), as well as in the temperate plains south of the Plata.

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CHAPTER X.

Santa Cruz—Expedition up river—Indians—Character of Patagonia—Basaltic platform—Immense streams of lava—Non-transport of blocks by river—Excavation of valley—Condor, range and habits—Cordillera—Erratic boulders of great size—Indian relics—Return to the ship.

SANTA CRUZ—PATAGONIA.

April 13th.—The Beagle anchored within the mouth of the Santa Cruz. This river is situated about sixty miles south of Port St. Julian. During the last voyage, Captain Stokes proceeded thirty miles up, but then, from the want of provisions, was obliged to return. Excepting what was discovered at that time, scarcely any thing was known about this large river. Captain FitzRoy now determined to follow its course as far as time would allow. On the 18th, three whale-boats started, carrying three weeks' provisions; and the party consisted of twenty-five souls—a force which would have been sufficient to have defied a host of Indians. With a strong flood-tide, and a fine day, we made a good run, soon drank some of the fresh water, and were at night nearly above the tidal influence.

The river here assumed a size and appearance, which, even at the highest point we ultimately reached, was scarcely diminished. It was generally from three to four hundred yards broad, and in the middle about seventeen feet deep. The rapidity of the current, which in its whole course runs at the rate of from four to six knots an hour, is perhaps its most remarkable feature. The water is of a fine blue colour, but with a slight milky tinge, and not so transparent as at first sight would have been expected. It flows over a bed of pebbles, like those which compose the beach and surrounding plains. Although its course is winding, it runs through a valley which extends in a direct line to the west-

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ward. This valley varies from five to ten miles in breadth; it is bounded by step-formed terraces, which rise in most parts one above the other to the height of five hundred feet, and have on the opposite sides a remarkable correspondence.

April 19th.—Against so strong a current, it was of course quite impossible to row or sail. Consequently the three boats were fastened together head and stern, two hands left in each, and the rest came on shore to track. As the general arrangements, made by Captain FitzRoy, were very good for facilitating the work of all, and as all had a share of it, I will describe the system. The party, including every one, was divided into two spells, each of which hauled at the tracking line alternately for an hour and a half. The officers of each boat lived with, ate the same food, and slept in the same tent with their crew, so that each boat was quite independent of the others. After sunset, the first level spot where any bushes were growing, was chosen for our night's lodging. Each of the crew took it in turns to be cook. Immediately the boat was hauled up, the cook made his fire; two others pitched the tent; the coxswain handed the things out of the boat; the rest carried them up to the tents, and collected firewood. By this order, in half an hour, every thing was ready for the night. A watch of two men and an officer was always kept, whose duty it was to look after the boats, keep up the fire, and guard against Indians. Each in the party had his one hour every night.

During this day we tracked but a short distance, for there were many islets, covered by thorny bushes, and the channels between them were shallow.

April 20th.—We passed the islands and set to work. Our regular day's march, although it was hard enough, carried us on an average only ten miles in a straight line, and perhaps fifteen or twenty altogether. Beyond the place where we slept last night the country is completely *terra incognita*, for it was there that Captain Stokes turned back. We saw in the distance a great smoke, and found the skeleton of a horse, so we knew that Indians were in the neigh-

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bourhood. On the next morning (21st) tracks of a party of horse, and marks left by the trailing of the chuzos were observed on the ground. It was generally thought they must have reconnoitred us during the night. Shortly afterwards we came to a spot, where from the fresh footsteps of men, children, and horses, it was evident the party had crossed the river.

April 22d.—The country remained the same, and was extremely uninteresting. The complete similarity of the productions throughout Patagonia, is one of its most striking characters. The level plains of arid shingle support the same stunted and dwarf plants; and in the valleys the same thorn-bearing bushes grow. Every where we see the same birds and insects. Even the very banks of the river, and of the clear streamlets which entered it, were scarcely enlivened by a brighter tint of green. The curse of sterility is on the land, and the water flowing over a bed of pebbles partakes of the same curse. Hence the number of waterfowl is very scanty; for what is there to support life in the stream of this barren river?

Patagonia, poor as she is in some respects, can, however, boast of a greater stock of small rodents* than, perhaps, any other country in the world. Several species of mice are externally characterized by large thin ears and a very fine fur. These little animals swarm amongst the thickets in the valleys, where they cannot for months together taste a drop of water. They all seem to be cannibals, for no sooner was a mouse caught in one of my traps than it was devoured by others. A small and delicately-shaped fox, which is likewise very abundant, probably derives its entire support from these small animals. The guanaco is also in his proper district; herds of fifty or a hundred were common; and, as I have said, we saw one which must have contained at least

* The deserts of Syria are characterized, according to Volney (vol. i., p. 351), by woody bushes, numerous rats, gazelles, and hares. In the landscape of Patagonia, the guanaco replaces the gazelle, and the agouti the hare.

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five hundred. The puma with the condor in its train, follows and preys upon these animals. The footsteps of the former were to be seen almost every where on the banks of the river; and the remains of several guanaco, with their necks dislocated, and bones broken, showed how they had met their death.

April 24th.—Like the navigators of old when approaching an unknown land, we examined and watched for the most trivial sign of a change. The drifted trunk of a tree, or a boulder of primitive rock, was hailed with joy, as if we had seen a forest growing on the flanks of the Cordillera. The top, however, of a heavy bank of clouds, which remained almost constantly in one position, was the most promising sign, and eventually turned out true. At first the clouds were mistaken for the mountains themselves, instead of the masses of vapour condensed by their icy summits.

26th.—We this day met with a marked change in the geological structure of the plains. From the first starting I had carefully examined the gravel in the river, and for the two last days had noticed the presence of a few small pebbles of a very cellular basalt. These gradually increased in number and in size, but none equalled in dimensions a man's head. This morning, however, pebbles of the same rock, but more compact, suddenly became abundant, and in the course of half an hour, we saw at the distance of five or six miles the angular edge of a great basaltic platform. When we arrived at its base we found the stream bubbling among the fallen blocks. For the next twenty-eight miles, the river-course was encumbered with these basaltic masses. Above that limit, immense fragments belonging to a primitive formation, but derived from the surrounding alluvium, were equally numerous. In both cases no fragments at all remarkable in size or number had been washed down the stream, more than three or four miles below either the parent rock, or the mass of alluvium from which they were derived. Considering the singular rapidity of the great body of water in the St. Cruz, and that no still reaches occur in

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any part, these examples are most striking of the inefficiency of rivers in transporting even moderately-sized fragments.

The basaltic cliffs are obscurely divided by lines of more cellular or amygdaloidal varieties, and the strata appear to the eye perfectly horizontal. They overlie the great tertiary deposits, and are covered (except where denuded in some of the lower terraces) by the usual beds of gravel. The basalt is clearly nothing more than lava, which has flowed beneath the sea; but the eruptions must have been on the grandest scale. At the point where we first met this formation, the mass was about 120 feet in thickness; following the river-course, it imperceptibly rose and became thicker, so that at forty miles above the first station it was 320 feet. What the thickness may be close to the Cordillera, I have no means of knowing, but the platform there attains an elevation between two and three thousand feet above the level of the sea: we must therefore look to the mountains of that great chain for its source; and worthy of such a source are streams, that have flowed over the bed of an ocean to a distance of one hundred miles.

A fine section of the basaltic platform is presented by the cliffs on both sides of the valley. At the first glance it is evident the strata must at one time have been united. What power then has removed along a whole line of country, a solid mass of very hard rock, which had an average thickness of about three hundred feet, and a breadth varying from rather less than two to four miles? The river, though it has so little power in transporting even inconsiderable fragments, yet in the lapse of ages might produce an effect by its gradual erosion, of which it is difficult to judge the limit. But in this case, independently of the insignificance of such agency, good reasons can be assigned for believing that this valley was formerly occupied by an arm of the sea. It is needless in this work to detail arguments, which chiefly rest on the form and nature of the banks, on the manner in which the valley near the foot of the Andes expands into a great bay, and on the occurrence of a few sea-shells lying in the

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bed of the river. If I had space I could prove that South America was formerly here cut off by a strait joining the Atlantic and Pacific oceans, like that of Magellan. But it may yet be asked, how has the solid basalt been removed? Geologists formerly would have brought into play, the violent action of some overwhelming debacle; but in this case such a supposition would have been quite inadmissible; because the same step-like terraces, that front the Patagonian coast, sweep up on each side of the valley. No possible action of any flood could have thus modelled the land in these two situations; and by the formation of such terraces the valley itself has been hollowed out. Although we know that there are tides, which run within the narrows of the Strait of Magellan at the rate of eight knots an hour, yet we must confess it makes the head almost giddy to reflect on the number of years, century after century, which the tides unaided by a heavy surf, must have required to have corroded so vast an area and thickness of solid rock. Nevertheless, we must believe that the strata undermined by the waters of this ancient strait, were broken up into huge fragments, and there lying scattered on the beach, were reduced to smaller blocks, then to pebbles, and lastly to the most impalpable mud, which the tides drifted into the bed, either of the Eastern or Western Ocean.

With the change in the geological structure of the plains the character of the landscape likewise altered. While rambling up some of the narrow and rocky defiles, I could almost have fancied myself transported back again to the barren valleys of St. Jago. Among the basaltic cliffs, I found some plants which I had seen nowhere else, but others I recognised as being wanderers from Tierra del Fuego. These porous rocks serve as a reservoir for the scanty rain-water, and consequently on the line where the igneous and sedimentary formations unite, several small springs (most rare occurrences in Patagonia) burst forth; and they could be distinguished at a distance by the circumscribed patch of bright green herbage.

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April 27th.—The bed of the river became rather narrower, and hence the stream more rapid. It here ran at the rate of six knots an hour. From this cause, and from the many great angular fragments, tracking the boats became both dangerous and laborious.

This day I shot a condor. It measured from tip to tip of the wings, eight and a half feet, and from beak to tail, four feet. It is a magnificent spectacle to behold several of these great birds seated on the edge of some steep precipice. I will here describe all I have observed respecting their habits. The condor is known to have a wide geographical range, being found on the west coast of South America, from the Strait of Magellan throughout the entire range of the Cordillera. On the Patagonian shore, the steep cliff near the mouth of the Rio Negro in lat. 41°, was the most northern point where I saw these birds, or heard of their existence. They have there wandered about four hundred miles from the great central line of their habitation in the Andes. Further south, among the bold precipices which form the head of Port Desire, they are not uncommon; yet only a few stragglers occasionally visit the sea-coast. A line of cliff near the mouth of St. Cruz, is frequented by these birds, and about eighty miles up the river, where first the sides of the valley were formed by steep basaltic precipices, the condor again appeared, although in the intermediate space not one had been seen. From these and similar facts, the presence of this bird seems chiefly to be determined by the occurrence of perpendicular cliffs. In Patagonia, the condors either by pairs or many together, both sleep and breed on the same overhanging ledges. In Chile, during the greater part of the year, they haunt the lower country near the shores of the Pacific, and at night several roost in one tree; but in the early part of summer, they retire to the most inaccessible parts of the inner Cordillera, there to breed in peace.

With respect to their propagation, I was told by the country people in Chile, that the condor makes no sort of

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nest, but in the months of November and December lays two large white eggs on a shelf of bare rock. On the Patagonian coast I could not see any sort of nest among the cliffs, where the young ones were standing. It is said the young condors cannot fly for an entire year. At Concepcion, on the fifth of March (corresponding to our September), I saw a young bird, which, though in size little inferior to an old one, was completely covered by down like that of a gosling, but of a blackish colour. I feel sure this bird could not have used its wings for flight for many months. After the period when the young condors can fly, and apparently as well as the old birds, they yet remain both roosting at night on the same ledge, and hunting by day with their parents. Before, however, the young bird has the ruff round its neck turned white, it may often be seen hunting by itself. At the mouth of the St. Cruz, during part of April and May, a pair of old birds might be seen every day either perched on a certain ledge, or sailing about in company with a single young one, which latter though full fledged, had not its ruff white. I should think, especially when recollecting the state in which the Concepcion bird was on the previous month, that this young condor had not been hatched from an egg of that summer. As there were no other young birds, it seems probable that the condor only lays once in two years.

These birds generally live by pairs; but among the inland basaltic cliffs of the St. Cruz, I found a spot, where scores most usually haunt. On coming suddenly to the brow of the precipice, it was a fine sight to see between twenty and thirty of these great birds start heavily from their resting-place, and wheel away in majestic circles. From the quantity of dung on the rocks, they must long have frequented this cliff, and probably they both roost and breed there. Having gorged themselves with carrion on the plains below, they retire to these favourite ledges, to digest their food. From these facts, the condor must to a certain

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degree, like the gallinazo, be considered a gregarious bird. In this part of the country they live altogether on the guanacoes, which either have died a natural death, or, as more commonly happens, have been killed by the pumas. I believe, from what I saw in Patagonia, that they do not on ordinary occasions extend their daily excursions to any great distance from their regular sleeping-places.

The condors may oftentimes be seen at a great height, soaring over a certain spot in the most graceful spires and circles. On some occasions I am sure that they do this for sport, but on others, the Chileno countrymen tell you that they are watching a dying animal, or the puma devouring its prey. If the condors glide down, and then suddenly all rise together, the Chileno knows that it is the puma which, watching the carcass, has sprung out to drive away the robbers. Besides feeding on carrion, the condors will frequently attack young goats and lambs. Hence the shepherd dogs are trained, the moment the enemy passes over, to run out, and looking upwards, to bark violently. The Chilenos destroy and catch numbers. Two methods are used; one is to place a carcass within an enclosure of sticks on a level piece of ground, and when the condors are gorged, to gallop up on horseback to the entrance, and thus enclose them: for when this bird has not space to run, it cannot give its body sufficient momentum to rise from the ground. The second method is to mark the trees in which, frequently to the number of five or six, they roost together, and then at night to climb up and noose them. They are such heavy sleepers, as I have myself witnessed, that this is not a difficult task. At Valparaiso, I have seen a living condor sold for sixpence, but the common price is eight or ten shillings. One which I saw brought in, had been lashed with rope, and was much injured; yet, the moment the line was cut by which its bill was secured, although surrounded by people, it began ravenously to tear a piece of carrion. In a garden at the same place, between twenty and thirty were kept alive. They were fed only once a week, but they

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appeared in pretty good health.* The Chileno countrymen assert that the condor will live and retain its powers, between five and six weeks without eating. I cannot answer for the truth of this, but it is a cruel experiment, which very likely has been tried.

When an animal is killed in the country, it is well known that the condors, like other carrion vultures, soon gain intelligence of it, and congregate in an inexplicable manner. In most cases it must not be overlooked, that the birds have discovered their prey, and have picked the skeleton clean, before the flesh is in the least tainted. Remembering the opinions of M. Audubon, on the little smelling powers of such birds,† I tried in the above-mentioned garden the following experiment: The condors were tied, each by a rope, in a long row at the bottom of a wall. Having folded up a piece of meat in white paper, I walked backwards and forwards, carrying it in my hand at the distance of about three yards, but no notice whatever was taken. I then threw it on the ground, within one yard of an old cock bird; he looked at it for a moment with attention, but then regarded it no more. With a stick I pushed it closer and closer, until at last he touched it with his beak; the paper was then instantly torn off with fury, and at the same moment, every bird in the long row began

* I noticed that several hours before any of the condors died, all the lice, with which they are infested, crawled to the outside feathers. I was told that this was always the case.

† In the case of the *Vultur aura*, Mr. Owen, in some notes read before the Zoological Society, has demonstrated from the developed form of the olfactory nerves, that this bird must possess an acute sense of smell. It was mentioned on the same evening, that on two occasions, persons in the West Indies having died, and their bodies not being buried till they smelt offensively, these birds congregated in numbers on the roof of the house. This instance appears quite conclusive, as it was evident they had gained the intelligence by the powers of smell alone, and not of sight. It would appear from the various facts recorded, that carrion-feeding hawks possess both the sense of sight and smell in an eminent degree.

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struggling and flapping its wings. Under the same circumstances, it would not have been possible to have deceived a dog.

I may remark, that oftentimes when lying down to rest on the open plains, and on looking upwards, I have seen carrion hawks, sailing through the air at a great height. Where the country is level I do not believe a space of the heavens, of more than 15° above the horizon, is commonly viewed with any attention by a person either walking or on horseback. If such is the case, and the vulture is on the wing at a height of between three and four thousand feet, before it could come within the above range of vision, its distance in a straight line from the beholder's eye, would be rather more than two British miles. Might it not thus readily be overlooked? When an animal is killed by the sportsman in a lonely valley, may he not all the while be watched from above by the sharp-sighted bird? And will not the manner of its descent proclaim throughout the district to the whole family of carrion-feeders, that their prey is at hand?

When the condors in a flock are wheeling round and round any spot, their flight is beautiful. Except when rising from the ground, I do not recollect ever having seen one of these birds flap its wings. Near Lima, I watched several for nearly half an hour, without once taking off my eyes. They moved in large curves, sweeping in circles, descending and ascending without once flapping. As they glided close over my head, I intently watched, from an oblique position, the outlines of the separate and terminal feathers of the wing, if there had been the least vibratory movement, these would have been blended together, but they were seen distinct against the blue sky. The head and neck were moved frequently, and apparently with force, and it appeared as if the extended wings formed the fulcrum on which the movements of the neck, body, and tail, acted. If the bird wished to descend, the wings were for a moment collapsed; and then when again expanded with an altered inclination,

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the momentum gained by the rapid descent seemed to urge the bird upwards, with the even and steady movement of a paper kite. In the case of any bird *soaring*, its motion must be sufficiently rapid, so that the action of the inclined surface of its body on the atmosphere, may counterbalance its gravity. The force to keep up the momentum of a body moving in a horizontal plane in that fluid (in which there is so little friction) cannot be great, and this force is all that is wanted. The movement of the neck and body of the condor, we must suppose, is sufficient for this. However this may be, it is truly wonderful and beautiful to see so great a bird, hour after hour, without any apparent exertion, wheeling and gliding over mountain and river.

April 29th.—From some high land we hailed with joy the white summits of the Cordillera, as they were seen occasionally peeping through their dusky envelope of clouds. During the few succeeding days, we continued to get on slowly, for we found the river-course very tortuous, and strewed with immense fragments of various ancient slaty rocks, and of granite. The plain bordering the valley had here attained an elevation of about 1100 feet, and its character was much altered. The well-rounded pebbles of porphyry were in this part mingled with many immense angular fragments of basalt and of the rocks above mentioned. The first of these erratic blocks which I noticed, was sixty-seven miles distant from the nearest mountain; another which had been transported to rather a less distance, measured five yards square, and projected five feet above the gravel. Its edges were so angular, and its size so great, that I at first mistook it for a rock *in situ*, and took out my compass to observe the direction of its cleavage. The plains here were not quite so level as those nearer the coast, but yet, they betrayed little signs of any violent action. Under these circumstances, it would be difficult, as it appears to me, to explain this phenomenon on any theory, excepting through that of transport by ice while the country was under water. But this is a subject to which I shall again recur.

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During the two last days we met with signs of horses, and with several small articles which had belonged to the Indians, —such as parts of a mantle and a bunch of ostrich feathers— but they appeared to have been lying long on the ground. Between the place where the Indians had so lately crossed the river and this neighbourhood, though so many miles apart, the country appears to be quite unfrequented. At first, considering the abundance of the guanacoes, I was surprised at this; but it is explained by the stony nature of the plains, which would soon disable an unshod horse from taking part in the chase. Nevertheless, in two places in this very central region, I found small heaps of stones, which I do not think could have been accidentally thrown together. They were placed on points, projecting over the edge of the highest lava cliff, and they resembled, but on a small scale, those near Port Desire.

MAY 4TH.—Captain FitzRoy determined to take the boats no higher. The river had a winding course, and was very rapid; and the appearance of the country offered no temptation to proceed any further. Every where we met with the same productions, and the same dreary landscape. We were now one hundred and forty miles distant from the Atlantic, and about sixty from the nearest arm of the Pacific. The valley in this upper part expanded into a wide basin, bounded on the north and south by the basaltic platforms, and fronted by the long range of the snow-clad Cordillera. But we viewed these grand mountains with regret, for we were obliged to imagine their form and nature, instead of standing, as we had hoped, on their crest, and looking down on the plain below. Besides the useless loss of time which an attempt to ascend any higher would have cost us, we had already been for some days on half allowance of bread. This, although really enough for any reasonable men, was, after our hard day's march, rather scanty food. Let those alone who have never tried it, exclaim about the comfort of a light stomach and an easy digestion.

5TH.—Before sunrise we commenced our descent. We

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shot down the stream with great rapidity, generally at the rate of ten knots an hour. In this one day we effected what had cost us five-and-a-half hard days' labour in ascending. On the 8th, we reached the Beagle after our twenty-one days' expedition. Every one excepting myself had cause to be dissatisfied; but to me the ascent afforded a most interesting section of the great tertiary formation of Patagonia.

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CHAPTER XI.

Tierra del Fuego, first arrival—Good Success Bay—Interview with savages—Scenery of the forests—Sir J. Banks's hill—Cape Horn—Wigwam Cove—Miserable condition of savages—Beagle channel—Fuegians—Ponsonby Sound—Equality of condition among natives—Bifurcation of Beagle channel—Glaciers—Return to ship.

TIERRA DEL FUEGO.

December 17th, 1832.—Having now finished with Patagonia, I will describe our first arrival in Tierra del Fuego. A little after noon we doubled Cape St. Diego, and entered the famous strait of Le Maire. We kept close to the Fuegian shore, but the outline of the rugged, inhospitable Staten land was visible amidst the clouds. In the afternoon we anchored in the bay of Good Success. While entering we were saluted in a manner becoming the inhabitants of this savage land. A group of Fuegians partly concealed by the entangled forest, were perched on a wild point overhanging the sea; and as we passed by, they sprang up, and waving their tattered cloaks sent forth a loud and sonorous shout. The savages followed the ship, and just before dark we saw their fire, and again heard their wild cry. The harbour consists of a fine piece of water half surrounded by low rounded mountains of clay-slate, which are covered to the water's edge by one dense gloomy forest. A single glance at the landscape was sufficient to show me, how widely different it was from any thing I had ever beheld. At night it blew a gale of wind, and heavy squalls from the mountains swept past us. It would have been a bad time out at sea, and we, as well as others, may call this Good Success Bay.

In the morning, the Captain sent a party to communicate with the Fuegians. When we came within hail, one of the four natives who were present advanced to receive us, and

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began to shout most vehemently, wishing to direct us where to land. When we were on shore the party looked rather alarmed, but continued talking and making gestures with great rapidity. It was without exception the most curious and interesting spectacle I had ever beheld. I could not have believed how wide was the difference, between savage and civilized man. It is greater than between a wild and domesticated animal, in as much as in man there is a greater power of improvement. The chief spokesman was old, and appeared to be the head of the family; the three others were powerful young men, about six feet high. The women and children had been sent away. These Fuegians are a very different race from the stunted miserable wretches further to the westward. They are much superior in person, and seem closely allied to the famous Patagonians of the Strait of Magellan. Their only garment consists of a mantle made of guanaco skin, with the wool outside; this they wear just thrown over their shoulders, as often leaving their persons exposed as covered. Their skin is of a dirty coppery red colour.

The old man had a fillet of white feathers tied round his head, which partly confined his black, coarse, and entangled hair. His face was crossed by two broad transverse bars; one painted bright red reached from ear to ear, and included the upper lip; the other, white like chalk, extended parallel and above the first, so that even his eyelids were thus coloured. Some of the other men were ornamented by streaks of black powder, made of charcoal. The party altogether closely resembled the devils which come on the stage in such plays as Der Freischutz.

Their very attitudes were abject, and the expression of their countenances distrustful, surprised, and startled. After we had presented them with some scarlet cloth, which they immediately tied round their necks, they became good friends. This was shown by the old man patting our breasts, and making a chuckling kind of noise, as people do when feeding chickens. I walked with the old man, and

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this demonstration of friendship was repeated several times; it was concluded by three hard slaps, which were given me on the breast and back at the same time. He then bared his bosom for me to return the compliment, which being done, he seemed highly pleased. The language of these people, according to our notions, scarcely deserves to be called articulate. Captain Cook has compared it to a man clearing his throat, but certainly no European ever cleared his throat with so many hoarse, guttural, and clicking sounds.

They are excellent mimics: as often as we coughed or yawned, or made any odd motion, they immediately imitated us. Some of our party began to squint and look awry; but one of the young Fuegians (whose whole face was painted black, excepting a white band across his eyes) succeeded in making far more hideous grimaces. They could repeat with perfect correctness, each word in any sentence we addressed them, and they remembered such words for some time. Yet we Europeans all know how difficult it is to distinguish apart the sounds in a foreign language. Which of us, for instance, could follow an American Indian through a sentence of more than three words? All savages appear to possess, to an uncommon degree, this power of mimicry. I was told almost in the same words, of the same ludicrous habits among the Caffres: the Australians, likewise, have long been notorious for being able to imitate and describe the gait of any man, so that he may be recognised. How can this faculty be explained? is it a consequence of the more practised habits of perception and keener senses, common to all men in a savage state, as compared to those long civilized?

When a song was struck up by our party, I thought the Fuegians would have fallen down with astonishment. With equal surprise they viewed our dancing; but one of the young men, when asked, had no objection to a little waltzing. Little accustomed to Europeans as they appeared to be, yet they knew, and dreaded our fire-arms; nothing would tempt them to take a gun in their hands. They begged for

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knives, calling them by the Spanish word "cuchilla." They explained also what they wanted, by acting as if they had a piece of blubber in their mouth, and then pretending to cut instead of tear it.

It was interesting to watch the conduct of these people towards Jemmy Button (one of the Fuegians* who had been taken, during the former voyage, to England): they immediately perceived the difference between him and the rest, and held much conversation between themselves on the subject. The old man addressed a long harangue to Jemmy, which it seems was to invite him to stay with them. But Jemmy understood very little of their language, and was, moreover, thoroughly ashamed of his countrymen. When York Minster (another of these men) came on shore, they noticed him in the same way, and told him he ought to shave; yet he had not twenty dwarf hairs on his face, whilst we all wore our untrimmed beards. They examined the colour of his skin, and compared it with ours. One of our arms being bared, they expressed the liveliest surprise and admiration at its whiteness. We thought that they mistook two or three of the officers, who were rather shorter and fairer (though adorned with large beards), for the ladies of our party. The tallest amongst the Fuegians was evidently much pleased at his height being noticed. When placed back to back with the tallest of the boat's crew, he tried his best to edge on higher ground, and to stand on tiptoe. He opened his mouth to show his teeth, and turned his face for a side view; and all this was done with such alacrity, that I dare say he thought himself the handsomest man in Tierra del Fuego. After the first feeling on our part of grave astonishment was over, nothing could be more ludicrous or interesting than the odd mixture of surprise and imitation which these savages every moment exhibited.

* Captain FitzRoy has given a history of these people. Four were taken to England; one died there, and the three others (two men and one woman) were now brought back and settled in their own country.

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The next day I attempted to penetrate some way into the country. Tierra del Fuego may be described as a mountainous country, partly submerged in the sea, so that deep islets and bays occupy the place where valleys should exist. The mountain sides (except on the exposed western coast) are covered from the water's edge upwards by one great forest. The trees reach to an elevation of between 1000 and 1500 feet; and are succeeded by a band of peat, with minute alpine plants; and this again is succeeded by the line of perpetual snow, which, according to Captain King, in the Strait of Magellan descends to between 3000 and 4000 feet. To find an acre of level land in any part of the country is most rare. I recollect only one little flat near Port Famine, and another of rather larger extent near Goeree Road. In both these cases, and in all others, the surface was covered by a thick bed of swampy peat. Even within the forest the ground is concealed by a mass of slowly putrefying vegetable matter, which, from being soaked with water, yields to the foot.

Finding it nearly hopeless to push my way through the wood, I followed the course of a mountain torrent. At first, from the waterfalls and number of dead trees, I could hardly crawl along; but the bed of the stream soon became a little more open, from the floods having swept the sides. I continued slowly to advance for an hour along the broken and rocky banks; and was amply repaid by the grandeur of the scene. The gloomy depth of the ravine well accorded with the universal signs of violence. On every side were lying irregular masses of rock and up-torn trees; other trees, though still erect, were decayed to the heart and ready to fall. The entangled mass of the thriving and the fallen reminded me of the forests within the tropics;—yet there was a difference; for in these still solitudes, Death, instead of Life, seemed the predominant spirit. I followed the watercourse till I came to a spot where a great slip had cleared a straight space down the mountain side. By this road I ascended to a considerable elevation, and obtained a good view of the surrounding woods. The trees all belong to one kind,

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the *Fagus betuloides*, for the number of the other species of beech, and of the Winter's bark, is quite inconsiderable. This tree keeps its leaves throughout the year; but its foliage is of a peculiar brownish-green colour, with a tinge of yellow. As the whole landscape is thus coloured, it has a sombre, dull appearance; nor is it often enlivened by the rays of the sun.

DECEMBER 20TH.—One side of the harbour is formed by a hill about 1500 feet high, which Captain FitzRoy has called after Sir J. Banks, in commemoration of his disastrous excursion, which proved fatal to two of his party, and nearly so to Dr. Solander. The snowstorm, which was the cause of their misfortune, happened in the middle of January, corresponding to our July, and in the latitude of Durham! I was anxious to reach the summit of this mountain to collect alpine plants; for flowers of any kind, in the lower part, were few in number. We followed the same watercourse as on the previous day, till it dwindled away, and then were compelled to crawl blindly among the trees. These, from the effects of the elevation, and of the impetuous winds, were low, thick, and crooked. At length we reached that which from a distance appeared like a carpet of fine green turf, but which, to our vexation, turned out to be a compact mass of little beech-trees about four or five feet high. These were as thick together as box in the border of a flower-garden, and we were obliged to struggle over the flat but treacherous surface. After a little more trouble we gained the peat, and then the bare slate rock.

A ridge connected this hill with another, distant some miles, and more lofty, so that patches of snow were lying on it. As the day was not far advanced, I determined to walk there and collect along the road. It would have been very hard work, had it not been for a well-beaten and straight path made by the guanacoes; for these animals, like sheep, always follow the same line. When we reached the hill we found it the highest in the immediate neighbourhood, and the waters flowed to the sea in opposite directions. We obtained a

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wide view over the surrounding country: to the northward a swampy moorland extended, but to the southward we had a scene of savage magnificence, well becoming Tierra del Fuego. There was a degree of mysterious grandeur in mountain behind mountain, with the deep intervening valleys, all covered by one thick, dusky mass of forest. The atmosphere, likewise, in this climate (where gale succeeds gale, with rain, hail, and sleet), seems blacker than any where else. In the Strait of Magellan looking due south from Port Famine, the distant channels between the mountains appear from their gloominess to lead beyond the confines of this world.

December 21st.—The Beagle got under way: and on the succeeding day, favoured to an uncommon degree by a fine easterly breeze, we closed in with the Barnevelts, and, running past Cape Deceit with its stony peaks, about three o'clock doubled the weatherbeaten Cape Horn. The evening was calm and bright, and we enjoyed a fine view of the surrounding isles. Cape Horn, however, demanded his tribute, and before night sent us a gale of wind directly in our teeth. We stood out to sea, and on the second day again made the land, when we saw on our weather-bow this notorious promontory in its proper form—veiled in a mist, and its dim outline surrounded by a storm of wind and water. Great black clouds were rolling across the heavens, and squalls of rain, with hail, swept by us with extreme violence; so that the captain determined to run into Wigwam Cove. This is a snug little harbour, not far from Cape Horn; and here, at Christmas-eve, we anchored in smooth water. The only thing which reminded us of the gale outside, was every now and then a puff from the mountains, which seemed to wish to blow us out of the water.

December 25th.—Close by the cove, a pointed hill, called Kater's Peak, rises to the height of 1700 feet. The surrounding islands all consist of conical masses of greenstone, associated sometimes with less regular hills of baked

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and altered clay-slate. This part of Tierra del Fuego may be considered as the extremity of the submerged chain of mountains already alluded to. The cove takes its name of "Wigwam" from some of the Fuegian habitations; but every bay in the neighbourhood might be so called with equal propriety. The inhabitants living chiefly upon shell-fish, are obliged constantly to change their place of residence; but they return at intervals to the same spots, as is evident from the pile of old shells, which must often amount to some tons in weight. These heaps can be distinguished at a long distance by the bright green colour of certain plants, which invariably grow on them. Among these may be enumerated the wild celery and scurvy grass, two very serviceable plants, the use of which has not been discovered by the natives.

The Fuegian wigwam resembles, in size and dimensions, a haycock. It merely consists of a few broken branches stuck in the ground, and very imperfectly thatched on one side with a few tufts of grass and rushes. The whole cannot be so much as the work of an hour, and it is only used for a few days. At Goeree Roads I saw a place where one of these naked men had slept, which absolutely offered no more cover than the form of a hare. The man was evidently living by himself, and York Minster said he was "very bad man," and that probably he had stolen something. On the west coast, however, the wigwams are rather better, for they are covered with seal-skins. We were detained here several days by the bad weather. The climate is certainly wretched; the summer solstice was now passed, yet every day snow fell on the hills, and in the valleys there was rain, accompanied by sleet. The thermometer generally stood about 45°, but in the night fell to 38° or 40°. From the damp and boisterous state of the atmosphere, not cheered by a gleam of sunshine, one fancied the climate even worse than it really was.

At a subsequent period the Beagle anchored for a couple of days under Wollaston Island, which is a short way to the northward. While going on shore we pulled alongside a

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canoe with six Fuegians. These were the most abject and miserable creatures I any where beheld.* On the east coast the natives, as we have seen, have guanaco cloaks, and on the west, they possess seal-skins. Amongst these central tribes the men generally possess an otter-skin, or some small scrap about as large as a pocket-handkerchief, which is barely sufficient to cover their backs as low down as their loins. It is laced across the breast by strings, and according as the wind blows, it is shifted from side to side. But these Fuegians in the canoe were quite naked, and even one full-grown woman was absolutely so. It was raining heavily, and the fresh water, together with the spray, trickled down her body. In another harbour not far distant, a woman, who was suckling a recently-born child, came one day alongside the vessel, and remained there whilst the sleet fell and thawed on her naked bosom, and on the skin of her naked child. These poor wretches were stunted in their growth, their hideous faces bedaubed with white paint, their skins filthy and greasy, their hair entangled, their voices discordant, their gestures violent and without dignity. Viewing such men, one can hardly make oneself believe they are fellow-creatures, and inhabitants of the same world. It is a common subject of conjecture what pleasure in life some of the less gifted animals can enjoy: how much more reason-

* I believe, in this extreme part of South America, man exists in a lower state of improvement than in any other part of the world. The South Sea islander of either race is comparatively civilized. The Esquimaux, in his subterranean hut, enjoys some of the comforts of life, and in his canoe, when fully equipped, manifests much skill. Some of the tribes of Southern Africa, prowling about in search of roots, and living concealed on the wild and arid plains, are sufficiently wretched. But the Australian, in the simplicity of the arts of life, comes nearest the Fuegian. He can, however, boast of his boomerang, his spear and throwing-stick, his method of climbing trees, tracking animals, and scheme of hunting. Although thus superior in acquirements, it by no means follows that he should likewise be so in capabilities. Indeed, from what we saw of the Fuegians, who were taken to England, I should think the case was the reverse.

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ably the same question may be asked with respect to these barbarians. At night, five or six human beings, naked and scarcely protected from the wind and rain of this tempestuous climate, sleep on the wet ground coiled up like animals. Whenever it is low water, they must rise to pick shell-fish from the rocks; and the women, winter and summer, either dive to collect sea eggs, or sit patiently in their canoes, and, with a baited hair-line, jerk out small fish. If a seal is killed, or the floating carcass of a putrid whale discovered, it is a feast: such miserable food is assisted by a few tasteless berries and fungi. Nor are they exempt from famine, and, as a consequence, cannibalism accompanied by parricide.

The tribes have no government or head, yet each is surrounded by other hostile ones, speaking different dialects; and the cause of their warfare would appear to be the means of subsistence. Their country is a broken mass of wild rock, lofty hills, and useless forests: and these are viewed through mists and endless storms. The habitable land is reduced to the stones which form the beach; in search of food they are compelled to wander from spot to spot, and so steep is the coast, that they can only move about in their wretched canoes. They cannot know the feeling of having a home, and still less that of domestic affection; unless indeed the treatment of a master to a laborious slave can be considered as such. How little can the higher powers of the mind be brought into play! What is there for imagination to picture, for reason to compare, for judgment to decide upon? to knock a limpet from the rock does not even require cunning, that lowest power of the mind. Their skill in some respects may be compared to the instinct of animals; for it is not improved by experience: the canoe, their most ingenious work, poor as it is, has remained the same, for the last two hundred and fifty years.

Whilst beholding these savages, one asks, whence have they come? What could have tempted, or what change compelled a tribe of men to leave the fine regions of

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the north, to travel down the Cordillera or backbone of America, to invent and build canoes, and then to enter on one of the most inhospitable countries within the limits of the globe? Although such reflections must at first occupy one's mind, yet we may feel sure that many of them are quite erroneous. There is no reason to believe that the Fuegians decrease in number; therefore we must suppose that they enjoy a sufficient share of happiness (of whatever kind it may be) to render life worth having. Nature by making habit omnipotent, and its effects hereditary, has fitted the Fuegian to the climate and the productions of his country.

JANUARY 15TH, 1833.—The Beagle anchored in Goeree Roads. Captain FitzRoy having determined to settle the Fuegians, according to their wishes, in Ponsonby Sound, four boats were equipped to carry them there through the Beagle channel. This channel which was discovered by Captain FitzRoy during the last voyage, is a most remarkable feature in the geography of this, or indeed of any other country. Its length is about 120 miles with an average breadth, not subject to any very great variations, of about two miles. It is throughout the greater part so extremely straight, that the view, bounded on each side by a line of mountains, gradually becomes indistinct in the perspective. This arm of the sea may be compared to the valley of Lochness in Scotland, with its chain of lakes and entering friths. At some future epoch the resemblance perhaps will become complete. Already in one part we have proofs of a rising of the land in a line of cliff, or terrace, composed of coarse sandstone, mud, and shingle, which forms both shores. The Beagle channel crosses the southern part of Tierra del Fuego in an east and west line; in its middle, it is joined on the south side by an irregular channel at right angles to it, which has been called Ponsonby Sound. This is the residence of Jemmy Button's tribe and family.

JANUARY 19TH.—Three whale boats and the yawl, with a

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party of twenty-eight, started under the command of Captain FitzRoy. In the afternoon we entered the eastern mouth of the channel, and shortly afterwards found a snug little cove, concealed by some surrounding islets. Here we pitched our tents, and lighted our fires. Nothing could look more comfortable than this scene. The glassy water of the little harbour, with the trees sending their branches over the rocky beach, the boats at anchor, the tents supported by the crossed oars, and the smoke curling up the wooded valley, formed a picture of quiet retirement. The next day (20th) we smoothly glided onwards in our little fleet, and came to a more inhabited district. Few if any of these natives could ever have seen a white man; certainly nothing could exceed their astonishment at the apparition of the four boats. Fires were lighted on every point (hence the name of the land), both to attract our attention, and to spread far and wide the news. Some of the men ran for miles along the shore. As we passed under one cliff, four or five men suddenly appeared above us, forming the most wild and savage group that can be imagined. They were absolutely naked, with long streaming hair, and with rugged staffs in their hands: springing from the ground they waved their arms around their heads, and sent forth the most hideous yells.

At dinner-time we landed among a party of Fuegians. At first they were not inclined to be friendly; for until the captain pulled in ahead of the other boats, they kept their slings in their hands. We soon, however, delighted them by trifling presents, such as tying red tape round their heads. It was as easy to please, as it was difficult to satisfy these savages. Young and old, men and children, never ceased repeating the word "yammerschooner," which means "give me." After pointing to almost every object, one after the other, even to the buttons on our coats, and saying their favourite word in as many intonations as possible, they would then use it in a neuter sense, and vacantly repeat "yammerschooner." After yammerschoonering for any article very eagerly, they would

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by a simple artifice point to their young women or little children, as much as to say, "If you will not give it me, surely you will to such as these?"

At night we endeavoured in vain to find an uninhabited cove; and at last were obliged to bivouac not far from a party of natives. They were very inoffensive as long as they were few in numbers, but in the morning (21st) being joined by others they showed symptoms of hostility. An European labours under great disadvantages, when treating with savages like these, who have not the least idea of the power of fire-arms. In the very act of levelling his musket, he appears to the savage far inferior to a man armed with a bow and arrow, a spear, or even a sling. Nor is it easy to teach them our superiority except by striking a fatal blow. Like wild beasts they do not appear in all cases to compare numbers; for each individual if attacked, instead of retiring, will endeavour to dash your brains out with a stone, as certainly as a tiger under similar circumstances would tear you. Captain FitzRoy on one occasion, being very anxious from good reasons to frighten away a small party, twice fired his pistol close by the side of a native. The man both times looked astounded, and carefully but quickly rubbed his head; he then stared awhile, and gabbled to his companions; but he never seemed to think of running away. We can hardly put ourselves in the position of these savages, to understand their actions. In the case of the Fuegian, the possibility of such a sound as the report of a gun close to his ear, could never have entered his mind. He perhaps literally did not for a second know whether it was a sound or a blow, and therefore very naturally rubbed his head. In a similar manner, when a savage sees a mark struck by a bullet, it may be some time before he is able at all to understand how it is effected; for the fact of a body being invisible from its velocity, would perhaps be to him an idea totally inconceivable. Moreover, the extreme force of a bullet, that penetrates a hard substance without tearing it, may convince the savage that it has no force at all. Certainly I believe that many savages of the lowest grade,

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such as these of Tierra del Fuego, have seen objects struck, and even small animals killed by the musket, without being in the least aware how deadly an instrument it was.

22D.—After having passed an unmolested night, in what would appear to be neutral territory. between Jemmy's tribe and the people we saw yesterday, we sailed pleasantly along. The scenery in this part had a peculiar and very magnificent character; although the effect was lessened from the lowness of the point of view in a boat, and from looking down the valley and hence losing all the beauty of a succession of ridges. The mountains attained an elevation of about 3000 feet, and were terminated by sharp and jagged points. They rose in one unbroken sweep from the water's edge, and were covered to the height of fourteen or fifteen hundred feet by the dusky-coloured forest. It was most curious to observe, how level and truly horizontal the line on the mountain side was, as far as the eye could range, at which trees ceased to grow. It precisely resembled the high-water mark of drift weed on a sea-beach.

At night we slept close to the junction of Ponsonby Sound with the Beagle channel. A small family of Fuegians, who were living in the cove, were very quiet and inoffensive, and soon joined our party round the blazing fire. We were well clothed, and though sitting close to the fire, were far from too warm; yet these naked savages, though further off, were observed to our great surprise, to be streaming with perspiration at undergoing such a roasting. They seemed, however, very well pleased, and all joined in the chorus of the seamen's songs: but the manner in which they were invariably a little behindhand was quite ludicrous.

During the night the news had spread, and early in the morning (23d) a fresh party arrived. Several of them had run so fast that their noses were bleeding, and their mouths frothed from the rapidity with which they talked, and with their naked bodies all bedaubed with black, white, and red, they looked like so many demoniacs who had been fighting. We then proceeded down Ponsonby Sound to the spot

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where poor Jemmy expected to find his mother and relations. We staid there five days. Captain FitzRoy has given an account of all the interesting events which there happened.

During the succeeding year we paid another visit to the Fuegians, and the Beagle herself followed the same course which I have just described as having been taken in the boats. I was amused by finding what a difference the circumstance of being quite superior in force made, in the interest of beholding these savages. While in the boats I got to hate the very sound of their voices, so much trouble did they give us. The first and last word was "yammerschooner." When, entering some quiet little cove, we have looked round and thought to pass a quiet night, the odious word "yammerschooner" has shrilly sounded from some gloomy nook, and then the little signal smoke has curled upwards to spread the news. On leaving some place we have said to each other, "Thank Heaven, we have at last fairly left these wretches!" when one more faint halloo from an all-powerful voice, heard at a prodigious distance, would reach our ears, and clearly could we distinguish—"yammerschooner." But on the latter occasion, the more Fuegians the merrier; and very merry work it was. Both parties laughing, wondering, gaping at each other; we pitying them, for giving us good fish and crabs for rags, &c.; they grasping at the chance of finding people so foolish as to exchange such splendid ornaments for a good supper. It was most amusing to see the undisguised smile of satisfaction with which one young woman, with her face painted black, tied with rushes several bits of scarlet cloth round her head. Her husband, who enjoyed the very universal privilege in this country of possessing two wives, evidently became jealous of all the attention paid to his young wife; and, after a consultation with his naked beauties, was paddled away by them.

Some of the Fuegians plainly showed that they had a fair idea of barter. I gave one man a large nail (a most valuable present) without making any signs for a return; but he immediately picked out two fish, and handed them up on the

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point of his spear. If any present was designed for one canoe, and it fell near another, it was invariably given to the right owner. We were always much surprised at the little notice, or rather none whatever, which was evinced respecting many things, even such as boats, the use of which must have been evident. Simple circumstances,—such as the whiteness of our skins, the beauty of scarlet cloth or blue beads, the absence of women, our care in washing ourselves,—excited their admiration far more than any grand or complicated object, such as the ship. Bougainville has remarked concerning these very people that they treat the "chef d'œuvres de l'industrie humaine, comme ils traitent les loix de la nature et ses phénomènes."

The perfect equality among the individuals composing these tribes, must for a long time retard their civilization. As we see those animals, whose instinct compels them to live in society and obey a chief, are most capable of improvement, so is it with the races of mankind. Whether we look at it as a cause or a consequence, the more civilized always have the most artificial governments. For instance, the inhabitants of Otaheite, who, when first discovered, were governed by hereditary kings, had arrived at a far higher grade than another branch of the same people, the New Zealanders,—who although benefited by being compelled to turn their attention to agriculture, were republicans in the most absolute sense. In Tierra del Fuego, until some chief shall arise with power sufficient to secure any acquired advantages, such as the domesticated animals or other valuable presents, it seems scarcely possible that the political state of the country can be improved. At present, even a piece of cloth is torn into shreds and distributed; and no one individual becomes richer than another. On the other hand, it is difficult to understand how a chief can arise till there is property of some sort by which he might manifest and still increase his authority.

JANUARY 28TH.—In the evening, Captain FitzRoy sent two boats back to the ship from Ponsonby Sound, and with

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the two others proceeded to survey the western end of the Beagle channel. The view in this central part was very remarkable. Looking towards either hand, no object intercepted the vanishing points of this long canal of the mountains. The circumstance of its being an arm of the sea was rendered very evident by several huge whales spouting in different directions. On one occasion I saw two of these monsters, probably male and female, slowly swimming one after the other, within less than a stone's throw of the shore, over which the beech extended its branches.

We sailed on till it was dark, and then pitched our tents in a quiet creek. The greatest luxury here is to find a beach of pebbles, for they are both dry and yield to the body. The peaty soil is damp; rock is uneven and hard; sand gets into one's meat, when cooked and eaten boat-fashion; but when lying in our blanket bags, on a good bed of smooth pebbles, we passed most comfortable nights.

It was my watch till one o'clock. There is something very solemn in these scenes. At no time does the consciousness in what a remote corner of the world you are then buried, come so strongly before your mind. Every thing tends to this effect; the stillness of the night is interrupted only by the heavy breathing of the seamen beneath the tents, and sometimes by the cry of a night bird. The occasional barking also of a dog, heard in the distance, reminds one that it is the land of the savage.

29TH.—Early in the morning we arrived at the point where the Beagle channel divides itself into two arms; and we entered the northern one. The scenery here becomes even grander than before. The lofty mountains on the north side compose the granitic axis, or backbone of the whole country. They were covered by a wide mantle of perpetual snow, and numerous cascades poured their waters, through the woods, into the narrow channel below. In many parts magnificent glaciers extended from the mountain side to the water's edge. It is scarcely possible to imagine any thing more beautiful than the beryl-like blue of the glacier, and especially when

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contrasted with the dead white of an expanse of snow. As fragments fell from the glacier into the water, they floated away, and the channel with its icebergs represented in miniature the polar sea. When we reached the western mouth of this branch of the channel, we sailed amongst many unknown islands, and then proceeded by the outer coast to the entrance of the other arm. Thence we returned to Ponsonby Sound, saw the Fuegians, and arrived at the ship after our twenty-days' excursion.

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CHAPTER XII.

Falkland Islands—Excursion round island—Aspect—Cattle, horses, rabbit, wolf-like fox—Fire made of bones—Art in making fire—Manner of hunting wild cattle—Geology, fossil shells—Valleys filled with great fragments, scenes of violence—Penguin—Geese—Eggs of doris—Zoophytes, coralline phosphorescent—Compound animals.

FALKLAND ISLANDS.

March 16th, 1834.—The Beagle anchored in Berkeley Sound, in East Falkland Island.* This archipelago is situated in nearly the same latitude as the mouth of the Strait of Magellan. It covers a space of about 120 by 60 geographical miles, and is a little more than half the size of Ireland. After the possession of these miserable islands had been contested by France, Spain, and England, they were left uninhabited. The government of Buenos Ayres then sold them to a private individual, but likewise used them, as old Spain had done before, for a penal settlement. England claimed her right and seized them. The Englishman who was left in charge of the flag was consequently murdered. A British officer was next sent, unsupported by any power: and when we arrived, we found him in charge of a population, of which rather more than half were runaway rebels and murderers.

The theatre is worthy of the scenes acted on it. An undulating land, with a desolate and wretched aspect, is every where covered by a peaty soil and wiry grass, of one monotonous brown colour. Here and there a peak or ridge of gray quartz rock, breaks through the smooth surface. Every one has heard of the climate of these regions; it may be compared to that which is experienced at the height of between one and two thousand feet, on the mountains of North

* In the same month, also, of the previous year, the Beagle visited these islands.

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Wales; having however less sunshine and less frost, but more wind and rain.

March 16th.—I will now describe a short excursion which I made round a part of this island. In the morning I started with six horses and two Gauchos: the latter were capital men for the purpose, and well accustomed to living on their own resources. The weather was very boisterous and cold, with heavy hailstorms. We got on, however, pretty well; but excepting in the geology, nothing could be less interesting than our day's ride. The country is uniformly the same undulating moorland; the surface being covered by light brown withered grass and a few very small shrubs, all springing out of an elastic peaty soil. In the valleys here and there might be seen a small flock of wild geese, and every where the ground was so soft, that the snipe was able to feed. Besides these two kinds of birds, there were few others. There is one main range of hills, nearly two thousand feet in height, and composed of quartz rock, the rugged and barren crests of which gave us some trouble to cross. On the south side we came to the best country for wild cattle; we met however no great number, for they had lately been much harassed.

In the evening we came across a small herd. One of my companions, St. Jago by name, soon separated a fat cow; he threw the bolas, and it struck her legs, but failed in becoming entangled. Then dropping his hat to mark the spot where the balls were left, while at full gallop he uncoiled his lazo, and after a most severe chase, again came up to the cow, and caught her round the horns. The other Gaucho had gone on ahead with the horses, so that St. Jago had some difficulty in killing the furious beast. He managed to get her on a level piece of ground, by taking advantage of her as often as she rushed at him; and when she would not move, my horse, from having been trained, would canter up, and with his chest give her a violent push. But when on level ground it does not appear an easy job for one man to kill a beast mad with terror. Nor would it be so, if

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the horse, when left to itself without its rider, did not soon learn, for its own safety, to keep the lazo tight; so that, if the animal moves forward, the horse moves just as quickly so much away; otherwise, it stands motionless leaning on one side. This horse, however, was a young one, and would not stand still, but gave in to the cow as she struggled. It was admirable to see with what dexterity St. Jago dodged behind the beast, till at last he contrived to give the fatal touch to the main tendon of the hind leg; after which, driving his knife into the head of the spinal marrow, the cow dropped as if struck by lightning. He cut off pieces of flesh with the skin to it, but without any bones, sufficient for our expedition. We then rode on to our sleeping-place, and had for supper "carne con cuero," or meat roasted with the skin on it. This is as superior to common beef, as venison is to mutton. A large circular piece taken from the back, is roasted on the embers with the hide downwards and in the form of a saucer, so that none of the gravy is lost. If any worthy alderman had supped with us that evening, "carne con cuero," without doubt, would soon have been celebrated in London.

During the night it rained, and the next day (17th) was very stormy, with much hail and snow. We rode across the island to the neck of land which joins the Rincon del Toro (the great peninsula at the S.W. extremity) to the rest of the island. From the greater number of cows which have been killed, there is a large proportion of bulls. These wander about by twos and threes, or by themselves, and are very savage. I never saw such magnificent beasts; they truly resembled the ancient sculptures, in which the size of the neck and head is but seldom equalled among tame animals. The young bulls ran away for a short distance, but the old ones did not stir a step, except to rush at man and horse; and many of the latter have thus been killed. One old bull crossed a boggy stream, and took up his stand on the opposite side to us. We in vain tried to drive him away, and failing, were obliged to make a large circuit. The Gauchos in revenge

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determined to render him for the future innocuous. It was very interesting to see how art completely mastered force. One lazo was thrown over his horns, as he rushed at the horse, and another round his hind legs: in a minute the monster was stretched harmless on the ground. After the lazo has once been tightly drawn round the horns of a furious animal, it does not at first appear an easy thing to disengage it again; nor, I apprehend, would it be so, if the man was by himself, and he did not wish to kill the beast. By the aid, however, of a second person throwing his lazo, so as to catch both hind legs, it is quickly managed: for the animal, as long as its hind legs are kept outstretched, is quite powerless, and the first man can with his hands loosen his lazo, and then quietly mount his horse; but the moment the second man, by backing ever so little, relaxes the strain, the lazo slips off the legs of the struggling beast, which thus rises free, shakes himself, and vainly rushes after his antagonist.

During our whole ride we only saw one troop of wild horses. These animals, as well as the cattle, were introduced by the French in 1764, since which time they have greatly increased. It is a curious fact, that the horses have never left the eastern end of the island, although there is no natural boundary to prevent them from roaming, and that part of the island is not more tempting than the rest. The Gauchos, though asserting this to be the case, are unable to account for the circumstance. The horses appear to thrive well, yet they are small sized, and have lost so much strength, that they are unfit to be used in taking wild cattle with the lazo. In consequence, it is necessary to go to the great expense of importing fresh horses from the Plata. At some future period the southern hemisphere probably will have its breed of Falkland ponies, as the northern has that of Shetland.

The rabbit is another animal which has been introduced, and has succeeded very well; so that they abound over large parts of the island. Yet, like the horses, they are confined

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within certain limits; for they have not crossed the central chain of hills; nor would they have extended even so far as the base, if, as the Gauchos informed me, small colonies had not been carried there. I should not have supposed that these animals, natives of northern Africa, could have existed in a climate so extremely humid as this, and which enjoys so little sunshine that even wheat ripens only occasionally. It is asserted that in Sweden, which any one would have thought a more favourable climate, the rabbit cannot live out of doors. The first few pair moreover had here to contend against pre-existing enemies, in the fox, and some large hawks. The French naturalists have considered the black variety a distinct species, and called it *Lepus Magellanicus*.* They imagined that Magellan, when talking of an animal under the name of "conejos," in the Strait of Magellan, referred to this species; but he was alluding to a small cavy, which to this day is thus called. The Gauchos laughed at the idea of the black kind being different from the gray, and they said that at all events it had not extended its range any further than the other; that the two were never found separate; and that they readily bred together, and produced piebald offspring. Of the latter I now possess a specimen, and it is marked about the head, differently from the French specific description. This circumstance shows how cautious naturalists should be in making species; for even Cuvier, on looking at the skull of one of these rabbits, thought it was probably distinct.

The only quadruped native to the island, is a large wolf-like fox,† which is common to both East and West Falkland. I

* Lesson's Zoology of the Voyage of the Coquille, vol. i., p. 168. All the early voyagers, and especially Bougainville, distinctly state that the wolf-like fox was the only native animal on the island. The distinction of this rabbit as a species, is taken from peculiarities in the fur, from the shape of the head, and from the shortness of the ears. I may here observe that the difference between the Irish and English hare, rests upon nearly similar characters, only more strongly marked.

† I have reason to believe there is likewise a field-mouse. The com-

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have no doubt it is a peculiar species, and confined to this archipelago; because many sealers, Gauchos, and Indians, who have visited these islands, all maintain that no such animal is found in any part of South America. Molina, from a similarity in habits, thought this was the same with his "culpeu;"* but I have seen both, and they are quite distinct. These wolves are well known, from Byron's account of their tameness and curiosity; which the sailors, who ran into the water to avoid them, mistook for fierceness. To this day their manners remain the same. They have been observed to enter a tent, and actually pull some meat from beneath the head of a sleeping seaman. The Gauchos, also, have frequently killed them in the evening, by holding out a piece of meat in one hand, and in the other a knife ready to stick them. As far as I am aware, there is no other instance in any part of the world, of so small a mass of broken land, distant from a continent, possessing so large a quadruped peculiar to itself. Their numbers have rapidly decreased; they are already banished from that half of the island which lies to the eastward of the neck of land between St. Salvador Bay and Berkeley Sound. Within a very few years after these islands shall have become regularly settled, in all probability this fox will be classed with the dodo, as an animal which has perished from the face of the earth. Mr. Lowe, an intelligent person who has long been acquainted with these islands, assured me, that all the foxes from the western island were smaller and of a redder colour than those from the eastern. In the four specimens which were brought to England in the Beagle† there was some variation, but the difference with respect to

mon European rat and mouse have roamed from the habitations, and have settled themselves at various points. The common hog has also run wild.

* The "culpeu" is the *Vulpes Magellanicus* brought home by Captain King from the Strait of Magellan. It is common in Chile.

† Captain FitzRoy has presented two of these foxes to the British Museum, where Mr. Gray had the kindness to compare them in my presence.

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the islands could not be perceived. At the same time the fact is far from improbable.

At night (17th) we slept on the neck of land which forms the south-west peninsula. The valley was pretty well sheltered from the cold wind; but there was very little brushwood for fuel. The Gauchos, however, soon found what, to my great surprise, made nearly as hot a fire as coals; this was the skeleton of a bullock lately killed, from which the flesh had been picked by the Caracaras. They told me that in winter they had often killed a beast, cleaned the flesh from the bones with their knives, and then with these same bones roasted the meat for their suppers.

18TH.—It rained during nearly the whole day. At night we managed, however, with our saddle-cloths, to keep ourselves pretty well dry and warm; but the ground on which we slept was on each occasion nearly in the state of a bog, and there was not a dry spot to sit down on after our day's ride. I have in another part stated how singular it is that trees should be entirely absent from these islands, while they cover the whole surface of Tierra del Fuego. The largest bush in the island (belonging to the family of Compositæ) is scarcely so tall as our gorze. The best fuel is afforded by a green little bush, about the size of common heath, which has the useful property of burning while fresh and green. It was very surprising to see the Gauchos, in the midst of rain, and every thing soaking wet, with nothing more than a tinder-box and piece of rag, immediately make a fire. They sought beneath the tufts of grass and bushes for a few dry twigs, and these they rubbed into fibres; then surrounding them with coarser twigs, something like a bird's nest, they put the rag with its spark of fire in the middle, and covered it up. The nest being then held up to the wind, by degrees it smoked more and more, and at last burst out in flames. I do not think any other method would have had a chance of succeeding with such damp materials.

19TH.—Each morning, from not having ridden for some time previously, I was very stiff. I was surprised to hear

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the Gauchos, who have from infancy almost lived on horseback, say that, under similar circumstances, they always suffer. St. Jago told me, that having been confined for three months by illness, he went out hunting wild cattle, and in consequence, for the next two days, his thighs were so stiff that he was obliged to lie in bed. This shows that the Gauchos, although they do not appear to do so, yet really must exert much muscular effort in riding. The hunting wild cattle, in a country so difficult to pass as this is on account of the swampy ground, must be very hard work. The Gauchos say they often pass at full speed over ground which would be impassable at a slower pace; in the same manner as a man is able to skate across thin ice. When hunting, the party endeavours to get as close as possible to the herd without being discovered. Each man carries four or five pair of the bolas; these he throws one after the other at as many cattle, which, when once entangled, are left for some days, till they become a little exhausted by hunger and struggling. They are then let free and driven towards a small herd of tame animals, which have been brought to the spot on purpose. From their previous treatment, being too much terrified to leave the herd, they are easily driven, if their strength lasts out, to the settlement.

The weather continued so very bad, that we determined to make a push, and try to reach the vessel before night. From the quantity of rain which had fallen, the surface of the whole country was swampy. I suppose my horse fell at least a dozen times, and sometimes the whole six were floundering in the mud together. All the little streams are bordered by soft peat, which makes it very difficult for the horses to leap them without falling. To complete our discomforts, we were obliged to cross the head of a creek, in which the water was as high as the backs of the horses, and the little waves, owing to the violence of the wind, broke over us, and made us very wet and cold. Even the iron-framed Gauchos professed themselves glad when they reached the settlement, after our little excursion.

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The geological structure of these islands is in most respects simple. The lower country consists of clay-slate and sandstone associated together, and the hills of white granular quartz rock. The strata of the latter are frequently arched with perfect symmetry, and the appearance of some of the masses is in consequence most singular. Pernety* has devoted several pages to the description of a hill of ruins, the successive strata of which he has justly compared to the seats of an amphitheatre. The quartz rock must have been quite pasty when it underwent such remarkable flexure without being shattered into fragments. As a passage between the quartz and the sandstone can be traced, it seems probable that the former owes its origin to the sandstone having been heated to such an excess, that it became viscid, and upon cooling crystallized. While in the soft state it must have been pushed up through the overlying beds.

The sandstone and clay-slate contain numerous casts of organic remains. These chiefly consist of shells allied to terebratula, of encrinites, of a branching coral divided into alternate compartments, and lastly, of an obscure impression of the lobes of a trilobite. These fossils possess great interest, because none hitherto have been brought to Europe from a latitude nearly so far south. Mr. Murchison, who had the kindness to look at my specimens, says that they have a close general resemblance to those belonging to the lower division of his Silurian system; and Mr. James Sowerby is of opinion that some of the species are identical. This would be a most remarkable circumstance in the ancient natural history of the world; for shells now living in latitude 50° on opposite sides of the equator, are totally distinct. From the similarity of the Falkland fossils with those in England which are associated with remains that indicate a climate of a tropical character, we may I presume infer that, during this same epoch, nearly the whole world was thus circumstanced.

* Pernety, Voyage aux Isles Malouines, p. 526.

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In many parts of the island, the bottoms of the valleys are covered in an extraordinary manner, by myriads of great angular fragments of the quartz rock. These have been mentioned with surprise by every voyager since the time of Pernety. The whole may be called "a stream of stones." The blocks vary in size, from that of a man's chest to ten or twenty times as large, and occasionally they altogether exceed such measures. Their edges show no signs of being water-worn, but are only a little blunted. They do not occur thrown together in irregular piles, but are spread out into level sheets, or great streams. It is not possible to ascertain their thickness, but the water of small streamlets could be heard trickling through the stones many feet below the surface. The actual depth is probably much greater, because the crevices between the lower fragments must long ago have been filled up with sand, and the bed of the rivulet thus raised. The width of these beds varies from a few hundred feet to a mile; but the peaty soil daily encroaches on the borders, and even forms islets wherever a few fragments happen to lie close together. In a valley south of Berkeley Sound, which some of our party called the "great valley of fragments," it was necessary to cross an uninterrupted band half a mile wide, by jumping from one pointed stone to another. So large were the fragments, that being overtaken by a shower of rain, I readily found good shelter beneath one of them.

Their little inclination is the most remarkable circumstance in these "streams of stones." On the hill-sides I have seen them sloping at an angle of ten degrees with the horizon; but in some of the level, broad-bottomed valleys, the inclination is only just sufficient to be clearly perceived. On so rugged a surface there was no means of measuring the angle; but to give a common illustration, I may say that the slope alone would not have checked the speed of an English mail-coach. In some places, a continuous stream of these fragments followed up the course of a valley, and even extended to the very crest of the hill. On these

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crests huge masses, exceeding in dimensions any small building, seemed to stand arrested in their headlong course: there, also, the curved strata of the archways lay piled over each other, like the ruins of some vast and ancient cathedral. In endeavouring to describe these scenes of violence, one is tempted to pass from one simile to another. We may imagine, that streams of white lava had flowed from many parts of the mountains into the lower country, and that, when consolidated, they had been rent by some enormous convulsion into myriads of fragments. The expression, "streams of stones," which immediately occurred to every one, conveyed the same idea. These scenes are, on the spot, rendered more striking, by the contrast of the low, rounded forms of the neighbouring hills.

I was much interested by finding on the highest peak of one range (about 700 feet above the sea) a great arched fragment, lying on its convex or upper surface. Must we believe that it was fairly pitched up in the air, and thus turned? Or, with more probability, that there existed formerly a part of the same range more elevated than the point on which this monument of a great convulsion of nature now lies. As the fragments in the valleys are neither rounded nor the crevices filled up with sand, we must infer that the period of violence was subsequent to the land having been raised above the waters of the sea. In a transverse section within these valleys the bottom is nearly level, or rises but very little towards either side. Hence the fragments appear to have travelled from the head of the valley; but in reality it seems most probable, either that they have been hurled down from the nearest slopes, or that masses of rock were broken up in the position they formerly occupied; and that since, by a vibratory movement of overwhelming force,* the

* "Nous n'avons pas été moins saisis d'étonnement à la vûe de l'innombrable quantité de pierres de toutes grandeurs, bouleversées les unes sur les autres, et cependant rangées, comme si elles avoient été amoncelées négligemment pour remplir des ravins. On ne se lassoit pas d'admirer les effets prodigieux de la nature."—*Pernety*, p. 526.

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fragments have been levelled into one continuous sheet. If during the earthquake* which in 1835 overthrew Concepcion, in Chile, it was thought wonderful that small bodies should have been pitched a few inches from the ground, what must we say to a movement which has caused fragments, many tons in weight (like so much sand on a vibrating board), to move onwards and find their level? I have seen, in the Cordillera of the Andes, the evident marks where stupendous mountains have been broken into pieces like so much thin crust, and the strata thrown on their vertical edges; but never did any scene, like the "streams of stones," so forcibly convey to my mind the idea of a convulsion of which in historical records we might in vain seek for any counterpart.

I have little to remark on the zoology of these islands. I have before described the Polyborus or Caracara. There are some other hawks, owls, and a few small land-birds. The waterfowl† are particularly numerous, and they must formerly, from the accounts of old navigators, have been much more so. One day, having placed myself between a penguin (*Aptenodytes demersa*) and the water, I was much amused by watching its habits. It was a brave bird; and till reaching the sea, it regularly fought and drove me backwards. Nothing less than heavy blows would have stopped him; every inch gained he firmly kept, standing close before me, erect and determined. When thus opposed he continually rolled his head from side to side, in a very odd manner, as if the power of distinct vision only lay in the anterior and

* An inhabitant of Mendoza, and hence well capable of judging, assured me that, during the several years he had resided on these islands, he had never felt the slightest shock of an earthquake.

† I may mention, that I one day observed a cormorant playing with a fish which it had caught. Eight times successively the bird let its prey go, then dived after it, and although in deep water, brought it each time to the surface. In the Zoological Gardens I have seen the otter treat a fish in the same manner, much as a cat does a mouse. I do not know of any other instance where dame Nature appears so wilfully cruel.

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basal part of each eye. This bird is commonly called the jackass penguin, from its habit, while on shore, of throwing its head backwards, and making a loud strange noise, very like the braying of that animal; but while at sea, and undisturbed, its note is very deep and solemn, and is often heard in the night-time. In diving, its little plumeless wings are used as fins; but on the land, as front legs. When crawling (it may be said on four legs) through the tussocks, or on the side of a grassy cliff, it moved so very quickly that it might readily have been mistaken for a quadruped. When at sea and fishing, it comes to the surface, for the purpose of breathing, with such a spring, and dives again so instantaneously, that I defy any one at first sight to be sure that it is not a fish leaping for sport.

Two kinds of geese frequent the Falklands. The upland species (*Anas leucoptera*) is common in pairs, and in small flocks, throughout the island. They do not migrate, but build on the small outlying islets. This is supposed to be from fear of the foxes: and it is perhaps from the same cause that these birds, though very tame by day, are shy and wild in the dusk of the evening. They live entirely on vegetable matter. The rock-goose, so called from living exclusively on the sea-beach (*Anas antarctica*), is common both here and on the west coast of America, as far north as Chile. In the deep and retired channels of Tierra del Fuego, the snow-white gander, invariably accompanied by his darker consort, and standing close by each other on some distant rocky point, is a common feature in the landscape.

In these islands a great loggerheaded duck or goose (*Anas brachyptera*), which sometimes weighs twenty-two pounds, is very abundant. These birds were in former days called, from their extraordinary manner of paddling and splashing upon the water, race-horses; but now they are named, much more appropriately, steamers. Their wings are too small and weak to allow of flight, but by their aid, partly swimming and partly flapping the surface of the water, they move very quickly. The manner is something like that by which the common house-

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duck escapes when pursued by a dog; but I am nearly sure that the steamer moves its wings alternately, instead of both together, as in other birds. These clumsy, loggerheaded ducks make such a noise and splashing, that the effect is exceedingly curious.

Thus we find in South America three birds, which use their wings for other purposes besides flight: the penguin as fins, the steamer as paddles, and the ostrich as sails to a vessel. The steamer is able to dive only a very short distance. It feeds entirely on shell-fish from the kelp and tidal rocks; hence the beak and head, for the purpose of breaking them, are surprisingly heavy and strong. So strong is the head, that I have scarcely been able to fracture it with my geological hammer; and all our sportsmen soon discovered how tenacious these birds were of life. When pluming themselves in the evening in a flock, they make the same odd mixture of sounds which bullfrogs do within the Tropics.

In Tierra del Fuego, as well as at the Falkland Islands, I made many observations on the lower marine animals,* but they are of little general interest. I will only mention one class of facts, relating to certain zoophytes in the more highly organized division of that class. Several genera (*flustra, eschara, cellaria, crisia,* and others) agree in having singular

* While at the Falklands, during the autumn of the southern hemisphere, most of the lower marine animals were breeding. I was surprised to find on counting the eggs of a large white Doris (this sea-slug was three and a half inches long) how extraordinarily numerous they were. From two to five eggs (each three-thousandths of an inch in diameter) were contained in a spherical little case. These were arranged two deep in transverse rows forming a ribbon. The ribbon adhered by its edge to the rock in an oval spire. One, which I found, measured nearly twenty inches in length and half in breadth. By counting how many balls were contained in a tenth of an inch in the row, and how many rows in an equal length of the ribbon, on the most moderate computation there were six hundred thousand eggs. Yet this Doris was certainly not very common: although I was often searching under the stones I saw only seven individuals.

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moveable organs, like those of *Flustra avicularia* (found in the European seas), attached to their cells. The organ, in the greater number of cases, very closely resembles the head of a vulture; but the lower mandible can be opened much wider, so as to form even a straight line with the upper. The head itself possesses considerable powers of movement, by means of a short neck. In one zoophyte the head itself was fixed, but the lower jaw free: in another it was replaced by a triangular hood, with a beautifully-fitted trap-door, which evidently answered to the lower mandible. A species of stony eschara had a structure somewhat similar. In the greater number of species, each shell was provided with one head, but in others each had two.

The young cells at the end of the branches necessarily contained quite immature polypi, yet the vulture-heads attached to them, though small, were in every respect perfect. When the polypus was removed by a needle from any of the cells, these organs did not appear in the least affected. When one of the latter was cut off from a cell, the lower mandible retained its power of opening and closing. Perhaps the most singular part of their structure is, that when there were more rows of cells than two, both in a Flustra and an Eschara, the central cells were furnished with these appendages, of only one-fourth the size of the lateral ones. Their movements varied according to the species:—in some I never saw the least motion; while others, with the lower mandible generally wide open, oscillated backwards and forwards at the rate of about five seconds each turn; others moved rapidly and by starts. When touched with a needle the beak generally seized the point so firmly, that the whole branch might be shaken.

These bodies have no relation whatever with the production of the gemmules. I could not trace any connexion between them and the polypus. From their formation being completed before that of the latter; from the independence of their movements; from the difference of their size in different parts of the branch; I have little doubt that in their

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functions they are related rather to the axis than to any of the polypi. In a similar manner, the fleshy appendage at the extremity of the sea-pen forms part of the zoophyte as a whole, as much as the roots of a tree do of the whole and not of the individual buds. Without doubt this is a very curious variation in the structure of a zoophyte: for the growing part in most other cases does not manifest the least irritability or power of movement.

I will mention one other kind of structure quite as anomalous. A small and elegant Crisia is furnished, at the corner of each cell, with a long and slightly-curved bristle, which is fixed at the lower end by a joint. It terminates in the finest point, and has its outer or convex side serrated with delicate teeth or notches. Having placed a *small* piece of a branch under the microscope, I was exceedingly surprised to see it suddenly start from the field of vision by the movement of these bristles, which acted as oars. Irritation generally produced this motion, but not always. When the coralline was laid flat on that side from which the toothed bristles projected, they were necessarily all pressed together and entangled. This scarcely ever failed to excite a considerable movement among them, and evidently with the object of freeing themselves. In a small piece, which was taken out of water and placed on blotting-paper, the movement of these organs was clearly visible for a few seconds by the naked eye.

In the case of the vulture-heads, as well as in that of the bristles, all that were on one side of a branch, moved sometimes coinstantaneously, sometimes in regular order one after the other; at other times the organs on both sides the branch moved together; but generally all were independent of each other, and entirely so of the polypi. In the Crisia, if the bristles were excited to move by irritation in any one branch, generally the whole zoophyte was affected. In the instance where the branch started from the simultaneous movement of these appendages, we see as perfect a transmission of will as in a single animal. The case, indeed, is not different from

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that of the sea-pen, which when touched drew itself into the sand. I will state one other instance of uniform action, though of a very different nature, in a zoophyte* closely allied to Clytia, and therefore very simply organized. Having kept a large tuft of it in a basin of salt water, when it was dark I found that as often as I rubbed any part of a branch, the whole became strongly phosphorescent with a green light: I do not think I ever saw any object more beautifully so. But the remarkable circumstance was, that the flashes of light always proceeded up the branches, from the base towards the extremities.

The examination of these compound animals was always very interesting to me. What can be more remarkable than to see a plant-like body producing an egg, furnished with setæ, and having independent movements, which soon becomes fixed, branches into numberless arms, and these, though crowded with polypi, yet in some cases possessing independent organs of movement, and obeying uniform impulses of will? The polypi are frequently animals of no simple organization; and in most respects certainly are to be considered as true individuals. It is therefore more curious to observe, in the young and terminal cells, their gradual formation, from the growth of the simple horny substance of which so many zoophytes are composed. The known organization of a tree should remove all surprise at the union of many individuals together, and their relation to a common body. Indeed we might expect, according to the apparent law, that any structure which prevails in one class will be produced in a lesser degree in some others—that since so many plants are compound, so would some animals be thus constructed. It requires, however, a greater effort of reason to view a bud as an individual, than a polypus furnished with a mouth and intestines; and therefore the union does not appear so strange.

* This coralline emitted a very strong and disagreeable odour, when freshly taken from the sea.

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Our conception of a compound animal,* where in some respects the individuality of each is not completed, may be aided, by reflecting on the production of two distinct creatures by bisecting one with a knife, or where nature herself performs the task. We may consider the polypi in a zoophyte, or the buds in a tree, as cases where the division of the individual has not been completely effected. In this kind of generation, the individuals seem produced only with relation to the present time; their numbers are multiplied, but their life is not extended beyond a fixed period. By the other, and more artificial kind, through intermediate steps or ovules, the relation is kept up through successive ages. By the latter method many peculiarities, which are transmitted by the former, are obliterated, and the character of the species is limited; while on the other hand, certain peculiarities (doubtless adaptations) become hereditary and form races. We may fancy that in these two circumstances we see a step towards the final cause of the shortness of life.

* With regard to associated life, animals of other classes besides the mollusca and radiata present obscure instances of it. The bee could not live by itself. And in the neuter, we see an individual produced which is not fitted for the reproduction of its kind—that highest point at which the organization of all animals, especially the lower ones, tends—therefore such neuters are born as much for the good of the community, as the leaf-bud is for the tree.

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CHAPTER XIII.

Strait of Magellan—Port Famine—Geology—Deep water in channels—Erratic boulders—Climate—Limit of fruit trees—Mean temperature—Luxuriant forests—Rigour of antarctic islands—Contrast with the north — Snow-line, great flexure of—Glaciers — Icebergs transport fragments of rock — Glacier in low latitude — Absence of erratic blocks in intertropical regions — Glaciers and tropical vegetation —Comparison with northern hemisphere—Siberian animals in ice—Embedded in cold mud—Edible fungus—Zoology—Fucus giganteus—Leave Tierra del Fuego.

STRAIT OF MAGELLAN.

In the end of May, 1834, we entered for the second time the eastern mouth of the Strait of Magellan. Having beat our way against wind and wave we anchored at Gregory Bay, and had an interview with the so-called gigantic Patagonians; of whom Captain FitzRoy has given so good an account. The country on both sides of the strait, in this part, consists of level plains, like those of the rest of Patagonia. Cape Negro, a little past the second narrow, may be considered as the point where the land begins to assume the marked features of Tierra del Fuego. On the east coast, south of the Strait, broken park-like scenery in a like manner connects these two countries, which are opposed to each other in almost every point. It is truly surprising to find in a space of twenty miles such a change in the landscape. If we take rather a greater distance, as between Port Famine and Gregory Bay, that is about sixty miles, the difference is still more wonderful. At the former place we have rounded mountains concealed by impervious forests, which are drenched with the rain, brought by an endless succession of gales; while at Cape Gregory there is a clear and bright blue sky over the dry and sterile plains. The atmospheric cur-

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rents,* although rapid, turbulent, and unconfined by any apparent limits, yet seem to follow, like a river in its bed, a regularly determined course.

June 1st.—We anchored in the fine bay of Port Famine. It was now the beginning of winter, and I never saw a more cheerless prospect; the dusky woods piebald with snow, could be only indistinctly seen through a drizzling hazy atmosphere. We were, however, lucky in getting two fine days. On one of these, Mount Sarmiento, a distant mountain 6800 feet high, presented a very noble spectacle. I was frequently surprised, in the scenery of Tierra del Fuego, at the little apparent elevation of mountains really lofty. I suspect it is owing to a cause, which would not at first be imagined, namely, that the whole mass, from the summit to the water's edge, is generally in full view. I remember having seen a mountain, first from the Beagle channel, where the whole sweep from the summit to the base was full in view, and then from Ponsonby Sound across several successive ridges; and it was curious to observe in the latter case, as each fresh step afforded means of judging of the distance, how the mountain appeared to rise in height.

The Fuegians twice came and plagued us. As there were many instruments, clothes, and men on shore, it was thought necessary to frighten them away. The first time, a few great guns were fired, when they were far distant. It was most ludicrous to watch through a glass the Indians, as often as the shot struck the water, take up stones, and as a bold defiance, throw them towards the ship, though about a mile and a half distant! A boat was then sent with orders to fire a few musket-shot wide of them. The Fuegians hid them-

* The south-westerly breezes are generally very dry. January 29th, being at anchor under Cape Gregory; a very hard gale from W. by S., clear sky with few cumili; temperature 57°, due point 36°, difference 21°. On January 15th, at Port St. Julian: in the morning light winds with much rain, followed by a very heavy squall with rain,—settled into heavy gale with large cumili,—cleared up, blowing very strong from SSW. Temperature 60°, due point 42°,—differnece 18°.

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selves behind the trees; and for every discharge of the musket they fired their arrows: all, however, fell short of the boat, and the officer as he pointed at them laughed. This made the Fuegians frantic with passion, and they shook their mantles in vain rage. At last seeing the balls cut and strike the trees, they ran away; and we were left in peace and quietness.

On a former occasion, when the Beagle was here in the month of February, I started one morning at four o'clock to ascend Mount Tarn, which is 2600 feet high, and is the most elevated point in this immediate neighbourhood. We went in a boat to the foot of the mountain (but not to the best part), and then began our ascent. The forest commences at the line of high-water mark, and during the two first hours I gave over all hopes of reaching the summit. So thick was the wood, that it was necessary to have constant recourse to the compass; for every landmark, though in a mountainous country, was completely shut out. In the deep ravines, the death-like scene of desolation exceeded all description; outside it was blowing a gale, but in these hollows, not even a breath of wind stirred the leaves of the tallest trees. So gloomy, cold, and wet was every part, that not even the fungi, mosses, or ferns, could flourish. In the valleys it was scarcely possible to crawl along, they were so completely barricaded by the great mouldering trunks, which had fallen down in every direction. When passing over these natural bridges, one's course was often arrested by sinking knee deep into the rotten wood; at other times, when attempting to lean against a firm tree, one was startled by finding a mass of decayed matter ready to fall at the slightest touch. We at last found ourselves among the stunted trees, and then soon reached the bare ridge, which conducted us to the summit. Here was a view characteristic of Tierra del Fuego;—irregular chains of hills, mottled with patches of snow, deep yellowish-green valleys, and arms of the sea intersecting the land in many directions. The strong wind was piercingly cold, and the atmosphere rather hazy, so that we did not stay

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long on the top of the mountain. Our descent was not quite so laborious as our ascent; for the weight of the body forced a passage, and all the slips and falls were in the right direction.

Captain King has given a sketch of the geology of Tierra del Fuego, to which I have little to add. A great formation of clay-slate, rarely containing organic remains, but sometimes presenting casts of a kind of ammonite, is fronted on the east side by plains belonging probably to two tertiary epochs. On the west coast, a prolongation of the grand crevice of the Andes, from which so much heat has escaped from the interior of the globe, has metamorphosed the slate. There is, however, a double line, the structure of which I do not quite comprehend. The interior one consists of granite and mica slate; the exterior one (perhaps more modern), of greenstone, porphyritic and other curious trappean rocks. Almost every one at first thinks that this country owes its grand name of "the Land of Fire," to the number of its volcanoes. Such, however, is not the case: I did not see even a pebble of any volcanic rock, except in Wollaston Island, where some rounded masses of scoriæ were embedded in a conglomerate of no modern date. In a geological point of view this circumstance allows us to consider the grand linear train of ancient and modern volcanoes, which fall on parallel fissures in the Andes, as extending from lat. 55° 40′ south to 60° north, a distance little less than seven thousand geographical miles.

Perhaps the most curious feature in the geology of this country, is the extent to which the land is intersected by arms of the sea. These channels, as Captain King remarks, are irregular and dotted with islands, where the granitic and trappean rocks occur, but in the clay-slate formation are so straight, that in one instance "a parallel ruler placed on the map upon the projecting points of the south shore, extended across, also touched the headlands of the opposite coast."

I have heard Captain FitzRoy remark, that on entering any of these channels from the outer coast, it is always ne-

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cessary to look out directly for anchorage; for further inland the depth soon becomes extremely great. Captain Cook, in entering Christmas Sound, had first 37 fathom, then 40, 60, and, immediately afterwards, no soundings with 170. This structure of the bottom, I presume, must arise from the sediment deposited near the mouths of the channels, by the opposed tides and swell; and likewise from the enormous degradation of the coast rocks, caused by an ocean harassed by endless gales.

The Strait of Magellan is extremely deep in most parts, even close to the shore. About mid-channel eastward of Cape Froward, Captain King found no bottom with 1536 feet: if, therefore, the water should be drained off, Tierra del Fuego would present a far more lofty range of mountains than it does at present. I will not here enter on any speculations regarding the causes which have produced this remarkable structure, in a district in which the latter movements at least have been those of elevation. I may, however, observe, that pebbles, and great boulders of various and peculiar crystalline rocks, which have undoubtedly travelled from the south-west coast, lie scattered over the whole of the eastern part of Tierra del Fuego. One enormous block of syenite near St. Sebastian Bay was barn-shaped, and had a girth of 47 feet; it projected five feet above the sand, and appeared to be deeply buried. The very nearest point to which we can look for the parent rock, is about ninety miles distant. On the shores of the Strait of Magellan, near Port Famine, numerous semi-rounded fragments of various granites and hornblendic rocks are strewed on the beach, and on the sides of the mountain, to an elevation of thirty or forty feet. Now to this point the high road from the Southern and Western shores passes directly over the great abyss of more than 1500 feet deep. Whatever may have been the means of transport, it has not been one of indiscriminate violence: for the two places, St. Sebastian Bay and Shoal Harbour, where the great fragments are most numerous, certainly existed previously to the last and

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smallest change of level, as channels connecting the Strait of Magellan, in the one case with the open sea, and in the other with Otway Water.

The climate of the southern part of South America presents many phenomena of the highest interest. It has long been observed that there exists some essential difference between it, and that of the countries in the northern hemisphere. I have already remarked on the surprising contrast between the rank vegetation of the broken west coast, consequent on the humid climate, as compared with the dry and sterile plains of Patagonia. The clouded and boisterous state of the atmosphere is necessarily accompanied by a decrease in extreme temperature; hence we find that fruits which ripen well, and are very abundant, such as the grape and fig, in lat. 41° on the east coast, succeed very poorly in a lower latitude on the opposite side of the continent.* The result is more strongly marked, if we take Europe as the standard of comparison. In Chiloe, lat. 42°, corresponding to the northern parts of Spain, peaches require the greatest care, and seldom produce fruit; but strawberries and apples succeed to admiration. At Valdivia, lat. 40°, or that of Madrid, standard peaches bear abundantly; grapes and figs ripen, but are far from common; olives seldom even partially ripen, and oranges not at all; yet in Europe this is the parallel most productive of these fruits. Even at Concepcion, lat. 36°, oranges are not abundant, though the other named fruits succeed perfectly. At the Falklands, in the same latitude as the south of England, wheat very seldom comes to maturity; but we ought to feel little surprise at this, when we hear that in Chiloe (lat. 42°) the inhabitants are frequently compelled to cut their corn before it is ready, and bring it into their houses to dry.

With respect to the climate of Tierra del Fuego during

* As there are no settlements on the Patagonian coast, there are few means of comparison. Cherry-trees left by the Spaniards at Port Desire, lat. 48°, still bear fruit, whereas, in Chiloe, on the west coast, 360 miles further north, I believe they do not succeed.

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the colder parts of the year, Captain King has published some most interesting tables in the Geographical Journal.* The Beagle during this voyage, was employed in the extreme southern parts of the country, from December 18th to February 20th. From the appearance of the vegetation during the first part, and from the weather we experienced at the Falkland Islands, subsequent to the last date, I feel little doubt that these sixty-five days included the best part of the summer. Perhaps if another fortnight had been added, the mean would have been a little higher. The first eighteen of these days were spent partly at sea, near Cape Horn, and we were drifted for a short time by bad weather to nearly ninety miles to the southward. The mean temperature, from observations made every two hours by the officers on board the Beagle, was 45°. During the succeeding thirty-seven days† the Beagle was at anchor in different harbours a few leagues north of Cape Horn, and then the mean from observations at 6 A.M., noon, and 6 P.M., was 50°. The mean, therefore, between these two periods, which include the hottest part of the year, is only 47°.5. The latter of the two periods was unusually warm, but the former much the contrary, and the station where the observations were made was a little further to the southward. The whole of these observations apply to the extreme islands: Captain King's were made in a central position 1° 45′ further northward. If from the above considerations we add two degrees and a half to the mean obtained this voyage, the result (50°) will probably give the temperature of the hottest part of the year in central Tierra del Fuego. Captain King gives as the mean temperature of June 32°.97, of July 33°.03, of the first twelve days in August 33°.25;

* Journal of the Royal Geographical Society for the years 1830, 1831.

† The mean of the maxima of these thirty-seven days was only 55°.5, and of the minima 45°.3,—the mean range thus being 10°.2. For the whole sixty-five days, the mean of the maxima was only 51°.7, which certainly is a very wretched summer, and shows how little bright sunshine there can be.

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answering to our December, January, and February, which three months appear to be the coldest, and the mean of these is 33°.08.* Dublin is nearly in the same latitude in the northern hemisphere as Port Famine is in the southern, and we will take its temperature as a means of comparison.

	Latitudes.	Summer Temperature	Winter Temperature	Difference.	Mean of Summer and Winter.
Dublin† . . .	53° 21′ N.	59° .54	39° .2	20° .34	49° .37
Port Famine .	53 38′ S.	50	33 .08	16 .92	41 .54
Difference .	0 17′	9 .54	6 .12	3 .42	7 .83

It will be seen by this that the temperature at Port Famine is very considerably lower, both during summer and winter, than at Dublin, and that at the former the difference between the seasons is not so great, or that the climate is there more equable. It seems the general opinion of those who have visited this country, that the frosts are not so severe or so long as in England. The sealers say that throughout the year they wear the same quantity of clothing. Nevertheless Captain King states, that during the winter of 1828 the temperature was once as low as‡ 12°.6. I have drawn up these rough and approximate statements merely for the sake of illustrating some of the following remarks.

* This mean must be a little too low, because the whole of August is not included. I see Von Buch says, "we can hardly assign to Saltenfiord, Norway (in lat. 67°, or 13° 22′ nearer the pole than Port Famine) a higher mean temperature than 34°, nor a higher temperature for the warm month of July than 57°.8." (Travels through Norway, p. 123.) Captain King gives as the mean for February, which probably is the hottest month at Port Famine, only at 51°.1. Some observations made at the Falkland Islands (2° 13′ north of Port Famine) which are often quoted, give as the mean for the whole year 47°.3, and for the summer 53°.1. These results are very much higher than what I should have anticipated, from the climate of the neighbouring mainland.

† This line is taken from Barton's Lectures on the Geography of Plants.

‡ In this wretched climate, subject to such extreme cold, is it not most wonderful, that human beings should be able to exist unclothed and without shelter?

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The kind of climate here described appears to be common to the *southern* parts of the whole of the southern hemisphere. Although so inhospitable to our feelings, and to most of the plants from the warmer parts of Europe, yet it is most favourable to the native vegetation. The forests, which cover the entire country between the latitudes of 38° and 45°, rival in luxuriance those of the glowing intertropical regions. Whilst in Chiloe (lat. 42°) I could almost have fancied myself in Brazil. Stately trees of many kinds, with smooth and highly coloured barks, are loaded by parasitical plants of the monocotyledonous structure; large and elegant ferns are numerous; and arborescent grasses intwine the trees into one entangled mass, to the height of thirty or forty feet above the ground. Palm-trees grow in lat. 37°; an arborescent grass very like a bamboo in 40°; and another closely-allied kind, of great length but not erect, even as far south as 45°.

In another part of this same hemisphere, which has so uniform a character owing to its large proportional area of sea, Forster found parasitical orchideous plants living south of lat. 45° in New Zealand. Tree-ferns thrive luxuriantly near Hobart Town, in Van Diemen's Land. I measured one there which was exactly six feet in circumference; and its height from the ground to the base of the fronds appeared to be very little under twenty. Mr. Brown says* "an arborescent species of the same genus (*Dicksonia*) was found by Forster, in New Zealand, at Dusky Bay, in nearly 46° S., the highest latitude in which tree-ferns have yet been observed. It is remarkable that, although they have so considerable a range in the southern hemisphere, no tree-fern has been found beyond the northern tropic: a distribution in the two hemispheres somewhat similar to this has been already noticed respecting the Orchideæ that are parasitical on trees."

Even in Tierra del Fuego, Captain King describes the "vegetation thriving most luxuriantly, and large woody stem-

* Appendix to Flinder's Voyage, pp. 575 and 584.

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med trees of Fuchsia and Veronica, in England considered and treated as tender plants, in full flower, within a very short distance of the base of a mountain covered for two-thirds down with snow, and with the temperature at 36°." He states, also, that humming-birds were seen sipping the sweets of the flowers, " after two or three days of constant rain, snow, and sleet, during which time the thermometer had been at the freezing point." I myself have seen parrots feeding on the seeds of the winter's bark, south of latitude 55°.

Although the limit of an almost tropical vegetation extends thus far southward, yet the dearth of living things, both vegetable and animal, on the islands situated even far without the antarctic circle, is surprising, compared with the corresponding parallels in the northern hemisphere. In South Shetland in lat. 62° to 63° (same as Ferroe, or southern part of Norway) Weddell* states, " None of the islands afford any vegetation save a short straggling grass, which is found in very small patches in places where there happens to be a little soil. This, together with a moss similar to that which is found in Iceland, appears in the middle of January, at which time the islands are partially clear of snow." In Deception Island, one of the same group, Lieutenant Kendall, says,† " There was nothing in the shape of vegetation except a small kind of lichen." The island itself is partly composed of ice and volcanic ashes interstratified. Another curious proof of the rigour of the climate is mentioned: " Having observed a mound on the hill immediately above this cove, I opened it, and found a rude coffin, the rotten state of which bespoke its having been long consigned to the earth; but the body had undergone scarcely any decomposition. The legs were doubled up, and it was dressed in the jacket and cap of a sailor, but neither they nor the countenance were similar to those of an Englishman."

Sandwich Land, which is nearly three degrees further from

* Weddell's Voyage, p. 133.

† Geographical Journal, 1830, pp. 65 and 66.

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the pole, is thus described by Captain Cook (February 1st, hottest time in the year, and in same latitude as north of Scotland): "Every part was blocked or filled up with ice, and the whole country, from the summits of the mountains down to the very brink of the cliffs which terminate the coast, covered many fathoms thick with everlasting snow. The cliffs alone were all which was to be seen like land." Again he adds, talking of two islets, "These only were clear of snow, and seemed covered with a green turf." In Georgia, lat. 54° to 55°, the bays are terminated by ice cliffs of considerable height, and, according to Cook, the country "in the very height of summer, is in a manner wholly covered many fathoms deep with frozen snow, but more especially on the south-west coast." The only vegetable is "a strong-bladed grass growing in tufts, wild burnet, and a plant like moss." Although 96 miles long and about ten broad, it possesses not a single quadruped, and only one land bird, namely a small titlark (an Anthus), a specimen of which I procured in the Falklands. This bird, if undescribed, certainly well deserves the name of *antarcticus*, for although not living within that circle, it inhabits a more inhospitable region than any other terrestrial animal. Anderson, in Cook's Voyage, says, even in Kerguelen Land (an island 120 miles long by 60 broad, and situated in lat. 50°, corresponding to the extreme southern point of England), "The whole catalogue of plants does not exceed sixteen or seventeen, including some sorts of moss, and a beautiful species of lichen which grows upon the rocks higher up than the rest of the vegetable productions. Nor is there even the least appearance of a shrub in the whole country." It is doubtful whether there is a single land bird; and then he adds, "The hills are of a moderate height; yet many of their tops were covered with snow* at this time, though answering to our June." These statements forcibly prove the intemperance of the climate even far without the frozen limits of the antarctic circle.

* I have reason to believe, that icebergs are formed on the coast during a part of the year.

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There are no direct observations, by which to judge of the mean temperature of the year in these southern islands. But after reading the above accounts, it will readily be granted that it must be very low. Even in Georgia, in lat. 54°-55°, it is not improbable that the soil is perpetually frozen at a few feet beneath the surface. At Deception Island in lat. 62°-63° from the preservation of the dead body alluded to, and the interstratification of ice with the volcanic ashes, we may feel almost sure that such must be the case. In the northern hemisphere, it is only on the great continents that so low a mean temperature is found in corresponding latitudes. In North America, according to Richardson,* north of lat. 56°, the thaw does not penetrate to a greater depth than three feet. In the Steppes of Siberia, Humboldt† states that to the northward of 62°, the ground between twelve and fifteen feet below the surface is always frozen. In the space, however, between these two great northern continents, the line of perpetual congelation rises considerably towards the north.

It is a remarkable meteorological fact, that in the northern and southern hemispheres, a low mean temperature, in latitudes without the frigid zone, is the result of a directly opposite condition of things. In the northern hemisphere the atmosphere is rendered extremely cold, from the radiation of a large extent of country during a long winter; nor is it moderated by the warmer currents of any neighbouring sea: hence the extreme cold of the winter more than counterbalances the heat of summer. In the southern hemisphere, on the other hand, although the winter is moderate, the summer is cold; for a sky constantly clouded rarely permits the rays of the sun to warm the surface (itself a bad absorbent) of the great ocean: hence, the mean temperature of the year falls below the freezing point. It will at once be evident, that a kind of vegetation which requires an equable temperature, will approach much nearer

* Appendix to Back's Expedition.

† Fragmens Asiatiques, vol. ii., p. 386.

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the line of perpetual congelation in a climate such as this of the southern hemisphere, than in the opposite one subject to extremes.

The height of the plane of perpetual snow in any country, seems chiefly to be determined by the extreme heat of summer, rather than by the mean of the year. As the summer in Tierra del Fuego is so very wretched, we ought not to feel surprised at the fact stated by Capt. King, —that in the Strait of Magellan, the line descends to about 3500 or 4000 feet. In the northern hemisphere, we must travel about fourteen degrees nearer the pole to meet with so low a limit, namely, between lat. 67° and 70° on the mountains of Norway.

In the Cordillera of South America, between latitudes 41° and 43° 30′, the culminant peaks have altitudes pretty nearly equal. Several were measured by the officers of the Beagle with considerable care, by angles of elevation, the positions of the mountains being accurately known. Osorno is 7550 feet; mountain south of Osorno 5609; Minchinmadiva 7046; northern end of same range 6862; Corcovado 7510; Yntales 6725. Not only these points, but a great part of the range* was thickly clothed with snow, in the beginning of February (answering to our August), which descended some way down the mountains, and presented to a distant beholder a perfectly horizontal line. We were assured that the snow, which it appeared must inevitably be the case, remained throughout the year. On January 26th, after a week of uncommonly fine weather, Mr. King measured with a pocket sextant, the angle of this line with the summit of the Corcovado; and subtracting the result from the total height, the snow-line was found to descend to 4480 feet. It is possible that there may have existed some unknown cause of error; but as the average height of the few *highest*

* Mr. Sulivan, who surveyed this part of Chiloe, informs me, that between Osorno and Yntales, there are probably many mountains which rise to a height of nearly 6000 feet. He says he does not recollect any one summit, which (during January) was not covered with snow.

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peaks in the *snow-clad range* is under 7000 feet, it is evident that the height of the snow-line cannot at most much exceed 6000 feet.

As this is a point of interest, I shall mention a few other circumstances, by which I think we may come to a nearly definite conclusion. On February 2d (1835) I obtained the last view of the Cordillera; on that day the lower line of the snow descended some way (so as to form a considerable angle with the summit, when viewed from a distance of 61 miles) on the mountain south of Osorno (lat. 41° 20′), which stands by itself, and has a height of 5607 feet. Since arriving in England I have received a letter from Mr. Douglas in Chiloe, who, describing some volcanic phenomena, accidentally mentions the snow-line. He says, on February 20th (same year), on the volcano of Minchinmadiva (lat. 42° 48′), which has an elevation of 7046 feet, lava was ejected from a crater "just above the verge of the snow." Again, on February 27th, he alludes to the summit of the Corcovado (7510 feet) being covered with snow, as was Yntales* (6725 feet) in lat. 43° 30′. Again Mr. Douglas, speaking of the Corcovado, says, "On the 16th of March the snow appeared to cover one-fifth of its (*visible*) perpendicular height." By this date the snow-line must have attained its greatest height (if, indeed, fresh snow had not fallen); and, as the Corcovado rises in an unbroken slope close to the sea, the proportion covered by snow might be judged of, with *some* degree of accuracy. The height of the Corcovado (7510 feet) was obtained by three angular measurements, made by the officers on the survey, and the mean nearly agreed with the three separate results. Reflecting on all these circumstances, we may conclude with perfect safety, that the limit of perpetual snow, between the latitudes 41° and 43°, cannot much, if at all, exceed 6000 feet.

Proceeding northward along the Cordillera we find a very

* On January 15th, Yntales, seen from the Northern Chonos Islands, was entirely covered by snow.

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different condition of things. In the pass of the Portillo (to the southward of 33°) Dr. Gillies determined barometrically the height of the double range; and he found the two ridges to be respectively 13,210 and 14,365 feet. On March 21st and 22d (1835), shortly before fresh snow fell, I crossed these mountains,* and although there were large masses of snow, there were much greater spaces at some height on each side uncovered. Dr. Gillies† says, "the summit (of the volcano of Peuquenes) is generally‡ covered with snow, and its elevation cannot be less than 15,000 above the level of the sea." From these statements, compared with my observations, the snow-line when I crossed certainly was considerably above 14,365,—we may assume 15,000 as about the limit. From the results obtained by Humboldt, Pentland, Gillies, and King, we are enabled to draw up the following table of the extraordinary range of the snow-line on the Cordillera of South America:

Latitude.	Height in feet of Snow-line.	Observer.
Equatorial region: Mean result.	15,748	Humboldt.
Bolivia, Lat. 16°-18° S.	17,000	Pentland.§
Central Chile, Lat. 33° S.	14,500 to 15,000	Gillies.
Chiloe, Lat. 41°-43° S.	6,000	Officers of the Beagle.
Tierra del Fuego, 54° S.	3,500 to 4,000	King.‖

* I crossed the Uspallata Pass on April 5th. The height, as given by Mr. Pentland (Geographical Journal), is 12,454. In the ravines there were some inconsiderable patches of snow, but the general surface was quite bare.

† The Edinburgh Journal of Natural and Geographical Science, August, 1830, p. 316.

‡ I have reason to suspect that the snow-line in Chile is subject to ex-

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In considering this table, and beginning from the south, we observe, that through the first twelve degrees, the height of the snow-line rises only a little more than 2000 feet. In this space the climate and productions of the country are in many respects very uniform. In the succeeding nine degrees the rise is no less than nine thousand feet. Before any one pronounces this to be impossible, let him reflect well that the height of the snow-line very much depends on the heat of summer. In Chiloe no fruit, excepting apples and strawberries, comes to perfection; it is even oftentimes necessary to carry the barley and corn into the houses to be ripened:* on the other hand, in central Chile, even the sugar-cane† has been cultivated out of doors, and during a long summer of seven months the sky is seldom clouded, and rain never falls. The island of Chiloe, as well as the neighbouring main-

treme variation. I was told, that during one remarkably dry and long summer, all the snow disappeared from Aconcagua. Not being at the time aware of the extraordinary elevation of this mountain (23,000), I did not closely cross-question my informers. It must be remembered that even in ordinary summers the sky is generally cloudless for six or seven months, that no fresh snow falls, and that the atmosphere is excessively dry. It may be asked whether vast quantities of snow would not, under this condition of circumstances, be evaporated? so that it might be *possible* that all the snow should disappear from a mountain without the temperature having risen above the freezing point. Mr. Miers (vol. i., p. 384) says he passed the Cordillera by the Cumbre Pass on May 30th, 1819, "when not the smallest vestige of snow was observable in any part of the Andes." Yet Aconcagua is in full view in the approach to this pass. Mr. Miers, in another part (p. 383), makes a general assertion to the same effect.

§ See Mr. Pentland's most interesting paper in the Geograph. Journal, read March 1835.

‖ Journal of Geograph. Soc., vol. i., p. 165.

* For this fact I may quote, as additional authority, Aguerros Descripcion Historial de la Provincia de Chiloé, 1791, p. 94.

† Miers's Chile, vol. i., p. 415. It is said that the sugar-cane grew at Ingenio, lat. 32°-33°, but not in sufficient quantity to make the manufacture profitable. In the valley of Quillota, south of Ingenio, I saw some large date palm-trees.

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land, is concealed by one dense forest, dripping with moisture, and abounding with ferns and other plants that love a humid atmosphere: while the soil of central Chile, where not irrigated, is arid and nearly desert. These two countries, so remarkably opposed to each other in every character, blend together rather suddenly near Concepcion, in lat. 37°. I do not doubt, the plain of perpetual snow undergoes an extraordinary flexure in the district where the forest ceases; for trees indicate a rainy climate, and hence a clouded state of atmosphere.*

From central Chile to Bolivia, a space of 16°, the rise of the snow-line is only 2000 feet. If Bolivia possessed an atmosphere as clear as that of Chile, the limit in all probability would be even higher than the present 17,000. The cause why the limit in the equatorial regions should be lower than in a latitude seventeen degrees to the southward, I leave to those to explain, who have more means of information respecting the dryness and clouded state of the atmosphere in the respective regions.

The presence of glaciers depends on the accumulation of a large mass of snow, subject to some variations of temperature, sufficient partially to thaw, and then reconsolidate the

* The average degree of atmospheric transparency seems to be a most important element in determining the climate of any place. Dr. Richardson (Report to Brit. Assoc. for 1836, p. 131) has remarked that Professor Leslie, from experimenting on the effects of radiation only in an insular climate, deduced theoretical inferences respecting the mean temperature of the year, extremely different from the results obtained under the clear atmosphere of the polar regions. I apprehend central Chile will bear comparison with any part of the world for the clearness of its sky, and Chiloe, for one of an opposite condition: therefore we should not feel surprised, if the effects of two such opposite climates at first appear and malous. The remarkable difference in the height of the snow-line, on the opposite sides of the Himmalaya, has been explained by Humboldt and Jacquemont, on the same principle: and in a like manner, the difference between the heights on the Pyrenees and on Caucasus, the latter mountains being characterized by a climate more excessive, than that of the former.

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mass in its downward course. They have been aptly compared to gigantic icicles. The lower limit of glaciers, must depend on that of the parent snow, greatly affected by the form of the land: in Tierra del Fuego the snow-line descends very low, and the mountain sides are abrupt; therefore we might expect to find glaciers extending far down their flanks.* Nevertheless, when on first beholding, in the middle of summer, many of the creeks on the northern side of the Beagle channel terminated by bold precipices of ice overhanging the salt water, I felt greatly astonished. For the mountains from which they descended, were far from being very lofty. Captain FitzRoy from angular measurements considers the general range to have an elevation rather under 4000 feet, with one point called Chain Mountain rising to 4300. Further inland, there is indeed a more lofty mountain of 7000 feet, but it is not directly connected with the glaciers to which I now allude. This range, which exceeds by so little the height of some mountains in Britain, which yet sends down in the middle of summer its frozen streams to the sea-coast, is situated in the latitude of the Cumberland hills.

I was much interested by observing the great difference between the matter brought down by torrents and by glaciers. In the former case a spit of gravel is formed, but in the latter a pile of boulders. On one occasion, the boats being hauled on shore, within the distance of half a mile from a glacier, we were admiring the perpendicular cliff of blue ice, and wishing that some more fragments would fall off, like those we saw floating on the water, at a distance of more than a mile from their source. At last, down came a mass

* In the Alps, Saussure gives 8793 feet as the mean of the lower limit of the snow-line. At Mont Blanc the glacier of Montanvert is said (Encyclo. Metropol.) to descend 12,000 feet below the summit of the mountain, and this will make its base 5160 feet lower than the line of snow. In Norway (See Von Buch) where a glacier first comes down to the water's edge (lat. 67°), it is 3800 below the same line: in Tierra del Fuego the difference must be very nearly the same as in the last case.

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with a roaring noise, and immediately we saw the smooth outline of a wave travelling towards us. The men ran down as quickly as they could to the boats; for the chance of their being dashed to pieces was evident. One of the seamen just caught hold of the bows, as the curling breaker reached it: he was knocked over and over but not hurt; and the boats, though thrice lifted on high and let fall again, received no damage. This was most fortunate for us, for we were a hundred miles distant from the ship, and we should have been left without provisions or fire-arms.

I had previously observed that some large fragments of rock on the beach had been lately displaced: but until seeing this wave I did not understand the cause. The structure of the creek in which this happened was very curious. One side was formed by a spur of mica slate (of which rock the surrounding mountains were composed); the head by a cliff of ice about forty feet high; and the other side by a promontory which was built up of huge rounded fragments of granite and mica slate, and was more than fifty feet in height. To account for the present position of these blocks, where they must have long remained, for old trees were growing on the upper parts; we must suppose, either that the glacier formerly advanced half a mile further outward, or that the land stood at a rather different level. Whether we are able fully to account, or not, for the height and size of this promontory of boulders, certainly it must have been the work of the glacier. One semi-rounded fragment of granite lying just above high-water mark, was of enormous dimensions. It projected six feet above the sand, and was buried to an unknown depth: its shape was oval with a circumference of thirty yards, so that the longer axis probably measured about ten or eleven. This fragment must have come from the higher parts of the range; for the base of the mountain was entirely composed of mica slate.

The waves caused by the fall of the ice must be a most powerful agent in rounding and heaping together these huge fragments, and likewise in wearing away projecting points of

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the solid rock. In Georgia, situated in the very same latitude, Cook, speaking of the great ice-cliffs at the head of every harbour, says, "pieces were continually breaking off, and floating out to sea, and a great fall happened while we were in the bay, which made a noise like cannon." He adds, "It can hardly be doubted, that a great deal of ice is formed here in winter, which in the spring is broken off, and dispersed over the sea. Mr. Sorrell, the boatswain of the Beagle, who has long been accustomed to these seas, informs me, that at this season he has seen small icebergs, with mud and gravel on them, floating from the shores. I have heard from another quarter of the same circumstance. Captain Hunter* says, he met numerous ice-islands in this neighbourhood, and that "many were half black apparently with earth from the land, to which they had adhered, or else with mud from the bottom on which they had been formed." By the latter method large fragments might easily be transported, and unless the iceberg should be upset, they would never be discovered. Nevertheless, the islands of ice floating in the southern ocean, and especially those occurring far south, appear generally to be quite free from all impurities excepting the dung of seafowl. Captain Biscoe, who extended his enterprising researches so far towards the antarctic pole, informs me in a letter that he never observed in a single instance† any mud or fragments of stone on the numerous icebergs which he encountered during his voyage.

Glaciers occur at the head of the sounds along the whole western coast of the southern part of South America. Looking at the chart I find sixteen places mentioned: besides these I know of several others, such as those in the Beagle channel and at the foot of Mount Sarmiento. The sounds, moreover, were not all traced to the head, and it is in this part that the glaciers most frequently occur. Of the sixteen referred to, many include several frozen arms coming down

* Hunter's Voyage to Port Jackson, p. 102.

† Mr. Sorrell says, that he once saw an iceberg to the eastward of South Shetland, with a considerable block of rock lying on it.

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from one vast body of ice. In the Canal of the Mountains, for instance, no less than nine descend from a mountain, the whole side of which, according to the chart, is covered by a glacier of the extraordinary length of twenty-one miles, and with an average breadth of a mile and a half. It must not be supposed that the glacier merely ascends some valley for the twenty-one miles, but it extends apparently at the same height for that length, parallel to the sound; and here and there sends down an arm to the sea-coast.* There are other glaciers having a similar structure and position, with a length of ten and fifteen miles.

I will now specify a few of the more remarkable cases, taken from Captain King's paper, to which I have so often referred. The canal of St. Andrew is said by Lieutenant Skyring to be "suddenly and boldly closed by tremendous and astonishing glaciers." The highest mountain in this part (Mount Stokes) was ascertained during our ascent of the river of St. Cruz to be 6200 feet, and this certainly exceeds considerably the height of the general range. About ninety miles to the northward, Sir G. Eyre's Sound, in the latitude of Paris, has its several arms terminated by glaciers. Mr. Bynoe, the surgeon of the Beagle, who accompanied the boat when this part was surveyed, informs me that about mid-channel, and more than *twenty* miles from the head of the sound, there were great numbers of floating masses of ice. Standing in the boat he supposes he saw about fifty: he, together with four of the boat's crew, landed on one, which although only two or three feet above the surface of the water, felt quite steady, and easily supported their weight. On the surface, in the central part, a mass of granite, of an angular form, was partly embedded; and the

* I may remark that in the chart, the greater number of the creeks which receive the glaciers, have crosses drawn in front, which signify projecting masses of rock. After what we have seen in the Beagle channel, I suspect that they are detached masses brought down by the overwhelming force of the glaciers.

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ice had thawed all round it, so as to form a shallow pool of water. It was a cube of nearly two feet; and Mr. Bynoe with a maul knocked off, and brought away, a piece as large as a man's head. The iceberg was still floating, and drifting outwards: even if it had been stranded in the immediate neighbourhood, the block of granite would have rested on the clay-slate of the surrounding mountains. For the parent rock we must look to the higher parts of the range, near the head of the sound.

Again, a few miles to the northward I see in the chart an *Iceberg* Sound, which no doubt was so called from the number of floating masses of ice. It may be recollected that in this latitude, on the opposite side of the Cordillera, the plains of St. Cruz, at the distance of fifty and sixty miles from the mountains, were strewed with great fragments of rock. Of these, one was sixty feet in circumference, and another, which was angular, measured five yards square;—both being partly buried in the gravel, so that their thickness was unknown. As it is probable that the plains were covered by the sea within a period geologically recent, and as we absolutely know, that icebergs at the present day, both in the same latitude and even further northward, are transporting angular blocks from the opposite side of the Cordillera, the explanation of the St. Cruz case through the same means of transport, is rendered so evidently probable, that we are not justified in doubting to receive it: more especially as the unbroken surface of those plains, and the terrace-formed valley, opposes a very great difficulty to the admission of any violent debacle. The latitudes which we have now been talking of, correspond to the southern extremity of Cornwall, and the northern provinces of France.

I will add only one other case; namely, the occurrence of glaciers at the level of the sea, in the gulf of Penas, latitude 46° 40′. A glacier is represented in the charts as in one part abutting on *a flat swamp often inundated*, and in ano-

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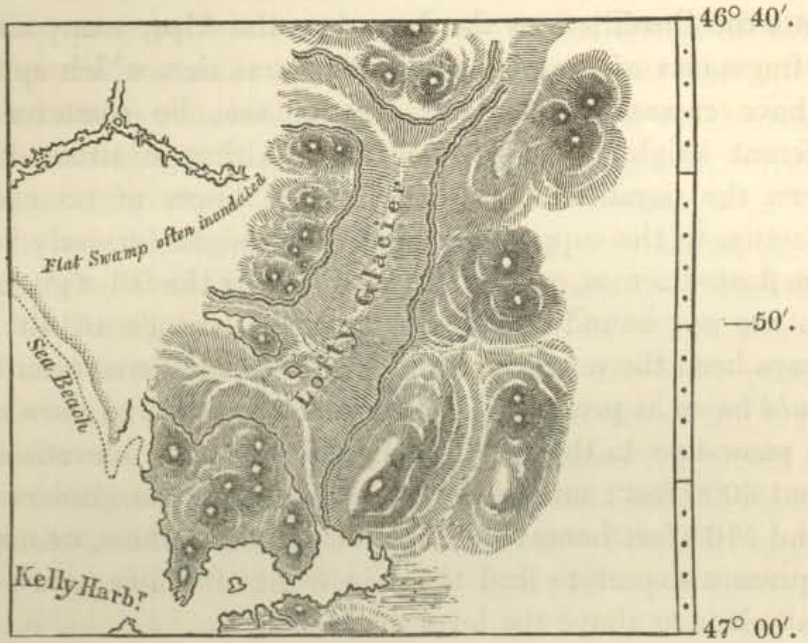
ther reaching to the head of Kelly Harbour. The accompanying wood-cut is copied from the published charts.



Captain King says its length is fifteen miles, and from the chart one part is seven broad; it is also described as being lofty; so that we here have an enormous mountain, covering a wide area, composed of ice. If we compare its situation with countries in the northern hemisphere, the corresponding parallel crosses the Alps of Switzerland. Or we may state the case stronger, by saying that glaciers here descend to the sea within less than nine degrees of latitude, from where palms grow, less than two and a half from arborescent grasses, and (looking to the westward in the same hemisphere) less than two from orchideous parasites, and within a single degree of tree-ferns! In Norway, Von Buch found glaciers descending to the sea at Kunnen in latitude 67°; that is twenty degrees nearer the pole, than in this hemisphere;—a difference of latitude rather greater than that between the snow-lines of equal altitude in the same two countries.

The survey of the *inner* coast terminated at the gulf of Penas, so that I am far from knowing whether glaciers are not

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found much further northward: and considering the immense size of the one just described, it is extremely improbable that it should be the last. On the island of Chiloe, which fronts the Cordillera as the Jura does the Alps, many angular fragments of granite, of an enormous size, which appear to have crossed the inland arm of sea, lie scattered at different heights over the country. Although situated between the parallels of 41° and 43°, I know of no sound objection to the supposition that these might formerly have been floated across, on icebergs produced by the fall of glaciers. We are not bound to suppose that the latitude 46° 40′ has always been the northern limit of such phenomena, even if it *should* be so at present. We have endeavoured to show that the snow-line in the parallel of Chiloe has an elevation of about 6000 feet; and since on Mont Blanc the glaciers descend 5160 feet beneath the line of perpetual snow, we might at present expect to find them in front of Chiloe at a very small altitude above the level of the sea.

With respect to the position of the glaciers, they seem to occur only within the deep sounds which penetrate the central Cordillera. This may be attributed chiefly to the subordinate elevation of the outer lines. When we consider the vast dimensions and number of these glaciers, the effect produced on the land must be very great. Every one has heard of the mass of rubbish propelled by the glaciers of Switzerland, as they slowly creep onwards. In the same manner in Tierra del Fuego, on a still night the cracking and groaning of the great moving mass may be distinctly heard. The same force, which is known to uproot whole forests of lofty trees, must, when grating over the surface, tear from the flanks of the mountain many huge fragments of rock. Beneath each glacier, also, a roaring torrent drains the upper part of the ice. To these effects, which are common to all cases, there must be added, in this country, the wear and tear of the waves produced by each successive fall. Nor can this agency be inconsiderable, when we remember that it goes on night and day, century after century. We must look

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at every portion of the mountain as having, during the gradual rising of the land, been successively exposed to the action of these combined forces.

It is, perhaps, useless to speculate on the effects of earthquakes without some positive data. But as we find in the immediate neighbourhood of that great glacier, which stands in the latitude of the Alps, Byron* mentioning with surprise the quantities of sea-shells lying on all the hill-tops (a fact which may be taken as a proof of recent continental elevations); and Bulkeley,† in his narrative, saying, "This day we felt four great earthquakes, three of which were very terrible;" we may feel well assured, that the same power, which in Chile causes such vast masses of rock and soil to fall from the sea-cliffs, has oftentimes precipitated fragments far more immense, of a mass traversed by great fissures, already in motion, and resting on an inclined plane. I cannot imagine any scene of more terrific violence, than the waves produced by such a fall: we know that they are very bad from the mere oscillation, consequent on the movements of the ground; but in this case I can readily believe that the water would be fairly beaten back out of the deepest inlet, and then returning with an overwhelming force, would whirl about rocks of vast size like so much chaff.

In after ages, with a climate modified by the process of such physical changes as are now going on throughout the greater part of this continent, the effects which had been produced by these glaciers would appear inexplicable, to a person who doubted the possibility of their occurrence in such latitudes. He would see in the most retired and protected valleys (the present channels) beaches composed of great rounded boulders, such as those heaped up on the shore of the most turbulent ocean. Then perhaps he would speculate, either that the outer chain of mountains had been elevated

* Byron's Narrative of the Shipwreck of the Wager.

† Bulkeley's and Cummin's Faithful Narrative of the loss of the Wager. The earthquake happened August 25, 1741.

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subsequently to the interior ones, so as to protect a coast hitherto exposed, or that overwhelming deluges had swept down the valleys, and in some manner produced, in one day, the effects of attrition which on ordinary occasions require the prolonged action of centuries.

If we could at the present day submerge the greater part of Tierra del Fuego, or leave unelevated that which we know has recently been gained, an island with a few small outliers would be formed, similar to Georgia, and situated in exactly the same latitude. Have we in such case the slightest right to deny the probability that the snow-line would descend nearly to the water's edge, and that every valley would be "terminated by a wall of ice," and that "in winter masses would be broken off and dispersed over the sea?"—all of which circumstances are now happening in Georgia. The currents, which always set from the westward towards the east, would drift these floating masses through the channels towards the eastern side. And as we know that icebergs at the present day, in both hemispheres, occasionally transport fragments of rock, so we cannot deny that those of Tierra del Fuego might formerly have done so. When the land was elevated, the fragments of rock would be found deposited on the eastern side of the continent, in bands representing the ancient channels. Whether or not the hypothesis of their transport be true, such is the position of the erratic blocks in Tierra del Fuego.

With respect to the general theory of the transport by great fragments of ice, especially of such as are angular, I may add a few remarks. Humboldt having observed that none occurred over the vast intertropical plains of the eastern side of South America, believed that they were entirely absent from the whole continent. As far as I am able to discover from the works of travellers, and from what I have myself seen, the remark holds good in the countries on both sides of the Cordillera as far south as central Chile. Azara has particularly stated such to be the case in Chaco. With respect to the tributaries of the Amazons, nothing can more

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strongly prove it than La Condamine's* story. He says, "Below Borja even for four or five hundred leagues, a stone, even a single flint, is as great a rarity as a diamond would be. The savages of those countries don't know what a stone is, and have not even a notion of it. It is diversion enough to see some of them when they come to Borja, and first meet with stones, express their admiration at them with signs, and be eager to pick them up, loading themselves therewith as with a valuable merchandise." It is therefore a remarkable circumstance that as soon as we reach the colder latitudes in the southern hemisphere (from 41° to Cape Horn), the same phenomenon occurs, almost on as grand a scale and with similar limits, as in the northern parts both of the Old and New World. Neither in the southern nor in the northern hemisphere do the fragments, coming from the polar regions, or from other mountain groups, arrive within a considerable distance of the lines of the tropics.

We must couple the absence of erratic blocks along that part of the Andes which is situated under a warmer climate, with the similar non-occurrence, as I am informed by Professor Royle, in Northern India round the flanks of the Himmalaya;—those loftiest pinnacles on the face of the globe. With regard to Southern Africa, from lat. 35° to the tropic, Dr. Andrew Smith, who has visited as a naturalist so large a portion of the interior, assures me he has never seen any thing of the kind. Nor do I recollect meeting with any mention of them, in the works of the numerous travellers in the equatorial regions of the same continent. The same remark certainly holds good with Australia in the parallel of Sydney, but perhaps is more doubtful with respect to Van Diemen's Land.† To my mind these negative facts‡ have

* La Condamine's Voyage (English translation), p. 24.

† I will here put together all the (apparent?) exceptions which I have met with to the supposed law that erratic blocks are absent in the intertropical regions of the world. First, in the Bulletin de la Société Géologique, 1837, p. 234, there is an account of some erratic blocks near Macao (lat. 22° N.); but as it is distinctly stated they are all of granite,

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very great weight in support of the mass of positive evidence which Mr. Lyell* has brought to bear upon the question.

and the greater number of even the same coloured variety, as the granitic rock, on which they rest, the case need not be considered. Secondly, in a late number of the Madras Journal, Dr. Benza has described some erratic blocks lying on a plain between the Neilgherries (lat. 12° N.) and Madras. He states that the foundation-rock of the country is gneiss, "while the granite clusters are more elevated, and affect either a prismatic form, or are piled up *one on the other*, like *logging stones*." Dr. Benza had the kindness to inform me that these masses are very large, and that several are piled one upon the other. Again, Brongniart says (Tableau de Terrains, p. 83), "On cite aussi dans l'Inde, au pays d'Hyderabad (lat. 17° N.), des blocs *énormes* de granite, *amoncelés* les uns sur les autres" (Deluc neveu). Every one must draw his own conclusions from these accounts, regarding the probability of erratic blocks being heaped up, one upon the other, *like logging stones*. The same doubt likewise partly applies to the Macao case. With respect to the boulders of Hyderabad, Dr. T. Christie has distinctly stated (Edin. New Phil. Jour., Oct. 1828, p. 102), that they are *in situ*, and has explained their origin. For my own part, I cannot forget that whole granitic hills at the Cape of Good Hope, which, from weathering, have assumed a boulder-like form, were once described as transported masses. The two next cases do not properly come under consideration, for they refer to masses lying in the *valleys* of lofty mountains. We must not overlook such accidents as bursting of lakes, earthquakes, and the action of former coast-lines. Helms, in his Travels (English translation, p. 45), states he was astonished to find the highest snow-capped mountains near Potosi (20° N.) covered with a stratum of rounded granitic stones. He supposes they must have come from Tucuman, which is several hundred miles distant: yet at p. 55 he says, at Iocalla (a few leagues only from Potosi), "a mass of granite many miles in length, rises in huge weatherbeaten rocks:" the whole account is to me quite unintelligible. Lastly, M. Gay (Annales des Sciences, 1833) describes granitic boulders within the valley of Cauquenes (lat. 33°-34° S.), in the Cordillera. I visited this place: the boulders and pebbles are not large, and those beyond the mouth of the valley are small. The case did not appear to me nearly so extraordinary as it seems to have struck M. Gay. I cannot agree with his assertion that this rock is not found in that part of the Cordillera: but this is a subject which I shall discuss in a future work.

‡ The absence of great embedded fragments in the formations of the secondary epoch, when we know that the climate was of a more tropical character, is a fact of the same kind.

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The circumstance of a luxuriant vegetation with a tropical character so largely encroaching on the temperate zones, under the same kind of climate that allows of a limit of perpetual snow of little altitude, and consequent descent of the glaciers into the sea, is very important; because it has been argued, with great apparent truth, that as there is the strongest presumptive evidence of a gradual cooling down of the climate (or rather of a less favourable state for tropical productions) in Europe, it is most unphilosophical to imagine that formerly glaciers could have acted where they do not now occur. It may be asked; what are the circumstances in the southern hemisphere that produce such results? Must we not attribute them to the large proportional area of water; and do not plain geological inferences compel us to allow, that during the epoch anterior to the present, the northern hemisphere more closely approached to that condition, than it now does?

We are all so much better acquainted with the position of places in our own, than in any other quarter of the globe, that I will recapitulate what is actually taking place in the southern hemisphere,† only transporting in imagination each part to a corresponding latitude in the north. On this supposition, in the southern provinces of France, magnificent forests, intwined by arborescent grasses, and the trees loaded with parasitical plants, would cover the face of the country. In the latitude of Mont Blanc, but on an island as far eastward as central Siberia, tree-ferns and parasitical orchideæ would thrive amidst the thick woods. Even as far north as central Denmark, humming-birds might be seen fluttering about delicate flowers, and parrots feeding amidst the evergreen woods, with which the mountains would be clothed down to the water's edge. Nevertheless, the southern part of Scot-

* Anniversary Address to the Geological Society, Feb. 19, 1836, p. 30; and Principles of Geology, vol. i., p. 269, and vol. iv., p. 47, fifth edition.

† It is in the southern hemisphere that we find elephants, rhinoceroses, hippopotomuses, and lions, as far south as lat. 34° 35′. In South America the jaguar occurs in 42°, and the puma in 53°.

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land (only removed twice as far to the westward) would present an island "almost wholly covered with everlasting snow," and having each bay terminated by ice-cliffs, from which great masses yearly detached, would sometimes bear with them fragments of rock. This island would only boast of one land bird, a little grass and moss; yet in the same latitude the sea might swarm with living creatures. A chain of mountains, which we will call the Cordillera, running north and south through the Alps (but having an altitude much inferior to the latter), would connect them with the central part of Denmark. Along this whole line nearly every deep sound would end in "bold and astonishing glaciers." In the Alps themselves (with their altitude reduced by about half) we should find proofs of recent elevations, and occasionally terrible earthquakes would cause such masses of ice to be precipitated into the sea, that waves tearing all before them, would heap together enormous fragments, and pile them up in the corners of the valleys. At other times, icebergs, "charged with no inconsiderable blocks of granite,"* would be floated from the flanks of Mont Blanc, and then stranded on the outlying islands of the Jura. Who then will deny the possibility of these things having actually taken place in Europe during a former period, and under circumstances known to be different from the present, when on merely looking to the other hemisphere, we see they are among the daily order of events?

To the northward of our new Cape Horn, we should only have certain knowledge of a few island groups, situated in the latitude of the south part of Norway, and others in that of Ferroe. These, in the middle of summer, would be buried under snow, and surrounded by walls of ice; so that scarcely a living thing of any kind would be supported on the land. If some bold navigator attempted to penetrate beyond these islands towards the pole, he would run a

* Geographical Journal. Capt. King uses these words when alluding to the case in Sir G. Eyre's Sound, which I have more fully described from the information of Mr. Bynoe.

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thousand dangers, and only meet an ocean strewed with mountain-masses of ice.

At the Ferroe islands (or we may say a little to the southward of the Wiljui, where Pallas found (in lat. 64° N.) the frozen rhinoceros), a body buried under the surface of the soil would undergo so little decomposition, that years afterwards (as in the instance mentioned at South Shetland, 62°-63° S.), every feature might be recognised perfect and unchanged. I particularly allude to this circumstance, because the case of the Siberian animals preserved with their flesh in the ice, offers the same apparent difficulty with the glaciers; namely, the union in the same hemisphere of a climate in some senses severe, with one allowing of the life of those forms which *at present*, although abounding *without* the tropics, do not approach the frozen zones.

The perfect preservation of the Siberian animals, perhaps presented, till within a few years, one of the most difficult problems which geology ever attempted to solve. On the one hand it was granted, that the carcasses had not been drifted from any great distance by any tumultuous deluge, and on the other it was assumed as certain, that when the animals lived, the climate must have been so totally different, that the presence of ice in the vicinity was as incredible, as would be the freezing of the Ganges. Mr. Lyell in his "Principles of Geology"* has thrown the greatest light on this subject, by indicating the northerly course of the existing rivers with the probability that they formerly carried carcasses in the same direction; by showing (from Humboldt) how far the inhabitants of the hottest countries sometimes wander; by insisting on the caution necessary in judging of habits between animals of the same genius, when the species are not identical; and especially by bringing forward in the clearest manner the probable change from an insular to an extreme climate, as the

* In the fourth and subsequent editions.

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consequence of the elevation of the land, of which proofs have lately been brought to light.*

In a former part of this volume, I have endeavoured to prove, that as far as regards the *quantity* of food, there is no difficulty in supposing that these large quadrupeds inhabited sterile regions, producing but a scanty vegetation. With respect to temperature, the woolly covering both of the elephant and the rhinoceros seems at once to render it at least probable (although it has been argued that some animals living in the hottest regions are thickly clothed) that they were fitted for a cold climate. I suppose no reason can be assigned why, during a former epoch, when the pachydermata abounded over the greater part of the world, some species should not have been fitted for the northern regions, precisely as now happens with deer and several other animals.† If, then, we believe that the climate of Siberia, anteriorly to the physical changes above alluded to, had some resemblance with that of the southern hemisphere at the present day—a circumstance which harmonizes well with other facts,‡ as I think has

* Wrangel's Voyage in the Icy Sea in the years 1821, 1822, and 1823. Edited by Professor Parrot, of Dorpat, Berlin, 1826.

† Dr. Fleming first brought this notion forward in two papers published in the Edinburgh Philosoph. Journ. (April, 1829, and Jan. 1830). He adduces the case of allied species of the bear, fox, hare, and ox, living under widely different climates.

‡ Since writing the above, I have been much interested by reading an account by Professor Esmark, which proves that formerly, glaciers in Norway descended to a lower altitude than at present; and therefore, that they came down to the level of the sea in a lower latitude. This, according to generally-received ideas, would indicate a colder climate, and so it was considered to do by Professor Esmark; for he argues from it in favour of Whiston's hypothesis, that the "earth in its aphelion was covered with ice and snow." Professor Esmark describes a glacier-dike, in lat. 58° 57′, as "lying close to the level of the sea, in a district, where you find only a few heaps of perpetual snow in the hollows of the mountains." He says, "Not only the dike itself, but the whole horizontal surface, exhibits proofs that there has been a glacier here, for the plain exactly resembles

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been shown by the imaginary case, when we transported existing phenomena from one to the other hemisphere,—the following conclusions may be deduced as probable: First, that the degree of cold formerly was not excessive; secondly, that snow did not for a long time together cover the ground (such not being the case at the extreme parts 55°-56° of S. America); thirdly, that the vegetation partook of a more tropical character than it now does in the same latitudes; and lastly, that at but a short distance to the northward of the country thus circumstanced (even not so far as where Pallas found the entire rhinoceros), the soil might be perpetually congealed: so that if the carcass of any animal should once be buried a few feet beneath the surface, it would be preserved for centuries.

Both Humboldt* and Lyell have remarked, that at the present day, the bodies of any animals, wandering beyond the line of perpetual congelation which extends as far south as 62°, if once embedded by any accident a few feet beneath the surface, would be preserved for an indefinite length of time: the same would happen with carcasses drifted by the rivers; and by such means the extinct mammalia may have been entombed. There is only one small step wanting, as it appears to me, and the whole problem would be solved with a degree of simplicity very striking, compared with the several theories first invented. From the account given by

those which I found adjoining the glaciers presently existing between Londfiord and Lomb." (See Ed. New Phil. Journal, p. 117, October 1826.) These facts afford a very strong and admirable confirmation of the view, that the climate of Europe has been gradually changing, from a character resembling that of the southern hemisphere, to its present condition. For on this hypothesis, we might have anticipated, that proofs would have been discovered, that glaciers formerly descended to a lower altitude than they now do; and yet, that the organic remains of that epoch, instead of a former period of refrigeration, would have indicated a climate of a more tropical character;—a conclusion, which may be deduced from plain geological evidence.

* See Humboldt, Fragmens Asiatiques, vol. ii., pp. 385—395.

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Mr. Lyell of the Siberian plains, with their innumerable fossil bones, the relics of many successive generations, there can be little doubt that the beds were accumulated either in a shallow sea, or in an estuary. From the description given in Beechey's voyage of Eschscholtz Bay, the same remark is applicable to the north-west coast of America: the formation there appears identical with the common littoral deposits* recently elevated, which I have seen on the shores of the southern part of the same continent. It seems also well established, that the Siberian remains are only exposed where the rivers intersect the plain. With this fact, and the proofs of recent elevation, the whole case appears to be precisely similar to that of the Pampas: namely, that the carcasses were formerly floated into the sea, and the remains covered up in the deposits which were then accumulating. These beds have since been elevated; and as the rivers excavate their channels the entombed skeletons are exposed.

Here then, is the difficulty: how were the carcasses preserved at the bottom of the sea? I do not think it has been sufficiently noticed, that the preservation of the animal with its flesh was an occasional event, and not directly consequent on its position far northward. Cuvier† refers to the voyage of Billing as showing that the *bones* of the elephant, buffalo, and rhinoceros, are nowhere so abundant as on the islands between the mouths of the Lena and Indigirska. It is even said that excepting some hills of rock, the whole is composed of sand, ice, and bones. These islands lie to the northward of the place where Adams found the mammoth with its flesh preserved, and even ten degrees north of the Wiljui, where the rhinoceros was discovered in a like condition. In the case of the *bones* we may suppose that the carcasses were

* See some remarks by Dr. Buckland on the similarity of this formation with the deposits so commonly found over a great part of Europe. Appendix to Beechey's Voyage, p. 609.

† Ossemens Fossiles, vol. i., p. 151.

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drifted into a deeper sea, and there remaining at the bottom, the flesh decomposed.* But in the second and more extraordinary case, where putrefaction seems to have been arrested, the body probably was soon covered up by deposits which were then accumulating. It may be asked, whether the mud a few feet deep, at the bottom of a shallow sea which is annually frozen, has a temperature higher than 32°? It must be remembered how intense a degree of cold is required to freeze salt water; and that the mud at some depth below the surface, would have a low mean temperature, precisely in the same manner as the subsoil on the land is frozen in countries which enjoy a short but hot summer. If this be possible,† the entombment of these extinct quadru-

* Under these circumstances of slow decomposition, the surrounding deposits would probably be impregnated with much animal matter; and thus the peculiar odour perceived in the neighbourhood of the strata containing fossil bones at Eschscholtz Bay, may be accounted for. See Appendix to Beechey's Voyage.

† With respect to the possibility of even ice accumulating at the bottom of the sea, I shall only refer to the following passage taken from the English translation of the *Expedition to the East Coast of Greenland, by Captain W. Graah, Danish Royal Navy.* "Nor is this the only danger to be apprehended: the ice off this blink, even to a considerable distance from it, being said to shoot up from the bottom of the sea in such a manner, and in such masses, as in many years to make it utterly impassable. How to account for the phenomenon to which I have just adverted I know not, unless by supposing that the bottom of the sea itself is hereabouts like the dry land covered with a thick crust of ice. But whether this crust is formed upon the spot, or is the remains of icebergs and the heavy drift-ice frozen to the bottom during severe winters, or a portion of the land-ice, which loaded with stones and fragments of the crumbling hill has protruded itself into the sea, is a problem impossible, perhaps to solve." Again he says: "We passed it without any accident, and without having observed any thing of that upheaving of the ice off it, to which allusion has been made, though the fact of its occurrence cannot be doubted, the very name of the place, Puisortok, being thence derived." It seems fully established on excellent testimony (see Journ. of Geograph. Soc., vol. v., p. 12, and vol. vi., p. 416; also a collection of notices in Edinburgh Journal of Nat. and Geograph. Soc., vol. ii., p. 55), that fresh-water rivers in Russia and Siberia, and even in England, often freeze at

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peds is rendered very simple; and with regard to the conditions of their former existence, the principal difficulties have, I think, already been removed.

Having concluded this long discussion on the analogies which may be drawn from the existing climate of the southern parts of America, together with its productions, we will return to the description of Tierra del Fuego.

There is one vegetable production in this country which is worthy of mention, as it affords a staple article of food to the aborigines. It is a globular fungus of a bright yellow colour, and of about the size of a small apple, which adheres in vast numbers to the bark of the beech-trees. It probably forms a new genus, allied to the morell. In the young state it is elastic and turgid, from being charged with moisture. The external skin is smooth, yet slightly marked with small circular pits, like those from the smallpox. When cut in two, the inside is seen to consist of a white fleshy substance, which viewed under a high power resembles, from the numerous thread-like cylinders, vermicelli. Close beneath the surface, cup-shaped balls, about one-twelfth of an inch in diameter, are arranged at regular intervals. These cups are filled with a slightly adhesive, yet elastic, colourless, quite transparent matter; and from the latter character they at first appeared empty. These little gelatinous balls could be easily detached from the surrounding mass, except at the upper extremity, where the edge divided itself into threads, which mingled with the rest of the vermicelli-like mass. The external skin directly above each of the balls is pitted, and as the fungus grows old, it is ruptured, and the gelatinous mass, which no doubt contains the sporules, is disseminated.

the bottom, and that the flakes of ice when they rise to the surface, often "bring with them large stones." All that seems to be required in producing ground-ice, is, that there should be sufficient movement in the fluid, so that the whole is cooled down to the freezing point, and then the water *crystallizes*, wherever there is a point of attachment.

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After this process of fructification has taken place, the whole surface becomes honeycombed, with empty cells (as represented in the accompanying woodcut), and the fungus

shrinks, and grows tougher. In this state it is eaten by the Fuegians, in large quantities, uncooked, and when well chewed has a mucilaginous and slightly sweet taste, together with a faint odour like that of a mushroom. Excepting a few berries of a dwarf arbutus, which need hardly be taken into the account, these poor savages never eat any other vegetable food besides this fungus.*

I have already mentioned the sombre and dull character of the forests,† in which two or three species of trees grow, to the exclusion of all others. Above the forest land, there are many dwarf alpine plants, which all spring from the mass of peat, and help to compose it. The central part of Tierra del Fuego, where the clay-slate formation

* In New Zealand, before the introduction of the potato, the root of the fern was consumed in large quantities. At the present day I should think Tierra del Fuego was the only country in the world, where a cryptogamic plant afforded a staple article of food.

† Captain FitzRoy informs me that in April (our October) the leaves of those trees which grow near the base of the mountains change colour, but not those in the more elevated parts. I remember having read some observations showing, that in England the leaves fall earlier in a warm and fine autumn, than in a late and cold one. This change in the colour being retarded in the more elevated and therefore colder situations, must be owing to the same general law of vegetation. The trees of Tierra del Fuego during no part of the year entirely shed their leaves.

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occurs, is most favourable to the growth of trees; on the outer coast the poorer granitic soil, and a situation more exposed to the violent winds, do not allow of their attaining any great size. Near Port Famine I have seen more large trees than any where else: I measured a winter's bark which was four feet six inches in girth, and several of the beech were thirteen feet. Captain King also mentions one of the latter which was seven feet in diameter, seventeen feet above the roots.

The zoology of Tierra del Fuego, as might have been expected from the nature of its climate and vegetation, is very poor. Of mammalia, besides Cetacea and Phocæ, there is one bat, a mouse with grooved front teeth (*Reithrodon* of Waterhouse), and two other species, the tucutuco (the greater number of these rodents are confined to the eastern and dry part), a fox, sea-otter, guanaco, and one deer. The latter animal is rare, and is not, I believe, to be found south of the Strait of Magellan, as happens with the others.

Observing the general correspondence of the cliffs of soft sandstone, mud, and shingle, on the opposite sides of the Strait, together with those on some intervening islands, one is strongly tempted to believe that the land was once joined, and thus allowed animals so delicate and helpless as the tucutuco, and Reithrodon, to pass over. The correspondence of the cliffs is far from proving any junction; because such cliffs generally are formed by the intersection of sloping deposits, which, before the elevation of the land, had been accumulated near the then existing shores. It is, however, a remarkable coincidence, that in the two large islands cut off by the Beagle channel from the rest of Tierra del Fuego, one has cliffs composed of matter that may be called stratified alluvium, which front similar ones on the opposite side of the channel,—while the other is exclusively bordered by the older rocks: in the former, called Navarin Island, both foxes and guanacoes occur; but in the latter, Hoste Island, although similar in every respect, and only separated by a channel a little more than half a mile wide, I have the word of Jemmy

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Button for saying that neither of these animals are found. I must confess to an exception to the rule, in the presence of a small mouse, of a species occurring likewise in Patagonia.

The gloomy woods are inhabited by few birds: occasionally the plaintive note of a white tufted tyrant-flycatcher may be heard, concealed near the summit of the most lofty trees; and more rarely the loud strange cry of a black woodpecker, with a fine scarlet crest on its head. A little, dusky-coloured wren (*Scytalopus fuscus*) hops in a skulking manner among the entangled mass of the fallen and decaying trunks. But the creeper (*Synallaxis Tupinieri*) is the commonest bird in the country. Throughout the beech forests, high up and low down, in the most gloomy, wet, and impenetrable ravines, it may be met with. This little bird no doubt appears more numerous than it really is, from its habit of following, with seeming curiosity, any person who enters these silent woods: continually uttering a harsh twitter, it flutters from tree to tree, within a few feet of the intruder's face. It is far from wishing for the modest concealment of the true creeper (*Certhia familiaris*), nor does it, like that bird, run up and down the trunks of trees; but industriously, after the manner of a willow wren, hops about, and searches for insects on every twig and branch. In the more open parts three or four species of finches, a thrush, a starling (or *Icterus*), two furnarii, and several hawks and owls occur.

The absence of any species whatever in the whole class of Reptiles is a marked feature in the zoology of this country, as well as in that of the Falkland Islands. I do not ground this statement merely on my own observation, but I heard it from the Spanish inhabitants of the latter place, and from Jemmy Button with regard to Tierra del Fuego. On the banks of the St. Cruz in 50° south, I saw a frog; and it is not improbable that these animals, as well as lizards, may be found as far south as the Strait of Magellan, where the country retains the character of Patagonia; but within the

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damp and cold limit not one occurs. That the climate would not have suited some of the orders, such as lizards, might have been foreseen; but with respect to frogs, this was not so obvious.

Coleopterous insects occur in very small numbers. Until I had endeavoured by every means to find them, I could not believe, that a country as large as Scotland, covered with vegetable productions, and with a variety of stations, would ever have been so unproductive. The greater part of my small collection consists of alpine insects (*Harpalidæ* and *Heteromera*) found beneath stones, above the limit of the forest. Lower down, with the exception of some few Curculiones scarcely any could be found. The Chrysomelidæ, which are so pre-eminently characteristic of the Tropics, are here almost entirely absent.* This must depend on the climate; for the quantity of vegetable matter is superfluously great. In the hottest part of the summer the mean of the maxima for thirty-seven successive days was 55°, and the thermometer on some of the days rose to 60°; yet there were no orthoptera, very few diptera, lepidoptera, or hymenoptera. In the pools of water I found but few aquatic beetles, and not any fresh-water shells. Succinea at first appears an exception; but here it must be called a terrestrial species, for it lives on the damp herbage far from water. Land shells could only be procured in the same situations with the alpine beetles. I have already contrasted the climate, as well as the general appearance of Tierra del Fuego with that of Patagonia; and the difference is strongly exemplified in the entomology.

* I believe I must except one alpine Haltica, and a single specimen of a Melasoma. Mr. Waterhouse, who was good enough to look at my collection from this place, tells me, that of the Harpalidæ there are eight or nine species,—the forms of the greater number being very peculiar; of Heteromera, four or five species; of Rhyncophora six or seven; and of the following families one species in each: Staphylinidæ, Elateridæ, Cebrionidæ, Melolonthidæ. The species in the other orders, were even fewer. In all the orders, the scarcity of the individuals was even more remarkable than that of the species.

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I do not believe they have a species in common; certainly the general character of the insects is widely different.

If we turn from the land to the sea, we shall find the latter as abundantly stocked with living creatures as the former is poorly so. In all parts of the world a rocky and partially protected shore perhaps supports, in a given space, a greater number of individual animals than any other kind of station. Here, under every stone, numerous crawling creatures swarmed, and especially crustacea of the family of *Cymothoades*. The number of Sphæroma was truly wonderful: as these animals, when coiled up, have some resemblance to Trilobites, they were an interesting sight to a geologist. On the tidal rocks patelliform shells of large size were very abundant. Even at the depth of forty or fifty fathoms, the bottom of the sea was far from sterile, as was shown by the abundance of small strong corallines.

There is one marine production, which from its importance is worthy of a particular history. It is the kelp or *Fucus giganteus* of Solander. This plant grows on every rock from low-water mark to a great depth, both on the outer coast and within the channels. I believe, during the voyages of the Adventure and Beagle, not one rock near the surface was discovered, which was not buoyed by this floating weed. The good service it thus affords to vessels navigating near this stormy land is evident; and it certainly has saved many a one from being wrecked. I know few things more surprising than to see this plant growing and flourishing amidst those great breakers of the western ocean, which no mass of rock, let it be ever so hard, can long resist. The stem is round, slimy, and smooth, and seldom has a diameter of so much as an inch. A few taken together are sufficiently strong to support the weight of the large loose stones to which in the inland channels they grow attached; and some of these stones are so heavy, that when drawn to the surface they can scarcely be lifted into a boat by one person.

Captain Cook, in his second voyage, says, that at Kerguelen Land "some of this weed is of a most enormous

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length, though the stem is not much thicker than a man's thumb. I have mentioned, that on some of the shoals upon which it grows, we did not strike ground with a line of twenty-four fathoms. The depth of water, therefore, must have been greater. And as this weed does not grow in a perpendicular direction, but makes a very acute angle with the bottom, and much of it afterwards spreads many fathoms on the surface of the sea, I am well warranted to say that some of it grows to the length of sixty fathoms and upwards." Certainly at the Falkland Islands, and about Tierra del Fuego, extensive beds frequently spring up from ten and fifteen fathom water. I do not suppose the stem of any other plant attains so great a length as 360 feet, as stated by Captain Cook. Its geographical range is very considerable; it is found from the extreme southern islets near Cape Horn, as far north, on the eastern coast (according to information given me by Mr. Stokes), as lat. 43°,—and on the western it was tolerably abundant, but far from luxuriant, at Chiloe, in lat. 42°. It may possibly extend a little further northward, but is soon succeeded by a different species. We thus have a range of fifteen degrees in latitude; and as Cook, who must have been well acquainted with the species, found it at Kerguelen Land, no less than 140° in longitude.

The number of living creatures of all orders, whose existence intimately depends on the kelp, is wonderful. A great volume might be written, describing the inhabitants of one of these beds of sea-weed. Almost every leaf, excepting those that float on the surface, is so thickly incrusted with corallines, as to be of a white colour. We find exquisitely-delicate structures, some inhabited by simple hydra-like polypi, others by more organized kinds, and beautiful compound Ascidiæ.* On the flat surfaces of the leaves various patelliform shells, Trochi, uncovered molluscs, and some bivalves are attached. Innumerable crustacea frequent every part of

* I have reason to believe that many of these animals are exclusively confined to this station.

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the plant. On shaking the great entangled roots, a pile of small fish, shells, cuttle-fish, crabs of all orders, sea-eggs, star-fish, beautiful Holuthuriæ (some taking the external form of the nudibranch molluscs), Planariæ, and crawling nereidous animals of a multitude of forms, all fall out together. Often as I recurred to a branch of the kelp, I never failed to discover animals of new and curious structures. In Chiloe, where, as I have said, the kelp did not thrive very well, the numerous shells, corallines, and crustacea were absent; but there yet remained a few of the flustraceæ, and some compound Ascidiæ; the latter, however, were of different species from those in Tierra del Fuego. We here see the fucus possessing a wider range than the animals which use it as an abode.

I can only compare these great aquatic forests of the southern hemisphere with the terrestrial ones in the intertropical regions. Yet if the latter should be destroyed in any country, I do not believe nearly so many species of animals would perish, as, under similar circumstances, would happen with the kelp. Amidst the leaves of this plant numerous species of fish live, which nowhere else would find food or shelter; with their destruction the many cormorants, divers, and other fishing birds, the otters, seals, and porpoises, would soon perish also; and lastly, the Fuegian savage, the miserable lord of this miserable land, would redouble his cannibal feast, decrease in numbers, and perhaps cease to exist.

JUNE 8TH.—We weighed anchor early in the morning, and left Port Famine. Captain FitzRoy determined to leave the Strait of Magellan by the Magdalen channel, which had not long been discovered. Our course lay due south, down that gloomy passage which I have before alluded to, as appearing to lead to another and worse world. The wind was fair, but the atmosphere was very thick; so that we missed much curious scenery. The dark ragged clouds were rapidly driven over the mountains, from their summits nearly to their bases. The glimpses which we caught through the

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dusky mass were highly interesting: jagged points, cones of snow, blue glaciers, strong outlines marked on a lurid sky, were seen at different distances and heights. In the midst of such scenery we anchored at Cape Turn, close to Mount Sarmiento, which was then hidden in the clouds. At the base of the lofty and almost perpendicular sides of our little cove, there was one deserted wigwam, and it alone reminded us that man sometimes wandered in these desolate regions. But it would be difficult to imagine a scene where he seemed to have less claims, or less authority. The inanimate works of nature—rock, ice, snow, wind, and water—all warring with each other, yet combined against man—here reigned in absolute sovereignty.

June 9th.—In the morning we were delighted by seeing the veil of mist gradually rise from Sarmiento, and display it to our view. This mountain, which is one of the highest in Tierra del Fuego, has an elevation of 6800 feet. Its base, for about an eighth of its total height, is clothed by dusky woods, and above this a field of snow extends to the summit. These vast piles of snow, which never melt, and seem destined to last as long as the world holds together, present a noble and even sublime spectacle. The outline of the mountain was admirably clear and defined. Owing to the abundance of light reflected from the white and glittering surface, no shadows are cast on any part; and those lines which intersect the sky can alone be distinguished: hence the mass stood out in the boldest relief. Several glaciers descended in a winding course, from the snow to the sea-coast: they may be likened to great frozen Niagaras; and perhaps these cataracts of blue ice are to the full as beautiful as the moving ones of water. By night we reached the western part of the channel; but the water was so deep that no anchorage could be found. We were in consequence obliged to stand off and on, in this narrow arm of the sea, during a pitch-dark night of fourteen hours long.

June 10th.—In the morning we made the best of our way into the open Pacific. The Western coast generally

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consists of low, rounded, quite barren, hills of granite and greenstone. Sir John Narborough called one part South Desolation, because it is "so desolate a land to behold;" and well indeed might he say so. Outside the main islands there are numberless scattered rocks, on which the long swell of the open ocean incessantly rages. We passed out between the East and West Furies, and a little further northward there are so many breakers that the sea is called the Milky Way. One sight of such a coast is enough to make a landsman dream for a week about shipwreck, peril, and death; and with this sight, we bade farewell for ever to Tierra del Fuego.

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CHAPTER XIV.

Valparaiso—Excursion to base of Andes—Structure of land—Ascend Bell of Quillota—Shattered masses of greenstone—Immense valleys—Mines—State of miners—Santiago—Hot baths of Cauquenes—Gold mines—Grinding mills—Perforated stones—Habits of puma—El turco and tapacolo—Humming-birds.

CENTRAL CHILE.

JULY 23D.—The Beagle anchored late at night in the bay of Valparaiso, the chief seaport of Chile. When morning came, every thing appeared delightful. After Tierra del Fuego, the climate felt quite delicious—the atmosphere so dry, and the heavens so clear and blue, with the sun shining brightly, that all nature seemed sparkling with life. The view from the anchorage is very pretty. The town is built at the very foot of a range of hills, about 1600 feet high, and rather steep. From its position, it consists of one long, straggling street, which runs parallel to the beach, and wherever a ravine comes down, the houses are piled up on each side of it. The rounded hills, being only partially protected by a very scanty vegetation, are worn into numberless little gullies, which expose a singularly bright red soil. From this cause, and from the low whitewashed houses with tile roofs, the view reminded me of St. Cruz in Teneriffe. In a north-easterly direction there are some fine glimpses of the Andes: but these mountains appear much grander when viewed from the neighbouring hills; the great distance at which they are situated can then more readily be perceived. The volcano of Aconcagua is particularly magnificent. This huge and irregularly conical mass has an elevation greater than that of Chimborazo; for, from measurements made by the officers in the Beagle, its height is no less than 23,000 feet. The Cordillera, however, viewed from

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this point, owe the greater part of their beauty to the atmosphere through which they are seen. When the sun was setting in the Pacific, it was admirable to watch how clearly their rugged outlines could be distinguished, yet how varied and how delicate were the shades of their colour.

I had the good fortune to find living here Mr. Richard Corfield, an old schoolfellow and friend, to whose hospitality and kindness I was greatly indebted, in having afforded me a most pleasant residence during the Beagle's stay in Chile. The immediate neighbourhood of Valparaiso is not very productive to the naturalist. The surrounding hills consist of a granitic formation, which sometimes assumes the character of gneiss, and sometimes of granite. Their summits are flat-topped, and their flanks rounded. I have before stated, that forests cover that side of the Cordillera which fronts the prevailing winds. Here, during the summer, which forms the longer portion of the year, the winds blow steadily from the southward, and a little off shore, so that rain never falls: during the three winter months it is however sufficiently abundant. The vegetation in consequence is very scanty. Except in some deep valleys, trees nowhere occur, and only a little grass and a few low bushes are scattered over the less steep parts of the hills. When we reflect that, at the distance of 350 miles to the southward, this side of the Andes is completely hidden by one impenetrable forest, the contrast is very remarkable.

I took several long walks while collecting objects of natural history. The country is pleasant for exercise. There are many very beautiful flowers, and as in most other dry climates, the plants and shrubs possess strong and peculiar odours; even one's clothes by brushing through them became scented. I did not yet cease from wonder, at finding each succeeding day as fine as the foregoing. What a difference does climate make in the enjoyment of life! How opposite are the sensations when viewing black mountains half-enveloped in clouds, and seeing another range through the light

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blue haze of a fine day! The one for a time may be very sublime; the other is all gaiety and happy life.

AUGUST 14TH.—I set out on a riding excursion, for the purpose of geologizing the basal parts of the Andes, which alone at this time of the year were not shut up by the winter snow. Our first day's ride was northward along the sea-coast. After dark we reached the Hacienda of Quintero, the estate which formerly belonged to Lord Cochrane. My object in coming here was to see the great beds of shells, which are elevated some yards above the level of the sea. They nearly all consist of one species of Erycina; and these shells at the present day live together in great numbers, on the sandy flats. So wonderfully numerous are those forming the beds, that for years they have been quarried, and burnt for the lime, with which the large town of Valparaiso is supplied. As any change of level, even in this neighbourhood, has often been disputed, I may add, that I saw dead barnacles adhering to points of solid rock which were now so much elevated, that even during gales of wind they would scarcely be wetted by the spray.

15TH.—We returned towards the valley of Quillota. The country was exceedingly pleasant; just such as poets would call pastoral: green open lawns, separated by small valleys with rivulets, and the cottages, we will suppose of the shepherds, scattered on the hill-sides. We were obliged to cross the ridge of the Chilecauquen. At its base there were many fine evergreen forest-trees, but these only flourished in the ravines, where there was running water. Any person who had seen only the country near Valparaiso, would never have imagined that there had been such picturesque spots in Chile. As soon as we reached the brow of the Sierra, the valley of Quillota was immediately under our feet. The prospect was one of remarkable artificial luxuriance. The valley is very broad and quite flat, and is thus easily irrigated in all parts. The little square gardens are crowded with orange and olive trees, and every sort of vegetable. On each side huge bare mountains rise, and this from the contrast renders the patch-

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work valley the more pleasing. Whoever called "Valparaiso" the "Valley of Paradise," must have been thinking of Quillota. We crossed over to the Hacienda de San Isidoro, situated at the very foot of the Bell mountain.

Chile, as may be seen in the maps, is a narrow strip of land between the Cordillera and the Pacific; and this strip is itself traversed by several mountain-lines, which in this part run parallel to the great range. Between these outer lines, and the main Cordillera, a succession of level basins, generally opening into each other by narrow passages, extend far to the southward. In these the principal towns are situated, as San Felipe, Santiago, S. Fernando. These basins or plains, together with the transverse flat valleys (like that of Quillota) which connect them with the coast, I have little doubt, are the bottoms of ancient inlets and deep bays, such as at the present day intersect every part of Tierra del Fuego, and the west coast of Patagonia. Chile must formerly have resembled the latter country, in the configuration of its land and water. This resemblance was occasionally seen with great force, when a level fog-bank covered, as with a mantle, all the lower parts of the country: the white vapour curling into the ravines, beautifully represented little coves and bays; and here and there a solitary hillock peeping up, showed that it had formerly stood there as an islet. The contrast of these flat valleys and basins with the irregular mountains, gave the scenery a character which to me was novel and very interesting.

From the natural slope to seaward of these plains, they are very easily irrigated, and in consequence singularly fertile. Without this process the land would produce scarcely any thing; for during the whole summer the sky is cloudless. The mountains and hills are dotted over with bushes and low trees, and excepting these, the vegetation is very scanty. Each landowner in the valley possesses a certain portion of hill-country, where his half-wild cattle, in considerable numbers, manage to find sufficient pasture. Once every year there is a grand "rodeo,"

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when all the cattle are driven down, counted, and marked, and a certain number separated to be fattened in the irrigated fields. Wheat is extensively cultivated, and also a good deal of Indian corn: a kind of bean is, however, the staple article of food for the common labourers. The orchards produce an overflowing abundance of peaches, figs, and grapes. With all these advantages, the inhabitants of the country ought to be much more prosperous than they are.

August 16th.—The mayor-domo of the Hacienda was good enough to give me a guide and fresh horses; and in the morning we set out to ascend the Campana, or Bell mountain, which is 6400 feet high. The paths were very bad, but both the geology and scenery amply repaid the trouble. We reached, by the evening, a spring called the Agua del Guanaco, which is situated at a great height. This must be an old name, for it is very many years since a guanaco has drunk its waters. During the ascent I noticed that nothing grew on the northern slope but bushes, whilst on the southern there was a sort of bamboo, about fifteen feet high. In a few places there were palms, and I was surprised to see one at an elevation of at least 4500 feet. These palms are, for their family, ugly trees. Their stem is very large, and of a curious form, being thicker in the middle than at the base or top. They are excessively numerous in some parts of Chile, and valuable on account of a sort of treacle made from the sap. On one estate near Petorca, they tried to count them, but failed, after having numbered several hundred thousand. Every year in August (early spring time) very many are cut down, and when the trunk is lying on the ground, the crown of leaves is lopped off. The sap then immediately begins to flow from the upper end, and continues so doing for some months: it is, however, necessary that a thin slice should be shaved off from that end every morning, so as to expose a fresh surface. A good tree will give ninety gallons, and all this must have been contained in the vessels of the apparently dry trunk. It is said that the sap flows much more quickly on those days when the sun is powerful; and likewise,

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that it is absolutely necessary to take care, in cutting down the tree, that it should fall with its head upwards on the side of the hill; for if it falls down the slope, scarcely any sap will flow; although in that case, one would have thought that the action would have been aided, instead of checked, by the force of gravity. The sap is concentrated by boiling, and is then called treacle, which it very much resembles in taste.

We unsaddled our horses near the spring, and prepared to pass the night. The evening was fine, and the atmosphere so clear, that the masts of the vessels at anchor in the bay of Valparaiso, although no less than twenty-six geographical miles distant, could be distinguished clearly, as little black streaks. A ship doubling the point under sail appeared as a bright white speck. Anson expresses much surprise, in his voyage, at the distance his vessels were discovered from the coast; but he did not sufficiently allow for the height of the land, and the great transparency of the air.

The setting of the sun was glorious; the valleys being black, whilst the snowy peaks of the Andes yet retained a ruby tint. When it was dark, we made a fire beneath a little arbour of bamboos, fried our charqui (or dried strips of beef), took our maté, and were quite comfortable. There is an inexpressible charm in thus living in the open air. The evening was calm and still;—the shrill noise of the mountain bizcacha, and the faint cry of the goatsucker, were only occasionally to be heard. Besides these, few birds, or even insects, frequent these dry, parched mountains.

August 17th.—In the morning we climbed up the rough mass of greenstone which crowns the summit. This rock, as frequently happens, was much shattered and broken into huge angular fragments. I observed, however, one remarkable circumstance, namely, that many of the surfaces presented every degree of freshness—some appearing as if broken the day before, whilst on others lichens had either just become, or had long grown, attached. I so fully believed that this was owing to the frequent earthquakes, that I felt inclined to hurry from beneath every pile of the loose

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masses. As this is an observation in which one would be very apt to be deceived, I doubted its accuracy, until ascending Mount Wellington, near Hobart Town. The summit of that mountain is similarly composed, and similarly shattered; but all the blocks appeared as if they had been hurled into their present position thousands of years ago.

We spent the day on the summit, and I never enjoyed one more thoroughly. Chile, bounded by the Andes and the Pacific, was seen as in a map. The pleasure from the scenery, in itself beautiful, was heightened by the many reflections which arose from the mere view of the grand range, with its lesser parallel ones, and of the broad valley of Quillota directly intersecting the latter. Who can avoid admiring the wonderful force which has upheaved these mountains, and even more so the countless ages which it must have required, to have broken through, removed, and levelled whole masses of them? It is well in this case to call to mind the vast shingle and sedimentary beds of Patagonia, which, if heaped on the Cordillera, would increase by so many thousand feet its height. When in that country, I wondered how any mountain-chain could have supplied such masses, and not have been utterly obliterated. We must not now reverse the wonder, and doubt whether all-powerful time can grind down mountains—even the gigantic Cordillera—into gravel and mud.

The appearance of the Andes was different from that which I had expected. The lower line of the snow was of course horizontal, and to this line the even summits of the range seemed quite parallel. Only at long intervals a mass of points, or a single cone, showed where a volcano had existed, or does now exist. Hence the range resembled a great solid wall, surmounted here and there by a tower, and thus made a most complete barrier to the country.

Almost every part of the hill has been drilled by attempts to open gold-mines. I was surprised to see, on the actual summit, which could only be reached by climbing, a small pit, where some yellowish crystals of hypersthene had

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induced somebody to throw away his labour. The rage for mining has left scarcely a spot in Chile unexamined. I spent the evening as before, talking round the fire with my two companions. The Guasos of Chile, which correspond to the Gauchos of the Pampas, are, however, a very different set of beings. Chile is the more civilized of the two countries, and the inhabitants, in consequence, have lost much individual character. Gradations in rank are much more strongly marked: the Guaso does not by any means consider every man his equal; and I was quite surprised to find that my companions did not like to eat at the same time with myself. This feeling of inequality is a necessary consequence of the existence of an aristocracy of wealth. It is said that some few of the greater landowners possess from five to ten thousand pounds sterling per annum: an inequality of riches which I believe is not met with in any of the cattle-breeding countries to the eastward of the Andes. A traveller does not here meet that unbounded hospitality which refuses all payment, but yet is so kindly offered that no scruples can be raised in accepting it. Almost every house in Chile will receive you for the night, but a trifle is expected to be given in the morning; even a rich man will accept two or three shillings. The Gaucho, although he may be a cut-throat, is a gentleman; the Guaso is in few respects better, but at the same time a vulgar, ordinary fellow. The two men, although employed much in the same manner, are different in their habits and attire; and the peculiarities of each are universal in their respective countries. The Gaucho seems part of his horse, and scorns to exert himself excepting when on its back; the Guaso may be hired to work as a labourer in the fields. The former lives entirely on animal food; the latter almost wholly on vegetable. We do not here see the white boots, the broad drawers, and scarlet chilipa; the picturesque costume of the Pampas. Here, common trousers are protected by black and green worsted leggings. The poncho, however, is common to both. The chief pride in the Guaso lies in his spurs;

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which are absurdly large. I measured one which was six inches in the *diameter* of the rowel, and the rowel itself contained upwards of thirty points. The stirrups are on the same scale, each consisting of a square, carved block of wood, hollowed out, yet weighing three or four pounds. The Guaso is perhaps more expert with the lazo than the Gaucho; but, from the nature of the country, he does not know the use of the bolas.

August 18th.—We descended the mountain, and passed some beautiful little spots, with rivulets and fine trees. Having slept at the same hacienda as before, we rode during the two succeeding days up the valley, and passed through Quillota, which is more like a collection of nursery-gardens than a town. The orchards were beautiful, presenting one mass of peach-blossoms. I saw also in one or two places the date-palm. It is a most stately tree; and I should think a group of them in their native Asiatic and African deserts must be superb. We passed likewise San Felipe, a pretty straggling town like Quillota. The valley in this part expands into one of those great bays or plains, reaching to the foot of the Cordillera, which have been mentioned as forming so curious a part of the scenery of Chile.

In the evening we reached the mines of Jajuel, situated in a ravine at the flank of the great chain. I staid here five days. My host, the superintendent of the mine, was a shrewd but rather ignorant Cornish miner. He had married a Spanish woman, and did not mean to return home; but his admiration for the mines of Cornwall remained unbounded. Amongst many other questions, he asked me, "Now that George Rex is dead, how many more of the family of Rexes are yet alive?" This Rex certainly must be a relation of the great author Finis, who wrote all books!

These mines are of copper, and the ore is all shipped to Swansea, to be smelted. Hence the mines have an aspect singularly quiet, as compared to those in England: here no smoke, furnaces, or great steam-engines, disturb the solitude of the surrounding mountains.

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The Chilian government, or rather the old Spanish law, encourages by every method the searching for mines. The discoverer may work a mine on any ground, by paying five shillings; and before paying this he may try, even in the garden of another man, for twenty days.

It is now well known that the Chilian method of mining is the cheapest. My host says the two principal improvements introduced by foreigners have been, first, reducing by previous roasting the copper pyrites—which, being the common ore in Cornwall, the English miners were astounded on their arrival to find thrown away as useless: secondly, stamping and washing the scoriæ from the furnaces—by which process particles of metal are recovered in abundance. I have actually seen mules carrying to the coast, for transportation to England, a cargo of such cinders. But the first case is much the most curious. The Chilian miners were so convinced that copper pyrites contained not a particle of copper, that they laughed at the Englishmen for their ignorance, who laughed in turn, and bought their richest veins for a few dollars. It is very odd that, in a country where mining had been extensively carried on for many years, so simple a process as gently roasting the ore, to expel the sulphur previous to smelting it, had never been discovered. A few improvements have likewise been introduced in some of the simple machinery; but even to the present day, water is removed from some mines by men carrying it up the shaft in leathern bags!

The labouring men work very hard. They have little time allowed for their meals, and during summer and winter they begin when it is light, and leave off at dark. They are paid one pound sterling a month, and their food is given them: this for breakfast consists of sixteen figs and two small loaves of bread; for dinner boiled beans; for supper broken roasted wheat grain. They scarcely ever taste meat; as, with the twelve pounds per annum, they have to clothe themselves, and support their families. The miners who work in the mine itself, have twenty-five shillings per month, and are allowed a little

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charqui. But these men come down from their bleak habitations only once in every fortnight or three weeks.

During my stay here I thoroughly enjoyed scrambling about these huge mountains. The geology, as might have been expected, was very interesting. The shattered and baked rocks, traversed by innumerable dykes of greenstone, showed what commotions had formerly taken place there. The scenery was much the same as that near the Bell of Quillota,—dry barren mountains, dotted at intervals by bushes with a scanty foliage. The cactuses, or rather opuntias, were here very numerous. I measured one of as pherical figure, which, including the spines, was six feet and four inches in circumference. The height of the common cylindrical, branching kind is from twelve to fifteen feet, and the girth (with spines) of the branches between three and four.

A heavy fall of snow on the mountains prevented me, during the last two days, from making some interesting excursions. I attempted to reach a lake, which the inhabitants, from some unaccountable reason, believe to be an arm of the sea. During a very dry season, it was proposed to attempt cutting a channel from it, for the sake of the water; but the padre, after a consultation, declared it was too dangerous, as all Chile would be inundated, if, as generally supposed, the lake was connected with the Pacific. We ascended to a great height, but becoming involved in the snow-drifts, failed in reaching this wonderful lake, and had some difficulty in returning. I thought we should have lost our horses; for there was no means of guessing how deep the drifts were, and the animals, when led, could only move by jumping. The black sky showed that a fresh snow-storm was gathering, and we therefore were not a little glad when we escaped. By the time we reached the base, the storm commenced, and it was lucky for us that this did not happen three hours earlier in the day.

August 26th.—We left Jajuel and again crossed the basin of S. Felipe. The day was truly Chilian: glaringly bright, and the atmosphere quite clear. The thick and uni-

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form covering of newly-fallen snow rendered the view of the volcano of Aconcagua and the main chain quite glorious. We were now on the road to Santiago, the capital of Chile. We crossed the Cerro del Talguen, and slept at a little rancho. The host, talking about the state of Chile as compared to other countries, was very humble: "Some see with two eyes, and some with one, but for my part I do not think that Chile sees with any."

August 27th.—After crossing many low hills, we descended into the small land-locked plain of Guitron. In the basins, such as this one, which are elevated from 1000 to 2000 feet above the sea, two species of acacia, which are stunted in their forms, and stand wide apart from each other, grow in large numbers. These trees are never found near the sea-coast; and this gives another characteristic feature to the scenery of these basins.

We crossed a low ridge which separates Guitron from the great plain on which Santiago stands. The view was here pre-eminently striking: the dead level surface, covered in parts by woods of acacia, and with the city in the distance, abutting horizontally against the base of the Andes, whose snowy peaks were bright with the evening sun. At the first glance of this view it was quite evident that the plain represented the extent of a former inland sea. As soon as we gained the level road we pushed our horses into a gallop, and reached the city before it was dark.

I staid a week in Santiago, and enjoyed myself very much. In the morning I rode to various places on the plain, and in the evening dined with several of the English merchants, whose hospitality at this place is well known. A never-failing source of pleasure, was to ascend the little pap of rock (fort St. Lucia) which projects in the middle of the city. The scenery certainly is most striking, and as I have said, very peculiar. I am informed that this same character is common to the cities on the great Mexican platform. Of the town I have nothing to say in detail: it is not so fine or so large as Buenos Ayres, but is built after the same

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model. I arrived here by a circuit to the north; so I resolved to return to Valparaiso, by a rather longer excursion, to the southward of the direct road.

SEPTEMBER 5TH.—By the middle of the day we arrived at one of the suspension bridges, made of hide, which crosses the Maypo, a large turbulent river, a few leagues south of Santiago. These bridges are very poor affairs. The road, following the curvature of the suspending ropes, is made of bundles of sticks placed close together. It was full of holes, and oscillated rather fearfully, even from the weight of a man leading his horse. In the evening we reached a comfortable farm-house, where there were several very pretty signoritas. They were much horrified at my having entered one of their churches out of mere curiosity. They asked me, "Why do you not become a Christian—for our religion is certain?" I assured them I was a sort of Christian; but they would not hear of it—appealing to my own words, "Do not your padres, your very bishops, marry?" The absurdity of a bishop having a wife, particularly struck them: they scarcely knew whether to be most amused or horror-struck at such an enormity.

6TH.—We proceeded due south, and slept at Rancagua. The road passed over the level but narrow plain, bounded on one side by lofty hills, and on the other by the Cordillera. The next day we turned up the valley of the Rio Cachapual, in which the hot-baths of Cauquenes, long celebrated for their medicinal properties, are situated. The suspension bridges, in the less frequented parts, are generally taken down during the winter, when the rivers are low. Such was the case in this valley, and we were therefore obliged to cross the stream on horseback. This is rather disagreeable, for the foaming water, though not deep, rushes so quickly over the bed of large rounded stones, that one's head becomes quite confused, and it is difficult even to perceive whether the horse is moving onward, or standing still. In summer, when the snow melts, the torrents are quite impassable: their strength and fury is then extremely great;

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as might be plainly seen, by the marks which they had left. We reached the baths in the evening, and staid there five days, being confined the two last by heavy rain. The buildings consist of a square of miserable little hovels, each with a single table and bench. They are situated in a narrow deep valley, just without the central Cordillera. It is a quiet, solitary spot, with a good deal of wild beauty.

The mineral springs of Cauquenes burst forth on a line of dislocation, crossing a mass of stratified rock, the whole of which betrays the action of heat. A considerable quantity of gas is continually escaping from the same orifices with the water. Though the springs are only a few yards apart, they have very different temperatures; and this appears to be the result of an unequal mixture of cold water: for those with the lowest temperature have scarcely any mineral taste. After the great earthquake of 1822, the springs ceased, and the water did not return for nearly a year. It is said that they have not since regained their former volume or temperature.* These springs were also much affected by the earthquake of 1835; the temperature being suddenly changed from 118° to 92°.† It seems probable that mineral waters rising deep from the bowels of the earth, would always be more deranged by subterranean disturbances, than those nearer the surface. The man who had charge of the baths assured me, that in summer the water is hotter and more plentiful than in winter. The former circumstance I should have expected, from the less mixture, during the dry season, of cold water; but the latter statement appears very strange and contradictory. The periodical increase during the summer when

* When I doubted the change of temperature, in this case as well as in the one mentioned a few lines lower down, the inhabitants maintained that they knew it well. Their thermometer, however, was an odd one: it is the common custom in this country to scald a fowl before plucking it, in the same manner as we treat a pig, and then the feathers come off very easily: they judged from the comparative facility with which this operation could be performed during the two periods.

† Caldcleugh's Philosoph. Transact. for 1836.

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rain never falls, can, I think, only be accounted for by the melting of the snow: yet the mountains which are covered by snow during that season are three or four leagues distant from the springs. I have no reason to doubt the accuracy of my informer, who having lived on the spot for several years, ought to be well acquainted with the circumstance,—which, if true, certainly is very curious: for, we must suppose that the water, being conducted through porous strata to the regions of heat, is again thrown up to the surface by the line of dislocated and injected rock at Cauquenes; and the regularity of the phenomenon would seem to indicate that in this district heated rock occurred at a depth not excessively great.

One day I rode up the valley to the furthest inhabited spot. Shortly above that point, the Cachapual divides into two deep tremendous ravines, which penetrate directly into the great range. I scrambled up a peaked mountain, probably more than six thousand feet high. Here, as indeed every where else, scenes of the highest interest presented themselves. It was by one of these ravines that Pincheira entered Chile, and ravaged the neighbouring country. This is the same man whose attack on an estancia at the Rio Negro I have described. He was a renegade half-cast Spaniard, who collected a great body of Indians together, and established himself by a stream in the Pampas, which place none of the forces sent after him could ever discover. From this point he used to sally forth, and crossing the Cordillera by passes hitherto unattempted, he ravaged the farm-houses, and drove the cattle to his secret rendezvous. Pincheira was a capital horseman, and he made all around him equally good, for he invariably shot any one who hesitated to follow him. It was against this man, and other wandering Indian tribes, that Rosas waged the war of extermination.

September 13th.—We left the baths of Cauquenes, and rejoining the main road, slept at the Rio Claro. From this place we rode to the town of S. Fernando. Before arriving there, the last basin had expanded into a great plain, which

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extended so far to the south, that the snowy summits of the more distant Andes were seen, as if above the horizon of the sea. S. Fernando is forty leagues from Santiago; and it was my furthest point southward; for we here turned at right angles towards the coast. We slept at the gold-mines of Yaquil, which are worked by Mr. Nixon, an American gentleman, to whose kindness I was much indebted during the four days I staid at his house.

SEPTEMBER 14TH.—This morning we rode to the mines, which are situated at the distance of some leagues, near the summit of a lofty hill. On the way we had a glimpse of the lake Tagua-tagua, celebrated for its floating islands, which have been described by M. Gay.* They are composed of the stalks of various dead plants intertwined together, and on the surface of which other living ones take root. Their form is generally circular, and their thickness from four to six feet, of which the greater part is immersed in the water. As the wind blows they pass from one side of the lake to the other, and often carry cattle and horses as passengers.

When we arrived at the mine, I was struck by the pale appearance of many of the men, and inquired from Mr. Nixon respecting their condition. The mine is 450 feet deep, and each man brings up about 200 pounds† weight of stone. With this load they have to climb up the alternate notches cut in the trunks of trees, placed in a zigzag line up the shaft. Even beardless young men, eighteen and twenty years old, with little muscular development of their bodies (they are quite naked excepting drawers) ascend with this great load from nearly the same depth. A strong man, who is not accustomed to this labour, perspires most profusely, with merely carrying up his own body. With this very severe labour, they live entirely on boiled beans and bread. They

* Annales des Sciences Naturelles, March, 1833. M. Gay, a zealous and able naturalist, is now occupied in studying every branch of natural history throughout the kingdom of Chile.

† In another mine, as will hereafter be mentioned, I picked out a load by hazard, and weighed it: it was 197 pounds.

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would prefer having the latter alone; but their masters, finding they cannot work so hard upon this, treat them like horses, and make them eat the beans. Their pay is here rather more than at the mines of Jajuel, being from 24 to 28 shillings per month. They leave the mine only once in three weeks; when they stay with their families for two days.* One of the rules in this mine sounds very harsh, but answers pretty well for the master. The only method of stealing gold, is to secrete pieces of the ore, and take them out as occasion may offer. Whenever the major-domo finds a lump thus hidden, its full value is stopped out of the wages of all the men; who thus, without they all combine, are obliged to keep watch over each other.

When the ore is brought to the mill, it is ground into an impalpable powder; the process of washing removes all the lighter particles, and amalgamation finally secures the gold dust. The washing, when described, sounds a very simple process; but it is beautiful to see how the exact adaption of the current of water to the specific gravity of the gold, so easily separates the powdered matrix from the metal. The mud which passes from the mills is collected into pools, where it subsides, and every now and then is cleared out, and thrown into a common heap. A great deal of chemical action then commences, salts of various kinds effloresce on the surface, and the mass becomes hard. In the heap which I examined, an angulo-concretionary structure was also superinduced, and what was very remarkable, these pseudo-frag-

* Bad as all the above treatment appears, it is gladly accepted of by the miners; for the condition of the labouring agriculturists is much worse. The wages of the latter are lower, and they live almost exclusively on beans. This poverty must be chiefly owing to the feudal-like system on which the land is tilled. The landowner gives a small plot of ground to the labourer, for building and cultivating, and in return has his services (or that of a proxy) for every day of his life, without any wages. Until a father has a grown up son who can by his labour pay the rent, there is no one, except on chance days, to take care of the patch of ground. Hence extreme poverty is very common among the labouring classes in this country.

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ments possessed an even and well-defined slaty structure; but the laminæ were not inclined at any uniform angle. The mud, after having been left for a year or two, and then rewashed, yields gold; and this process may be repeated even six or seven times; but the gold each time becomes less in quantity, and the intervals required (as the inhabitants say to generate the metal) are longer. There can be no doubt that the chemical action, already mentioned, each time liberates fresh gold from some combination. The discovery of a method to effect this before the first grinding, would without doubt raise the value of gold ores many fold.

It is curious to find how the minute particles of gold, after being scattered about, and from not corroding, at last accumulate in some quantity. A short time since a few miners, being out of work, obtained permission to scrape the ground round the house and mill: they washed the earth thus got together, and so procured thirty dollars' worth of gold. This is an exact counterpart of what takes place in nature. Mountains suffer degradation and wear away, and with them the metallic veins which they contain. The hardest rock is worn into impalpable mud, the ordinary metals oxidate, and both are removed; but gold, platina, and a few others, are nearly indestructible, and from their weight, sinking to the bottom, are left behind. After whole mountains have passed through this grinding mill, and have been washed by the hand of nature, the residue becomes metalliferous, and man finds it worth his while to complete the task of separation.

There are some old Indian ruins in this neighbourhood, and I was shown one of the perforated stones which Molina* mentions, as being found in many places in considerable numbers. They are of a circular flattened form, from five to six inches in diameter, and with a hole passing quite through the centre. It has generally been supposed, that

* Molina, Compendio de la Historia, &c. del Reyno de Chile, vol. i., p. 81.

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they were used as heads to clubs, although their form does not appear at all well adapted for that purpose. Burchell* states that some of the tribes in Southern Africa dig up roots, by the aid of a pointed stick, the force and weight of which is increased by a round stone with a hole, into which the stick is firmly wedged. It appears probable that the Indians of Chile formerly used some such rude agricultural instrument.

One day, a German collector in natural history, of the name of Renous, called, and nearly at the same time an old Spanish lawyer. I was amused by afterwards hearing the conversation which took place between them. Renous speaks Spanish so well, that the old lawyer mistook him for a fellow-countryman. Renous, alluding to myself, asked him what he thought of the King of England sending out a collector to their country, to pick up lizards and beetles, and to break stones? The old gentleman thought seriously for some time, and then said, "It is not well,—*hay un gato encerrado aqui* (there is a cat shut up here). No man is so rich as to send out people to pick up such rubbish. I do not like it: if one of us were to go and do such things in England, do not you think the King of England would very soon send us out of his country?" And this old gentleman, from his profession, belongs to the better informed and more intelligent classes! Renous himself, two or three years before, left in a house at S. Fernando some caterpillars, under charge of a girl to feed, that they might turn into butterflies. This was rumoured through the town, and at last the Padres and Governor consulted together, and agreed it must be some heresy. Accordingly, when Renous returned, he was arrested.

September 19th.—We left Yaquil, and followed the flat valley, formed like that of Quillota, in which the Rio Tinderidica flows. Even at these few miles south of Santiago the climate is much damper; in consequence there were fine tracks of pasturage, which were not irrigated. (20th.) We fol-

* Burchell's Travels, vol. ii., p. 45.

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lowed this valley till it expanded into a great plain, which reaches from the sea to the mountains west of Rancagua. We shortly lost all trees and even bushes; so that the inhabitants are nearly as badly off for firewood as those in the Pampas. Never having heard of these plains, I was much surprised at meeting with such scenery in Chile. The plains belong to more than one series of different elevations, and they are traversed by broad flat-bottomed valleys; both of which circumstances, as in Patagonia, bespeak the gentle retreat of the ocean. In the steep cliffs bordering these valleys, there are some large caves, which no doubt were formed by the waters of the ancient bays and channels. One of these which I visited is celebrated under the name of Cueva del Obispo; having formerly been consecrated. During the day I felt very unwell, and from that time till the end of October did not recover.

SEPTEMBER 22D.—We continued to pass over green plains without a tree. The next day we arrived at a house near Navedad, on the sea-coast, where a rich Haciendero gave us lodgings. I stayed here the two ensuing days, and although very unwell, managed to collect from the tertiary formation some marine shells, many of which turn out to be quite new forms. 24th. Our course was now directed towards Valparaiso, which with great difficulty I reached on the 27th, and was there confined to my bed till the end of October. During this time I was an inmate in Mr. Corfield's house, whose kindness to me I do not know how to express.

I will here add a few observations on some of the animals and birds of Chile. The Puma, or South American Lion, is not uncommon. This animal has a wide geographical range; being found from the equatorial forests, throughout the deserts of Patagonia, as far south as the damp and cold latitudes (53° to 54°) of Tierra del Fuego. I have also seen its footsteps in the Cordillera of central Chile, at an elevation of at least 10,000 feet. In La Plata the puma chiefly preys on deer, ostriches, bizcacha, and other small quadrupeds; it

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there seldom attacks cattle or horses, and except in most rare cases, as a female having young, is never dangerous to man. In Chile, however, it destroys many young horses and cattle, owing probably to the scarcity of other quadrupeds: I heard, likewise, of two men and a woman who had been killed by them. It is asserted that the puma always kills its prey by springing on the shoulders, and then drawing back the head with one of its paws, until the vertebræ break: I have seen in Patagonia, the skeletons of guanacoes, with their necks thus dislocated.

The puma, after eating its fill, covers the carcass with many large bushes, and lies down to watch it. This habit is often the cause of its being discovered; for the condors wheeling in the air, every now and then descend to partake of the feast, and being angrily driven away, rise all together on the wing. The Chileno Guaso then knows there is a lion watching his prey—the word is given—and men and dogs hurry to the chase. Sir F. Head says that a Gaucho in the Pampas, upon merely seeing some condors wheeling in the air, cried "A lion!" I could never myself meet with any one who pretended to such powers of discrimination. It is asserted, that if a puma has once been betrayed by thus watching the carcass, and has then been hunted, it never resumes this habit; but that having gorged itself, it wanders far away.

The puma is easily killed. In an open country, it is first entangled with the bolas, then lazoed, and dragged along the ground till rendered insensible. At Tandeel (south of the Plata), I was told, that within three months one hundred were destroyed. In Chile they are generally driven up bushes or trees, and are then either shot, or baited to death by dogs. The dogs employed in this chase belong to a particular breed, called Leoneros. They are weak, slight animals, like long-legged terriers, but are born with a particular instinct for this sport. The puma is described as being very crafty: when pursued it often returns on its former track, and then suddenly making a spring on one side, waits there till the

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dogs have passed by. It is a very silent animal, uttering no cry even when wounded, and only rarely during the breeding season.

Of birds, two species of the genus *Pteroptochos* (*megapodius* and *albicollis* of Kittlitz) are perhaps the most conspicuous. The former, called by the Chilenos "el Turco," is as large as a fieldfare, to which bird it has some alliance; but its legs are much longer, tail shorter, and beak stronger: its colour is a reddish brown. The turco is not uncommon. It lives on the ground, sheltered among the thickets which are scattered over the dry and sterile hills. With its tail erect, and stilt-like legs, it may be seen every now and then, popping from one bush to another, with uncommon celerity. It really requires little imagination to believe the bird is ashamed of itself, and is aware of its most ridiculous figure. On first seeing it, one is tempted to exclaim, "A vilely stuffed specimen has escaped from some museum, and has come to life again!" It cannot be made to take flight without the greatest trouble, nor does it run, but only hops. The various loud cries which it utters when concealed amongst the bushes, are as strange as its whole appearance. It is said to build its nest in a deep hole beneath the ground. I dissected several specimens: the gizzard, which was very muscular, contained beetles, vegetable fibres, and pebbles. From this character, from the length of legs, scratching feet, membranous covering to the nostrils, short and arched wings, this bird seems to a certain degree to connect the thrushes with the gallinaceous order.

The second species (or *Pt. albicollis*) is allied to the first in its general form. It is called Tapacolo, or "cover your posterior;" and well does the shameless little bird deserve its name; for it carries its tail more than erect, that is, inclined backwards towards its head. It is very common, and frequents the bottoms of hedge-rows, and the bushes scattered over the barren hills, where scarcely another bird can exist. Hence the tapacolo is conspicuous in the ornithology of Chile. In its general manner of feeding, of quickly hopping

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out of the thickets and back again, in its desire of concealment, unwillingness to take flight, and nidification, it bears a close resemblance to the turco; but its appearance is not quite so ridiculous. The tapacolo is very crafty: when frightened by any person, it will remain motionless at the bottom of a bush, and will then, after a little while, try with much address to crawl away on the opposite side. It is also an active bird, and continually making a noise: these noises are various and strangely odd; some are like the cooing of doves, others like the bubbling of water, and many defy all similes. The country people say it changes its cry five times in the year—according to some change of season I suppose. I believe these two species of Pteroptochos are only found in central Chile. To the southward, within the damp forest region, two other species supply the place of these lovers of a more sterile land; and a fifth species is common to both districts. On the Patagonian coast a bird allied to them, both in structure and habits, represents this Chilian genus.*

Two species of humming-birds are common, and I have seen a third kind within the Cordillera, at an elevation of about 10,000 feet. *Mellisuga Kingii* is found over a space of 2500 miles on the west coast, from the hot dry country of Lima, to the forests of Tierra del Fuego—where it has been described as flitting about in a snow-storm. In the wooded island of Chiloe, which has an extremely humid climate, this little bird, skipping from side to side amidst the dripping foliage, is perhaps more abundant than almost any other kind. It there very commonly frequents open marshy ground, where a kind of bromelia grows: hovering near the edge of the thick beds, it every now and then dashed in close to the

* It is a remarkable fact, that Molina, though describing in detail all the birds and animals of Chile, never once mentions this genus, the species of which are so common, and so remarkable in their habits. Was he at a loss how to classify them, and did he consequently think that silence was the more prudent course? It is one more instance of the frequency of omission by authors, on those very subjects where it would be least expected.

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ground; but I could not see whether it ever actually alighted. At the time of year I refer to, there were very few flowers, and none whatever near the beds of bromelia. Hence I was quite sure they did not live on honey; and on opening the stomach and upper intestine, by the aid of a lens I could plainly distinguish, in a yellow fluid, morsels of the wings of diptera—probably tipulidæ. It is evident that these birds search for minute insects in their winter-quarters under the thick foliage. I opened the stomachs of several specimens, which were shot in different parts of the continent; and in all, remains of insects were so numerous, as often to present a black comminuted mass, as in the stomach of a creeper. In central Chile these birds are migratory: they make their appearance there in autumn, and in the latter end of the month corresponding to our October, they were very common. In the spring they began to disappear, and on the 12th of what would correspond to our March, in the course of a long walk, I saw only one individual. As this species migrates to the southward, it is replaced by the arrival of a larger kind, which will be presently described. I do not believe the small kind breeds in Chile; for, during the summer, their nests were common to the south of that country. The migration of the humming-birds on both the east* and west coast of North America exactly corresponds to what takes place in this southern continent. In both cases they move towards the tropic during the colder parts of the year, and retreat northward before the returning heat. Some, however, remain during the whole year in Tierra del Fuego; and in Northern California,—which in the northern hemisphere has the same relative position which Tierra del Fuego has in the southern,—some, according to Beechey, likewise remain.

The second species (*Trochilus gigas*) is a very large bird, for the delicate family to which it belongs. In the neighbourhood of Valparaiso, during this year, it had arrived in

* Humboldt's Pers. Narr., vol. v., part i., p. 352; Cook's Third Voyage, vol. ii.; and Beechey's Voyage.

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numbers, a little before the vernal equinox. It comes from the parched deserts of the north, probably for the purpose of breeding in Chile. When on the wing, the appearance of this bird is singular. Like others of the genus, it moves from place to place with a rapidity which may be compared to that of Syrphus amongst diptera, and Sphinx among moths; but whilst hovering over a flower, it flaps its wings with a very slow and powerful movement, totally different from that vibratory one common to most of the species, which produces the humming noise. I never saw any other bird, where the force of its wings appeared (as in a butterfly) so powerful in proportion to the weight of its body. When hovering by a flower, its tail is constantly expanded and shut like a fan, the body being kept in a nearly vertical position. This action appears to steady and support the bird, between the slow movements of its wings. Although flying from flower to flower in search of food, its stomach generally contained abundant remains of insects, which I suspect are much more the object of its search than honey is. The note of this species, like that of nearly the whole family, is extremely shrill.

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CHAPTER XV.

Chiloe—General aspect—Boat excursion — Native Indians — Castro— Large leaves of Gunnera scabra—Tame fox—Ascend San Pedro— Chonos Archipelago—Peninsula of Tres Montes—Granitic range— Lowe's Harbour—Wild potato—Forest—Formation of peat—Myopotamus, otter and mice—Cheucau and barking-bird—Furnarius—Singular character of ornithology—Petrels.

CHILOE AND CHONOS ISLANDS.

NOVEMBER 10TH.—The Beagle sailed from Valparaiso to the southward, for the purpose of surveying the southern part of Chile, the island of Chiloe, and the broken land called the Chonos Archipelago, as far south as the Peninsula of Tres Montes. On the 21st we anchored in the bay of S. Carlos, the capital of Chiloe.

This island is about ninety miles long, with a breadth of rather less than thirty. The land is hilly, but not mountainous, and is every where covered by one great forest, excepting a few scattered green patches, which have been cleared round the thatched cottages. From a distance the view somewhat resembles Tierra del Fuego; but the woods, when seen nearer, are incomparably more beautiful. Many kinds of fine evergreen trees, and plants with a tropical character, here take the place of the gloomy beech of the southern shores. In winter the climate is detestable, and in summer it is only a little better. I should think there are few parts of the world, within the temperate regions, where so much rain falls. The winds are very boisterous, and the sky almost always clouded: to have a week of fine weather is something wonderful. It is even difficult to get a single glimpse of the Cordillera: during our first visit only one opportunity occurred, and that was before sunrise, when the Volcano of Osorno stood out in bold relief; and it was curious

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to watch, as the sun rose, the outline gradually fading away in the glare of the eastern sky.

The inhabitants, from their complexion and low stature, appear to have three-fourths of Indian blood in their veins. They are an humble, quiet, industrious set of men. Although the fertile soil, resulting from the decomposition of volcanic rocks, supports a rank vegetation, yet the climate is not favourable to any production which requires much sunshine to ripen it. There is very little pasture for the larger quadrupeds; and in consequence, the staple articles of food are pigs, potatoes, and fish. The people all dress in strong woollen garments, which each family makes for itself, and dyes with indigo of a dark blue colour. The arts, however, are in the rudest state;—as may be seen in their strange fashion of ploughing, their method of spinning, grinding corn, and in the construction of their boats.

The forests are so impenetrable, that the land is nowhere cultivated except near the coast, and on the adjoining islets. Even where roads exist, they are scarcely passable from the soft and swampy state of the soil. The inhabitants, like those of Tierra del Fuego, chiefly move about on the beach, or in boats: in some cases the latter afford the only means of getting from one house to another. Although with plenty to eat, the people are very poor: there is no demand for labour, and consequently the lower orders cannot scrape together money sufficient to purchase even the smallest luxuries. There is also a great deficiency of a circulating medium. I have seen a man bringing on his back a bag of charcoal, with which to buy some trifle, and another a plank to exchange for a bottle of wine. Hence every tradesman must also be a merchant, and again sell the goods which he takes in exchange.

November 24th.—The yawl and whale-boat were sent under the command of Mr. Sulivan, to survey the eastern or inland coast of Chiloe; and with orders to meet the Beagle at the southern extremity of the island; to which point she would proceed by the outside, so as thus to circumnavi-

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gate the island. I accompanied this expedition, but instead of going in the boats the first day, I hired horses to take me to Chacao, at the northern extremity of the island. The road followed the coast; every now and then crossing promontories covered by fine forests. In these shaded paths it is absolutely necessary that the whole road should be made of logs of wood, which are squared and placed by the side of each other. From the rays of the sun never penetrating the evergreen foliage, the ground is so damp and soft, that except by such means, neither man nor horse would be able to pass along. I arrived at the village of Chacao, shortly after the tents belonging to the boats had been pitched for the night.

The land in this neighbourhood had been extensively cleared, and there were many quiet and most picturesque nooks in the forest. Chacao was formerly the principal port; but many vessels having been lost, owing to the dangerous currents and rocks in the straits, the Spanish government burnt the church, and thus arbitrarily compelled the greater number of inhabitants to migrate to S. Carlos. In a short time the barefooted son of the governor came down to reconnoitre us. Seeing the English flag hoisted at the yawl's mast-head, he asked, with the utmost indifference, whether it was always to fly at Chacao. In several places, the inhabitants were much astonished at the appearance of men-of-war's boats, and hoped and believed it was the forerunner of a Spanish fleet, coming to recover the island from the patriot government of Chile. All the men in power had, however, been informed of our intended visit, and were exceedingly civil. While we were eating our supper, the governor paid us a visit. He had been a lieutenant-colonel in the Spanish service, but now was miserably poor. He gave us two sheep, and accepted in return two cotton handkerchiefs, some brass trinkets, and a little tobacco.

25TH.—Torrents of rain: we managed, however, to run down the coast as far as Huapi-lenou. The whole of this eastern side of Chiloe has one aspect: it is a plain, broken by valleys, and divided into little islands, and the whole

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thickly covered with one impervious blackish-green forest. On the margins there are some cleared spaces, surrounding the high-roofed cottages.

26TH.—The day rose splendidly clear. The volcano of Osorno was spouting out volumes of smoke. This most beautiful mountain, formed like a perfect cone, and white with snow, stands out in front of the Cordillera. Another great volcano, with a saddle-shaped summit, also emitted from its immense crater little jets of steam. Subsequently we saw the lofty-peaked Corcovado—well deserving the name of "el famoso Corcovado." Thus we beheld, from one point of view, three great active volcanoes, each of which had an elevation of about seven thousand feet. In addition to this, far to the south, there were other very lofty cones covered with snow, which although not known to be active, must have been in their origin volcanic. The line of the Andes is not, in this neighbourhood, nearly so elevated as in Chile; neither does it appear to form so perfect a barrier between the regions of the earth. This great range, although running in a direct north and south line, owing to an optical deception, always appeared more or less semicircular; for the extreme peaks being seen standing above the same horizon together with the nearer ones, their much greater distance was not so easily recognised.

When landing on a point to take observations, we saw a family of pure Indian extraction. The father was singularly like York Minster; and some of the younger boys, with their ruddy complexions, might have been mistaken for Pampas Indians. Every thing I have seen convinces me of the close connexion of the different tribes, who nevertheless speak quite distinct languages. This party could muster but little Spanish, and talked to each other in their own tongue. It is a pleasant thing to see the aborigines advanced to the same degree of civilization, however low that may be, which their white conquerors have attained. More to the south we saw many pure Indians: indeed, some of the islands, such as Chauques, &c., have no other inhabitants than such as retain

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the Indian surname. In the census of 1832, there were in Chiloe and its dependencies, forty-two thousand souls. The greater number of these appear to be little copper-coloured men, of mixed blood. Eleven thousand actually retain their Indian surname; but it is probable that not nearly all of them are of pure blood. Their manner of life is the same with that of the other poor inhabitants, and they are all Christians: but it is said that they yet retain some strange superstitious ceremonies, and that they pretend to hold communication with the devil in certain caves. Formerly, every one convicted of this offence was sent to the Inquisition at Lima. Many of those people who are not included in the eleven thousand, cannot be distinguished by their appearance from Indians. Gomez, the governor of Lemuy, is descended from noblemen of Spain on both sides, but by constant intermarriages with natives, the present man is an Indian. On the other hand, the governor of Quinchao boasts much of his pure Spanish blood.

We reached at night a beautiful little cove, north of the island of Caucahue. The people here complained of want of land. This is partly owing to their own negligence in not clearing the woods, and partly to restrictions of the government, which makes it necessary before buying ever so small a piece, to pay two shillings to the surveyor, for measuring each quadra (150 yards square), together with whatever price he fixes for the value of the land. After his valuation, the land must be put up three times to auction, and if no one bids more, the purchaser can have it at that rate. All these exactions must be a serious check to clearing the ground, where the inhabitants are so extremely poor. In most countries, forests are removed without much difficulty, by the aid of fire; but in Chiloe, from the damp nature of the climate, and the sort of trees, it is necessary first to cut them down. This is a heavy drawback to the prosperity of Chiloe. In the time of the Spaniards the Indians could not hold land; and a family, after having cleared a piece of ground, might be driven away, and the property seized by

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the government. The Chilian authorities are now performing an act of justice, by making retribution to these poor Indians; giving to each man, according to his grade of life, a certain portion of land. The value of uncleared ground is very little. The government gave Mr. Douglas (the present surveyor, who informed me of these circumstances) eight and a half square miles of forest near S. Carlos, in lieu of a debt; and this he sold for 350 dollars, or about seventy pounds sterling.

The two succeeding days were fine, and at night we reached the island of Quinchao. This neighbourhood is the most cultivated part of the Archipelago; for a broad strip of land on the coast of the main island, as well as on many of the smaller adjoining ones, is almost completely cleared. Some of the farm-houses seemed very comfortable. I was curious to ascertain how rich any of these people might be, but Mr. Douglas says that no one can be considered as possessing a regular income. One of the richest landowners might possibly accumulate, in a long industrious life, as much as a thousand pounds sterling; but should this happen, it would all be stowed away in some secret corner; for it is the custom of almost every family to have a jar or treasure-chest buried in the ground.

November 30th.—Early on Sunday morning we reached Castro,—the ancient capital of Chiloe, but now a most forlorn and deserted place. The usual quadrangular arrangement of Spanish towns could be traced, but the streets and plaza were coated with fine green turf, on which sheep were browsing. The church, which stands in the middle, is entirely built of plank, and has a picturesque and venerable appearance. The poverty of the place may be conceived from the fact, that although containing some hundreds of inhabitants, one of our party was unable any where to purchase either a pound of sugar, or an ordinary knife. No individual possessed either a watch or a clock; and an old man, who was supposed to have a good idea of time, was employed to strike the church bell by guess.

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The arrival of our boats was a rare event in this quiet, retired corner of the world; and nearly all the inhabitants came down to the beach to see us pitch our tents. They were very civil, and offered us a house; and one man even sent us a cask of cider as a present. In the afternoon we paid our respects to the governor;—a quiet old man, who, in his appearance and manner of life, was scarcely superior to an English cottager. At night heavy rain set in, which was hardly sufficient to drive away from the tents the large circle of lookers on. An Indian family, who had come to trade in a canoe from Caylen, bivouacked near us. They had no shelter during the rain. In the morning, I asked a young Indian, who was wet to the skin, how he had passed the night. He seemed perfectly content, and answered, "Muy bien, senor."

December 1st.—We steered for the island of Lemuy. I was anxious to examine a reported coal-mine, which turned out to be lignite of little value, in the sandstone (probably of an ancient tertiary epoch) of which these islands are composed. When we reached Lemuy we had much difficulty in finding any place to pitch our tents, for it was spring tide, and the land was wooded down to the water's edge. In a short time we were surrounded by a large group of the nearly pure Indian inhabitants. They were much surprised at our arrival, and said one to the other, "This is the reason we have seen so many parrots lately; the cheucau (an odd red-breasted little bird, which inhabits the thick forest, and utters very peculiar noises) has not cried 'beware' for nothing." They were soon anxious for barter. Money was scarcely worth any thing, but their eagerness for tobacco was something quite extraordinary. After tobacco indigo came next in value; then capsicum, old clothes, and gunpowder. The latter article was required for a very innocent purpose: each parish has a public musket, and the gunpowder was wanted for making a noise on their saint or feast days.

The people here live chiefly on shell-fish and potatoes. At certain seasons they catch also, in "corrales" or hedges

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under water, many fish which are left on the mud-banks as the tide falls. They occasionally possess fowls, sheep, goats, pigs, horses, and cattle; the order in which they are here mentioned expressing their respective frequency. I never saw any thing more obliging and humble than the manners of these people. They generally began with stating, that they were poor natives of the place, and not Spaniards, and that they were in sad want of tobacco and other comforts. At Caylen, the most southern island, we bought with a stick of tobacco of the value of three-halfpence, two fowls—one of which, the Indian stated, had skin between its toes, and turned out to be a fine duck; and with some cotton handkerchiefs, worth three shillings, we procured three sheep, and a large bunch of onions. The yawl at this place was anchored some way from the shore, and we had fears for her safety during the night. Our pilot, Mr. Douglas, accordingly told the constable of the district, that we always placed sentinels with loaded arms, and not understanding Spanish, if we saw any person in the dark, we should assuredly shoot him. The constable, with much humility, agreed to the perfect propriety of this arrangement, and promised us that no one should stir out of his house during that night.

During the four succeeding days we continued sailing southward. The general features of the country remained the same, but it was much less thickly inhabited. On the large island of Tanqui there was scarcely one cleared spot; the trees on every side extending their branches over the sea-beach. I one day noticed some very fine plants of the panke (*Gunnera scabra*), which somewhat resembles the rhubarb on a gigantic scale, growing on the sandstone cliffs. The inhabitants eat the stalks, which are subacid, and tan leather with the roots, and prepare a black die from them. The leaf is nearly circular, but deeply indented on its margin: I measured one which had a diameter of nearly eight feet, and therefore a circumference of no less than twenty-four! The stalk is rather more than a yard high, and each plant

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sends out four or five of these enormous leaves—presenting together a very noble appearance.

DECEMBER 6TH.—We reached Caylen, called "el fin del Cristiandad." In the morning we stopped for a few minutes at a house on the northern end of Laylec, which was the extreme point of South American Christendom, and a miserable hovel it was. The latitude is 43° 10′, which is two degrees further south than the Rio Negro on the Atlantic coast. These extreme Christians were very poor, and, under the plea of their situation, begged some tobacco. As a proof of the poverty of these Indians, I may mention that, shortly before this, we had met a man who had travelled three days and a half on foot, and had as many to return, for the sake of recovering the value of a small axe, and a few fish. How very difficult it must be to buy the smallest article, when such trouble is taken to recover so small a debt!

In the evening we reached the island of S. Pedro, where we found the Beagle at anchor. In doubling the point, two of the officers landed to take a round of angles with the theodolite. A fox, of a kind said to be peculiar to the island, and very rare in it, and which is an undescribed species, was sitting on the rocks. He was so intently absorbed in watching their manœuvres, that I was able, by quietly walking up behind, to knock him on the head with my geological hammer. This fox, more curious or more scientific, but less wise, than the generality of his brethren, is now mounted in the museum of the Zoological Society.

We staid three days in this harbour; on one of which Captain FitzRoy, with a party, attempted to ascend to the summit of San Pedro. The woods here had rather a different aspect from those on the northern parts of the island. The rock also being micaceous slate, there was no beach, but the steep sides dipped directly beneath the water. The general aspect in consequence was more like that of Tierra del Fuego than of Chiloe. In vain we tried to gain the summit: he forest was so impenetrable that no one, who has not beheld it, can imagine so entangled a mass of dying and dead

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trunks. I am sure that often, for more than ten minutes together, our feet never touched the ground, and we were frequently ten or fifteen feet above; it so that the seamen as a joke called out the soundings. At other times we crept one after another on our hands and knees, under the rotten trunks. In the lower part of the mountain, noble trees of the winter's bark, and a laurel like the sassafras with fragrant leaves, and others, the names of which I do not know, were matted together by a trailing bamboo or cane. Here we were more like fishes struggling in a net than any other animal. On the higher parts, brushwood takes the place of larger trees, with here and there a red cedar or an alerce pine. I was also pleased to see, at an elevation of a little less than 1000 feet, our old friend the southern beech. They were, however, poor stunted trees; and I should think this must be nearly their northern limit. We ultimately gave up the attempt in despair.

December 10th.—The yawl and whale-boat, with Mr. Sulivan, proceeded on their survey, but I remained on board the Beagle, which the next day left S. Pedro for the southward. On the 13th we ran into an opening in the southern part of Guayatecas, or the Chonos Archipelago; and it was fortunate we did so, for on the following day a storm, worthy of Tierra del Fuego, raged with its wonted fury. White massive clouds were piled up against a dark blue sky, and across them black ragged sheets of vapour were rapidly driven. The successive mountain-ranges appeared like dim shadows; and the setting sun cast on the woodland a yellow gleam, much like that produced by the flame of spirits of wine on a man's countenance. The water was white with the flying spray; and the wind lulled and roared again through the rigging. It was a most ominous, sublime scene. During a few minutes there was a bright rainbow, and it was curious to observe the effect of the spray, which, being carried along the surface of the water, changed the ordinary semicircle into a ring. A band of prismatic colours was continued from both feet of the common arch, across the bay, close to the vessel's side; thus forming a distorted, but very nearly entire circle.

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We staid here three days. The weather continued bad; but this did not much signify, for the surface of the land in all these islands is all but impassable. The coast is so very rugged, that to attempt to walk in that direction requires continued scrambling up and down, over the sharp rocks of mica slate; and as for the woods—our faces, hands, and shin-bones all bore witness to the maltreatment we received in merely attempting to penetrate their forbidden recesses.

December 18th.—We stood out to sea. On the 20th we bade farewell to the south, and with a fair wind turned the ship's head northward. From Cape Tres Montes we sailed pleasantly along the lofty weather-beaten coast; which is remarkable for the bold outline of its hills, and the thick covering of forest—even on the almost precipitous flanks. The next day a harbour was discovered, which on this dangerous coast might be of great utility to a distressed vessel. It can easily be recognised by a hill 1600 feet high, which is even more perfectly conical than the famous sugar-loaf at Rio de Janeiro. The next day, after anchoring, I succeeded in reaching the summit of this hill. It was a laborious undertaking, for the sides were so steep, that in some parts it was necessary to use the trees as ladders: there were also several extensive brakes of the Fuchsia covered with its beautiful drooping flowers, but very difficult to crawl through. In these wild countries it gives much delight, to gain the summit of any mountain. There is an indefinite expectation of meeting something very strange, which, however often it may be balked, never failed with me to recur on each successive attempt. Every one must know the feeling of triumph and pride which a grand view from a height communicates to the mind. In these little frequented countries there is also joined to it some vanity, that you perhaps are the first man who ever stood on this pinnacle or admired this view.

A strong desire is always felt to ascertain, whether any body has previously visited the place. A bit of wood with a nail in it is picked up and studied, as if it were covered with hieroglyphics. Possessed with this feeling, I was much in-

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terested by finding, on a wild part of the coast, a bed made of grass beneath a ledge of rock. Close by it there had been a fire, and the man had used an axe. The fire, bed, and situation, showed the dexterity of an Indian; but he could scarcely have been an Indian; for the race is in this part extinct, owing to the Catholic desire of making at one blow Christians and Slaves. I had at the time some misgivings (though they afterwards were proved to have been groundless) that the solitary man, who had made his bed on this wild spot, must have been some poor shipwrecked sailor, who, in trying to travel up the coast, had here lain himself down for his dreary night.

December 28th.—The weather continued very bad, but it at last permitted us to proceed with the survey. The time hung heavy on our hands, as it always did when we were delayed from day to day by successive gales of wind. In the evening another harbour was discovered, where we anchored. Directly afterwards a man was seen waving his shirt; and a boat was sent which brought back two seamen. A party of six had run away from an American whaling vessel, and had landed a little to the southward in a boat, which was shortly afterwards knocked to pieces by the surf. They had now been wandering up and down the coast for fifteen months, without knowing which way to go, or where they were. What a singular piece of good fortune it was that this harbour was now discovered! Had it not been for this one chance, they might have wandered till they had grown old men, and at last have perished on this wild coast. Their sufferings had been very great, and one of their party had lost his life, by falling from the cliffs. They were sometimes obliged to separate in search of food, and this explained the bed of the solitary man. Considering what they had undergone, I think they had kept a very good reckoning of time; though they had lost four days, by making this the 24th instead of the 28th.

December 30th.—We anchored in a snug little cove at the foot of some high hills, near the northern extremity of

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Tres Montes. After breakfast the next morning, a party ascended one of these mountains, which had an altitude of 2400 feet. The scenery was remarkable. The chief part of the range was composed of grand, solid, abrupt masses of granite, which appeared as if they had been coeval with the beginning of the world. The granite is capped with slaty gneiss, and this in the lapse of ages has been worn into strange finger-shaped points. These two formations, thus differing in their outlines, agree in being almost destitute of vegetation. This barrenness had to our eyes a still stranger appearance, from our having been so long accustomed to the sight of an almost universal forest of dark green trees. I took much delight in examining the structure of these mountains. The complicated and lofty ranges bore a noble aspect of durability,—equally profitless, however, to man and to all other animals. Granite to the geologist is classic ground: from its wide-spread limits, and its beautiful and compact texture, few rocks have been more early recognised. Granite has given rise, perhaps, to more discussion concerning its origin than any other formation. We generally see it constituting the fundamental rock, and, however formed, we know it is the deepest layer in the crust of this globe, to which man has been able to penetrate. The limit of man's knowledge in any subject possesses a high interest, which is perhaps increased by its close neighbourhood to the realms of imagination.

January 1st, 1835.—The new year is ushered in, with the ceremonies proper to it in these regions. She lays out no false hopes; a heavy N. W. gale, with steady rain, bespeaks the rising year. Thank God, we are not destined here to see the end of it, but hope then to be in the Pacific, where a blue sky tells one there is a heaven—a something beyond the clouds above our heads.

The N. W. winds prevailing for the next four days, we only managed to cross a great bay, and then anchored in another secure harbour. I accompanied the captain in a boat to the head of a deep creek. On the way the number

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of seals which we saw was quite astonishing; every bit of flat rock, and parts of the beach, were covered with them. They appeared to be of a loving disposition, and lay huddled together, fast asleep, like so many pigs; but even pigs would be ashamed of their dirt, and of the foul smell which came from them. Each herd was watched by the patient but inauspicious eyes of the turkey-buzzard. This disgusting bird, with its bald scarlet head, formed to wallow in putridity, is very common on the west coast, and their attendance on the seals shows that they are dependant on their mortality. We found the water (probably only that of the surface) nearly fresh; this was caused by the number of torrents, which, in the form of cascades, came tumbling over the bold granite mountains into the sea. The fresh water attracts the fish, and these bring many terns, gulls, and two kinds of cormorant. We saw also a pair of the beautiful black-necked swans, and several small sea-otters, the fur of which is held in such high estimation. In returning we were again amused by the impetuous manner in which the heap of seals, old and young, tumbled into the water as the boat passed. They did not remain long under, but rising, followed us with outstretched necks, expressing great wonder and curiosity.

7TH.—Having run up the coast, we anchored near the northern end of the Chonos Archipelago, in Lowe's Harbour, where we remained a week. The islands were here, as in Chiloe, composed of a stratified littoral deposit of soft sandstone with shingle; and the vegetation in consequence was beautifully luxuriant. The woods came down to the sea-beach, just in the same manner as an evergreen shrubbery over a gravel walk. We also enjoyed from the anchorage a splendid view of four great snowy cones of the Cordillera, beginning with the saddle-topped volcano, next "el famoso Corcovado," and then two others to the southward. The range itself had in this latitude so little elevation, that few parts of it appeared above the line of the neighbouring islets. We found here a party of five men

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from Caylen, " el fin del Cristiandad," who had most adventurously crossed the open space of sea which separates Chonos from Chiloe, in their miserable boat-canoe, for the purpose of fishing. These islands will, in all probability, in a short time become peopled, like those adjoining the coast of Chiloe.

Humboldt,* in his Essay on the Kingdom of New Spain, has given a most interesting discussion on the history of the common potato. He believes that the plant described by Molina,† under the name of *maglia*, is the original stock of this useful vegetable, and that it grows in Chile in its native soil. He supposes that thence it was transported by the Indian population to Peru, Quito, New Granada, and the whole Cordillera, from 40° south to 5° north. He observes that it is a remarkable circumstance, and in accordance with all records respecting the course of the stream of American population, that previously to the Spanish conquest, it was unknown in Mexico. Among the Chonos Islands, a wild potato grows in abundance, which in general habit is even more closely similar to the cultivated kind than is the *maglia* of Molina.

These potatoes grow near the sea-beach, in thick beds, on a sandy, shelly soil, wherever the trees are not too close together. In the middle of January they were in flower, but the tubers were small, and few in number; especially in those plants which grew in the shade, and had the most luxuriant foliage. Nevertheless, I found one which was of an oval form, with one diameter two inches in length. The raw bulbs had precisely the smell of the common potato of England, but when cooked they shrunk, and became watery and insipid. They had not a bitter taste, as, according to Molina, is the case with the Chilian kind; and they could be eaten with safety. Some plants measured

* Humboldt's New Spain, book iv., chap. ix.

† Molina's Chile, Spanish edition, vol. i., p. 136.

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from the ground to the tip of the upper leaf, not less than four feet.

So very close is the general resemblance with the cultivated species, that it is necessary to show that they have not been imported. The simple fact of their growth on the islands, and even small rocks, throughout the Chonos Archipelago, which has never been inhabited, and very seldom visited, is an argument of some weight. But the circumstance of the wildest Indian tribes being well acquainted with the plant, is stronger. Mr. Lowe, a very intelligent and active sealer, informs me, that on showing some potatoes to the naked savages in the Gulf of Trinidad (lat. 50°), they immediately recognised them, and calling them "Aquina," wanted to take them away. The savages also pointed to a place where they grew; which fact was subsequently verified. The Indians of Chiloe, belonging to another tribe, also give them a name in their own language. The simple fact of their being known and named by distinct races, over a space of four or five hundred miles on a most unfrequented and scarcely known coast, almost proves their native existence. Professor Henslow, who has examined the dried specimens which I brought home, says that they are the same with those described by Mr. Sabine* from Valparaiso, but that they form a variety which by some botanists has been considered as specifically distinct. It is remarkable that the same plant should be found on the sterile mountains of central Chile, where a drop of rain does not fall for more than six months, and within the damp forests of the southern islands. From what we know of the habits of the potato, this latter situation would appear more congenial than the former, as its birthplace.

In the central parts of the Chonos Archipelago, in lat. 45° 30′, the forest has assumed very much the same charac-

* Horticultural Transact., vol. v., p. 249. Mr. Caldcleugh sent home two tubers, which being well manured, even the first season produced numerous potatoes and an abundance of leaves.

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ter which is found along the whole west coast for 600 miles to Cape Horn. The arborescent grass of Chiloe has here ceased to exist; while the beech of Tierra del Fuego both grows to a good size, and forms a considerable proportion of the wood; not, however, in the same exclusive manner as it does further to the southward. Cryptogamic plants here find a most congenial climate. In the neighbourhood of the Strait of Magellan, I have before remarked that the country appears too cold and wet to allow of their arriving at perfection; but in these islands, within the forest, the number of species, and great abundance of mosses, lichens, and small ferns, is quite extraordinary.* In Tierra del Fuego trees grow only on the hill-sides; every level piece of land being invariably covered by a thick bed of peat; but in Chiloe the same kind of situation supports the most luxuriant forest. Here, within the Chonos Archipelago, the nature of the climate more closely approaches that of the southern, than that of the northern, of these two countries. Nearly every patch of level ground is covered by two species of plants (*Astelia pumila* of Brown,† and *Donatia magellanica*), which by their joint decay compose a thick bed of elastic peat.

In Tierra del Fuego, above the region of woodland, the former of these eminently sociable plants is the chief agent in the production of peat. Fresh leaves are always succeeding one to the other, round the central tap root; the lower ones soon decay; and in tracing a root downward in the peat, the leaves (yet holding their position) can be observed passing through every stage of decomposition, till the whole becomes blended in one confused mass. The Astelia is assisted by few other plants; here and there a small creeping one (*Myrtus nummularia*), with a woody stem like our

* By sweeping with my insect-net, I procured from these situations a considerable number of minute insects of the family of Staphylinidæ, and others allied to Pselaphus, and minute Hymenoptera. But the most characteristic family in number of both individuals and species, throughout the more open parts of Chiloe and Chonos, is that of the Telephoridæ.

† *Anthericum trifarium* of Solander.

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cranberry, but with a sweet berry; another (*Empetrum rubrum*) like our heath, and a third (*Juncus grandiflorus*) a rush; are nearly the only ones that grow on the swampy surface. These plants, though possessing a very close general resemblance to the English kinds, are botanically different. In the more level parts of the country, the surface of the peat is broken up into little pools of water, which stand at different heights, and appear as if artificially excavated. Small streams of water, flowing under ground, complete the disorganization of the vegetable matter, and consolidate the whole.

The climate of the southern part of America appears particularly favourable to the production of peat. In the Falkland Islands, almost every kind of plant, even the coarse grass which covers the whole surface of the island, becomes converted into this substance. I was at first at a loss to imagine how so much peat had been formed; but the conversion of the grass at once explains it. I observed that even some bones of cattle, strewed on the surface, were nearly covered up by the decaying matter at the foot of the blades of withered grass. Scarcely any situation checks its growth; it overhangs the banks of running streams, and encroaches on the piles of loose angular fragments of quartz rock. Some of the beds are of considerable thickness, even as much as twelve feet: the peat in the lower part is earthy, and completely altered, and when dry, becomes so solid that it ignites with difficulty. No doubt, although every plant lends its aid in the process, yet the Astelia is the most efficient. It is rather a singular circumstance, as being so very different from what occurs in Europe, that no kind of moss forms by its decay any portion of the peat in South America.

With respect to the northern limit at which the climate allows of that peculiar kind of slow decomposition which is necessary for the production of peat, I believe that in Chiloe (lat. 41° to 42°), although there is much swampy ground, no well-characterized substance of this nature

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occurs. But in the Chonos Islands, three degrees further southward, we have seen that it is abundant. On the eastern coast in La Plata (lat. 35°), I was told by a Spanish resident (who had visited Ireland), that he had often sought for this substance, but had never been able to find any. He showed me, as the nearest approach to it which he had discovered, a black peaty soil, so penetrated with roots as to allow of an extremely slow and imperfect combustion.

The zoology of these broken islets of the Chonos Archipelago, is, as might have been expected, very poor. Of quadrupeds, two aquatic kinds are common. The *Myopotamus Coipus* (like a beaver, but with a round tail) is well known from its fine fur, which is an object of trade, throughout the tributaries of La Plata. It here, however, exclusively frequents salt water; which same circumstance has been mentioned, as sometimes occurring with the great rodent, the Capybara. A small sea-otter is very numerous. This animal does not feed exclusively on fish, but, like the seals, draws a large supply from a small red crab, which swims in shoals near the surface of the water. Mr. Bynoe saw one in Tierra del Fuego eating a cuttle-fish; and at Lowe's Harbour another was killed, in the act of carrying to its hole a large volute; and this was the only specimen of that shell which was procured. At one place I caught in a trap a singular little mouse; it appeared common on several of the islets, but the Chilotans at Lowe's Harbour said that it was not found in all. What a succession of chances,* or what changes of level, must have been brought into play, thus to spread these small animals throughout this broken archipelago!

In all parts of Chiloe and Chonos, two very strange birds occur, which have many points of affinity with the Turco

* Many rapacious animals bring their prey alive to feed their young. Are there any instances on record of such a habit among owls or hawks? If so, in the course of centuries, every now and then, one might escape from the young birds. Some such agency is wanted, to account for the distribution of the smaller gnawing animals on islands near to each other.

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and Tapacolo. One is called by the inhabitants "Cheucau" (*Pteroptochos rubecula*). It frequents the most gloomy and retired spots within the damp forests. Sometimes, although its cry may be heard close at hand, let a person watch ever so attentively, he will not see the cheucau; at other times, let him stand motionless, and the red-breasted little bird will approach within a few feet, in the most familiar manner. It then busily hops about the entangled mass of rotting canes and branches, with its little tail cocked upwards. I opened the gizzard of some specimens: it was very muscular, and contained hard seeds, buds of plants, and vegetable fibres, mixed with small stones. The cheucau is held in superstitious fear by the Chilotans, on account of its strange and varied cries. There are three very distinct kinds,—one is called "chiduco," and is an omen of good; another, "huitreu," which is extremely unfavourable; and a third, which I have forgotten. These words are given in imitation of its cries, and the natives are in some things absolutely governed by them. The Chilotans assuredly have chosen a most comical little creature for their prophet.

An allied species, but rather larger, is called by the natives "Guid-guid" (*Hylactes Tarnii* of King, and *Pteroptochos* of Kittlitz), and by the English the barking-bird. This latter name is well given; for I defy any one at first to feel certain that a small dog is not yelping somewhere in the forest. Just as with the cheucau, a person will sometimes hear the bark close by, but in vain may endeavour, by watching, and with still less chance by beating the bushes, to see its author; yet at other times the guid-guid fearlessly comes near. Its manner of feeding and its general habits are very similar to those of the cheucau. Both species are said to build their nests close to the ground, amongst the rotten branches. The ground being so extremely wet, is a good reason why they do not burrow holes, like the northern species. Besides the cheucau and guid-guid, there is another species, but it is not very common. Moreover, the bird which has been men-

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tioned in Tierra del Fuego, under the title of a black wren (*Scytalopus fuscus* of Gould), appears, in its skulking habits, odd cries, and place of resort, and likewise in some points of structure, to be closely related to this singular genus.

On the coast,* a small dusky-coloured bird (a *Furnarius* allied to *fuliginosus*) is very common. It is remarkable from its quiet and very tame habits. It lives entirely on the sea-beach, and there (as well as sometimes on the floating kelp), picks up small sea-shells and crabs; thus supplying the place of a sandpiper. Besides these birds, only a few others inhabit this broken land. In my rough notes I describe the strange noises, which although frequently heard within these gloomy forests, yet scarcely disturb the general silence. The yelping of the guid-guid, and the sudden whew-whew of the cheucau, sometimes come from afar, and sometimes from close at hand;—the little wren occasionally adds its cry;—the creeper follows the intruder, screaming and twittering;—the humming-bird may be seen every now and then darting from side to side, and emitting, like an insect, its shrill chirp;—lastly, from the top of some lofty tree, the indistinct but plaintive note of the white-tufted tyrant-flycatcher may be noticed.

From the great preponderance in most countries of certain kinds of birds, such as the finches, one feels at first surprised at meeting with such peculiar forms, above enumerated, as the commonest birds in any district. In central Chile two of them, namely the *Synallaxis* and *Scytalopus*, occur, although most rarely. When finding, as in this case, any animal which seems to play so insignificant a part in the great scheme of nature, one is apt to wonder why a distinct species

* I may mention as a proof of how great a difference there is between the seasons of the wooded and the open parts of the coast, that on September 20th, in lat. 34°, these birds had young ones in the nest, while among the Chonos Islands, three months later in the summer, they were only laying; the difference in latitude between these two places being about 700 miles.

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should have been created. But it should always be recollected, that in some other country perhaps it is an essential member of society, or at some former period may have been so. If America south of 37° should be sunk beneath the waters of the ocean, the *Synallaxis* and *Scytalopus* might continue to exist in central Chile for a long period, but it is very improbable that their numbers would increase. We should then see a case, which must inevitably have happened with very many animals.

These southern seas are frequented by several species of Petrels. The largest kind, *Procellaria gigantea*, or nelly, (quebrantahuesos, or break-bones, of the Spaniards) is a common bird, both in the inland channels and on the open sea. In its habits and manner of flight there is a very close resemblance with the albatross, and as with the latter bird, a person may watch it for hours together without seeing on what it feeds, so is it with this petrel. The "break-bones" is, however, a rapacious bird,* for it was observed by some of the officers at Port St. Antonio chasing a diver. The bird tried to escape both by diving and flying, but was continually struck down, and at last killed by a blow on its head. At Port St. Julian, also, these great petrels were seen killing and devouring young gulls.

A second species (*Puffinus cinereus*†), which is common to Europe, Cape Horn, and the coast of Peru, is of a much smaller size than the *gigantea*, but, like it, of a dirty black colour. It generally frequents the inland sounds in very large flocks: I do not think I ever saw so many birds of any other sort together, as I once saw of these behind the island of Chiloe. Hundreds of thousands flew in an irregular line, for several hours in one direction. When part of the flock settled on the water, the surface was blackened, and a noise proceeded from them, as of human beings talking in the dis-

* The Spaniards who named it were probably aware of this, for "quebrantahuesos" means properly an osprey.

† I am indebted to Mr. Gould for naming these birds, and for kindly furnishing me with much information respecting them.

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tance. At this time the water was in parts coloured by clouds of small crustacea. At Port Famine, every morning and evening, a long band of these birds continued to fly, with extreme rapidity, up and down the central parts of the channel. I opened the stomach of one (which I shot with some difficulty, for they were rather wary), and it contained a small fish, and seven good-sized, prawn-like crabs.

There are several other species of petrels, but I will only mention one other kind, the *Puffinuria Berardii*, which offers one more example of those extraordinary cases, of a bird evidently belonging to one well-marked family, yet both in its habits and structure allied to a very distinct tribe. This bird never leaves the quiet inland sounds. When disturbed it dives to a distance, and on coming to the surface, with the same movement takes wing. After flying for a space in a direct course, by the rapid movement of its short wings, it drops, as if struck dead, and dives again. The form of the beak and nostrils, length of foot, and even colouring of the plumage, show that this bird is a petrel: at the same time, its short wings and consequent little power of flight, its form of body and shape of tail, its habits of diving, and the absence of a hind toe to its foot, and its choice of situation, make it doubtful whether its relationship is not equally close with the auks as with the petrels. It would undoubtedly be mistaken for one of the former, when seen either on the wing, or when diving and quietly swimming about the retired channels of Tierra del Fuego.

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CHAPTER XVI.

San Carlos, Chiloe—Osorno in eruption—Ride to Castro and Cucao—Impenetrable forests—Valdivia—Apple-trees—Ride to Llanos—Indians—Earthquake—Concepcion—Great earthquake—Effects of wave—Rocks fissured—Appearance of the former towns—Water in the bay black and boiling—Direction of vibration—Stones displaced—Cause of great waves—Permanent elevation of land—Great lake of fluid rock beneath crust of the globe—Connexion of volcanic phenomena—Slow elevation of mountain chain, cause of earthquakes.

CHILOE AND CONCEPCION.

On January the 15th we sailed from Lowe's Harbour, and three days afterwards anchored a second time in the bay of S. Carlos in Chiloe. On the night of the 19th the volcano of Osorno was in activity. At midnight the sentry observed something like a large star; from which state the bright spot gradually increased in size till about three o'clock, when a very magnificent spectacle was presented. By the aid of a glass, dark objects, in constant succession, were seen, in the midst of a great red glare of light, to be thrown upwards and to fall down again. The light was sufficient to cast on the water a long bright reflection. By the morning the volcano* had resumed its tranquillity.

Large masses of molten matter seem very commonly to be cast out of the igneous vents, in this part of the Cordillera. I was assured, that when the Corcovado is in eruption, great masses projected upwards are seen to burst in the air, and to assume fantastical forms, such as trees and other bodies. One may form an idea of the immense size of these bodies, when it is stated that they have been seen from the high land

* In another work I shall have occasion to refer to this eruption, which is connected with one of the grandest series of volcanic phenomena on record.

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behind S. Carlos, which is distant no less than ninety-three miles from the Corcovado.

Captain FitzRoy being anxious that some bearings should be taken on the outer coast of Chiloe, it was planned that Mr. King and myself should ride to Castro, and thence across the island to the Capella de Cucao, situated on the west coast. Having hired horses and a guide, we set out on the morning of the 22d. We had not proceeded far, before we were joined by a woman and two boys, who were bent on the same journey. Every one on this road acts on a "hail fellow well met," fashion; and one may here enjoy the privilege, so rare in South America, of travelling without fire-arms.

At first, the country consists of a succession of hills and valleys. Nearer to Castro it becomes very level, but is still some height above the sea. The road itself is a curious affair: it consists in its whole length, with the exception of very few parts, of great logs of wood, which are either broad and placed longitudinally, or narrow and transversely. In summer the road is not very bad: but in winter, when the wood is rendered slippery from rain, travelling is exceedingly difficult. At that time of the year, the ground on each side becomes a morass, and is often overflowed: hence it is necessary that the longitudinal logs should be fastened down by transverse poles, which are pegged on each side into the earth. These pegs render a fall from a horse dangerous; as the chance of alighting on one of them is not small. It is remarkable, however, how active custom has made the Chilotan horses. In crossing bad parts, where the logs have been displaced, they skipped from one to the other, almost with the quickness and certainty of a dog. On either hand the road is bordered by the lofty forest-trees, with their bases matted together by the canes. When occasionally a long reach of this avenue could be observed, it presented a curious scene of uniformity: the white line of logs, narrowing in perspective, became hidden by the gloomy forest, or it terminated in a zigzag which ascended some steep hill.

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Although the distance from S. Carlos to Castro is only twelve leagues in a straight line, the formation of the road must have been a great labour. I was told that several people had formerly lost their lives in attempting to cross the forest. The first who succeeded was an Indian, who cut his way through the canes in eight days, and reached S. Carlos. He was rewarded by the Spanish government with a grant of land. During the summer, many of the Indians wander about the forests (but chiefly in the higher parts, where the woods are not quite so thick) in search of the half wild cattle which live on the leaves of the cane, and certain trees. It was one of these huntsmen who by chance discovered, a few years since, an English vessel, which had been wrecked on the outer coast. The crew were beginning to fail in provisions, and it is not probable that, without the aid of this man, they would have been able to have extricated themselves from these scarcely penetrable woods. As it was, one seaman died on the march, from fatigue. The Indians in these excursions steer by the sun; so that if there is a continuance of cloudy weather, they cannot travel.

The day was beautiful, and the number of trees which were in full flower perfumed the air; yet even this could scarcely dissipate the effect arising from the gloomy dampness of the forest. Moreover, the many dead trunks that stand like skeletons, never fail to give to these primeval woods a character of solemnity which is wanting in those of countries long civilized. Shortly after sunset we bivouacked for the night. Our female companion, who was rather good-looking, belonged to one of the most respectable families in Castro: she rode, however, astride, and without shoes or stockings. I was surprised at the total want of pride shown by her and her brother. They brought food with them, but at all our meals sat watching Mr. King and myself whilst eating, till we were fairly shamed into feeding the whole party. The night was cloudless; and while lying in our beds, we enjoyed the sight (and it is a high enjoyment) of the multitude of stars which illumined the darkness of the forest.

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JANUARY 23D. — We rose early in the morning, and reached the pretty quiet town of Castro by two o'clock. The old governor had died since our last visit, and in his place a Chileno was acting. We had a letter of introduction to Don Pedro. We found him exceedingly hospitable and kind, and with a degree of disinterestedness which is more common in La Plata than on this side of the continent. The next day Don Pedro procured us fresh horses, and offered to accompany us himself. We proceeded to the south; generally following the coast, and passing through several hamlets, each with its large barn-like chapel, built of wood. Near Castro we saw a remarkably pretty waterfall: it was very small, but the water fell in a single sheet into a large circular basin, around which stately trees, from 100 to 120 feet high, cast a dark shade. At Vilipilli, Don Pedro asked the commandant to give us a guide to Cucao. The old gentleman offered to come himself; but for a long time he would not believe that any thing could induce two Englishmen to go to such an out of the way place as Cucao. We thus were accompanied by the two greatest aristocrats in the country; as was plainly to be seen in the manner of all the poorer Indians towards them.

At Chonchi, we struck off across the island, and followed intricate winding paths, sometimes passing through magnificent forests, and then opening into pretty cleared spots, abounding with corn and potato crops. In this undulating woody country, partially cultivated, there was something which reminded me of the wilder parts of England, and therefore had to my eye a most fascinating aspect. At Vilinco, which is situated on the borders of the lake of Cucao, only a few fields are cleared; and all the inhabitants appear to be Indians. This lake is twelve miles long, and runs in an east and west direction. From local circumstances, the sea-breeze blows very regularly during the day, and during the night it falls calm. This has given rise to strange exaggerations: for the phenomenon, as described to us at S. Carlos, was quite a prodigy.

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The road to Cucao was so very bad, that we determined to embark in a *periagua*. The commandant, in the most authoritative manner, ordered six Indians to get ready to pull us over, without deigning to tell them whether they would be paid. The periagua is a strange rough boat, but the crew were still stranger; I doubt if six uglier little men ever got into a boat together. They pulled, however, very well and cheerfully: the stroke-oar gabbled Indian, and uttered strange cries, much after the fashion of a pig-driver when driving his pigs. We started with a light breeze against us, but yet reached, before late at night, the Capella de Cucao. The country on each side of the lake was one unbroken forest.

In the same periagua with us, a cow was embarked. To get so large an animal into a small boat appears at first a difficulty; but the Indians managed it in a minute. They brought the cow alongside the boat, which was heeled towards her; then placing two oars under her belly, with their ends resting on the gunwale, by the aid of these levers they fairly tumbled the poor beast, heels over head, into the bottom of the boat, and then lashed her down with ropes. At Cucao, we found an uninhabited hovel (which is the residence of the padre when he pays this Capella a visit), where, lighting a fire, we cooked our supper, and were very comfortable.

The district of Cucao is the only inhabited part on the whole west coast of Chiloe. It contains about thirty or forty Indian families, who are scattered along four or five miles of the shore. They are very much secluded from the rest of Chiloe, and have scarcely any sort of commerce, except sometimes in a little oil, which they get from seal-blubber. They are pretty well dressed, in clothes of their own manufacture, and they have plenty to eat. They seemed, however, discontented, yet humble to a degree which it was quite painful to witness. The former feeling is, I think, chiefly to be attributed to the harsh and authoritative manner in which they are treated by their rulers. Our companions, although so very civil to us,

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behaved to the poor Indians as if they had been slaves, rather than free men. They ordered provisions and the use of their horses, without ever condescending to say how much, or indeed whether the owners should be paid at all. In the morning, being left alone with these poor people, we soon ingratiated ourselves by presents of cigars and maté. A lump of white sugar was divided between all present, and tasted with the greatest curiosity. The Indians ended all their complaints by saying, "and it is only because we are poor Indians, and know nothing; but it was not so when we had a king."

The next day, after breakfast, we road to Punta Huantamó, a few miles to the northward. The road lay along a very broad beach, on which, even after so many fine days, a terrible surf was breaking. I was assured that after a heavy gale, the roar can be heard at night even at Castro, a distance of no less than twenty-one sea miles, across a hilly and wooded country. We had some difficulty in reaching the point, owing to the intolerably bad paths; for every where in the shade the ground soon becomes a perfect quagmire. The point itself is a bold rocky hill. It is covered by a plant allied, I believe, to Bromelia, and called by the inhabitants Chepones. In scrambling through the beds, our hands were very much scratched. I was amused by observing the precaution our Indian guide took, in turning up his trousers, thinking that they were more delicate than his own hard skin. This plant bears a fruit, in shape like an artichoke, in which a number of seed-vessels are packed; these contain a pleasant sweet pulp, here much esteemed. I saw at Lowe's Harbour, the Chilotans making chichi, or cider, with this fruit: so true is it, as Humboldt remarks, that almost every where man finds means of preparing some kind of beverage from the vegetable kingdom. The savages, however, of Tierra del Fuego, and I believe of Australia, have not advanced thus far in the arts.

The coast to the northward of Punta Huantamó is exceedingly rugged and broken, and is fronted by many breakers,

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on which the sea is eternally roaring. Mr. King and myself were anxious to return, if it had been possible, on foot along this coast; but even the Indians said it is quite impracticable. We were told that men have crossed by striking directly through the woods from Cucao to S. Carlos, but never by the coast. On these expeditions, the Indians carry with them only toasted corn, and of this they eat sparingly twice a day.

26TH.—Re-embarking in the periagua, we returned across the lake, and then mounted our horses. The whole of Chiloe took advantage of this week of unusually fine weather, to clear the ground by burning. In every direction volumes of smoke were curling upwards. Although the inhabitants were so assiduous in setting fire to every part of the wood, yet I did not see a single fire which they had succeeded in making extensive. We dined with our friend the commandant, and did not reach Castro till after dark.

The next morning we started very early. After having ridden for some time, we obtained from the brow of a steep hill an extensive view (and it is a rare thing on this road) of the great forest. Over the horizon of trees, the volcano of Corcovado, and the great flat-topped one to the northward, stood out in proud pre-eminence; scarcely another peak in the long range showed its snowy top. I hope it will be long before I forget this farewell view of the magnificent Cordillera of Chiloe. At night we bivouacked under a cloudless sky, and the next morning reached S. Carlos. We arrived on the right day, for before evening heavy rain commenced.

FEBRUARY 4th.—Sailed from Chiloe. During the last week I made several short excursions. One was to examine a great bed of oyster and Venus shells, of the same kind now living in the neighbouring bay, but elevated 350 feet (measured by the barometer) above the level of the sea. From among these shells large forest-trees were growing. Another ride was to P. Huechucucuy. I had with me a guide who knew the country far too well; for he would

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pertinaciously tell me the Indian name for every little point, rivulet, and creek. In the same manner as in Tierra del Fuego, the Indian language appears singularly well adapted for attaching names to the most trivial divisions of the land. I believe every one was glad to say farewell to Chiloe. Yet if we could forget the gloom and ceaseless rain of winter, Chiloe might pass for a charming island. There is, also, something very attractive in the simplicity and humble politeness of all the poor inhabitants.

We steered along shore to the northward, but owing to thick weather, did not reach Valdivia till the night of the eighth. The external features of the whole line of country were the same with the central parts of Chiloe. The forest was nowhere cleared away. On the sea-coast bold rocky points projected, but further inland the older formations were covered up by plains, belonging to geological periods of no great antiquity. The next morning, after anchoring in the fine harbour of Valdivia, the boat proceeded to the town, which is distant about ten miles. We followed the course of the river, occasionally passing a few hovels, and patches of ground cleared out of the otherwise unbroken forest; and sometimes meeting a canoe with an Indian family. The town is situated on the low banks of the stream, and is so completely buried in a wood of apple-trees, that the streets are merely paths in an orchard.

I have never seen any country where apple-trees appeared to thrive so well as in this damp part of South America. On the borders of the roads there were many young trees which had evidently planted themselves. In Chiloe, the inhabitants possess a marvellously short method of making an orchard. At the lower part of almost every branch, small, conical, brown, wrinkled points project: these are always ready to change into roots, as may sometimes be seen, where any mud has been accidentally splashed against the tree. A branch as thick as a man's thigh is chosen, and is cut off just beneath a group of these points; all the smaller branches are lopped off, and it is then placed about two feet

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deep in the ground: the operation is performed in the earliest part of the spring. During the succeeding summer, the stump throws out very long shoots, and sometimes even bears fruit. I was shown one which had produced as many as twenty-three apples, but this was thought very unusual. The ensuing summer, the first year shoots throw out others, and by the third season the stump is changed (as I have myself seen) into a well-wooded tree, loaded with an abundance of fruit. I understand there is one kind of apple-tree in England, which can be treated in a similar manner; but I believe the rapidity of growth, and at the same time production of fruit, is very inferior to that of the trees in Chiloe. An old man near Valdivia illustrated his motto, "Necessidad es la madre del invencion," by giving an account of the several useful things he manufactured from his apples. After making cider, he extracted from the refuse a white and very finely-flavoured spirit: by another process he procured a sweet treacle, or, as he called it, honey. He likewise showed us wine derived from the same fruit. The children and pigs seemed almost to live, during this season of the year, in the orchards.

February 11th.—I set out with a guide on a short ride, in which, however, I managed to see singularly little, either of the geology of the country, or of its inhabitants. There is not much cleared land near Valdivia: after crossing a river at the distance of a few miles, we entered the forest, and then passed only one miserable hovel, before reaching our sleeping-place for the night. The short difference in latitude, of 150 miles, has given another aspect to the forest, compared to that of Chiloe. This is owing to a slightly different proportion in the kinds of trees. The evergreens do not appear to be quite so numerous; and the forest in consequence is coloured by a brighter and more lively green. In the same manner as in Chiloe, the lower parts are matted together by canes. Here also another kind of the same family (resembling the bamboo of Brazil, and about twenty feet in height), grows in clusters, and ornaments the banks of some of the streams

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in a very pretty manner. It is with this plant that the Indians make their chuzos, or long tapering spears. Our resting-house was so dirty that I preferred sleeping outside. The first night on these journeys is generally an uncomfortable one, because one's body is not accustomed to the tickling and biting of the fleas. I am sure, in the morning, there was not a space on my legs of the size of a shilling, which had not its little red mark, where the flea had feasted.

12TH.—We continued to ride through the uncleared forest; only occasionally meeting an Indian on horseback, or a troop of fine mules bringing alerce planks and corn from the southern plains. In the afternoon one of the horses knocked up: we were then on the brow of a hill, which commanded a fine view of the Llanos. The view of these open plains was very refreshing, after being hemmed in and buried amongst a wilderness of trees. The uniformity of a forest soon becomes very wearisome. This west coast makes me remember with pleasure the free, unbounded plains of Patagonia; yet with the true spirit of contradiction, I cannot forget how sublime is the silence of the forest. The Llanos are the most fertile and thickly-peopled parts of the country; as they possess the immense advantage of being nearly free from trees. Before leaving the forest we crossed some flat little lawns, around which single trees encroached, in the same manner as in an English park. It is curious how frequently a plain seems hostile to the growth of trees. Humboldt found much difficulty in endeavouring to account for their presence in certain parts of South America, and their absence in other parts. It appears to me, that the level state of the surface very frequently determines this point; but the cause of its doing so I do not know. In the case of Tierra del Fuego, the deficiency of trees on level ground is probably owing to the accumulation of too much moisture in such situations. But to the northward of Maldonado, in Banda Oriental, where we have a fine undulating country, with streams of water (which are themselves fringed with

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woods), the circumstance appears to me, as I have before stated, of very difficult explanation.

On account of the tired horse, I determined to stop close by, at the Mission of Cudico; to the friar of which I had a letter of introduction. Cudico is an intermediate district between the forest and the Llanos. There are a good many cottages, with patches of corn and potatoes, nearly all belonging to Indians. The tribes dependant on Valdivia are "reducidos y cristianos." The Indians further northward, about Arauco and Imperial, are still very wild and not converted; but they all have much intercourse with the Spaniards. The padre said that the Christian Indians did not much like coming to mass, but that otherwise they show respect for religion. The greatest difficulty is in making them observe the ceremonies of marriage. The wild Indians take as many wives as they can support; and a cacique will sometimes have more than ten. On entering his house, the number may be told by that of the separate fires. This plan must be a good one to prevent quarrelling. Each wife lives a week in turn with the cacique; but all are employed in weaving ponchos, &c., for his advantage. To be the wife of a cacique is an honour much sought after by the Indian women.

The men of all the tribes wear a coarse woollen poncho; but those south of Valdivia wear short trousers, and those northward a petticoat, like the chilipa of the Gauchos. All have their long hair bound by a scarlet fillet round their heads; but otherwise they are uncovered. These Indians are good-sized men; their cheek-bones are very prominent, and in general appearance they resemble the great American family to which they belong; but their physiognomy seemed to me to be slightly different from that of any other tribe which I had before seen. Their expression is generally grave and even austere, and possesses much character: this may pass either for honest bluntness, or fierce determination. The long black hair, the grave and much-lined features, and the dark complexion, called to my mind old

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portraits of James the First; but very likely the resemblance may be imaginary. On the road we met with none of that humble politeness so universal in Chiloe. Some gave their "mari mari" (good morning) with promptness, but the greater number did not seem inclined to offer any salute. This independence of manners is probably a consequence of their long wars, and the repeated victories which they alone of all the tribes in America have gained over the Spaniards.

I spent the evening very pleasantly, talking with the padre. He was exceedingly kind and hospitable; and coming from Santiago, had contrived to surround himself with some few comforts. Being a man of some little education, he bitterly complained of the total want of society. With no particular zeal for religion, no business or pursuit, how completely must this man's life be wasted! Finding nothing which tempted me either to stay or to proceed, the next day we set out on our return through the forest. We met on the road seven very wild Indians. Amongst them were some caciques, who had been receiving a yearly stipend, which is paid to some who have long remained faithful. They were fine-looking men, and they rode one after the other, with most gloomy faces. An old cacique, who headed them, had been, I suppose, more excessively drunk than the rest, for he seemed both extremely grave and very crabbed. Shortly before this, two Indians joined us, who were travelling from a distant mission to Valdivia, concerning some lawsuit. One was a good-humoured old man, but from his wrinkled beardless face looked more like an old woman than a man. I frequently presented both of them with cigars; and though ready to receive them, and I dare say grateful, they would hardly condescend to thank me. A Chilotan Indian would have taken off his hat and given his "Dios le page!" (May God repay you!) — The travelling was very tedious, both from the badness of the roads, and from the number of great fallen trees, which it was necessary either to leap over, or to avoid by making long circuits. We slept

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on the road, and next morning reached Valdivia, whence I proceeded on board.

A few days afterwards I crossed the bay with a party of officers, and landed near the fort called Niebla. The buildings were in a most ruinous state, and the gun-carriages quite rotten. Mr. Wickham remarked to the commanding officer, that with one discharge they would certainly all fall to pieces. The poor man, trying to put a good face upon it, gravely replied, "No, I am sure, sir, they would stand two!" The Spaniards must have intended to have made this place impregnable. There is now lying in the middle of the courtyard a little mountain of mortar, which rivals in hardness the rock on which it is placed. It was brought from Chile, and cost seven thousand dollars. The revolution having broken out, prevented its being applied to any purpose, and now it remains a monument of the fallen greatness of Spain.

I wanted to go to a house about a mile and a half distant; but my guide said it was quite impossible to penetrate the wood in a straight line. He offered, however, to lead me, by following obscure cattle-tracks, the shortest way; the walk, nevertheless, took no less than three hours! This man is employed in hunting strayed cattle; yet, well as he must know the woods, he was not long since lost for two whole days, and had nothing to eat. These facts convey a good idea of the impracticability of the forests of these countries. A question often occurred to me—How long does any vestige of a fallen tree remain? This man showed me one which a party of fugitive royalists had cut down fourteen years ago; and taking this as a criterion, I should think a bole a foot and a half in diameter would in thirty years present a mere ridge of mould.

February 20th.—The day has been memorable in the annals of Valdivia, for the most severe earthquake experienced by the oldest inhabitant. I happened to be on shore, and was lying down in the wood to rest myself. It came on suddenly, and lasted two minutes; but the time appeared

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much longer. The rocking of the ground was most sensible. The undulations appeared to my companion and myself to come from due east; whilst others thought they proceeded from south-west; which shows how difficult it is in all cases to perceive the direction of these vibrations. There was no difficulty in standing upright, but the motion made me almost giddy. It was something like the movement of a vessel in a little cross ripple, or still more like that felt by a person skating over thin ice, which bends under the weight of his body.

A bad earthquake at once destroys the oldest associations: the world, the very emblem of all that is solid, has moved beneath our feet like a crust over a fluid;—one second of time has conveyed to the mind a strange idea of insecurity, which hours of reflection would never have created. In the forest, as a breeze moved the trees, I only felt the earth tremble, but saw no consequences from it. Captain FitzRoy and the officers were at the town during the shock, and there the scene was more awful; for although the houses, from being built of wood, did not fall, yet they were so violently shaken that the boards creaked and rattled. The people rushed out of doors in the greatest alarm. I feel little doubt that it is these accompaniments which cause that horror of earthquakes, experienced by all those who have thus seen as well as felt their effects. Within the forest it was a deeply interesting, but by no means an awe-exciting phenomenon. The tides were very curiously affected. The great shock took place at the time of low water; and an old woman who was on the beach told me, that the water flowed very quickly, but not in big waves, to high-water mark, and then as quickly returned to its proper level; this was also evident by the line of wet sand. This same kind of quick but quiet movement in the tide happened a few years since at Chiloe, during a slight earthquake, and created much causeless alarm. In the course of the evening there were other weaker shocks, all of which seemed to produce in the harbour the most complicated currents, and some of great strength.

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22D.—We sailed from Valdivia, and on the 4th of March, entered the harbour of Concepcion. While the ship was beating up to the anchorage, which is distant several miles, I was landed on the island of Quiriquina. The mayor-domo of the estate quickly rode down to tell us the terrible news of the great earthquake of the 20th;—"that not a house in Concepcion, or Talcuhano, (the port) was standing; that seventy villages were destroyed; and that a great wave had almost washed away the ruins of Talcuhano." Of this latter fact I soon saw abundant proof; the whole coast being strewed over with timber and furniture, as if a thousand great ships had been wrecked. Besides chairs, tables, book-shelves, &c., in great numbers, there were several roofs of cottages, which had been drifted in an almost entire state. The storehouses at Talcuhano had burst open, and great bags of cotton, yerba, and other valuable merchandise, were scattered about on the shore. During my walk round the island, I observed that numerous fragments of rock, which, from the marine productions adhering to them, must recently have been lying in deep water, had been cast up high on the beach. One of these was a slab six feet by three, and about two feet thick.

The island itself as plainly showed the overwhelming power of the earthquake, as the beach did that of the consequent great wave. The ground was fissured in many parts, in north and south lines; which direction perhaps was caused by the yielding of the parallel and steep sides of the narrow island. Some of the fissures near the cliffs were a yard wide: many enormous masses had already fallen on the beach; and the inhabitants thought, that when the rains commenced, even much greater slips would happen. The effect of the vibration on the hard primary slate, which composes the foundation of the island, was still more curious: the superficial parts of some narrow ridges were as completely shivered, as if they had been blasted by gunpowder. This effect, which was rendered very evident by the fresh fractures and displaced soil, must, during earthquakes, be confined to near the sur-

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face, for otherwise there would not exist a block of solid rock throughout Chile. This limited action is not improbable, as it is certain, that the surface of any body, when vibrating, is in a different condition from the central parts. It is, perhaps, owing to this same reason, that earthquakes do not cause quite such terrific havoc within deep mines, as would at first have been expected. I believe this convulsion has been more effectual in lessening the size of the island of Quiriquina, than the ordinary wear and tear of the weather and the sea during the course of an entire century.

The next day I landed at Talcuhano, and afterwards rode to Concepcion. Captain FitzRoy has given so detailed and accurate an account of the earthquake, that it is almost useless for me to say any thing on the subject; but I will extract a few passages from my journal. Both towns presented the most awful yet interesting spectacle I ever beheld. To a person who had formerly known the places, it possibly might have been still more impressive; for the ruins were so mingled together, and the whole scene possessed so little the air of a habitable place, that it was scarcely possible to imagine its former appearance or condition. The earthquake commenced at half-past eleven in the forenoon. If it had happened in the middle of the night the greater number of the inhabitants (which in this one province amount to many thousands),* instead of less than a hundred, must have perished. In Concepcion, each house, or row of houses, stood by itself, a heap or line of ruins; but in Talcuhano, owing to the great wave, little more than one layer of bricks, tiles, and timber, with here and there part of a wall left standing, could be distinguished. From this circumstance, Concepcion, although not so completely desolated, was a more terrible, and if I may so call it, picturesque sight. The first shock was very sudden. The invariable practice among the residents in

* Miers estimates them at 40,000; but the towns in some of the other provinces were likewise overthrown.

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these provinces, of running out of doors at the first trembling of the ground, alone saved them. The mayor-domo at Quiriquina told me, that the first notice he received of the earthquake, was finding both the horse he rode, and himself, rolling together on the ground. Rising up, he was again thrown down. He also told me that some cows, which were standing on the steep sides of the island, were rolled into the sea. The great wave, however, was far more destructive in this respect: on one low island near the head of the bay, seventy animals were washed off and drowned. It is generally thought that this has been the worst earthquake ever recorded in Chile; but as the very bad ones occur only after long intervals, this cannot easily be known; nor indeed would a much more severe shock have made any great difference, for the ruin is now complete.

After viewing Concepcion, I cannot understand how the greater number of inhabitants escaped unhurt. The houses in many parts fell outwards; thus forming in the middle of the streets little hillocks of brickwork and rubbish. Mr. Rous, the English consul, told us that he was at breakfast when the first movement warned him to run out. He had scarcely reached the middle of the courtyard, when one side of his house came thundering down. He retained presence of mind to remember, that if he once got on the top of that part which had already fallen, he should be safe. Not being able, from the motion of the ground, to stand, he crawled up on his hands and knees; and no sooner had he ascended this little eminence, than the other side of the house fell in, the great beams sweeping close in front of his head. With his eyes blinded, and his mouth choked with the cloud of dust which darkened the sky, at last he gained the street. As shock succeeded shock, at the interval of a few minutes, no one dared approach the shattered ruins; and no one knew whether his dearest friends and relations might not be perishing from the want of help. The thatched roofs fell over the fires, and flames burst forth in all parts. Hundreds knew

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themselves to be ruined, and few had the means of providing food for the day. Can a more miserable and fearful scene be imagined?

Earthquakes alone are sufficient to destroy the prosperity of any country. If, for instance, beneath England, the now inert subterranean forces should exert those powers which most assuredly in former geological ages they have exerted, how completely would the entire condition of the country be changed! What would become of the lofty houses, thickly-packed cities, great manufacturies, the beautiful public and private edifices? If the new period of disturbance were first to commence by some great earthquake in the dead of the night, how terrific would be the carnage! England would at once be bankrupt; all papers, records, and accounts would from that moment be lost. Government being unable to collect the taxes, and failing to maintain its authority, the hand of violence and rapine would go uncontrolled In every large town famine would be proclaimed, pestilence and death following in its train.

Captain FitzRoy has given an account of the great wave, which, travelling from seaward, burst over Talcuhano. In the middle of the bay it was seen as one unbroken swell of the watér; but on each side, meeting with resistance, it curled over, and tore up cottages and trees as it swept onwards with overwhelming force. At the head of the bay it is easy to imagine the fearful line of white breakers which three times rushed over, and almost obliterated, the ruins of the former town. Pools of salt water yet remained in the streets; and children, making boats with old tables and chairs, appeared as happy as their parents were miserable. It was, however, exceedingly interesting to observe how active and cheerful all appeared, after their heavy misfortune. It was remarked with much truth, that from the destruction being universal, no one individual was humbled more than another, or could suspect his friends of coldness; and this latter effect is perhaps the most grievous one of the loss of wealth. Mr. Rous, and a large party whom he kindly took

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under his protection, lived for the first week in a garden beneath some apple-trees. At first they were as merry as if it had been a picnic; but soon afterwards heavy rain caused much discomfort, for they were absolutely without shelter.

In Captain FitzRoy's paper it is said that two explosions, one like a column of smoke, and another like the blowing of a great whale, were seen in the bay of Concepcion. The water also appeared every where to be boiling; and it "became black, and exhaled a most disagreeable sulphureous smell." I am informed by Mr. Alison, that during the earthquake of 1822 these last-mentioned circumstances occurred in the bay of Valparaiso. The two great explosions in the first case must no doubt be connected with deep-seated changes; but the bubbling water, its black colour and fetid smell, the usual concomitants of a severe earthquake, may, I think, be attributed to the disturbance of mud containing organic matter in decay. In the bay of Callao, during a calm day, I noticed, that as the ship dragged her cable over the bottom, its course was marked by a line of bubbles.

The lower orders in Talcuhano thought that the earthquake was caused by some old Indian women, who two years ago having been offended, stopped the volcano of Antuco. This silly belief is curious, because it shows that experience has taught them to observe the constant relation between the suppressed activity of volcanoes, and the trembling of the ground. It was necessary to apply the witchcraft to the point where their knowledge stopped; and this was the closing of the volcanic vent. This saying is the more odd in this particular instance, because the result of Captain FitzRoy's investigation was to discountenance the belief that Antuco (whatever might have been the case with the volcanoes further northward) was any way affected.

The town of Concepcion was built in the usual Spanish fashion, with all the streets running at right angles to each other. One set ranged S.W. by W. and N.E. by E., and the other N.W. by N. and S.E. by S. The walls in the former direction certainly stood better than those in the

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other. Captain FitzRoy* has likewise remarked, that the greater number of the masses of brickwork were thrown down towards the N.E. Both these circumstances perfectly agree with the general idea of the undulation having come from the S.W.; in which quarter subterranean noises were also sometimes heard. It is evident on this supposition, that the N.W. and S.E. walls, being nearly coincident with the line of undulation (or with the crests of the successive waves), would be much more likely to fall than those which had their extremities presented towards the point whence the vibration proceeded; for, in the first case, the whole wall would be thrown at the same moment out of its perpendicular. This may be illustrated by placing books edgewise on a carpet, and then, after the manner suggested by Michell, imitating the undulations of an earthquake: it will be found, that they fall with more or less readiness, according to their direction. The fissures in the ground, though not uniform, generally had a S.E. and N.W. direction;† and therefore they corresponded to the lines of principal flexure. Bearing in mind all these circumstances, which so clearly point to the S.W. as the chief focus of disturbance, it is a very interesting fact that the island of S. Maria,† situated in that quarter, was during the general uplifting of the land (to which I shall presently refer) raised to nearly three times the altitude of any other part of the coast.

The different resistance offered by the walls, according to their direction, was well exemplified in the case of the cathedral. The side which fronted the N.E. presented a grand pile of ruins, in the midst of which door-cases and masses of timber stood up, as if floating in a stream. Some of the angular blocks of brickwork were of great dimensions; and they had been rolled to a distance on the level plaza, like fragments of rock round the base of some high moun-

* Sketch of Surveying Voyages of Adventure and Beagle by Captain FitzRoy, Royal Geograph. Journal, vol. vi., p. 320.

† Ditto, p. 327, *et passim*.

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tain. The side walls, though exceedingly fractured, yet remained standing; but the vast buttresses (at right angles to them, and therefore parallel to the walls that fell) were in many cases cut clean off, as if by a chisel, and hurled to the ground.

Some square ornaments on the coping of these same walls were moved by the earthquake into a diagonal position. The buttresses of the church of La Merced, at Valparaiso, and some heavy pieces of furniture in the rooms, were similarly affected by the shock of 1822.* Mr. Lyell† has also given a drawing of an obelisk in Calabria, of which the separate stones were partially turned round. In these instances, the displacement at first appears to be owing to a vorticose movement beneath each point thus affected; but such can hardly be the case. May it not be caused by a tendency in each stone to arrange itself in some particular position, with respect to the lines of vibration, — in a manner somewhat similar to pins on a sheet of paper, or on a board, when it is shaken? Generally speaking, arched doorways or windows stood much better than any other kind of building. Nevertheless, a poor lame old man, who had been in the habit, during trifling shocks, of crawling to a certain doorway, was this time crushed to pieces.

I have not attempted to give any detailed description of the appearance of Concepcion, for I feel it is quite impossible to convey the mingled feelings with which one beholds such a spectacle. Several of the officers visited it before me, but their strongest language failed to communicate a just idea of the desolation. It is a bitter and humiliating thing to see works, which have cost men so much time and labour, overthrown in one minute; yet compassion for the inhabitants is almost instantly forgotten, from the interest excited in finding that state of things produced in a moment of time, which one is accustomed to attribute to a succession of ages. In my

* Miers's Chile, vol. i., p. 392.

† Lyell's Principles of Geology, chap. xv., book ii.

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opinion, we have scarcely beheld since leaving England, any other sight so deeply interesting.

In almost every severe earthquake which has been described, the neighbouring waters of the sea are said to have been greatly agitated. The disturbance seems generally, as in the case of Concepcion, to have been of two kinds: first, at the instant of the shock, the water swells high up on the beach, with a gentle motion, and then as quietly retreats; secondly, some little time afterwards, the whole body of the sea retires from the coast, and then returns in great waves of overwhelming force. The first and less regular movement seems to be an immediate consequence of the earthquake differently affecting a fluid and a solid, so that their respective levels are slightly deranged. But the second case is a far more important phenomenon, and at first appears of less easy explanation. In reading accounts of earthquakes, and especially of those on the west coast of America, as collated from various authors by Sir W. Parish,* it is certain that the first great movement of the waters has been that of retiring. Several hypotheses† have been invented to explain this fact. Some have supposed it owing to a vertical oscillation in the land, the water retaining its level: but this can hardly happen, even on a moderately shoal coast; for the water near the land must partake of the motion of the bottom. Moreover, as Mr. Lyell has urged, a change of level in the land will not account for movements in the sea, of a similar nature, affecting islands distant from the line of uplifted coast. This occurred at Madeira during the famous Lisbon earthquake. Juan Fernandez also offers a parallel instance; for the sea was disturbed there much in the same manner as on the coast of Chile.

The whole phenomenon, it appears to me, is due to a common undulation in the water, proceeding from a line or point of

* Sir W. Parish had the kindness to lend me the original manuscript, which was read before the Geological Society, March 5th, 1835.

† Lyell's Geology, book ii., ch. xvi.

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disturbance, some little way distant. If the waves sent off from the paddles of a steam-vessel be watched breaking on the sloping shore of a still river, the water will be seen first to retire two or three feet, and then to return in little breakers, precisely analogous to those consequent on an earthquake. From the oblique direction in which the waves are sent off from the paddles, the vessel has proceeded a long way ahead, before the undulation reaches the shore; and hence it is at once manifest, that this movement bears no relation to the actual displacement of the fluid from the bulk of the vessel. Indeed, it seems a general circumstance, that in all cases where the equilibrium of an undulation is thus destroyed, the water is drawn from the resisting surface to form the advancing breaker.* Considering then a wave produced by an earthquake as an ordinary undulation proceeding from some point or line in the offing, we can see the cause, first of its occurrence some time after the shock; secondly, of its affecting the shores of the mainland and of outlying islets in a uniform manner—namely, the water retiring first, and then returning in a mountainous breaker; and lastly, of its size being modified (as appears to be the case) by the form of the neighbouring coast. For instance Talcuhano and Callao are situated at the head of great shoaling bays, and they have always suffered from this phenomenon; whereas, the town of Valparaiso, which is seated close on the border of a profound ocean, though shaken by the severest earthquakes, has never been overwhelmed by one of these terrific deluges. On this view, we have only to imagine, in the case of Concepcion, a point of disturbance in the bottom of the sea in a south-west direction, whence the wave was seen to travel, and where the land was elevated to a greater height than any other part,—and the whole phenomenon will be explained.

It is probable that near every coast, the chief line of dis-

* I am indebted to Mr. Whewell for explaining to me the probable movements on the shore, of an undulation of which the equilibrium has been destroyed.

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turbance would be situated at that distance in the offing, where the fluid which was most agitated, from overlying the shallow bottom near the land, joined on to that part which covered the depths (but slightly moved) of the ocean. In all distant parts of the coast the small oscillations of the sea, both at the moment of the great shock, and during the lesser following ones, would be confounded with the undulation propagated from the focus of disturbance, and hence the series of movements would be undistinguishable.

The most remarkable effect (or perhaps speaking more correctly, cause) of this earthquake was the permanent elevation of the land. Captain FitzRoy having twice visited the island of Santa Maria, for the purpose of examining every circumstance with extreme accuracy, has brought a mass of evidence in proof of such elevation, far more conclusive than that on which geologists on most other occasions place implicit faith. The phenomenon possesses an uncommon degree of interest, from this particular part of the coast of Chile having previously been the theatre of several earthquakes of the worst class. It is almost certain, from the altered soundings, together with the circumstance of the bottom of the bay near Penco, consisting of hard stone, that there has been an uplifting to the amount of four fathoms, since the famous convulsion of 1751. With this additional instance fresh before us, we may assume as probable, according to the principles laid down by Mr. Lyell,* other small successive elevations, and may fearlessly maintain that the problem of the raised shells,† recorded by Ulloa, is explained.

Some of the consequences which may be deduced from the phenomena connected with this earthquake are most important in a geological point of view; but in the present work I cannot do more than simply allude to the results. Although it is known that earthquakes have been felt over enormous

* Lyell's Geology, book ii., chap. xvi.

† I saw these shells in very great quantities on the flanks of the island of Quiriquina.

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spaces, and strange subterranean noises likewise heard over nearly equal areas, yet few cases are on record of volcanoes, very far distant from each other, bursting out at the same moment of time. In this instance, however, at the same hour when the whole country around Concepcion was permanently elevated, a train of volcanoes situated in the Andes, in front of Chiloe, instantaneously spouted out a dark column of smoke, and during the subsequent year continued in uncommon activity. It is, moreover, a very interesting circumstance, that, in the immediate neighbourhood, these eruptions entirely relieved the trembling ground, although at a little distance, and in sight of the volcanoes, the island of Chiloe was strongly affected. To the northward, a volcano burst out at the bottom of the sea adjoining the island of Juan Fernandez, and several of the great chimneys in the Cordillera of central Chile commenced a fresh period of activity. We thus see a permanent elevation of the land, renewed activity through habitual vents, and a submarine outburst, forming parts of one great phenomenon. The extent of country throughout which the subterranean forces were thus unequivocally displayed, measures 700 by 400 geographical miles. From several considerations, which I have not space here to enter on, and especially from the number of intermediate points whence liquefied matter was ejected, we can scarcely avoid the conclusion, however fearful it may be, that a vast lake of melted matter, of an area nearly doubling in extent that of the Black Sea, is spread out beneath a mere crust of solid land.

The elevation of the land to the amount of some feet during these earthquakes, appears to be a paroxysmal movement, in a series of lesser and even insensible steps, by which the whole west coast of South America has been raised above the level of the sea. In the same manner, the most violent explosion from any volcano is merely one in a series of lesser eruptions: and we have seen that both these phonomena, which are in so many ways related, are parts of one common action, only modified by local circum-

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stances. With respect to the cause of the paroxysmal convulsion in particular portions of the great area which is simultaneously affected, it can be shown to be extremely probable, that it is owing to the giving way of the superincumbent strata, (and this giving way probably is a consequence of the tension from the general elevation) and their interjection by fluid rock—one step in the formation of a mountain chain. On this view we are led to conclude, that the unstratified mass forming the axis of any mountain, has been pumped in when in a fluid state, by as many separate strokes as there were earthquakes. For instance, in the case of Concepcion, during the few months subsequent to the great shock, upwards of three hundred tremours of the ground were felt, each of which indicated a fresh fracture, and injection of the fluid stone. It is a case precisely analogous to what happens in all bad eruptions, which are invariably followed by a succession of smaller ones: the difference is, that in the volcano the lava is ejected, while in the formation of a mountain chain it is injected. This view of the extremely gradual elevation of a line of mountains, will alone explain the difficulty (which, as far as I am aware, has never been attempted to be solved) of the axis consisting of rock which has become solid under the pressure of the superincumbent strata, while yet these same strata, in their present inclined and vertical positions, cannot possibly cover more than a small portion of that axis.

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CHAPTER XVII.

Valparaiso—Passage of Andes by Portillo pass—Sagacity of mules—Mountain torrents—Mines, how discovered—Marine alluvium in valleys—Effect of snow on surface—Geology, fossil shells, double range, two periods of elevation—Red snow—Winds on the crest—Snow thawing in pinnacles—Dry and clear atmosphere—Electricity—Pampas—Zoology of opposite sides of Andes—Uniformity of Patagonia—Locusts—Great bugs—Mendoza—Uspallata—Silicified trees in vertical position—Indian ruins—Change of climate—Earthquake arching bed of river—Cumbre—Valparaiso.

PASSAGE OF CORDILLERA.

MARCH 7TH, 1835.—We staid only three days at Concepcion, and then sailed for Valparaiso. The wind being northerly, we only reached the mouth of the harbour of Concepcion before it was dark. Being very near the land, and a fog coming on, the anchor was dropped. Presently a large American whaler appeared close alongside of us; and we heard the Yankee swearing at his men, to make them keep quiet, whilst he listened where the breakers were. Captain FitzRoy hailed him in a loud clear voice, to anchor where he then was. The poor man must have thought the voice came from the shore: such a Babel of cries issued at once from the ship—every one hallooing out, "Let go the anchor! veer cable! shorten sail!" It was the most laughable thing I ever heard. If the ship's crew had been all captains, and no men, there could not have been a greater uproar of orders. We afterwards found that the mate stuttered. I suppose all hands were assisting him in giving his orders.

On the 11th we anchored at Valparaiso; and two days afterwards I set out on an excursion to cross the Cordillera. I proceeded to Santiago, where Mr. Caldcleugh most kindly

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assisted me in every possible way, in making the little preparations which were necessary. In this immediate part of Chile there are two passes across the Andes to Mendoza, and the plains on the opposite side. The one most commonly used, namely, that of Aconcagua, or Uspallata, is situated some way to the northward of the capital: the other, called the Portillo, is to the southward, and less distant. The latter is, however, rather more lofty, and from the double chain, more dangerous during a snow-storm. For these reasons it is but little used, especially late in the season.

MARCH 18TH.—We set out for the Portillo pass. Leaving Santiago we crossed the wide burnt-up plain on which that city stands, and in the afternoon arrived at the Maypo, one of the principal rivers in Chile. The valley, at the point where it enters the first Cordillera, is bounded on each side by lofty barren mountains; and although not broad, it is very fertile. Numerous cottages were surrounded by vines, and by orchards of apple, nectarine, and peach trees; the boughs of the latter breaking with the weight of the beautiful ripe fruit.

In the evening we passed the custom-house, where our luggage was examined. The frontier of Chile is better guarded by the Cordillera, than by the waters of the sea. There are very few valleys which lead to the central ranges, and, except by these, the mountains are far too steep and lofty for any beast of burden to pass over them. The custom-house officers were very civil; which was perhaps partly owing to the passport which the President of the republic had given me; but I must also express my admiration at the natural politeness of almost every Chileno. In this instance the contrast with the same class of men in most other countries was strongly marked. I may mention an anecdote with which I was much pleased at the time. We met near Mendoza a little and very fat negress, riding astride on a mule. She had a *goître* so enormous, that it was scarcely possible to avoid gazing at her for a moment; but my two companions almost instantly, by way of apology,

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made the common salute of the country, by taking off their hats. Where would one of the lower classes in Europe have shown such feeling politeness to a poor and miserable object of a degraded race?

At night we slept at a cottage. Our manner of travelling was delightfully independent. In the inhabited parts we bought a little firewood, hired pasture for the animals, and bivouacked in the corner of the same field with them. Carrying an iron pot, we cooked and ate our supper under the cloudless sky, and knew no trouble. My companions were Mariano Gonzales, who had formerly accompanied me, and an "arriero," with his ten mules and a "madrina."

The madrina (or godmother) is a most important personage. She is an old steady mare, with a little bell round her neck; and wheresoever she goes, the mules, like good children, follow her. If several large troops are turned into one field to graze, in the morning the muleteer has only to lead the madrinas a little apart, and tinkle their bells; and, although there may be two or three hundred mules together, each immediately knows its own bell, and separates itself from the rest. The affection of these animals for their madrinas saves infinite trouble. It is nearly impossible to lose an old mule; for if detained for several hours by force, she will, by the power of smell, like a dog, track out her companions, or rather the madrina; for, according to the muleteer, she is the chief object of affection. The feeling, however, is not of an individual nature; for I believe I am right in saying, that any animal with a bell will serve as madrina. In a troop each animal carries, on a level road, a cargo weighing 416 pounds (more than twenty-nine stone); but in a mountainous country a hundred pounds less.* Yet with what delicate slim limbs, without any proportional bulk of muscle, these animals support so great a burden! The

* Throughout Chile, except between Santiago and Valparaiso, every thing is conveyed on mules. This is an expensive method of transport, but unavoidable without good roads and improved waggons. In a troop of mules, there is generally a muleteer to each six animals.

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mule always appears to me a most surprising animal. That a hybrid should possess more reason, memory, obstinacy, social affection, and powers of muscular endurance, than either of its parents, seems to indicate that art has here outmastered nature. Of our ten animals, six were intended for riding and four for carrying cargoes, each taking turn about. We carried a good deal of food, in case we should be snowed up, as the season was rather late for passing the Portillo.

March 19th.—We rode during this day to the last, and therefore most elevated house in the valley. The number of inhabitants became scanty; but wherever water could be brought on the land, it was very fertile. All the valleys in the Cordillera agree in the same kind of structure. An irregularly-stratified mass of well-rounded shingle, together with a little mud and sand, fills up the bottom to the depth of some hundred feet. This deposit follows the course of the valley, sloping upwards with a most gradual and gentle inclination. The rivers have removed a large part in the centre; thus leaving a terrace of equal height, but varying width, on each side. This narrow space between the cliffs bordering the bed of the river, and the foot of the mountains, is the only part fit for cultivation, and on it likewise the road is carried.

The rivers, such as the Maypo, which flow in these valleys, should rather be called mountain torrents. Their inclination is very great, and their water the colour of mud. The roar which the Maypo made, as it rushed over the great rounded fragments, was like that of the sea. Amidst the din of rushing waters, the noise from the stones, as they rattled one over another, was most distinctly audible even at a distance. This rattling noise, night and day, may be heard along the whole course of the torrent. The sound spoke eloquently to the geologist: the thousands and thousands of stones, which, striking against each other, make the one dull uniform sound, are all hurrying in one direction. It is like thinking of time, where the minute that

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now glides past is irrecoverable. So is it with these stones; the ocean is their eternity, and each note of that wild music tells of one other step towards their destiny.

It is not possible for the mind to comprehend, except by a slow process, any effect which is produced by a cause repeated so often, that the multiplier itself ceases to convey any more definite idea, than the savage receives when he points to the hairs of his head. As often as I have seen beds of mud, sand, and shingle, accumulated to the thickness of many thousand feet, I have felt inclined to exclaim that causes, such as the present rivers and the present beaches, could never have ground down such masses. But, on the other hand, when listening to the rattling noise of these torrents, and calling to mind that whole races of animals have passed away from the surface of the globe, during the period throughout which, night and day, these stones have gone rattling onwards in their course, I have thought to myself, can any mountains, any continent, withstand such waste?

In this part of the valley, the mountains on each side are from about three to six or eight thousand feet high: their outline is rounded, but with steep and bare flanks. The general colour of the rock is a dullish purple, and the stratification very distinct. If the scenery is not beautiful, it is remarkable and grand. We met during the day several herds of cattle, which men were driving down from the higher valleys in the Cordillera. This sign of the approaching winter hurried our steps, more than was convenient for geological purposes. The house where we slept was situated at the foot of a mountain, on the summit of which are the mines of S. Pedro de Nolasko.

Sir F. Head wonders how mines have been discovered in situations so extraordinary, as the bleak summit of the mountain of S. Pedro de Nolasko. In the first place, metallic veins in this country are generally harder than the surrounding strata: hence, during the gradual degradation of the hills, they project above the

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surface of the ground. Secondly, almost every labourer, especially in the northern parts of Chile, understands something about the appearance of ores. In the great mining provinces of Coquimbo and Copiapó, firewood is very scarce, and men are employed in searching for it over every hill and dale; and by this means nearly all the richest mines have there been discovered. Chanuncillo, from which silver, to the value of many hundred thousand pounds has been raised in the course of a few years, was thus discovered: a man having thrown a stone at his loaded donkey, afterwards thought that it was very heavy, and picking it up again, he found it was full of pure silver. The vein occurred at no great distance, standing up like a wedge of silver. The miners also, on Sundays, taking a crowbar with them, often set out on such discoveries. In the south part of Chile, the men who drive cattle into the Cordillera, and who frequent every ravine where there is a little pasture, are the usual agents.

March 20th.—As we ascended the valley, the vegetation, with the exception of a few pretty alpine flowers, became exceedingly scanty; and of birds, animals, or insects, scarcely one could be seen. The lofty mountains, their summits marked with a few patches of snow, stood well separated from each other; the valleys being filled up with an immense thickness of stratified alluvium. I may here briefly remark, without detailing the reasons on which the opinion is grounded, that in all probability this matter was accumulated at the bottoms of deep arms of the sea, which running from the inland basins, penetrated to the axis of the Cordillera,—in a similar manner to what now happens in the southern part of this same great range. This fact, in itself most curious, as preserving a record of a very ancient state of things, possesses a high theoretical interest, when considered in relation to the kind of elevation by which the present great altitude of these mountains has been attained.

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The features in the scenery of the Andes which struck me most, as contrasted with the few other mountain chains with which I am acquainted, were,—the flat fringes sometimes expanding into narrow plains on each side the valleys,—the bright colours, chiefly red and purple, of the utterly bare and precipitous hills,—the grand and continuous wall-like dikes,—the strongly-marked strata which, when nearly vertical, form the most picturesque and wild pinnacles, but where less inclined, great massive mountains; the latter occupying the outskirts of the range, and the former the more lofty and central parts,—lastly, the smooth conical piles of fine and brightly-coloured detritus, which slope at a high angle from the flanks of the mountains to their bases, some of the piles having a height of more than two thousand feet.

I frequently observed both in Tierra del Fuego, and within the Andes, that where the rock was covered during the greater part of the year with snow, it was shivered in a very extraordinary manner into small angular fragments. Scoresby* has observed the same fact in Spitzbergen: he says, "The invariably broken state of the rocks appeared to have been the effect of frost. On calcareous rocks, some of which are not impervious to moisture, the effect is such as might have been expected; but how frost can operate in this way on quartz is not so easily understood." The whole phenomenon appears to me rather obscure: for that part of the mountain which is covered during many months by a mantle of snow, must be less subject to repeated and great changes of temperature than any other, yet it is the most affected. I have sometimes thought, that the earth and fragments of stone lying on the surface, were perhaps less effectually removed by means of slowly percolating snow-water,† than by the agency of rain, and therefore that the

* Scoresby's Arctic Regions, vol. i., p. 122.

† I have heard it remarked in Shropshire, that the water, when the Severn is flooded from long-continued rain, is much more turbid, than when it proceeds from the snow melting on the Welsh mountains. The

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appearance of a quicker decay of the solid rock may be deceptive. Whatever the cause may be, the quantity of crumbling stone on the Cordillera is very great. Occasionally in the spring, masses of such matter slide down the mountains, and cover the snow-drifts in the valleys; thus forming natural ice-houses. We rode over one, the elevation of which was far below the limit of perpetual congelation.

As the evening drew to a close, we reached the Valle del Yeso. This is a very singular basin, which must have once been a very deep and large lake: the barrier is formed by a huge mountain of alluvium, on one side of which the river has cut a gorge. The plain is covered by a little dry pasture, and amidst the surrounding rocky deserts we had the pleasant sight of a herd of cattle. The valley takes its name of Yeso from a great bed, I should think at least two thousand feet thick, of white, and in some parts quite pure, gypsum. We slept with a party of men, who were employed in loading mules with this substance, which is used in the manufacture of wine.

March 21st.—We set out early in the morning, and continued to follow the course of the river, which by this time had become small, till we arrived at the foot of the ridge that separates the waters flowing into the Pacific and Atlantic oceans. The road, which as yet had been good, with a steady but very gradual ascent, now changed into a steep zigzag track. The Cordillera in this part consists of two principal ranges; the passes across which attain respectively an elevation of 13,210 and 14,365 feet.* The first great line (consisting of course of many subordinate ones) is called Peuquenes. It divides the waters, and there-

floods also, in the former case, are said to be more destructive to the land. D'Orbigny (vol. i., p. 184), in explaining the cause of the various colours of the rivers in South America, remarks that those with blue or clear water, have their source in the Cordillera, where the snow melts.

* Measurements made by Dr. Gillies; Edinburgh Journal of Nat. and Geograph. Science, August, 1830.

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fore likewise the republics of Chile and Mendoza. To the eastward, a mountainous and elevated region separates it from the second range (called the Portillo) overlooking the Pampas. The streams from the intermediate tract find a passage a little way to the southward through this second line.

I will here give a very brief sketch of the geological structure of these mountains: first, of the Peuquenes, or western line; for the constitution of the two ranges is totally different. The lowest stratified rock is a dull red or purple claystone porphyry, of many varieties, alternating with conglomerates, and breccia composed of a similar substance: this formation attains a thickness of more than a mile. Above it there is a grand mass of gypsum, which alternates, passes into, and is replaced by, red sandstone, conglomerates, and black calcareous clay-slate. I hardly dare venture to guess the thickness of this second division; but I have already said some of the beds of gypsum alone attain a thickness of at least two thousand feet. Even at the very crest of the Peuquenes, at the height of 13,210 feet, and above it, the black clay-slate contained numerous marine remains, amongst which a gryphæa is the most abundant, likewise shells, resembling turritellæ, terebratulæ, and an ammonite. It is an old story, but not the less wonderful, to hear of shells, which formerly were crawling about at the bottom of the sea, being now elevated nearly fourteen thousand feet above its level. The formation probably is of the age of the central parts of the secondary series of Europe.

These great piles of strata have been penetrated, upheaved, and overturned, in the most extraordinary manner, by masses of injected rock, equalling mountains in size. On the bare sides of the hills, complicated dikes, and wedges of variously-coloured porphyries and other stones, are seen traversing the strata in every possible form and direction; proving also by their intersections, successive periods of violence. The rock which composes the axis of these great

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lines of dislocation, at a distance very closely resembles granite, but on examination, it is found rarely to contain any quartz; and instead of ordinary felspar, albite.

The metamorphic action has been very great, as might have been expected from the close proximity of such grand masses of rock, which were injected when in a liquefied state from heat. When it is known, first, that the stratified porphyries have flowed as streams of submarine lava under an enormous pressure, and that the mechanical beds separating them owe their origin to explosions from the same submarine craters; secondly, that the whole mass in the lower part has generally been so completely fused into one solid rock by metamorphic action, that the lines of division can only be traced with much difficulty; and thirdly, that masses of porphyry, undistinguishable by their mineralogical characters from the two first kinds, have been subsequently injected;—the extreme complication of the whole will readily be believed.

We now come to the second range, which is of even greater altitude than the first. Its nucleus in the section seen in crossing the Portillo pass, consists of magnificent pinnacles of coarsely-crystallized red granite. On the eastern flank, a few patches of mica slate still adhere to the unstratified mass; and at the foot a stream of basaltic lava has burst forth at some remote period,—perhaps when the sea covered the wide surface of the Pampas. On the western side of the axis, between the two ranges, laminated fine sandstone has been penetrated by immense granitic dikes proceeding from the central mass, and has thus been converted into granular quartz rock. The sandstone is covered by other sedimentary deposits, and these again by a coarse conglomerate, the vast thickness of which I will not attempt even to estimate. All these coarse mechanical beds dip from the red granite directly towards the Peuquenes range, as if they passed beneath it; though such is not the case. On examining the pebbles composing this conglomerate (which, to my surprise, betrayed no signs of metamorphic

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action), I was astonished to find perfectly rounded masses of the black calcareous clay-slate with organic remains,—the same rock which I had just crossed *in situ* on the Peuquenes. These phenomena compel us to arrive at the following conclusion:—that the Peuquenes existed as dry land for a long period anterior to the formation of the second range, and that, during this period, immense quantities of shingle were accumulated at its submarine flank. The action of a disturbing force then commenced: these more modern deposits were injected by dikes, altered by heat, and tilted towards the line whence, in the form of sediment and pebbles, they had originally proceeded,—thus making the offspring at first appear older than its parent. This second, grand, and subsequent line of elevation is parallel to the first and more ancient one.

I will only make one other geological observation: the Portillo chain in the neighbourhood of the pass is rather more elevated than the Peuquenes, yet the waters of the intermediate district have burst a passage through it. On the supposition of a subsequent and gradual elevation of the second line, this can be understood; for a chain of islets would at first appear, and as these were lifted up, the tides would always be working out deeper and broader channels between them. At the present day, even in the most retired sounds on the southern coast, the currents in the transverse breaks which connect the longitudinal channels, is so strong, that I have heard of one instance where a small vessel under sail was whirled round and round.

Mr. Pentland,* when describing an hydrographical phenomenon of a nearly similar kind, but on an infinitely grander scale, which occurs in Bolivia, says, "This very curious fact, of rivers escaping through such an immense mountain-mass as the Bolivian Cordillera, is perhaps one of the most important points connected with the physical geography of this portion of the Andes, and deserves to be

* Journal of the Royal Geograph. Society for 1835.

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noticed at greater length." It would be extremely rash to affirm that the eastern chain in Bolivia, like that of central Chile, must be of subsequent origin to the western one, or that nearer to the Pacific: but excepting through the explanation above offered, the circumstance that rivers flowing from a less elevated chain, should penetrate one far more lofty, appears to me quite inexplicable.

About noon we began the tedious ascent of the Peuquenes, and then for the first time experienced some little difficulty in our respiration. The mules would halt every fifty yards, and then the poor willing animals after a few seconds started of their own accord again. The short breathing from the rarefied atmosphere is called by the Chilenos "puna;" and they have most ridiculous notions concerning its origin. Some say, "all the waters here have puna;" others that "where there is snow there is puna;"—and this no doubt is true. It is considered a kind of disease, and I was shown the crosses over the graves of some who had died "punado." Excepting perhaps in the case of a person suffering from some organic disease of the heart or chest, I should think this must be an erroneous conclusion. A person near death, would probably at this elevation experience a more unusual difficulty in breathing than others; and hence the effect might be assumed as the cause. The only sensation I felt was a slight tightness over the head and chest; a feeling which may be experienced by leaving a warm room and running violently on a frosty day. There was much fancy even in this; for upon finding fossil shells on the highest ridge, I entirely forgot the puna in my delight. Certainly the exertion of walking was extreme, and the respiration became deep and laborious. It is incomprehensible to me, how Humboldt and others were able to ascend to the elevation of 19,000 feet. No doubt a residence of some months in the lofty region of Quito would prepare the constitution for such an exertion; yet I am told that in Potosi (about 13,000 feet), strangers do not become quite accustomed to the atmosphere for an entire year. The inhabitants all recommend onions

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for the puna; as this vegetable has sometimes been given in Europe for pectoral complaints, it may possibly be of real service:—for my part, I found nothing so good as the fossil shells!

When about halfway up we met a large party with seventy loaded mules. It was interesting to hear the wild cries of the muleteers, and to watch the long string descending; they appeared so diminutive, there being nothing but the bleak mountains with which they could be compared. When near the summit, the wind, as generally happens there, was impetuous and extremely cold. On each side of the ridge we had to pass over broad bands of snow, which perpetually lie there, and were now soon to be covered by a fresh layer. When we reached the crest and looked backwards, a glorious view was presented. The atmosphere resplendently clear; the sky an intense blue; the profound valleys; the wild broken forms; the heaps of ruins, piled up during the lapse of ages; the bright-coloured rocks, contrasted with the quiet mountains of snow; all these together produced a scene I never could have figured to my imagination. Neither plant nor bird, excepting a few condors wheeling around the higher pinnacles, distracted the attention from the inanimate mass. I felt glad I was alone: it was like watching a thunderstorm, or hearing a chorus of the Messiah in full orchestra.

On several of the patches of perpetual snow, I found the *Protococcus nivalis*, or red snow, so well known from the accounts of Arctic navigators. My attention was called to the circumstance by observing the footseps of the mules stained a pale red, as if their hoofs had been slightly bloody. I at first thought it was owing to dust blown from the surrounding mountains of red porphyry; for from the magnifying power of the crystals of snow, the groups of these atom-like plants appeared like coarse particles. The snow was coloured only where it had thawed very rapidly, or had been accidentally crushed. A small portion of it rubbed on paper communicated a faint rose tinge, mingled with a little brick red. I placed some of the snow between the leaves of

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my pocket-book, and a month afterwards examined with care the pale discoloured patches on the paper. The specimens, when scraped off, were of a spherical form, with a diameter of the thousandth of an inch. The central part consists of a blood-red substance, surrounded by a colourless bark. When living on the snow they are collected in groups, many lying close together; I overlooked, however, the thin couch of gelatinous matter on which they are said to rest.* The dried specimens placed in any fluid, as water, spirits of wine, or dilated sulphuric acid, were acted on in two different ways: sometimes an expansion was caused, at others a contraction. The central part after immersion invariably appeared as a drop of red oily fluid, containing a few most minute granules; and these probably are the germs of new individuals.

As I before remarked, the wind on the crest of the Peuquenes is generally impetuous and very cold. It is said to blow steadily from the westward or Pacific side: a circumstance which is likewise mentioned by Dr. Gillies.† As these observations apply chiefly to the summer season (when the passes are frequented), we must consider this wind, as an upper and return current. The Peak of Teneriffe, with a less elevation, and situated in lat. 28°, in like manner falls within the return stream. At first it appears rather surprising, that the trade-wind along the northern parts of Chile, and on the coast of Peru, should blow in so very southerly a direction as it does; but when we reflect, that the Cordillera, running in a north and south line, intercepts, like a great wall, the entire depth of the lower atmospheric current, we can easily see, that the trade-wind must be drawn northward, following the line of mountains, towards the equatorial regions, and thus lose part of that easterly movement which it otherwise would have gained from the rotation of the world. At Mendoza, on the eastern foot of the Andes, the climate is said to be subject to long calms, and to frequent

* Greville's Scottish Cryptogam. Flora, vol. iv., p. 231.

† Journal of Natural and Geographical Science, August, 1830.

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though false appearances of gathering rain-storms: we may imagine that the wind, which coming from the eastward is thus banked up by the line of mountains, would become stagnant and irregular in its movements.

Having crossed the Peuquenes, we descended into the mountainous country, intermediate between the two ranges, and then took up our quarters for the night. The elevation was probably not much under 11,000 feet, and the vegetation in consequence exceedingly scanty. The root of a small scrubby plant served as fuel, but it made a miserable fire, and the wind was piercingly cold. Being quite tired with my day's work, I made up my bed as quickly as I could, and went to sleep. About midnight I observed the sky became suddenly clouded: I awakened the arriero to know if there was any danger of bad weather; but he said that without thunder and lightning there was no risk of a heavy snow-storm. The peril is imminent, and the difficulty of subsequent escape great, to any one overtaken by bad weather between the two Cordillera. A certain cave offers the only place of refuge: Mr. Caldcleugh, who crossed on this same day of the month, was detained there for some time by a heavy fall of snow, as is related in his travels. Casuchas, or houses of refuge, have not been built in this pass as in that of Uspallata, and therefore, during the autumn, the Portillo is little frequented. I may here remark, that within the main Cordillera rain never falls, for during the summer, the sky is cloudless, and in winter snow-storms alone occur.

At the place where we slept, water necessarily boiled, from the diminished pressure of the atmosphere, at a much lower temperature than it does in a less elevated country; the case being the converse of that of a Papin's digester. In consequence of this, the potatoes, after remaining for some hours in the boiling water, were nearly as hard as ever. The pot was left on the fire all night, and next morning it was boiled again, but yet the potatoes were not cooked. I found out this, by overhearing my two companions discussing the cause; they had come to the simple conclusion, " that the

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cursed pot (which was a new one) did not choose to boil potatoes."

MARCH 22D.—After eating our potato-less breakfast, we travelled across the intermediate tract, to the foot of the Portillo range. In the middle of summer cattle are brought up here to graze; but they had now all been removed; even the greater number of the guanacoes had decamped, knowing well, that, if overtaken by a snow-storm, they would be caught in a trap. We had a fine view of a mass of mountains called Tupungato, the whole clothed with unbroken snow. From one peak my arriero said he had once seen smoke proceeding; and I thought I could distinguish the form of a large crater. In the maps Tupungato figures as a single mountain; this Chileno method of giving one name to a tract of mountains is a fruitful source of error. In the region of snow there was a blue patch, which no doubt was a glacier;—a phenomenon that has been said not to occur in these mountains.

Now commenced a heavy and long climb, similar to that up the Peuquenes. Bold conical hills of red granite rose on each hand; and in the valley there were several broad fields of perpetual snow. These frozen masses, during the process of thawing, had in some parts assumed the form of pinnacles or columns, which, as they were high and close together, caused some difficulty on account of the cargo mules. This structure in frozen snow was long since observed by Scoresby in the icebergs near Spitzbergen, and lately, with more care, by Colonel Jackson* on the Neva. On one of these columns of ice a frozen horse was exposed, sticking as on a pedestal, but with its hind legs straight up in the air. To account for its strange position, we must

* Journal of Geograph. Soc., vol. v., p. 12. Mr. Lyell (vol. iv., p. 360) has compared the fissures, by which the columnar structure seems to be determined, to the joints that traverse nearly all rocks, but which are best seen in the non-stratified masses. I may observe, in the case of the frozen snow, the columnar structure must be owing to a "metamorphic" action and not to a process during *deposition*.

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suppose that the animal fell with its head downward into a hole, when the stratum was continuous, and that afterwards the surrounding parts were removed by the thaw.

When nearly on the crest of the Portillo, we were enveloped in a cloud which was falling, under the form of minute frozen spicula. This was very unfortunate, as it continued the whole day, and quite intercepted our view. The pass takes its name of Portillo from a narrow cleft or doorway on the highest ridge, through which the road passes. From this point, on a clear day, those vast plains which extend from the base of the mountains towards the Atlantic can be seen. We descended to the upper limit of vegetation, and found good quarters for the night under the shelter of some large fragments of rock. We here met some passengers, who made anxious inquiries about the state of the road. Shortly after it was dark, the clouds suddenly cleared away; and the effect was quite magical. The great mountains, bright with the full moon, seemed impending over us on all sides, as if we had been buried at the bottom of some deep crevice. One morning also, very early, I witnessed the same striking effect. As soon as the clouds were dispersed, it froze severely; but as there was no wind, we slept very comfortably.

The increased brilliancy of the moon and stars at this elevation, owing to the perfect transparency of the atmosphere, was very remarkable. Travellers having observed the difficulty of judging heights and distances amidst lofty mountains, have generally attributed it to the absence of objects of comparison. It appears to me that it is fully as much owing to this transparency, confounding different distances, and partly, likewise, to the novelty of an unusual degree of fatigue arising from a little exertion,—habit being thus opposed to the evidence of the senses. I am sure that this extreme clearness of the air gives a peculiar character to the landscape; all objects appearing to be brought nearly into one plane, as in a drawing or panorama. The transparency is, I presume, owing to the equable and nearly perfect

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state of atmospheric dryness. The latter quality was shown by the manner in which woodwork shrunk (as I soon found by the trouble my geological hammer gave me); by articles of food, such as bread and sugar, becoming extremely hard; and by the preservation of the skin and parts of the flesh of the beasts, which perish on the road. To the same cause we must attribute the singular facility with which electricity is excited. My flannel-waistcoat, when rubbed in the dark, appeared as if it had been washed with phosphorus;—every hair on a dog's back crackled;—even the linen sheets, and leathern straps of the saddle, when handled, emitted sparks.

MARCH 23D.—The descent on the eastern side of the Cordillera is much shorter or steeper than on the Pacific side; in other words, the mountains rise more abruptly from the plains, than from the alpine country of Chile. A level and brilliantly white sea of clouds was extended beneath our feet, and thus shut out the view of the equally level Pampas. We soon entered the band of clouds, and did not again emerge from it that day. About noon, finding pasture for the animals and bushes for firewood, in a part of the valley called Los Arenales, we stopped for the night. This was near the uppermost limit of bushes, and the elevation, I suppose, was between seven and eight thousand feet.

I was very much struck with the marked difference between the vegetation of these eastern valleys and that of the opposite side: yet the climate, as well as the kind of soil, is nearly identical, and the difference of longitude very trifling. The same remark holds good with the quadrupeds, and in a lesser degree with the birds and insects. We must except certain species which habitually or occasionally frequent elevated mountains; and in the case of the birds, certain kinds, which have a range as far south as the Strait of Magellan. This fact is in perfect accordance with the geological history of the Andes; for these mountains have existed as a great barrier, since a period so remote that whole races of animals must subsequently have perished from the face of the earth. Therefore, unless we suppose the same species to have been

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created in two different countries, we ought not to expect any closer similarity between the organic beings on opposite sides of the Andes, than on shores separated by a broad strait of the sea. In both cases we must leave out of the question those kinds which have been able to cross the barrier, whether of salt water or solid rock.*

A great number of the plants and animals were absolutely the same, or most closely allied with those of Patagonia. We here have the agouti, bizcacha, three species of armadillo, the ostrich, certain kinds of partridges, and other birds, none of which are ever seen in Chile, but are the characteristic animals of the desert plains of Patagonia. We have likewise many of the same (to the eyes of a person who is not a botanist) thorny stunted bushes, withered grass, and dwarf plants. Even the black slowly-crawling beetles are closely similar, and some, I believe, on rigorous examination, absolutely identical. It had always been a subject of regret to me, that we were unavoidably compelled to give up the ascent of the St. Cruz river before reaching the mountains. I always had a latent hope of meeting with some great change in the features of the country; but I now feel sure, that it would only have been following the plains of Patagonia up an ascent.

March 24th.—Early in the morning I climbed up a mountain on one side of the valley, and enjoyed a far-extended view over the Pampas. This was a spectacle to which I had always looked forward with interest, but I was disappointed. At the first glance there was a strong resemblance to a distant view of the ocean, but in the northern parts many irregularities in the surface were soon distinguishable. The most striking feature in the scene consisted of the rivers,

* This is merely an illustration of the admirable laws first laid down by Mr. Lyell of the geographical distribution of animals as influenced by geological changes. The whole reasoning, of course, is founded on the assumption of the immutability of species. Otherwise the changes might be considered as superinduced by different circumstances in the two regions during a length of time.

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which, facing the rising sun, glittered like silver threads, till lost in the immensity of the distance.

In the middle of the day, we descended the valley, and reached a hovel, where an officer and three soldiers were posted to examine passports. One of these men was a thorough-bred Pampas Indian. He was kept much for the same purpose as a bloodhound, to track out any person who might pass by secretly, either on foot or horseback. Some years ago, a passenger had endeavoured to escape detection, by making a long circuit over a neighbouring mountain; but this Indian, having by chance crossed his track, followed it for the whole day, over dry and very stony parts, till at last he came on his prey hidden in a gully. We here heard that the silvery clouds, which we had admired from the bright region above, had poured down torrents of rain. The valley from this point gradually opened, and the hills became mere water-worn hillocks compared to the giants behind. It then expanded into a gently-sloping plain of shingle, covered with low trees and bushes. This talus, although it looked of little breadth, must be nearly ten miles wide, before it blends into the apparently dead level Pampas. We had already passed the only house in this neigbourhood, the Estancia of Chaquaio; and at sunset we pulled up in the first snug corner, and there bivouacked.

MARCH 25TH.—I was reminded of the Pampas of Buenos Ayres, by seeing the disk of the rising sun, intersected by an horizon, level as that of the ocean. During the night a heavy dew had fallen, a fact we did not experience within the Cordillera. The road proceeded for some distance due east across a low swamp; then meeting the dry plain, it turned to the north towards Mendoza. The distance is two very long days' journey. Our first day's journey was called fourteen leagues to Estacado, and the second seventeen to Luxan, near Mendoza. The whole distance is over a level desert plain, with not more than two or three houses. The sun was exceedingly powerful, and the ride devoid of all interest. There is very little water in this "traversia," and in our

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second day's journey, we found only one little pool. The water flowing from the mountains is small in quantity and soon becomes absorbed by the dry and porous soil; so that, although we travelled at the distance of only ten or fifteen miles from the outer range, we did not cross a single stream. In many parts the ground was incrusted with a saline efflorescence; hence we had the same salt-loving plants, common near Bahia Blanca. The landscape has one character from the Strait of Magellan along the whole eastern coast of Patagonia to the Rio Colorado; and it appears that the same kind of country extends northerly in a sweeping line as far as San Luis, and perhaps even further. To the eastward of this line, lies the basin of the comparatively damp and green plains of Buenos Ayres. The former country, including the sterile traversia of Mendoza and Patagonia, consists of a bed of shingle, worn smooth, and accumulated by the waves of a former sea; while the formation of the Pampas (plains covered by thistles, clover, and grass) is due to the estuary mud of the Plata, deposited under a different condition of circumstances.

After our two days' tedious journey, it was refreshing to see in the distance the rows of poplars and willows growing around the village and river of Luxan. Shortly before we arrived at this place, we observed to the southward a ragged cloud of a dark reddish-brown colour. For some time, we had no doubt but that it was thick smoke proceeding from some great fire on the plains. Soon afterwards we found it was a pest of locusts.* The insects overtook us, as they were travelling northward, by the aid of a light breeze, at the rate, I should suppose, of ten or fifteen miles an hour. The main body filled the air from a height of twenty feet, to that, as it appeared, of two or three thousand above the ground. The noise of their approach was that of a strong breeze† pass-

* The species is identical with, or resembles most closely, the famous *Gryllus migratorius* of eastern countries.

† "And the sound of their wings was as the sound of chariots of many horses running to battle."—*Revelat.* ix. 9.

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ing through the rigging of a ship. The sky seen through the advanced guard appeared like a mezzotinto engraving, but the main body was impervious to sight; they were not, however, so thick, but that they could escape from a stick moved backward and forward. When they alighted they were more numerous than the leaves in a field, and changed the green into a reddish colour: the swarm having once alighted, the individuals flew from side to side in any direction. The locusts are not an uncommon pest in this country: already during the season, several smaller swarms had come up from the sterile plains* of the south; and many trees had been entirely stripped of their leaves. Of course this swarm cannot even be compared to those of the eastern world, yet it was sufficient to make the well-known descriptions of their ravages more intelligible. I have omitted, perhaps, the most striking part of the scene,—the vain attempts of the poor cottagers to turn the stream aside. Many lighted fires and with the smoke, with shouts and waving of branches, they endeavoured to avert the attack.

We crossed the Luxan, which is a river of considerable size, though its course towards the sea-coast is very imperfectly known. It is even doubtful whether, in passing over the plains, it is evaporated, or whether it forms a tributary of the Sauce or Colorado. We slept in the village, which is a small place surrounded by gardens, and forms the most southern part, that is cultivated, of the province of Mendoza; it is five leagues south of the capital. At night I experienced an attack (for it deserves no less a name) of the *Benchuca* (a species of Reduvius) the great black bug of the Pampas. It is most disgusting to feel soft wingless insects, about an inch long, crawling over one's body. Before sucking they are quite thin, but afterwards become round and bloated with blood, and in this state they are easily crushed.

* Swarms of locusts sometimes overrun the more central plains of this continent. In these cases, and likewise as it appears in all parts of the world, the locusts are bred in desert plains, and thence migrate towards a more fertile country.

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They are also found in the northern parts of Chile and in Peru. One which I caught at Iquique was very empty. When placed on the table, and though surrounded by people, if a finger was presented, the bold insect would immediately draw its sucker, make a charge, and if allowed, draw blood. No pain was caused by the wound. It was curious to watch its body during the act of sucking, as it changed in less than ten minutes, from being as flat as a wafer to a globular form. This one feast, for which the benchuca was indebted to one of the officers, kept it fat during four whole months; but, after the first fortnight, the insect was quite ready to have another suck.

March 27th.—We rode on to Mendoza. The country was beautifully cultivated, and resembled Chile. This neighbourhood is celebrated for its fruit; and certainly nothing could appear more flourishing than the vineyards and the orchards of figs, peaches, and olives. We bought water-melons nearly twice as large as a man's head, most deliciously cool and well-flavoured, for a halfpenny apiece; and for the value of threepence, half a wheelbarrowful of peaches. The cultivated and enclosed part of this province is very small; there is little more than that which we passed through between Luxan and the capital. The land, as in Chile, entirely owes its fertility to artificial irrigation; and it is really wonderful to observe how abundantly productive a barren traversia is rendered by this simple process.

We staid the ensuing day in Mendoza. The prosperity of the place has much declined of late years. The inhabitants say "it is good to live in, but very bad to grow rich in." The lower orders have the lounging, reckless manners of the Gauchos of the Pampas; and their dress, riding-gear, and habits of life, are nearly the same. To my mind the town had a stupid forlorn aspect. Neither the boasted alameda, nor the scenery, is at all comparable to that of Santiago; but to those who have just crossed the unvaried savannahs of grass, on their road from Buenos Ayres, the gardens and orchards must appear delightful. Captain Head, speaking of

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the inhabitants, says, "They eat their dinners, and it is so very hot, they go to sleep—and could they do better?" I quite agree with Captain Head: the happy doom of the Mendozinos is to eat, sleep, and be idle.

March 29th.—We set out on our return to Chile by the Uspallata pass to the northward of Mendoza. We had to cross a long and most sterile traversia of fifteen leagues. The soil in parts was absolutely bare, in others covered by numberless dwarf cacti, armed with formidable spines, and called by the inhabitants "little lions." There were also a few low bushes. Although the plain is elevated about three thousand feet above the sea, the sun was very powerful; this, and the clouds of impalpable dust, rendered the travelling extremely irksome. Our course during the day lay nearly parallel to the mountains, but gradually approaching them. Before sunset we entered one of the wide valleys, or rather bays, which open on the plain: this soon narrowed into a ravine, and a little higher up the house of the Villa Vicencio was situated. As we had ridden all day without a drop of water, both ourselves and our animals were very thirsty, and we looked out anxiously for the stream which flows down this valley. It was curious to observe how gradually the water made its appearance: on the plain the course was quite dry; by degrees it became a little damper; then puddles of water were formed; these soon became connected, and at Villa Vicencio there was a nice little rivulet.

30th.—The solitary hovel which bears the imposing name of Villa Vicencio, has been mentioned by every traveller who has crossed the Andes. I staid here, and at some neighbouring mines, during the two succeeding days. The geology of the surrounding country is very curious. The Uspallata range is separated from the true Cordillera by a long narrow plain or basin, like those so often mentioned in Chile, but with an altitude of about six thousand feet. The range consists of various kinds of submarine lava, alternating with volcanic sandstones and other remarkable sedimentary deposits; the whole having a very close resemblance to some of

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the newer horizontal beds on the shores of the Pacific. From this resemblance I expected to find silicified wood, which is generally characteristic of those formations. I was gratified in a very extraordinary manner. In the central part of the range, at an elevation probably of seven thousand feet, on a bare slope, I observed some snow-white projecting columns. These were petrified trees, eleven being silicified, and from thirty to forty converted into coarsely-crystallized white calcareous spar. They were abruptly broken off; the upright stumps projecting a few feet above the ground. The trunks measured from three to five feet each in circumference. They stood a little way apart from each other, but the whole formed one distinct group. Mr. Robert Brown has been kind enough to examine the wood: he says it is coniferous, and that it partakes of the character of the Araucarian tribe (to which the common South Chilian pine belongs), but with some curious points of affinity with the yew. The volcanic sandstone in which they were embedded, and from the lower part of which they must have sprung, had accumulated in successive thin layers around their trunks; and the stone yet retained the impression of the bark.

It required little geological practice to interpret the marvellous story, which this scene at once unfolded; though I confess I was at first so much astonished that I could scarcely believe the plainest evidence of it. I saw the spot where a cluster of fine trees had once waved their branches on the shores of the Atlantic, when that ocean (now driven back 700 miles) approached the base of the Andes. I saw that they had sprung from a volcanic soil which had been raised above the level of the sea, and that this dry land, with its upright trees, had subsequently been let down to the depths of the ocean. There it was covered by sedimentary matter, and this again by enormous streams of submarine lava—one such mass alone attaining the thickness of a thousand feet; and these deluges of melted stone and aqueous deposits had been five times spread out alternately. The ocean which received such masses must have been deep; but again the subterra-

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nean forces exerted their power, and I now beheld the bed of that sea forming a chain of mountains more than seven thousand feet in altitude. Nor had those antagonist forces been dormant, which are always at work to wear down the surface of the land to one level: the great piles of strata had been intersected by many wide valleys; and the trees now changed into silex were exposed projecting from the volcanic soil now changed into rock, whence formerly in a green and budding state they had raised their lofty heads. Now, all is utterly irreclaimable and desert; even the lichen cannot adhere to the stony casts of former trees. Vast, and scarcely comprehensible as such changes must ever appear, yet they have all occurred within a period recent when compared with the history of the Cordillera; and that Cordillera itself is modern as compared with some other of the fossiliferous strata of South America.

April 1st.—We crossed the Uspallata range; and at night slept at the custom-house—the only inhabited spot on the plain. Shortly before leaving the mountains, there was a very extraordinary view: red, purple, green, and quite white sedimentary rocks, alternating with black lavas, were broken up and thrown into all kinds of disorder, by masses of porphyry, of every shade, from dark brown to the brightest lilac. It was the first view I ever saw, which really resembled those pretty sections which geologists make of the inside of the earth.

The next day we crossed the plain, and followed the course of the same great mountain-stream which flows by Luxan. Here it was a furious torrent, quite impassable, and appearing larger than in the low country; as was the case with the rivulet of Villa Vincencio. On the evening of the succeeding day we reached the Rio de las Vacas, which is considered the worst stream in the Cordillera to cross. As all these rivers have a rapid and short course, and are due to the snow melted by the sun's heat, the hour of the day makes a considerable difference in their volume. In the evening the stream is muddy and full, but about daybreak it becomes both clearer and much less impetuous.

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This we found to be the case with the Rio Vacas, and in the morning we crossed it with little difficulty.

The scenery thus far was very uninteresting, compared with that of the Portillo pass. Little can be seen beyond the bare walls of the one grand, flat-bottomed valley, which the road follows up to the highest crest. The valley and the huge rocky mountains were extremely barren: during the two previous nights the poor mules had absolutely nothing to eat; for excepting a few low resinous bushes, scarcely a plant could be seen. We went over in the course of this day some of the worst passes in the Cordillera. The degree of exaggeration concerning their danger and difficulty is very great. In Chile I was even told, that if I attempted to pass on foot my head would turn giddy, that there was no room to dismount, &c., but I did not see a place where any one might not have walked over backwards, or got off his mule on either side. One of the bad passes called *las Animas* (the Souls), I had crossed, and did not find out till a day afterwards that it was one of the awful dangers. No doubt there are many parts in which, if the mule should stumble, the rider would be hurled down a great precipice; but of such a catastrophe there is much less chance than with a man on foot. I dare say, in the spring, the "laderas," or roads, which each year are formed anew across the piles of fallen detritus, are very bad; but from what I have seen, I suspect the real danger is nothing, and the apparent very little. With cargo mules the case is rather different; for the loads project so far, that the animals occasionally running against each other, or against a point of rock, lose their balance and are thrown down the precipice. With regard to crossing the rivers, I can well believe that the difficulty amounts to every degree, till they are impracticable. At this season there was little trouble, but in the summer they must be very bad. I can quite imagine, as Captain Head describes, the different expressions of those who *have* passed the gulf, and those who *are* passing. I never heard of any man being drowned, but with loaded mules this is of frequent

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occurrence. The arriero tells you to show your mule the best line, and then allow her to cross as she chooses; the cargo mule takes a bad line, and is often lost.

April 4th.—From the Rio de las Vacas to the Puente del Inca, half a day's journey. As there was pasture for the mules, and geology for me, we bivouacked for the night. When one hears of a natural bridge, one pictures to oneself some deep and narrow ravine, across which a bold mass of rock has fallen; or a great arch hollowed out like the vault of a cavern. Instead of this, the Inca's bridge consists of a crust of stratified shingle, cemented together by the deposits of the neighbouring hot springs. It appears as if the stream had scooped out a channel on one side, leaving an overhanging ledge, which was at last met by the earth and stones falling down from the opposite cliff. Certainly an oblique junction, as would happen in such case, was very distinct on one side. The bridge of the Incas is by no means worthy of the great monarchs whose name it bears.

Close by, there were some ruins of Indian buildings. These occur in several other places; the most perfect, which I saw, being the Ruinas de Tambillos. Small square rooms were there huddled together, but placed in distinct groups. Some of the doorways were yet standing: they were formed by a cross slab of stone, but only raised about three feet high. Ulloa, in his "Noticias Americanas," remarks on the lowness of the doors in the ancient Peruvian dwellings. These houses, when perfect, must have been capable of containing a considerable number of persons. Tradition says, they were used as halting-places for the Incas, when they crossed these mountains. Traces of Indian habitations have been discovered in many parts of the Cordillera, where it does not appear probable, that they were constructed as mere resting-places; but yet where the land is as utterly unfit for any kind of cultivation as it is near the Tambillos or Puente del Inca. In the Portillo pass I saw one group of such ruins. In the ravine of Jajuel, near Aconcagua, where there is no pass, I heard of numerous remains situated

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at a great elevation, where it is both cold and extremely sterile. At first I imagined, that these houses were places of refuge built by the Indians on the first arrival of the Spaniards; but subsequently I have been almost inclined to speculate on the possibility of a small change of climate.

In the northern parts of Chile, within the Cordillera of Copiapó, old Indian houses are found in very many parts: by digging amongst the ruins, bits of woollen articles, instruments of precious metals, and heads of Indian corn, are not unfrequently discovered. I had likewise in my possession the head of an arrow, made of agate, of precisely the same figure as those now used in Tierra del Fuego. I am aware that the Peruvian Indians* frequently inhabit most lofty and bleak situations; but in these cases, I was assured by men, who had spent their lives in travelling the Andes, that very many (*muchisimas*) houses were found at elevations so great as almost to border on the perpetual snow, and in parts where there exist no passes, and where the land produces absolutely nothing, and what is still more extraordinary, where there is no water. Nevertheless it is the opinion of the people of the country (although they are much puzzled by the circumstance), that, from the appearance of the houses, the Indians must have used them as places of residence. In the Despoblado (uninhabited valley), near Copiapó, at a spot called Punta Gorda, I saw the remains of seven or eight square little rooms, which were of a similar form with those at the Tambillos, but built chiefly of mud (which the present inhabitants cannot by any means imitate in durability†) instead of with stone. They were situated in the most conspicuous and defenceless position,

* Mr. Pentland even considers, that the love of an elevated situation is characteristic of the constitution of this race.—*Geograph. Journ.*

† Ulloa (Noticias Americanas, p. 302) remarks on the same circumstance in Peru. He adds, when speaking of the mud bricks, "which gives room to think that they had some particular method of working them, that they should become hard, without cracking, the secret of which the present inhabitants are ignorant of."

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at the bottom of a flat broad valley. There was no water nearer than three or four leagues, and that only in very small quantity, and bad: the soil was absolutely sterile;—I looked in vain even for a lichen adhering to the rocks. At the present day, with the advantage of beasts of burden, a mine, unless it were very rich, could scarcely be worked there with profit. Yet the Indians formerly chose it as a place of residence! If at the present time two or three showers of rain were to fall annually, instead of one during as many years, as now is the case, a small rill of water would in all probability be formed in this great valley, draining a mountainous country; and then, by irrigation (the method of which was formerly so well understood by the Indians), the soil might easily be rendered sufficiently productive to support a few families.

I have certain proofs that this part of the continent of South America has been elevated, near the coast, at least from four to five hundred feet, since the epoch of existing shells; and further inland the rise possibly may have been greater. As the peculiarly arid character of the climate is evidently a consequence of the height of the great range of mountains, we may feel almost sure, that prior to the latter elevations, the atmosphere was not so completely drained of its moisture as at the present day. At a remote geological era, it is probable that the Andes consisted of a chain of islands, which were covered by luxuriant forests; and many of the trees, in a silicified state, may now be seen embedded in the upper conglomerates. Of these I measured one which was cylindrical, with a circumference of fifteen feet. As it is nearly certain that the mountains have risen slowly, so would the climate likewise become deteriorated slowly. We need not feel greatly surprised at walls of stone and hardened mud here lasting for many ages, when we remember how many centuries the Druidical mounds have withstood even the climate of England. The only question is, whether the amount of change, since the introduction of man into South America, has been sufficient to cause a sensible

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effect on the atmospheric moisture, and therefore on the fertility of the valleys in the upper Cordillera. From the extreme slowness with which there is reason to believe the continent is rising, the longevity of man as a species, required to allow of sufficient change, is the most valid objection to the above speculations: for on the eastern shores of this continent, we have seen that several animals, belonging to the same class of mammalia with man, have passed away, while the change of level between land and water, in that part at least, has been so small, that it can scarcely have caused any sensible difference in the climate. I may add, however, that at Lima, the elevation, within the human epoch, certainly has amounted to between seventy and eighty feet.

When at Lima, I conversed on this subject* with Mr. Gill, a civil engineer, who had seen much of the interior country. He told me that a conjecture of a change of climate had sometimes crossed his mind; but that he thought that the greater portion of land now incapable of cultivation, but covered with Indian ruins, had been reduced to that condition, by neglect and subterranean movements injuring the water conduits, which the Indians formerly constructed on so wonderful a scale. I may here just mention that these people actually carried tunnels through hills of solid rock, when such were necessary to conduct the irrigating streams. Mr. Gill told me, he had been employed professionally to examine one; he found the passage low, narrow, crooked, and not of uniform breadth, but of very considerable length. Is it not most wonderful that any people should have attempted such operations without the aid of iron or of gunpowder!

* Temple, in his travels through upper Peru or Bolivia, in going from Potosi to Oruro, says, "I saw many Indian villages or dwellings in ruins, up even to the very tops of the mountains, attesting a former population where now all is desolate." He makes similar remarks in another place, but it is not possible to judge, whether this desolation is owing merely to a want of population, or to an altered condition of the land.

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Mr. Gill mentioned to me a most interesting, and as far as I am aware, quite unparalleled case, of the effect of subterranean disturbances in altering the drainage of a country. Travelling from Casma to Huaraz (not very far distant from Lima), he found a plain covered with ruins and marks of ancient cultivation, but now quite barren. Near it was the dry course of a considerable river, whence the water for irrigation had formerly been conducted. There was nothing in the appearance of the watercourse to indicate that the river had not flowed there a few years previously: in some parts beds of sand and gravel were scattered, and in others the solid rock had been worn into a broad channel.* It is self-evident that a person following up the course of a stream, will always ascend at a greater or less inclination. Mr. Gill was therefore very much astonished, when walking up the bed of this ancient river, to find himself suddenly going down hill. He imagined that the slope had a fall of about forty or fifty feet perpendicular. We here have the most unequivocal evidence, that a ridge or line of hills has been uplifted directly across the bed of a stream, which must have been flowing for many centuries. From the moment the river-course was thus arched, the water would necessarily be thrown back; and a new channel would be formed on one side some way above. From that time, also, the neighbouring plain would lose its fertilizing stream, and become converted into the desert which it now remains.

APRIL 5TH.—We had a long day's ride across the central ridge, from the Inca's bridge to the Ojos del Agua, which is situated near the lowest *casucha* on the western slope. These casuchas are little round towers, with steps outside to reach the floor, which is elevated some feet above the ground on account of the snow-drifts. They are eight in number; and under the Spanish government, were kept

* Mr. Gill said he recollected that one part, which had been cut out of the solid rock, was about forty yards wide and eight feet deep. This is sufficient to give some idea of the size of the former stream.

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during the winter well stored with food and charcoal, and each courier had a master-key. Now they only answer the purpose of caves, or rather dungeons. Seated on some little eminence, they are not, however, ill suited to the surrounding scene of desolation. The zigzag ascent of the Cumbre, or the partition of the waters, was very steep and tedious. The height, according to Mr. Pentland,* is 12,454 feet. The road did not pass over any perpetual snow, although there were patches on either hand. The wind on the summit was exceedingly cold, but it was impossible not to stop a few minutes to admire, again and again, the colour of the heavens, and the brilliant transparency of the atmosphere. The scenery, moreover, was grand. To the westward there was a fine chaos of mountains, divided by profound ravines. Generally some snow has fallen before this period of the season, and it has even happened that the Cordillera has been finally closed by this time. But we were most fortunate. The sky, by night and by day, was cloudless, excepting perhaps a few round little masses of vapour, that floated over the highest pinnacles. I have often seen these islets in the sky, marking the position of the Cordillera, when the mountains themselves have been hidden beneath the horizon.

April 6th.—In the morning we found some thief had stolen one of our mules, and the bell of the madrina. We therefore rode only two or three miles down the valley, and staid there the ensuing day in hopes of recovering the mule, which the arriero thought had been hidden in some ravine. The scenery in this part had assumed a Chilian character: the lower parts of the mountains, dotted over with the pale evergreen Quillay tree, and with the great candlestick cactus, certainly are more to be admired than any thing in the bare Eastern valleys; but I cannot quite agree with the admiration expressed by some travellers. The extreme pleasure, I suspect, is chiefly owing to the prospect of a good fire,

* Geographical Journal. Notice on Bolivian Cordillera, March, 1835.

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after escaping from the cold regions above: and I am sure I most heartily participated in such feelings.

8TH.—We left the valley of the river of Aconcagua, by which we had descended, and reached in the evening a cottage near the Villa de St. Rosa. The fertility of the plain was extremely delightful. The autumn being well advanced, the leaves of many of the fruit-trees were falling; and of the labourers—some were busy in drying figs and peaches on the roofs of their cottages; while others were gathering the grapes from the vineyards. It was a pretty scene; but that pensive stillness was absent, which makes the autumn in England indeed the evening of the year.

On the 10th we reached Santiago, where I experienced a very kind and hospitable reception from Mr. Caldcleugh. My excursion only cost me twenty-four days, and never did I more deeply enjoy an equal space of time. A few days afterwards I returned to Mr. Corfield's house at Valparaiso.

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CHAPTER XVIII.

Bell mountain—Miners—Great loads carried by the Apires—Coquimbo—Earthquake—Geology—Terraces—Excursion up valley—Road to Guasco—Desert country—Valley of Copiapó—Rain and earthquakes, meteorolites—Hydrophobia—Copiapó—Excursion to Cordillera—Dry valley—Cold gales of wind—Noises from a hill—Iquique, complete desert—Salt alluvium—Nitrate of soda—Lima—Unhealthy country—Ruins of Callao, overthrown by earthquake—Elevated shells on island of San Lorenzo—Plain with embedded fragments of pottery.

NORTHERN CHILE AND PERU.

April 27th.—I set out on a journey to Coquimbo, and thence through Guasco to Copiapó, where Captain FitzRoy kindly offered to pick me up in the Beagle. The distance in a straight line along the shore northward is only 420 miles; but my mode of travelling caused me to find it a very long journey. I bought four horses and two mules, the latter carrying the cargo on alternate days. The six animals together only cost the value of twenty-five pounds sterling, and at Copiapó I sold them again for twenty-three. We travelled in the same independent manner as before, cooking our own meals, and sleeping in the open air. As we rode towards the Vino del Mar, I took a farewell view of Valparaiso, and admired its picturesque appearance. For geological purposes I made a detour from the high road to the foot of the Bell mountain. We passed through a highly auriferous district to the neighbourhood of Limache, where we slept. The country is covered with much alluvium, and by the side of each little rivulet it has been washed for gold. This employment supports the inhabitants of numerous scattered hovels; but, like all those who gain by chance, they are unthrifty in their habits.

28th.—In the afternoon we arrived at a cottage at the foot of the Bell mountain. The inhabitants were free-

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holders, which is not very usual in Chile. They supported themselves on the produce of a garden and a little field, but were very poor. Capital is so deficient in this part, that the people are obliged to sell their green corn while it is standing in the field, in order to buy necessaries for the ensuing year. Wheat in consequence was dearer in the very district of its production, than at Valparaiso, where the contractors live. The next day we joined the main road to Coquimbo. At night there was a very light shower of rain: this was the first drop that had fallen since the heavy rain of September 11th and 12th, which detained me a prisoner at the baths of Cauquenes. The interval was seven and a half months; but the rain this year in Chile was rather later than usual. The Andes were now covered by a thick mass of snow; and they presented, in the distance, a very glorious sight.

May 2d.—The road continued to follow the coast, at no great distance from the sea. The few trees and bushes which are common in central Chile, decreased rapidly in numbers, and were replaced by a tall plant, something like a yucca in appearance. The surface of the country, on a small scale, was singularly broken and irregular; abrupt little peaks of rock rising out of small plains or basins. The indented coast, and the bottom of the neighbouring sea, studded with breakers, would if converted into dry land, present similar forms; and such a conversion without doubt has taken place in the part over which we rode.

3d.—Quilimari to Conchalee. The country became more and more barren. In the valleys there was scarcely sufficient water for any irrigation; and the intermediate land was quite bare, not supporting even goats. In the spring, after the winter showers, a thin pasture rapidly springs up, and cattle are then driven down from the Cordillera to graze for a short time. It is curious to observe how the seeds of the grass seem to know, as if by an acquired instinct, what quantity of rain to expect. One shower far northward at Copiapó produces as great an effect on the vegetation, as two at Guasco, and as three or four in this district. At Valparaiso a winter

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so dry as to injure most seriously the pasture, would at Guasco produce the most unusual abundance. Travelling northward the quantity of rain does not appear to decrease in strict proportion to the distance. At Conchalee, which is only halfway between Valparaiso and Coquimbo (being 67 miles north of the former) rain is not expected till the end of May; whereas, at Valparaiso some generally falls early in April. The annual quantity is likewise small in proportion to the lateness of the season at which it commences.

May 4th.—Finding the coast-road devoid of interest of every kind, we turned inland towards the mining district of Illapel. The town of that name is very regular and pretty. Its flourishing condition depends on numerous mines, chiefly of copper, which occur in its immediate vicinity. This valley, like every other in Chile, is level, broad, and very fertile: it is bordered on each side, either by cliffs of stratified shingle, or by bare rocky mountains. Above the straight line of the uppermost irrigating ditch, all is brown as on a high road; while all below, is of as bright a green as verdigris, from the beds of alfarfa, a kind of clover.

We proceeded to Los Hornos, another mining district, where the principal hill was drilled with holes, like a great ants' nest. The Chilian miners are in their habits a peculiar race of men. Living for weeks together in the most desolate spots, when they descend to the villages on feast-days, there is no excess or extravagance into which they do not run. They sometimes gain a considerable sum, and then, like sailors with prize-money, they try how soon they can contrive to squander it. They drink excessively, buy quantities of clothes, and in a few days return penniless to their miserable abodes, there to work harder than beasts of burden. This thoughtlessness, as with sailors, is evidently the result of a similar manner of life. Their daily food is found them, and they acquire no habitual care as to the means of subsistence: moreover, at the same moment that temptation is offered, the means of enjoying it is placed in their power. On the other hand, in Cornwall, and some other

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parts of England, where the system of selling part of the vein is followed, the miners, from being obliged to act for themselves, and to judge with clearness, are a singularly intelligent and well-conducted set of men.

The dress of the Chilian miner is peculiar and rather picturesque. He wears a very long shirt, of some dark-coloured baize, with a leathern apron; the whole being fastened round his waist by a brightly-coloured sash. His trousers are very broad, and his small cap of scarlet cloth is made to fit the head closely. We met a party of these miners in full costume, carrying the body of one of their companions to be buried. They marched at a very quick trot, four men supporting the corpse. One set having run as hard as they could for about two hundred yards, were relieved by four others, who had previously dashed on ahead on horseback. Thus they proceeded, encouraging each other by wild cries: altogether the scene formed a most strange funeral.

We continued travelling northward, in a zigzag line; sometimes stopping a day to geologise. The country was so thinly inhabited, and the track so obscure, that we often had difficulty in finding our way. On the 12th I stayed at some mines. The ore in this case was not considered particularly good, but from being abundant it was supposed the mine would sell for about thirty or forty thousand dollars (that is 6000 or 8000 pounds sterling); yet it was bought by one of the English Associations for an ounce of gold (3*l.* 8*s.*). The ore is yellow pyrites, which as I have already remarked, before the arrival of the English, was not supposed to contain a particle of copper. On a scale of profits, nearly as great as in the above instance, piles of scoriæ abounding with minute globules of metallic copper were purchased; yet with these advantages, the mining associations, as is well known, contrived to lose immense sums of money. The folly of the greater number of commissioners and shareholders, amounted to infatuation:—a thousand pounds per annum given in some cases to entertain the authorities; libraries of well-bound geological books; bringing out miners

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for particular metals (as tin) which were soon found not to exist in the country; contracts to supply the miners with milk, in parts where there were no cows; machinery, where such could not possibly be used; and a hundred similar arrangements, bore witness to our absurdity, and to this day afford amusement to the natives. Yet there can be no doubt, that the same capital well employed in these mines would have yielded an immense return: a confidential man of business, a practical miner and assayer, would have been all that was required.

Captain Head has described the wonderful load which the "Apires," truly beasts of burden, carry up from deep mines. I confess I thought the account exaggerated; so that I was glad to take the opportunity of weighing one of the loads, which I picked out by hazard. It required considerable exertion on my part, when standing directly over it, to lift it from the ground. The load was considered under weight when found to be 197 pounds. The apire had carried this up eighty perpendicular yards,—part of the way by a steep passage, but the greater part up notched poles, placed in a zigzag line in the shaft. According to the general regulation, the apire is not allowed to halt for breath, except the mine is six hundred feet deep. The average load is considered as rather more than 200 pounds, and I have been assured that one of 300 pounds (twenty-two stone and a half) by way of a trial has been brought up from the deepest mine! At this time the apires were bringing up the usual load twelve times in the day; that is, 2400 pounds from eighty yards deep; and they were employed in the intervals in breaking and picking ore.

These men, excepting from accidents, are healthy, and appear cheerful. Their bodies are not very muscular. They rarely eat meat once a week, and never oftener, and then only the hard dry charqui. Although with a knowledge that the labour is voluntary, it was nevertheless quite revolting to see the state in which they reached the mouth of the mine; their bodies bent forward, leaning with their arms on the steps, their legs bowed, the muscles quivering, the perspiration

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streaming from their faces over their breasts, their nostrils distended, the corners of their mouth forcibly drawn back, and the expulsion of their breath most laborious. Each time, from habit, they utter an articulate cry of "ay-ay," which ends in a sound rising from deep in the chest, but shrill like the note of a fife. After staggering to the pile of ores, they emptied the "carpacho;" in two or three seconds recovering their breath, they wiped the sweat from their brows, and apparently quite fresh descended the mine again at a quick pace. This appears to me a wonderful instance of the amount of labour which habit (for it can be nothing else), will enable a man to endure.

In the evening, talking with the *mayor-domo* of these mines, about the number of foreigners now scattered over the whole country, he told me that, though quite a young man, he remembers when a boy at school at Coquimbo, a holiday being given, to see the captain of an English ship, who was brought to the city to speak to the governor. He believes that nothing would have induced any boy in the school, himself included, to have gone close to the Englishman; so deeply had they been impressed with an idea of the heresy, contamination, and evil to be derived from contact with such a person. To this day they relate the atrocious actions of the bucaniers; and especially of one man, who took away the figure of the Virgin Mary, and returned the year after for that of St. Joseph, saying it was a pity the lady should not have a husband. I heard also of an old lady who, at a dinner in Coquimbo, remarked how wonderfully strange it was that she should have lived to dine in the same room with an Englishman; for she remembered as a girl, that twice, at the mere cry of "Los Ingleses," every soul, carrying what valuables they could, had taken to the mountains.

May 14th.—We reached Coquimbo, where we staid a few days. The town is remarkable for nothing but its extreme quietness. It is said to contain from 6000 to 8000 inhabitants. On the morning of the 17th it rained lightly

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(the first time this year) for about five hours. With this shower, the farmers, who plant corn near the sea-coast where the atmosphere is more humid, would break up the ground; with a second, put the seed in: and if a third should fall, they would reap in the spring a good harvest. It was interesting to watch the effect of this trifling amount of moisture. Twelve hours afterwards the ground appeared as dry as ever; yet after an interval of ten days, all the hills were faintly tinged with green patches; the grass being sparingly scattered in hair-like fibres a full inch in length. Before this shower every part of the surface was bare as on a high road.

In the evening, Captain FitzRoy and myself were dining with Mr. Edwards, an English resident well known for his hospitality by all who have visited Coquimbo, when a sharp earthquake happened. I heard the forecoming rumble, but from the screams of the ladies, the running of servants, and the rush of several of the gentlemen to the doorway, I could not distinguish the motion. Some of the women afterwards were crying with terror, and one person said he should not be able to sleep all night, or if he did, it would only be to dream of falling houses. The father of this gentleman had lately lost all his property at Talcahuano, and he himself only just escaped a falling roof at Valparaiso, in 1822. He mentioned a curious coincidence which then happened: he was playing at cards, when a German, one of the party, got up, and said he would never sit in a room in these countries with the door shut, since, owing to his having done so, he had nearly lost his life at Copiapó. Accordingly he opened the door; and no sooner had he done this, than he cried out, "Here it comes again!" and the famous shock commenced. The whole party escaped. The danger in an earthquake is not from the time lost in opening a door, but from the chance of its becoming jammed by the movement of the walls.

It is impossible to be much surprised at the fear which natives and old residents, though some of them known to be men of great command of mind, so generally experience during

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earthquakes. I think, however, this excess of panic may be partly attributed to a want of habit in governing their fears; the usual restraint of shame being here absent. Indeed, the natives do not like to see a person indifferent. I heard of two Englishmen who, sleeping in the open air, during a smart shock, knowing there was no danger, did not rise. The natives cried out indignantly, "Look at those heretics, they will not even get out of their beds!"

I spent two or three days in examining the step-formed terraces of shingle first described by Captain Basil Hall, in his work, so full of spirited descriptions, on the west coast of America. Mr. Lyell concluded from the account, that they must have been formed by the sea during the gradual rising of the land. Such is the case: on some of the steps which sweep round from within the valley, so as to front the coast, shells of existing species both lie on the surface, and are embedded in a soft calcareous stone. This bed of the most modern tertiary epoch passes downward into another, containing some living species associated with others now lost. Amongst the latter may be mentioned shells of an enormous perna and an oyster, and the teeth of a gigantic shark, closely allied to, or identical with the *Carcharias Megalodon* of ancient Europe; the bones of which, or of some cetaceous animal, are also present, in a silicified state, in great numbers. At Guasco, the phenomenon of the parallel terraces is very strikingly seen: no less than seven perfectly level, but unequally broad plains, ascending by steps, occur on one or both sides the valley. So remarkable is the contrast of the successive horizontal lines, corresponding on each side, with the irregular outline of the surrounding mountains, that it attracts the attention of even those who feel no interest regarding the causes, which have modelled the surface of the land. The origin of the terraces of Coquimbo is precisely the same, according to my view, with that of the plains of Patagonia; the only difference is that the plains are rather broader than the terraces, and that they front the Atlantic ocean instead of a valley,—which valley, however, was for-

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merly occupied by an arm of the sea, but now by a fresh-water river. In every case it must be remembered, that the successive cliffs do not mark so many distinct elevations, but on the contrary, periods of comparative repose during the gradual and perhaps scarcely sensible rise of the land. In the valley of Guasco we have the record of seven such nights of rest, in the action of the subterranean powers.

May 21st.—I set out in company with Don Jose Edwards to the silver-mine of Arqueros, and thence up the valley of Elque or Coquimbo. Passing through a mountainous country, we reached by nightfall the mines belonging to Mr. Edwards. I enjoyed my night's rest here from a cause which will not be fully understood in England, namely, the absence of fleas! The rooms in Coquimbo swarm with them; but they will not live at the elevation of three or four thousand feet, even if brought there, as is constantly occurring at these mines. It can scarcely be the trifling diminution of temperature, but some other cause which is here destructive to these troublesome insects. I spent the greater part of the ensuing day in examining the mines. The veins occur abundantly scattered over several miles of hilly country; yet it is only a few years since that they were discovered by a wood-cutter. The mines are now in a bad state, though they formerly yielded about 2000 pounds in weight of silver a year. It has been said "a person with a copper-mine will gain; with silver he may gain; but with gold he is sure to lose." This is not true: all the large Chilian fortunes have been made by mines of the more precious metals. A short time since an English physician returned to England from Copiapó, taking with him the profits of one share in a silver-mine, which amounted to about 24,000 pounds sterling. No doubt a copper-mine with care is a sure game, whereas the other is gambling, or rather taking a ticket in a lottery.

The owners lose great quantities of rich ores; for no precautions can prevent robbery. I heard of a man laying a bet with another that one of his men should rob him before his face. The ore when brought out of the mine is broken into pieces,

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and the useless stone thrown on one side. A couple of the miners who were thus employed, pitched, as if by accident, two fragments away at the same moment, and then cried out for a joke, "Let us see which rolls furthest." The owner, who was standing by, bet a cigar with his friend on the race. The miner by this means watched the very point amongst the rubbish where the stone lay. In the evening he picked it up and carried it to his master, showing him a rich mass of silver ore, and saying, "This was the stone on which you won a cigar by its rolling so far."

MAY 23D.—We followed up the fertile valley, till we reached an Hacienda, belonging to a relation of Don Jose, where we stayed the ensuing day. I then rode one day's journey further, to see what were declared to be some petrified shells and beans. The former turned out to be so; the latter were small quartz pebbles. We passed through several small villages; and the valley was beautifully cultivated, and the whole scenery very grand. We were here near the main Cordillera; and the surrounding hills were very lofty. In all parts of northern Chile, fruit-trees produce much more abundantly at a considerable elevation near the Andes than in the lower country. The figs and grapes of this part are famous for their superiority, and are cultivated to a great extent. This valley is, perhaps, the most productive one north of Quillota: I believe it contains, including Coquimbo, 25,000 inhabitants. The next day I returned to the Hacienda, and thence, together with Don Jose, to Coquimbo.

JUNE 2D.—We set out for the valley of Guasco, following the coast-road, which was considered rather less desert than the other. Our first day's ride was to a solitary house, called Yerba Buena, where there was pasture for our horses. The shower mentioned as having fallen a fortnight ago, only reached about halfway to Guasco; we had, therefore, in the first part of our journey a most faint tinge of green, which soon faded away. Even where brightest, it was scarcely sufficient to remind one, of the fresh turf and budding flowers during the spring of other countries. While

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travelling through these deserts one feels like a prisoner shut up in a gloomy courtyard, longing to see something green and to smell a moist atmosphere.

June 3d.—Yerba Buena to Carizal. During the first part of the day we crossed a mountainous rocky desert; and afterwards a long deep sandy plain, scattered over with broken marine shells. There was very little water, and that little saline; hence the few streamlets were bordered on each side by white incrustations, amongst which succulent salt-loving plants grew. The whole country, from the coast to the Cordillera, is desert and uninhabited. I saw traces only of one living animal in abundance: this was a Bulimus, the shells of which were collected together in extraordinary numbers on the driest spots. In the spring, one humble little plant sends out a few leaves, and on these the snails feed. As they are seen only very early in the morning, when the ground is slightly damp from the dew, the Guasos believe they are born from it. I have observed in other places, that extremely dry and sterile districts, where the soil is calcareous, are most favourable to an extraordinary increase of land-shells. At Carizal there were a few cottages, some brackish water, and a trace of cultivation: but it was with difficulty that we purchased a little corn and straw for our horses.

4th.—Carizal to Sauce. We continued to ride over desert plains, tenanted by large herds of guanaco. We crossed also the valley of Chaneral; which, although the most fertile one between Guasco and Coquimbo, is very narrow, and produces so little pasture, that we could not purchase any for our horses. At Sauce we found a very civil old gentleman superintending a copper-smelting furnace. As an especial favour, he allowed me to purchase at a high price, an armful of dirty straw, which was all the poor horses had for supper after their long day's journey. Very few smelting furnaces are now at work in any part of Chile; it is found more profitable, on account of the extreme scarcity of firewood, and of the loss from the clumsy Chilian method of reduction, to ship the ore for Swansea.

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The next day, we crossed some mountains to Freyrina in the valley of Guasco. During each day's ride further northward, the vegetation became more scanty; even the great candlestick cactus was here replaced by a different and much smaller species. During the winter months, both in northern Chile and in Peru, a uniform stratum of clouds hangs (at no great height) over the Pacific. From these mountains we had a very striking view of the great white and brilliant field, which sent arms up the valleys; leaving islands and promontories in the same manner, as the sea now intersects the Chonos archipelago, or the west coast of Tierra del Fuego.

We staid two days at Freyrina. In the valley of Guasco there are four small towns. At the mouth, there is the port, a spot entirely desert, and without any water in the immediate neighbourhood. Five leagues higher up stands Freyrina, a long straggling village, with decent whitewashed houses. Again, ten leagues further up, Ballenar is situated, and above this Guasco Alto, a horticultural village, famous for its dried fruit. On a clear day, the view up the valley is very fine; the straight opening is terminated at a great distance by the outline of the snowy Cordillera; on each side an infinity of crossing lines blend together in a beautiful haze. The foreground is singular, from the number of parallel and extensive terraces; and the included strip of green valley, with its willow bushes, is contrasted on both hands by the naked hills. That the surrounding country was most barren, will be readily believed, from the circumstance of a shower of rain not having fallen during the last thirteen months. The inhabitants heard with the greatest envy of the rain in Coquimbo; from the appearance of the atmosphere they had strong expectations of equally good fortune, which, a fortnight afterwards, was realized. I was at Copiapó at the time; and there the people, with equal envy, talked of the abundant rain at Guasco. After two or three very dry years, perhaps with not more than one shower during the whole time, a rainy year generally follows; and this does more

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harm than even the drought. The river swells, and covers with gravel and sand the narrow strip of ground, which alone is fit for cultivation. The flood also injures the irrigating ditches. Great devastation had thus been caused three years ago.

June 8th.—We rode on to Ballenar. As the rocky mountains on each hand were concealed by clouds, the terrace-like plains gave the valley an appearance similar to that of Santa Cruz, in Patagonia. I staid the following day in the town, which is as large as Coquimbo and well built. It has only lately sprung up, and entirely owes its prosperity to some silver-mines. Ballenar takes its name from Ballenagh, in Ireland, the birthplace of the family of O'Higgins, who, under the Spanish government, were presidents and generals in Chile.

10th.—Instead of going direct to the town of Copiapó, I determined to fall into the valley higher up and nearer the Cordillera. We rode all day over an uninteresting country; I am tired of repeating the epithets barren and sterile. These words, however, as commonly used, are comparative: I have always applied them to the plains of Patagonia; yet the vegetation there can boast of spiny bushes and some tufts of grass, which is absolute fertility to any thing that can be seen here. And here again there are not many spaces of two hundred yards square, where some little bush, cactus or lichen, may not be discovered by careful examination; and in the soil seeds lie dormant ready to spring up during the first rainy winter. In Peru real deserts occur, over wide tracts of country. In the evening we arrived at a valley, in which the bed of the streamlet was damp: following it up, we came to tolerably good water. During the night, the stream, before it is evaporated and absorbed, flows a league lower down than during the day. Sticks were plentiful for firewood, so that it was a good place of bivouac for us: but for the poor animals there was not a mouthful for them to eat.

June 11th.—We rode without stopping for twelve hours,

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till we reached an old smelting furnace, where there was water and firewood; but our horses again had nothing to eat, being shut up in an old courtyard. The line of road was hilly, and the distant views interesting from the splendid weather, and the varied colours of the bare mountains. It is a pity to see the sun shining constantly over so useless a country; such days should brighten a prospect of fields and gardens. The next day we reached the valley of Copiapó. I was heartily glad of it; for the whole journey was a continued source of anxiety; it was most disagreeable to hear, whilst eating our own supper, our horses gnawing the posts to which they were tied, and to have no means of relieving their hunger. To all appearance, however, the animals were quite fresh; and no one could have told that they had eaten nothing for the last fifty-five hours.

I had a letter of introduction to Mr. Bingley, who received me very kindly at the Hacienda of Potrero Seco. This estate is between twenty and thirty miles long; but it is very narrow, having generally a width of only two fields, one on each side the river. In some parts, the estate is of no width, that is to say, the land cannot be irrigated, and therefore is valueless, like the surrounding rocky desert. The small quantity of cultivated land in the whole line of valley, does not however so much depend on its inequality, or its unfitness for irrigation, as on the small supply of water. The river this year was remarkably full; in this part it reached as high as the horse's belly, and was about fifteen yards wide, and rapid. It gradually decreases in volume till reaching the sea. This latter circumstance, however, rarely happens; and once for a period of thirty years not a drop entered the Pacific. The inhabitants watch a storm over the Cordillera with great interest; as one good fall of snow provides them with water for the ensuing year. This is of infinitely more consequence than rain in the lower country. The latter, as often as it occurs, which is about once in every two or three years, is a great advantage, because the

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cattle and mules can for some time afterwards find pasture in the mountains. But without snow in the Andes, desolation extends throughout the valley. It is on record, that three times nearly all the inhabitants have been obliged to emigrate to the south. This year there was plenty of water, and every man irrigated his ground as much as he chose; but it has frequently been necessary to post soldiers at the sluices, to see that each estate took only its proper allowance during so many hours in the week. The valley is said to contain 12,000 souls, but its produce is sufficient only for three months in the year; the rest of the supply being drawn from Valparaiso and the south. Before the discovery of the famous silver-mines of Chanuncillo, Copiapó was in a rapid state of decay; but now it is in a very thriving condition; and the town, which was completely overthrown by an earthquake, has been rebuilt.

The valley of Copiapó, forming a mere ribbon of green in a desert, runs in a very southerly direction; so that it is of considerable length to its origin in the Cordillera. The valleys of Guasco and Copiapó may both be considered as islands to the northward of Chile, separated by deserts instead of salt water. Beyond these, there is one other very miserable valley, called Paposo, which contains about 200 people; and then there extends the real desert of Atacama —a barrier far worse than the most turbulent ocean.

After staying a few days at Potrero Seco, I proceeded up the valley to the house of Don Benito Cruz, to whom I had a letter of introduction. I found him most hospitable; indeed it is impossible to bear too strong testimony to the kindness which travellers receive in almost every part of South America. The next day I hired some mules to take me by the ravine of Jolquera into the central Cordillera. On the second night the weather seemed to foretel a storm of snow or rain, and whilst lying in our beds we felt a trifling shock of an earthquake. The connexion between the latter phenomena and the weather has often been a disputed

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point: it appears to me to be one of very great interest, and not well understood. Humboldt* has remarked, "It would be difficult for a person, who has lived a long time in New Andalusia, or in the low regions of Peru, to deny that the season, the most to be dreaded from the frequency of earthquakes, is that of the beginning of the rains, which is, however, the time of thunder-storms. The atmosphere, and the state of the surface of the globe, seem to have an influence unknown to us, on the changes produced at great depths." In Northern Chile, from the extreme infrequency of rain, or even of weather foreboding rain, the probability of accidental coincidences between the two phenomena necessarily becomes very small; yet the inhabitants in that part are most firmly convinced of some connexion between the state of the atmosphere and the tremblings of the ground. I was much struck by this, when mentioning to some people at Copiapó that there had been a sharp shock at Coquimbo: they immediately cried, "How fortunate! there will be plenty of pasture there this year." To their minds an earthquake foretold rain, as surely, as rain foretold abundant pasture. Certainly it did so happen that on the very day of the earthquake, that shower of rain fell, which I have described as in ten days producing a thin sprinkling of grass.

Mr. Scrope has put forth an ingenious idea, that the period of subterranean disturbance, where the force is just on a balance with the resistance, may be determined by a sudden decrease in atmospheric pressure, which over a wide extent of country might produce a considerable effect. According to this explanation, the earthquake comes on at the given period from that state of the weather, which is generally accompanied by rain. But there is another class of phenomena, where the state of the weather evidently

* Personal Narrative, vol. iv., p. 11. In the fourth chapter of the second volume, p. 217, Humboldt, however, appears to think that such connexion is fanciful.

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appears a consequence (and not the determining cause) of the earthquake. I allude to those cases, when rain falls at a period of the year, at which it is a greater prodigy than the earthquake itself: I may instance the rain after the shock of November, 1822, at Valparaiso. A person must be somewhat habituated to these climates, to understand the excessive improbability of rain falling at such seasons, except as a consequence of some law quite unconnected with the ordinary course of the weather. In the case of great volcanic eruptions, as that of Coseguina, where torrents of rain fell at a time of year most unusual for it, and "almost unprecedented in Central America,"* it is not difficult to understand that the volumes of vapour and clouds of ashes, might have disturbed the atmospheric equilibrium. Humboldt† extends this view to the case of earthquakes; but for my part, I cannot conceive it possible, that the small quantity of aeriform fluid which at such times escapes from the fissured ground, can produce such remarkable effects.

Humboldt‡ has stated that, "on the days when the earth is shaken by violent shocks, the regularity of the horary variations of the barometer is not disturbed under the tropics. I have verified this observation at Cumana, at Lima, and at Riobamba; and it is so much the more worthy of fixing the attention of natural philosophers, as at St. Domingo, at the town of Cape François, it is asserted, that a water barometer§ was observed to sink two inches and a half immediately

* Caldcleugh. Philosoph. Transact. 1835.

† Personal Narrative, vol. ii., p. 219. ‡ Ibid., p. 217.

§ Courrejolles, in the Journal de Phys., tome liv., p. 106. This depression answers only to two lines of mercury. The barometer remained motionless at Pignerol, in April, 1808.—(Ibid., t. lxvii., p. 292.) [I may add that the earthquake alluded to by Courrejolles at p. 106, was accompanied by a "très-violent coup de vent;" which explains the fall of his water barometer. More lately, Mr. Williams, in his Narrative of Missionary Enterprise (p. 442), has given an account of a hurricane which devastated the Austral islands (S. W. of the Society Archipelago), and which at the Navigator Islands was accompanied by an earthquake. —C. D.]

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before the earthquake of 1770. In the same manner it is related, that, at the destruction of Oran, a druggist fled with his family, because observing accidentally a few minutes before the earthquake, the height of the mercury in his barometer, he perceived that the column sunk in an extraordinary manner. I know not whether we can give credit to this assertion." Mr. Alison, in a letter dated Valparaiso, informs me, that just before the earthquake of November, 1822, the mercury in the tube of the barometer standing in his store, sank beneath the graduated part. The tube was a bent one; nineteen inches being exposed, and the lowest graduated part corresponded to twenty-six English inches. With this third case, and more especially considering the unquestionable fact of rain so frequently following severe earthquakes, even at the most unusual seasons, I cannot conclude otherwise, than that there exists some connexion between the subterranean and atmospheric disturbances, of which we are at present quite ignorant.

Mr. Miers,† in his account of the Valparaiso earthquake, November 19th, 1822, has added one more to the list of coincidences between luminous meteors and earthquakes. He says "one of very considerable size, in apparent dimensions little less than the moon, was observed in the southward, at no very great elevation. It traversed a considerable arch of the heavens, leaving behind it a long train of light; and when it disappeared, it seemed to do so from explosion—as it leaped in the same manner as those which eject meteoric stones; but in this instance no noise was heard to attend its extinction, nor was it known that any stones fell. This occurred about half-past two o'clock in the morning after the earthquake." The earthquake itself happened at half-past ten o'clock. Mr. Miers then adds, that a friend of his "travelling on the night of the 4th of November, about a fortnight preceding the great earthquake, observed at a little past eleven o'clock in the *northern* sky,

† Miers's Travels, vol. i., p. 395.

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a large meteor of great splendour." It is remarkable that on this same day, according to the Journal of Science,* Copiapó to the *northward* was visited by a severe earthquake, which on the fifth was followed by a much more violent shock. Molina† states that the first shock which announced the great earthquake at midnight on the 24th of May, 1751, "was accompanied by a ball of fire, which precipitated itself from the Andes toward the sea." It is said in the Encyclo. Metropol.—(art. *Meteorology*)—"At Kingston, in Jamaica, in November 1812, a large meteor appeared a few minutes previous to some alarming and tremendous concussions." Aguerros‡ states, on the authority of Ovalle, that in the morning of May 14th, 1633, Carelmapu (north of Chiloe) was overthrown by a bad earthquake, accompanied by a great noise; and that while the people were considering the cause, they saw over a high hill near the village a globe of fire, which appeared to threaten the last day. It rose and quickly proceeded so as to fall in the sea, disturbing the neighbouring waters. This was accompanied by a great tempest, darkness, and a hail-storm, in which pieces of ice fell as large as musket-balls.

I have copied the foregoing notices, because under any point of view, it is remarkable that in one quarter of the globe there should have been so many coincidences between phenomena of not very common occurrence. It must, however, be observed, that the coincidence is not precise; the

* Vol. xvii.

† Molina (Spanish edition), vol. i., p. 33. At six o'clock in the evening of the 26th of May of the same year, that is about thirty-seven hours after the Concepcion earthquake, two meteoric stones fell near Agram in Croatia. They were seen coming *from* the west, which is in an opposite direction to the course of the Chilian meteor. This near coincidence of time was of course only accidental.

‡ Descripcion Historial de Chiloe, p. 104. "Vieron sobre un monte o cerro alto inmediato al pueblo, un globo de fuego que parecia amenazada la ultima desgracia. Elevó se y fué luego a caer al mar, alterando inmediatamente sus aguas."

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meteors having been seen in some cases a little before, in others a little after the earthquake. From the account given in Aguerros of the waters of the sea having been disturbed, and from that by Miers of an apparent explosion, it would appear that these meteors must be the same with those that accompany the fall of meteoric stones. This perhaps alone, is an argument that they are accidental accompaniments of earthquakes; for there seems to be no rational method of explaining the origin of meteorolites on any hypothesis directly connected with our world. It is however very singular, that all their constituent parts should be of the same nature as those found on this earth, —that the metals should be chiefly those most subject to magnetic influence,—and that olivine should frequently be present; a mineral* which is exclusively confined to a certain class of volcanic products.

To return to the valley of Copiapó. Finding little of interest in this part of the ravine, we retraced our steps to the house of Don Benito, where I staid two days collecting fossil shells and silicified wood. The latter was present in the most extraordinary quantity: it was here that I found a cylindrical trunk, fifteen feet in circumference, projecting from the side of a hill. It was amusing to hear discussions concerning the nature of the fossil shells,—whether or not they had been thus "born by nature,"—carried on almost in the same terms as were used a century before in Europe. My geological examination of the country generally created a good deal of surprise amongst the Chilenos: it was long before they would be convinced that I was not hunting for mines. This was sometimes troublesome. I found the most

* Olivine is known to accompany basaltic in opposition to clinkstone rocks. Gmelin says, "Natron and potash characterize clinkstone; iron and magnesia, basalt." "Magnesia and iron show a great tendency to enter into combination with each other." These two latter substances are main constituents of meteoric stones, while the alkalies are generally present in very small quantities. Gmelin on Clinkstone, Edinburgh New Philosoph. Journal, April, 1829.

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ready way of explaining my employment, was to ask them how it was that they themselves were not curious concerning earthquakes and volcanoes?—why some springs were hot and others cold?—why there were mountains in Chile, and not a hill in La Plata? These bare questions at once satisfied and silenced the greater number; some, however (like a few in England who are a century behindhand), thought that all such inquiries were useless and impious; and that it was quite sufficient that God had thus made the mountains.

An order had recently been issued that all stray dogs should be killed, and we saw many carcasses lying on the high road. A great number had lately been affected with hydrophobia, and several men had been bitten, and had died in consequence. On other occasions hydrophobia has prevailed in this valley. It is remarkable thus to find so strange and dreadful a disease appearing time after time in the same isolated spot. It has been remarked that certain villages in England are in like manner much more subject to this visitation than others. Hydrophobia must be extremely rare on the eastern side of the Andes, for Azara thought it was unknown in America; and Ulloa says the same with respect to Quito. I could not hear of a case having occurred in Van Diemen's Land, or in Australia; and Burchell says, during the five years he was at the Cape of Good Hope, he never heard of an instance of it. Webster again asserts that at the Azores, hydrophobia has never occurred; and the same observation has been made with respect to Mauritius and St. Helena.* In so strange a disease, some information might possibly be gained by considering the circumstances under which it originates in distant climates.

At night, a stranger arrived at the house of Don Benito, and asked permission to sleep there. He said he had been

* Azara's Travels, vol. i., p. 381.—Ulloa's Voyage, vol. ii., p. 28.—Burchell's Travels in Southern Africa, vol. ii., p. 524.—Webster's Description of the Azores, p. 124.—Voyage à l'Isle de France par un Officier du Roi, tome i., p. 248.—Description of St. Helena, p. 123.

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wandering about the mountains for seventeen days, having lost his way. He started from Guasco, and being accustomed to the mountains, did not expect any difficulty in following the track to Copiapó; but he soon became involved in a labyrinth of mountains, whence he could not escape. Some of his mules had fallen over precipices, and he had been in great distress. His chief difficulty arose from not knowing where to find water in the lower country, so that he was obliged to keep bordering the central ranges.

We returned down the valley, and on the 22d reached the town of Copiapó. The lower part of the valley is broad, forming a fine plain like that of Aconcagua or Quillota. The town covers a considerable space of ground, each house possessing a garden: but it is an uncomfortable place, and the dwellings are poorly furnished. Every one seems bent on the one object of making money, and then migrating as quickly as possible. All the inhabitants are more or less directly concerned with mines; and mines and ores are the the sole subjects of conversation. Necessaries of all sorts are very dear; as the distance from the town to the port is eighteen leagues, and the land carriage very expensive. A fowl costs five or six shillings; meat is nearly as dear as in England; firewood, or rather sticks, are brought on donkeys from a distance of two and three days' journey within the Cordillera; and pasturage for animals is a shilling a day: all this for South America is wonderfully exorbitant.

JUNE 26TH.—I hired a guide and eight mules to take me into the Cordillera by a different line from my last expedition. As the country was utterly desert, we took a cargo and a half of barley mixed with chopped straw. About two leagues above the town, a broad valley called the "Despoblado," or uninhabited, branches off from the one by which we had descended. Although a valley of the grandest dimensions, and leading to a pass across the Cordillera, yet it is completely dry, excepting perhaps, for a few days during some very rainy winter. The bottom of the main valley was nearly flat, and the sides of the crumbling mountains were

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but little furrowed by ravines. No considerable river could ever have poured its waters over the bed of shingle, without having excavated a channel similar to those occurring in the southern valleys. I feel little doubt that it was left in the state we now see it, by the gradually retiring sea. The dry valleys mentioned by travellers in Peru, probably owe their origin to a similar agency, and not to the running streams of any former period. I observed in one place, where a ravine (which amongst any other mountains would have been called a grand valley), joined the Despoblado, that the bed of the latter, though composed merely of sand and gravel, was higher than that of its tributary. A mere rivulet of water, in the course of an hour, would have cut a channel for itself; but it was evident that centuries had passed away, and no such rivulet had drained these great valleys. It was curious to behold this machinery (if such a term may be used) for the drainage, all, with the last trifling exception, perfect, yet without any signs of activity. Every one must have remarked how mud-banks, left by the retiring tide, imitate in miniature a country with hill and dale: and here we find a model, only on a grander scale, formed by the waves of a retiring ocean. Let thousands of years replace minutes of the tidal change, and the difference between soft mud and hard rock will barely modify the result. If a shower of rain falls on the mud-bank, when left dry, it deepens the shallow lines of excavation: and so will it be with the rain of successive centuries on the bank of rock and soil, which we call a continent.

We rode on after it was dark, till we reached a side ravine, with a small well called "Agua amarga." The water deserved its name, for besides being saline it was most offensively putrid and bitter; so that we could not force ourselves to drink either tea or maté. I suppose the distance from the river of Copiapó to this spot was at least twenty-five or thirty English miles; in the whole space there was not a single drop of water, the country almost deserving the name of desert in the strictest sense. Yet about halfway we passed the old Indian ruins near Punta Gorda, which I

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have already mentioned. I noticed also in front of some of the valleys, which branch off from the Despoblado, two piles of stones placed a little distance apart, and directed so as to point up the mouth of the small valley. My companions knew nothing about them, and only answered my queries by their imperturbable "quien sabe?"

JUNE 27TH.—We set out early in the morning, and by mid-day reached the ravine of Paypote, where there is a tiny rill of water, with a little vegetation, and even a few algarroba (a mimosa) trees. On this latter account a smelting furnace had formerly been built here. We found a solitary man in charge of it, whose sole employment was hunting guanacoes. At night it froze sharply; but having plenty of firewood, we kept ourselves warm.

28TH.—We continued gradually ascending as we followed the valley, which now had assumed the character of a ravine. During the day we saw several guanacoes, and the track of the closely-allied species, called the Vicuna. This latter animal is pre-eminently alpine in its habits; it seldom descends much below the limit of perpetual snow, and therefore haunts even a more lofty and sterile situation than the guanaco. The only other animal which we saw in any number was a small fox. I suppose this animal preys on the mice and other small rodents, which, as long as there is the least vegetation subsist in considerable numbers in very desert places. In Patagonia, even on the borders of the salinas, where a drop of fresh water can never be found, these little animals swarm. Next to lizards, mice appear to be able to support existence on the smallest and driest portions of the earth,—even on islets in the midst of great oceans. I believe it will be found, that several islands, which possess no other warmblooded quadruped, have small rodents peculiar to themselves.

The scenery on all sides showed desolation, brightened, and made palpable, by a clear, unclouded sky. Custom excludes the feeling of sublimity, and when this is wanting, such scenery is rather the reverse of interesting. We

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bivouacked at the " primera linea," or the first line of the partition of the waters. The streams, however, on the east side do not flow to the Atlantic, but into an elevated district, in the middle of which there is a large salina, or salt lake;—thus forming a little Caspian sea at the elevation, perhaps, of ten thousand feet. Where we slept, there were some considerable patches of snow, but they do not remain throughout the year. The winds in these lofty regions obey very regular laws: every day a fresh breeze blows up the valley, and at night, an hour or two after sunset, the air from the cold regions above descends, as through a funnel. This night it blew a gale of wind, and the temperature must have been considerably below the freezing-point, for water in a short time became a block of ice. No clothes seemed to oppose any obstacle to the air; I suffered very much from the cold, so that I could not sleep, and in the morning rose with my body quite dull and benumbed.

In the Cordillera further southward, people lose their lives from snow-storms; here, this sometimes happens from another cause. My guide, when a boy of fourteen years old, was passing the Cordillera with some others, in the month of May; and while in the central parts, a furious gale of wind arose so that the men could hardly stick on their mules, and stones were flying along the ground. The day was cloudless and not a speck of snow fell, but the temperature was low. It is probable that the thermometer would not have stood very many degrees below the freezing-point, but the effect on their bodies, ill protected by clothing, would be in proportion to the rapidity of the current of cold air. The gale lasted for more than a day; the men began to lose all their strength, and the mules would not move onwards. My guide's brother tried to return, but he perished, and his body was found two years afterwards, lying by the side of his mule near the road, with the bridle still in his hand. Two other men in the party lost their fingers and toes, and out of two hundred mules and thirty cows, only fourteen of the former escaped alive. Many years ago the whole of a large

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party are supposed to have perished from a similar cause, but their bodies to this day have never been discovered. The union of a cloudless sky, low temperature, and a furious gale of wind, must be I should think, in all parts of the world, an unusual occurrence.

JUNE 29TH.—We gladly travelled down the valley to our former night's lodging, and thence to near the Agua amarga. On July 1st, we reached the valley of Copiapó. The smell of the fresh clover was quite delightful, after the scentless air of the dry sterile Despoblado. Whilst staying in the town, I heard an account from several of the inhabitants of a hill in the neighbourhood, which they called "El Bramador,"—the roarer or bellower. I did not at the time pay sufficient attention to the account; but as far as I understood, the hill was covered by sand, and the noise was produced only when people, by ascending it, put the sand in motion. Upon reading an article in the Edinburgh Journal,* I was surprised to find the same circumstances, described in detail on the authority of Seetzen and Ehrenbergh, as the cause of the sounds, which have been heard by many travellers on Mount Sinai near the Red Sea. One person with whom I conversed had himself heard the noise; he described it as very surprising; and he distinctly stated, that although he could not understand how it was effected, yet it was necessary to set the sand rolling down the acclivity. I can vouch for the quantity of loose sand lying on the bare granite mountains in this neighbourhood. From the position of the hill, and from the account which I received, the phenomenon certainly does not appear to have any direct connexion with volcanic causes. I may remark that a horse walking over dry and coarse sand, causes a peculiar chirping noise from the friction of the particles: a fact which I have several times noticed on the coast of Brazil.

Three days afterwards I heard of the Beagle's arrival at

* Edinburgh Philosophical Journal, January, 1830, p. 74. Also, another article in the number for April in the same year, p. 258. See also Daubeny on Volcanoes, p. 438.

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the port, which is distant eighteen leagues. There is very little land cultivated below the town. The wide expanse of the valley supports a wretched wiry grass, which even the donkeys can hardly eat. This poorness of the vegetation is owing to the quantity of saline matter with which the soil is impregnated. Layers of sulphate and carbonate of soda, even several inches thick, occur in some parts. The port consists of an assemblage of miserable little hovels, situated at the foot of some sterile plains and hills. At present, from the river reaching the sea, the inhabitants enjoy the advantage of having fresh water within a mile and a half. On the beach there were large piles of merchandise, and the little place had an air of activity. In the evening I gave my adios with a hearty good will, to my companion Mariano Gonzales, with whom I had ridden so many leagues in Chile. The next morning the Beagle sailed for Iquique, lat. 20° 12′ on the coast of Peru.

July 12th.—We anchored in the port of Iquique. The town contains about a thousand inhabitants, and stands on a little plain of sand at the foot of a great wall of rock, 2000 feet in height, which here forms the coast. The whole is utterly desert. A light shower of rain falls only once in very many years; and hence the ravines are filled with detritus, and the mountain sides covered by piles of fine white sand, even a thousand feet high. During this season of the year, a heavy bank of clouds extending parallel to the ocean, seldom rises above the wall of rocks on the coast. The aspect of the place was most gloomy; the little port, with its few vessels, and small group of wretched houses, seemed overwhelmed and out of all proportion with the rest of the scene.

The inhabitants live like persons on board a ship; every necessary coming from a distance. Water is brought in boats from Pisagua, about forty miles to the northward and is sold at the rate of nine reals (4*s.* 6*d.*) an eighteen-gallon cask: I bought a wine-bottle full for threepence. In like

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manner firewood, and of course every article of food, is imported. Very few animals can be maintained in such a place: on the ensuing morning I hired, with difficulty at the price of four pounds sterling, two mules and a guide to take me to the saltpetre works. These are the present support of Iquique. During one year the value of one hundred thousand pounds sterling was exported to France and England. This saltpetre does not properly deserve to be so called; for it consists of nitrate of soda, and not of potash, and is therefore of much less value. It is said to be principally used in the manufacture of nitric acid. Owing to its deliquescent property it will not serve for gunpowder. Formerly there were two exceedingly rich silver-mines in this neighbourhood, but they now produce very little.

Our arrival in the offing caused some little apprehension. Peru was in a state of anarchy; and each party having demanded a contribution, the poor town of Iquique was in tribulation, thinking the evil hour was come. The people had also their domestic troubles; a short time before, three French carpenters had broken open the two churches, during the same night, and stolen all the plate: one of the robbers, however, subsequently confessed, and the plate was recovered. The convicts were sent to Arequipa, which, though the capital of this province, is 200 leagues distant: the government there thought it a pity to punish such useful workmen, who could make all sorts of furniture; and accordingly liberated them. Things being in this state, the churches were again broken open, but the plate this time was not recovered. The inhabitants became dreadfully enraged, and declaring that none but heretics would thus "eat God Almighty," proceeded to torture some Englishmen, with the intention of afterwards shooting them. At last the authorities interfered, and peace was established.

July 13th.—In the morning I started for the saltpetre works, a distance of fourteen leagues. Having ascended the steep coast mountains by a zigzag sandy track, we soon came in view of the mines of Guantajaya and St. Rosa. These

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two small villages are placed at the very mouths of the mines. If the town of Iquique appeared desolate, these, perched up on hills, had a still more unnatural aspect. We did not reach the saltpetre works till after sunset, having ridden all day across an undulating country, a complete and utter desert. The road was strewed with the bones and dried skins of the many beasts of burden, which had perished on it from fatigue. Excepting the Vultur aura, which preys on the carcasses, I saw neither bird, quadruped, reptile, or insect. On the coast mountains, at the elevation of about 2000 feet, where during this season the clouds generally hang, a very few cacti were growing in the clefts of rock; and the loose sand was strewed over with a simple lichen, which lies on the surface quite unattached. This plant belongs to the genus Cladonia, and somewhat resembles the reindeer lichen. In some parts it was in sufficient quantity to tinge the sand, as seen from a distance, of a pale yellowish colour. Further inland, during the whole ride of fourteen leagues, I saw only one other vegetable production, and that was a most minute yellow lichen, growing on the bones of the dead mules. This was the first true desert which I had seen: the effect on me was not impressive; but I believe this was owing to my having become gradually accustomed to such scenes, as I rode northward from Valparaiso, through Coquimbo to Copiapó. The appearance of the country was remarkable, from being covered by a thick crust of common salt, and of a saliferous sandstone, which properly deserves the name of alluvium. The salt is white, very hard, and compact. It occurs in water-worn nodules, which project from the agglutinated sand or soft sandstone. The appearance of this superficial mass, very closely resembled that of a country after snow, before the last dirty patches have thawed. The rocks of which the mountains are composed are saliferous; and I imagine, the very small quantity of rain that falls, is sufficient only to wash the salt from the higher strata, and that afterwards it concretes in nodules and patches, in the sandy soil of the valleys. Whatever its origin

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may be, the existence of a crust of a soluble substance over the whole face of the country, shows how extraordinarily dry the climate must have been for a period long antecedent.

At night I slept at the house of the owner of one of the saltpetre mines. The country is here equally unproductive with that near the coast; but water, though having rather a bitter and brackish taste, can be procured by digging. The well at this house was thirty-six yards deep. As scarcely any rain falls, it is evident the water is not derived from that source; indeed if it were, it could not fail to be as salt as brine, for the whole surrounding country is incrusted with various saline substances. We must therefore conclude that it percolates from some distant and more humid region, probably the mountains of the higher Cordillera. In that direction there are a few small villages, such as Tarapaca, where the inhabitants, having more water, are enabled to irrigate some little land, and produce hay, on which the mules and asses employed in carrying the saltpetre are fed.

The nitrate of soda is sold at the ship's side at fourteen shillings per hundred pounds. The chief expense is the transport to the sea-coast. The mine itself consists of a stratum between two and three feet thick, of the hard and nearly pure salt, lying close beneath the surface. The stratum follows the margin of a grand basin or plain, which manifestly must once have been either a lake or inland sea: the elevation at present is 3300 feet above the level of the Pacific. On our return we made a detour by the mines of Guantajaya. The village consists solely of the houses of the miners, and the place is utterly destitute of every necessary;—even water being brought thirty miles on the backs of animals. At present the mines yield little; though formerly they were very productive. One has a depth of four hundred yards, and out of it masses of silver were taken so pure, that it was only required to melt them in order to run them into bars. We reached Iquique after sunset: I went on board, and then the Beagle weighed for Lima. I was very glad to have seen

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this place, as I understand it is a good type of the greater part of the coast of Peru.

July 19th.—We anchored in the bay of Callao, the seaport of Lima, the capital of Peru. We staid here six weeks, but from the troubled state of public affairs, I saw very little of the country. During our whole visit the climate was far from being so delightful as it is generally represented. A dull heavy bank of clouds constantly hung over the land, so that during the first sixteen days I had only one view of the Cordillera behind Lima. These mountains, seen in stages, one above the other, through openings in the clouds, had a very grand appearance. It has almost become a proverb, that rain never falls in the lower part of Peru. Yet this can hardly be considered correct; for during almost every day of our visit there was a thick drizzling mist, which was sufficient to make the streets muddy and one's clothes damp: this the people are pleased to call Peruvian dew. That much rain does not fall is very certain, for the houses are covered only with flat roofs made of hardened mud; and on the mole, ship-loads of wheat were piled up, and are thus left for weeks together without any shelter.

I cannot say I liked the very little I saw of Peru: in summer, however, it is said that the climate is much pleasanter. In all seasons, both inhabitants and foreigners suffer from severe attacks of ague. This disease is common on the whole coast of Peru, but is unknown in the interior. The attacks of illness which arise from miasma never fail to appear most mysterious. So difficult is it to judge from the aspect of a country, whether or not it is healthy, that if a person had been told to choose within the tropics a situation appearing favourable for health, very probably he would have named this coast. The plain round the outskirts of Callao is sparingly covered with a coarse grass, and in some parts there are a few stagnant, though very small, pools of water. The miasma, in all probability, arises from these:

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for the town of Arica was similarly circumstanced, and its healthiness was much improved by the drainage of the water. The miasma is not always produced by a luxuriant vegetation with an ardent climate; for many parts of Brazil, even where there are marshes and a rank vegetation, are much more healthy than this sterile coast of Peru. The densest forests in a temperate climate, as in Chiloe, do not seem in the slightest degree to affect the healthy condition of the atmosphere.

The island of St. Jago, at the Cape de Verds, offers another strongly-marked instance of a country which any one would have expected to find most healthy, being very much the contrary. I have described the bare and open plains as supporting, during a few weeks after the rainy season, a thin vegetation, which directly withers away and dries up: at that period the air appears to become poisonous; both natives and foreigners often becoming affected with violent fevers. On the other hand, the Galapagos Archipelago, in the Pacific, with a similar soil, and periodically subject to the same process of vegetation, is perfectly healthy. Humboldt has observed, that, "under the torrid zone, the smallest marshes are the most dangerous, being surrounded, as at Vera Cruz and Carthagena, with an arid and sandy soil, which raises the temperature of the ambient air."* I must observe, however, that on the coast of Peru the temperature is not hot to any excessive degree; and perhaps in consequence, the intermittent fevers are not of the most malignant order.

In all unhealthy countries the greatest risk is run by sleeping on shore. Is this owing to the state of the body during sleep, or to a greater abundance of miasma at such times? It appears certain that those who stay on board a vessel, though anchored at only a short distance from the coast, generally suffer less than those actually on shore. On

* Political Essay on the Kingdom of New Spain, vol. iv., p. 199.

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the other hand, I have heard of one remarkable case where a fever broke out among the crew of a man-of-war some hundred miles off the coast of Africa, at the very same time that one of those fearful periods of death commenced at Sierra Leone. It may be remarked, that of the most destructive diseases, which bear an evident relation to climate, and which (as if by the addition of some direct poison) affect both natives and strangers, nearly all originate in the hotter regions of the earth. As geological induction shows that the climate, during the periods antecedent to the present, had an extra-tropical character, so, in all probability, there would be an extra tendency to disease, and we can therefore see that the introduction of man being, as generally supposed, recent, is an adaptation to the existing condition of the world.

No state in South America, since the declaration of independence, has suffered more from anarchy than Peru. At the time of our visit there were four chiefs in arms contending for supremacy in the government: if one succeeded in becoming for a time very powerful, the others coalesced against him; but no sooner were they victorious, than they were again disunited, and hostile to each other. The other day, at the Anniversary of the Independence, high mass was performed, the President partaking of the sacrament: during the *Te Deum laudamus*, instead of each regiment displaying the Peruvian flag, a black one with death's head was unfurled. Imagine a government under which such a scene could be ordered, on such an occasion, to be typical of their determination of fighting to the death! This state of affairs happened at a time very unfortunately for me, as I was precluded from taking any excursions much beyond the limits of the towns. The barren island of S. Lorenzo, which forms the harbour, was nearly the only place where one could walk securely. The upper part, which is about 1200 feet in height, during this season of the year, (winter) comes within the lower limit of

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the clouds; and in consequence of this, an abundant cryptogamic vegetation, and a few flowers, covered the summit. On the hills near Lima, at an elevation but little greater, the ground was carpeted with moss, and beds of beautiful yellow lilies, called Amancaes. This indicates a very much greater degree of humidity than at a corresponding altitude at Iquique. Travelling northward, the climate becomes damper, till on the banks of the Guyaquil, nearly under the equator, we find the most luxuriant forests. The change, however, from the sterile coast of Peru to that fertile land, is described as taking place rather abruptly, in the latitude of Cape Blanco, two degrees south of Guyaquil.

Callao is a filthy, ill-built, small seaport. The inhabitants, both there and at Lima, present every imaginable shade of mixture, between European, Negro, and Indian blood. They appear a depraved, drunken set of people. The atmosphere was loaded with foul smells, and that peculiar one, which may be perceived in almost every town within the tropics, was here very strong. The fortress, which withstood Lord Cochrane's long siege, has an imposing appearance. But the President, during our stay, sold the brass guns, and proceeded to dismantle parts of it. The reason assigned was, that he had not an officer to whom he could trust so important a charge. He himself had good reasons for knowing this, as he had obtained the presidentship by rebelling while in charge of this same fortress. After we left South America, he paid the penalty in the usual way, by being conquered, taken prisoner, and shot.

Lima stands on a plain in a valley, formed during the gradual retreat of the sea. It is distant seven miles from Callao, and is elevated 500 feet above it; but from the slope being very gradual, the road appears absolutely level; so that when at Lima it is difficult to believe one has ascended some hundred feet. Humboldt has remarked on this singularly deceptive case. Steep, barren hills rise like islands from the plain, which is divided, by straight mud-walls, into large green fields. In these scarcely a tree grows excepting a

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few willows; and the presence of an occasional clump of bananas and of oranges, alone reminded one that the landscape of a country in latitude 12° might have boasted of a far more splendid vegetation. The city of Lima is now in a wretched state of decay: the streets are nearly unpaved, and heaps of filth are piled up in all directions; where the black gallinazos, tame as poultry, pick up bits of carrion. The houses have generally an upper story, built, on account of the earthquakes, of plastered woodwork; but some of the old ones, which are now used by several families, are immensely large, and would rival in suites of apartments the most magnificent in any place. Lima, the City of the Kings, must formerly have been a splendid town. The extraordinary number of churches, even at the present day, gives it a peculiar and striking character, especially when viewed from a short distance.

One day I went out with some merchants to hunt in the immediate vicinity of the city. Our sport was very poor; but I had an opportunity of seeing the ruins of one of the ancient Indian villages, with its hill-like mound in the centre. The remains of houses, enclosures, irrigating streams, and burial mounds, scattered over this plain, cannot fail to give one a high idea of the condition and number of the ancient population. When their earthenware, woollen clothes, utensils of elegant forms cut out of the hardest rocks, tools of copper, ornaments of precious stones, palaces and hydraulic works, are considered, it is impossible not to respect the considerable advance made by them in the arts of civilization. The burial mounds, called Huacas, are really stupendous; although in some places it is only a natural hill which appears to have been incased and modelled.

There is also another and very different class of ruins, which possesses some interest, namely, those of old Callao, overwhelmed by the great earthquake of 1746, and its accompanying wave. The destruction must have been more complete even than at Concepcion. Quantities of shingle almost conceal the foundations of the walls, and vast masses of

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brickwork appear to have been whirled about by the retiring waves like pebbles. It has been stated that the land subsided during this memorable shock: I could not discover any proof of this; yet it seems far from improbable, for the form of the coast must certainly have undergone some change since the foundation of the old town; as no people in their senses would willingly have chosen for their building place the narrow spit of shingle on which the ruins now stand. On the island of San Lorenzo, there are very satisfactory proofs of elevation within the recent period: this of course would not contravene the belief of a small subsidence, if any signs of such movement could be discovered. The side of the mountain fronting the bay on that island, is worn into three obscure terraces, which are covered by masses of shells many hundred tons in weight, of species now existing on the beach. Several of the univalves had serpulæ and small balani attached on their insides; proving that they must have remained some time, after the animal had died, at the bottom of the sea. In such cases we may feel sure that they had not been carried up, as has sometimes been believed, either by birds or men for food.

When examining the beds of shells, which have been raised above the level of the sea, on other parts of the coast, I often felt curious to trace their final disappearance from decay. On the island of San Lorenzo, this could be done in the most satisfactory manner: at a small height the shells were quite perfect; on a terrace, eighty-five feet above the sea, they were partially decomposed and coated by a soft scaly substance; at double this altitude a thin layer of calcareous powder beneath the soil, without a trace of organic structure, was all that could be discovered. This highly curious and satisfactory gradation of change, it is evident could be traced only under the peculiar conditions of this climate, where rain never falls so as to wash away the particles of shells in their last stage of decomposition. I was much interested by finding embedded, together with pieces of sea-weed in the mass of shells, in the eighty-five foot bed, a bit of *cotton-thread*,

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plaited rush, and the head of a stalk of Indian corn. This fact, coupled with another, which will be mentioned, proves I think the amount of eighty-five feet elevation since man inhabited this part of Peru. On the coast of Patagonia and La Plata, where perhaps the movements have been slower, there is evidence, as we have seen, that several mammalia have become extinct during a smaller change of level. At Valparaiso, where there exist abundant proofs of recent elevation to a greater altitude than in this part of Peru, I can show that the greatest possible change during the last 220 years, has not exceeded the small measure of fifteen feet.

On the mainland in front of San Lorenzo, near Bellavista, there is an extensive and level plain, at the height of about a hundred feet. The section on the coast shows that the lower part consists of alternating layers of sand and impure clay, together with some gravel; and the surface, to the depth of from three to six feet, of a reddish loam, containing a few scattered sea-shells, and numerous small fragments of coarse red earthenware. At first I was inclined to believe that this superficial bed must have been deposited beneath the sea; but I afterwards found in one spot, that it covered an artificial floor of round stones. The conclusion which then seemed most probable was, that at a period when the land stood at a less height, there was a plain very similar to the one now surrounding Callao, which being protected by a shingle beach, is raised but very little above the level of the sea. On this plain, with its clay beds, I imagine the Indians manufactured their earthen vessels; and that, during some violent earthquake, the sea broke over the beach and converted the plain into a temporary lake, as happened in 1713* around Callao. The water would then deposit mud, containing fragments of pottery from the kilns, and shells from the sea. This bed with fossil earthenware occurring at about the same altitude with the terrace on San Lorenzo, confirms the supposed amount of elevation within the human period.

* Frezier's Voyage.

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CHAPTER XIX.

Islands volcanic—Number of craters—Leafless bushes—Colony at Charles Island—James Island—Salt-lake in crater—Character of vegetation—Ornithology, curious finches—Great tortoises, habits of, paths to the wells—Marine lizard feeds on sea-weed—Terrestrial species, burrowing habits, herbivorous—Importance of reptiles in the Archipelago—Few and minute insects—American type of organization—Species confined to certain islands—Tameness of birds—Falkland Islands—Fear of man an acquired instinct.

GALAPAGOS ARCHIPELAGO.

SEPTEMBER 15TH.—The Beagle arrived at the southernmost of the Galapagos islands. This archipelago consists of ten principal islands, of which five much exceed the others in size. They are situated under the equatorial line, and between five and six hundred miles to the westward of the coast of America. The constitution of the whole is volcanic. With the exception of some ejected fragments of granite, which have been most curiously glazed and altered by the heat, every part consists of lava, or of sandstone resulting from the attrition of such materials. The higher islands, (which attain an elevation of three, and even four thousand feet) generally have one or more principal craters towards their centre, and on their flanks smaller orifices. I have no exact data from which to calculate, but I do not hesitate to affirm, that there must be, in all the islands of the archipelago, at least two thousand craters. These are of two kinds; one, as in ordinary cases, consisting of scoriæ and lava, the other of finely-stratified volcanic sandstone. The latter in most instances have a form beautifully symmetrical: their origin is due to the ejection of mud,—that is, fine volcanic ashes and water,—without any lava.

Considering that these islands are placed directly under the equator, the climate is far from being excessively hot; a

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circumstance which, perhaps, is chiefly owing to the singularly low temperature of the surrounding sea. Excepting during one short season, very little rain falls, and even then it is not regular: but the clouds generally hang low. From these circumstances the lower parts of the islands are extremely arid, whilst the summits, at an elevation of a thousand feet or more, possess a tolerably luxuriant vegetation. This is especially the case on the windward side, which first receives and condenses the moisture from the atmosphere.

In the morning (17th,) we landed on Chatham Island, which, like the others, rises with a tame and rounded outline, interrupted only here and there by scattered hillocks—the remains of former craters. Nothing could be less inviting than the first appearance. A broken field of black basaltic lava is every where covered by astunted brushwood, which shows little signs of life. The dry and parched surface, having been heated by the noonday sun, gave the air a close and sultry feeling, like that from a stove: we fancied even the bushes smelt unpleasantly. Although I diligently tried to collect as many plants as possible, I succeeded in getting only ten kinds; and such wretched-looking little weeds would have better become an arctic, than an equatorial Flora.

The thin woods, which cover the lower parts of all the islands, excepting where the lava has recently flowed, appear from a short distance quite leafless, like the deciduous trees of the northern hemisphere in winter. It was some time before I discovered, that not only almost every plant was in full leaf, but that the greater number were now in flower. After the period of heavy rains, the islands are said to appear for a short time partially green. The only other country, in which I have seen a vegetation with a character at all approaching to this, is at the volcanic island of Fernando Noronha, placed in many respects under similar conditions.

The natural history of this archipelago is very remarkable: it seems to be a little world within itself; the greater number of its inhabitants, both vegetable and animal, being found

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nowhere else. As I shall refer to this subject again, I will only here remark, as forming a striking character on first landing, that the birds are strangers to man. So tame and unsuspecting were they, that they did not even understand what was meant by stones being thrown at them; and quite regardless of us, they approached so close that any number might have been killed with a stick.

The Beagle sailed round Chatham Island, and anchored in several bays. One night I slept on shore, on a part of the island where some black cones—the former chimneys of the subterranean heated fluids—were extraordinarily numerous. From one small eminence, I counted sixty of these truncated hillocks, which were all surmounted by a more or less perfect crater. The greater number consisted merely of a ring of red scoriæ, or slags, cemented together: and their height above the plain of lava, was not more than from fifty to a hundred feet. From their regular form, they gave the country a *workshop* appearance, which strongly reminded me of those parts of Staffordshire where the great iron-foundries are most numerous.

The age of the various beds of lava was distinctly marked by the comparative growth, or entire absence, of vegetation. Nothing can be imagined more rough and horrid than the surface of the more modern streams. These have been aptly compared to the sea petrified in its most boisterous moments: no sea, however, would present such irregular undulations, or would be traversed by such deep chasms. All the craters are in an extinct condition; and although the age of the different streams of lava could be so clearly distinguished, it is probable they have remained so for many centuries. There is no account in any of the old voyagers of any volcano on this island having been seen in activity; yet since the time of Dampier (1684), there must have been some increase in the quantity of vegetation, otherwise so accurate a person would not have expressed himself thus:—"Four or five of the easternmost islands are rocky, barren, and hilly, producing neither

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tree, herb, nor grass, but a few dildoe (cactus) trees, except by the sea-side."* This description is at present applicable only to the western islands, where the volcanic forces are in frequent activity.

The day, on which I visited the little craters, was glowing hot, and the scrambling over the rough surface, and through the intricate thickets, was very fatiguing; but I was well repaid by the Cyclopian scene. In my walk I met two large tortoises, each of which must have weighed at least two hundred pounds. One was eating a piece of cactus, and when I approached, it looked at me, and then quietly walked away: the other gave a deep hiss and drew in its head. These huge reptiles, surrounded by the black lava, the leafless shrubs, and large cacti, appeared to my fancy like some antediluvian animals.

SEPTEMBER 23D.—The Beagle proceeded to Charles Island. This archipelago has long been frequented, first by the Bucaniers, and latterly by whalers, but it is only within the last six years, that a small colony has been established on it. The inhabitants are between two and three hundred in number: they nearly all consist of people of colour, who have been banished for political crimes from the Republic of the Equator (Quito is the capital of this state) to which these islands belong. The settlement is placed about four and a half miles inland, and at an elevation probably of a thousand feet. In the first part of the road we passed through leafless thickets, as in Chatham Island. Higher up, the wood gradually became greener; and immediately we had crossed the ridge of the island, our bodies were cooled by the fine southerly trade-wind, and our senses refreshed by the sight of a green and thriving vegetation. The houses are irregularly scattered over a flat space of ground, which is cultivated with sweet potatoes and bananas. It will not easily be imagined how pleasant the

* Dampier's Voyage, vol. i., p. 101.

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sight of black mud was to us, after having been so long accustomed to the parched soil of Peru and Chile.

The inhabitants, although complaining of poverty, gain, without much trouble, the means of subsistence from the fertile soil. In the woods there are many wild pigs and goats, but the main article of animal food is derived from the tortoise. Their numbers in this island have of course been greatly reduced, but the people yet reckon on two days' hunting supplying food for the rest of the week. It is said that formerly single vessels have taken away as many as seven hundred of these animals, and that the ship's company of a frigate some years since brought down two hundred to the beach in one day.

We staid at this island four days, during which time I collected many plants and birds. One morning I ascended the highest hill, which has an altitude of nearly 1800 feet. The summit consists of a broken-down crater, thickly clothed with coarse grass and brushwood. Even in this one island, I counted thirty-nine hills, each of which was terminated by a more or less perfect circular depression.

SEPTEMBER 29TH.—We doubled the south-west extremity of Albermarle Island, and the next day were nearly becalmed between it and Narborough Island. Both are covered with immense streams of black naked lava; which, having either flowed over the rims of the great caldrons, or having burst forth from the smaller orifices on the flanks, have in their descent spread over miles of the sea-coast. On both of these islands eruptions are known occasionally to take place; and in Albermarle we saw a small jet of smoke curling from the summit of one of the more lofty craters. In the evening we anchored in Bank's Cove, in Albermarle Island.

When morning came, we found that the harbour in which we were at anchor was formed by a broken-down crater, composed of volcanic sandstone. After breakfast I went out walking. To the southward of this first crater, there was another of similar composition, and beautifully

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symmetrical. It was elliptic in form; the longer axis being less than a mile, and its depth about 500 feet. The bottom was occupied by a shallow lake, and in its centre a tiny crater formed an islet. The day was overpoweringly hot, and the lake looked clear and blue. I hurried down the cindery slope, and choked with dust eagerly tasted the water—but to my sorrow I found it salt as brine.

The rocks on the coast abounded with great black lizards, between three and four feet long; and on the hills, another species was equally common. We saw several of the latter, some clumsily running out of our way, and others shuffling into their burrows. I shall presently describe in more detail the habits of both these reptiles.

October 3d.—We sailed round the northern end of Albermarle Island. Nearly the whole of this side is covered with recent streams of dark-coloured lavas, and is studded with craters. I should think it would be difficult to find in any other part of the world, an island situated within the tropics, and of such considerable size (namely 75 miles long), so sterile and incapable of supporting life.

On the 8th we reached James Island.* Captain FitzRoy put Mr. Bynoe, myself, and three others on shore, leaving with us a tent and provisions, to wait there till the vessel returned from watering. This was an admirable plan for the collections, as we had an entire week of hard work. We found here a party of Spaniards, who had been sent from Charles Island to dry fish, and to salt tortoise-meat.

At the distance of about six miles, and at the height of nearly 2000 feet, the Spaniards had erected a hovel in which two men lived, who were employed in catching tortoises, whilst the others were fishing on the coast. I paid this party two visits, and slept there one night. In the same manner as in the other islands, the lower region is covered by nearly leafless bushes: but here many of them grow to the size of

* Both Charles and James Islands take their names from the Stuarts. See Cowley's Voyage in 1684.

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trees. I measured several which were two feet in diameter, and some even two feet nine inches. The upper region being kept damp, from the moisture of the condensed clouds, supports a green and flourishing vegetation. So damp was the ground, that there were large beds of a coarse carex, in which great numbers of a very small water-rail lived and bred. While staying in this upper region, we lived entirely upon tortoise-meat. The breastplate roasted (as the Gauchos do *carne con cuero*), with the flesh attached to it, is very good; and the young tortoises make excellent soup; but otherwise the meat to my taste is very indifferent.

During another day we accompanied a party of the Spaniards in their whale-boat to a salina, or lake from which salt is procured. After landing, we had a very rough walk over a rugged field of recent lava, which has almost surrounded a sandstone crater, at the bottom of which the salt-lake is situated. The water was only three or four inches deep, and rested on a layer of beautifully crystallized white salt. The lake was quite circular, and fringed with a border of brightly green succulent plants: the precipitous walls of the crater were also clothed with wood, so that the scene was both picturesque and curious. A few years since, the sailors belonging to a sealing-vessel murdered their captain in this quiet spot; and we saw his skull lying among the bushes.

During the greater part of our week on shore, the sky was cloudless, and if the trade-wind failed for an hour, the heat became very oppressive. On two days, the thermometer within the tent stood for some hours at 93°; but in the open air, in the wind and sun, at only 85°. The sand was extremely hot; the thermometer placed in some of a brown colour immediately rose to 137°, and how much higher it would have risen, I do not know, for it was not graduated above that number. The *black* sand felt much hotter, so that even in thick boots it was disagreeable, on this account, to walk over it.

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I will now offer a few general observations on the natural history of these islands. I endeavoured to make as nearly a perfect collection in every branch as time permitted. The plants have not yet been examined, but Professor Henslow, who has kindly undertaken the description of them, informs me that there are probably many new species, and perhaps even some new genera. They all have an extremely weedy character, and it would scarcely have been supposed, that they had grown at an inconsiderable elevation directly under the equator. In the lower and sterile parts, the bush, which from its minute brown leaves chiefly gives the leafless appearance to the brushwood, is one of the Euphorbiaceæ. In the same region an acacia and a cactus (*Opuntia Galapageia**), with large oval compressed articulations, springing from a cylindrical stem, are in some parts common. These are the only trees which in that part afford any shade. Near the summits of the different islands, the vegetation has a very different character; ferns and coarse grasses are abundant; and the commonest tree is one of the Compositæ. Tree-ferns are not present. One of the most singular characters of the Flora, considering the position of this archipelago, is the absence of every member of the palm family. Cocos Island, on the other hand, which is the nearest point of land, takes its name from the great number of cocoa-nut trees on it. From the presence of the Opuntias and some other plants, the vegetation partakes more of the character of that of America than of any other country.

Of mammalia a large kind of mouse forms a well-marked species. From its large thin ears, and other characters, it approaches in form a section of the genus, which is confined to the sterile regions of South America. There is also a rat which Mr. Waterhouse believes is probably distinct from the English kind; but I cannot help suspecting that it is only the same altered by the peculiar conditions of its new country.

* Magazine of Zoology and Botany, vol. i., p. 466.

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In my collections from these islands, Mr. Gould considers that there are twenty-six different species of land birds. With the exception of one, all probably are undescribed kinds, which inhabit this archipelago, and no other part of the world. Among the waders and waterfowl it is more difficult, without detailed comparison, to say what are new. But a water-sail which lives near the summits of the mountains, is undescribed, as perhaps is a Totanus and a heron. The only kind of gull which is found among these islands, is also new; when the wandering habits of this genus are considered, this is a very remarkable circumstance. The species most closely allied to it, comes from the Strait of Magellan. Of the other aquatic birds, the species appear the same with well-known American birds.

The general character of the plumage of these birds is extremely plain, and like the Flora possesses little beauty. Although the species are thus peculiar to the archipelago, yet nearly all in their general structure, habits, colour of feathers, and even tone of voice, are strictly American. The following brief list will give an idea of their kinds. 1st. A buzzard, having many of the characters of Polyborus or Caracara; and in its habits not to be distinguished from that peculiar South American genus; 2d. Two owls; 3d. Three species of tyrant-flycatchers — a form strictly American. One of these appears identical with a common kind (*Muscicapa coronata?* Lath.), which has a very wide range, from La Plata throughout Brazil to Mexico; 4th. A sylvicola, an American form, and especially common in the northern division of the continent; 5th. Three species of mocking-birds, a genus common to both Americas; 6th. A finch, with a stiff tail and a long claw to its hinder toe, closely allied to a North American genus; 7th. A swallow belonging to the American division of that genus; 8th. A dove, like, but distinct from, the Chilian species; 9th. A group of finches, of which Mr. Gould considers there are thirteen species; and these he has distributed into four new sub-genera. These birds are the most singular of

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any in the archipelago. They all agree in many points; namely, in a peculiar structure of their bill, short tails, general form, and in their plumage. The females are gray or brown, but the old cocks jet-black. All the species, excepting two, feed in flocks on the ground, and have very similar habits. It is very remarkable that a nearly perfect gradation of structure in this one group can be traced in the form of the beak, from one exceeding in dimensions that of the largest gros-beak, to another differing but little from that of a warbler. Of the aquatic birds I have already remarked that some are peculiar to these islands, and some common to North and South America.

We will now turn to the order of reptiles, which forms, perhaps, the most striking feature in the zoology of these islands. The species are not numerous, but the number of individuals of each kind, is extraordinarily great. There is one kind both of the turtle and tortoise; of lizards four; and of snakes about the same number.

I will first describe the habits of the tortoise (*Testudo Indicus*) which has been so frequently alluded to. These animals are found, I believe, in all the islands of the Archipelago; certainly in the greater number. They frequent in preference the high damp parts, but likewise inhabit the lower and arid districts. I have already mentioned* proofs, from the numbers which have been taken in a single day, how very numerous they must be. Some individuals grow to an immense size: Mr. Lawson, an Englishman, who had at the time of our visit charge of the colony, told us that he had seen several so large, that it required six or eight men to lift them from the ground; and that some had afforded as much as two hundred pounds of meat. The old males are the largest, the females rarely growing to so great a size. The male can readily be distinguished from the female by the

* Dampier says, "The land-turtles are here so numerous, that five or six hundred men might subsist on them for several months without any other sort of provisions. They are so extraordinarily large and fat, and so sweet, that no pullet eats more pleasantly."—Vol. i., p. 110.

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greater length of its tail. The tortoises which live on those islands where there is no water, or in the lower and arid parts of the others, chiefly feed on the succulent cactus. Those which frequent the higher and damp regions, eat the leaves of various trees, a kind of berry (called guayavita) which is acid and austere, and likewise a pale green filamentous lichen, that hangs in tresses from the boughs of the trees.

The tortoise is very fond of water, drinking large quantities, and wallowing in the mud. The larger islands alone possess springs, and these are always situated towards the central parts, and at a considerable elevation. The tortoises, therefore, which frequent the lower districts, when thirsty, are obliged to travel from a long distance. Hence broad and well-beaten paths radiate off in every direction from the wells even down to the sea-coast; and the Spaniards by following them up, first discovered the watering-places. When I landed at Chatham Island, I could not imagine what animal travelled so methodically along the well-chosen tracks. Near the springs it was a curious spectacle to behold many of these great monsters; one set eagerly travelling onwards with outstretched necks, and another set returning, after having drunk their fill. When the tortoise arrives at the spring, quite regardless of any spectator, it buries its head in the water above its eyes, and greedily swallows great mouthfuls, at the rate of about ten in a minute. The inhabitants say each animal stays three or four days in the neighbourhood of the water, and then returns to the lower country; but they differed in their accounts respecting the frequency of these visits. The animal probably regulates them according to the nature of the food which it has consumed. It is, however, certain, that tortoises can subsist even on those islands where there is no other water, than what falls during a few rainy days in the year.

I believe it is well ascertained, that the bladder of the frog

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acts as a reservoir for the moisture necessary to its existence: such seems to be the case with the tortoise. For some time after a visit to the springs, the urinary bladder of these animals is distended with fluid, which is said gradually to decrease in volume, and to become less pure. The inhabitants, when walking in the lower district, and overcome with thirst, often take advantage of this circumstance, by killing a tortoise, and if the bladder is full, drinking its contents. In one I saw killed, the fluid was quite limpid, and had only a *very slightly* bitter taste. The inhabitants, however, always drink first the water in the pericardium, which is described as being best.

The tortoises, when moving towards any definite point, travel by night and day, and arrive at their journey's end much sooner than would be expected. The inhabitants, from observations on marked individuals, consider that they can move a distance of about eight miles in two or three days. One large tortoise, which I watched, I found walked at the rate of sixty yards in ten minutes, that is 360 in the hour, or four miles a day,—allowing also a little time for it to eat on the road.

During the breeding season, when the male and female are together, the male utters a hoarse roar or bellowing, which it is said, can be heard at the distance of more than a hundred yards. The female never uses her voice, and the male only at such times; so that when the people hear this noise, they know the two are together. They were at this time (October) laying their eggs. The female, where the soil is sandy, deposits them together, and covers them up with sand; but where the ground is rocky she drops them indiscriminately in any hollow. Mr. Bynoe found seven placed in a line in a fissure. The egg is white and spherical; one which I measured was seven inches and three-eighths in circumference. The young animals, as soon as they are hatched, fall a prey in great numbers to the buzzard, with the habits of the Caracara. The old ones seem generally

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to die from accidents, as from falling down precipices. At least several of the inhabitants told me, they had never found one dead without some such apparent cause.

The inhabitants believe that these animals are absolutely deaf; certainly they do not overhear a person walking close behind them. I was always amused, when overtaking one of these great monsters as it was quietly pacing along, to see how suddenly, the instant I passed, it would draw in its head and legs, and uttering a deep hiss fall to the ground with a heavy sound, as if struck dead. I frequently got on their backs, and then, upon giving a few raps on the hinder part of the shell, they would rise up and walk away;—but I found it very difficult to keep my balance.

The flesh of this animal is largely employed, both fresh and salted; and a beautifully clear oil is prepared from the fat. When a tortoise is caught, the man makes a slit in the skin near its tail, so as to see inside its body, whether the fat under the dorsal plate is thick. If it is not, the animal is liberated; and it is said to recover soon from this strange operation. In order to secure the tortoises, it is not sufficient to turn them like turtle, for they are often able to regain their upright position.

It was confidently asserted, that the tortoises coming from different islands in the archipelago were slightly different in form; and that in certain islands they attained a larger average size than in others. Mr. Lawson maintained that he could at once tell from which island any one was brought. Unfortunately, the specimens which came home in the Beagle were too small to institute any certain comparison. This tortoise, which goes by the name of *Testudo Indicus*, is at present found in many parts of the world. It is the opinion of Mr. Bell, and some others who have studied reptiles, that it is not improbable that they all originally came from this archipelago. When it is known how long these islands have been frequented by the bucaniers, and that they constantly took away numbers of these animals alive, it seems very probable that they should have distributed them in

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different parts of the world. If this tortoise does not originally come from these islands, it is a remarkable anomaly; inasmuch as nearly all the other land inhabitants seem to have had their birthplace here.

Of lizards there are four or five species; two probably belong to the South American genus Leiocephalus, and two to Amblyrhyncus. This remarkable genus was characterized by Mr. Bell,* from a stuffed specimen sent from Mexico, but which I conceive there can be little doubt originally came through some whaling ship from these islands. The two species agree pretty closely in general appearance; but one is aquatic and the other terrestrial in its habits. Mr. Bell thus concludes his description of *Amb. cristatus:* "On a comparison of this animal with the true Iguanas, the most striking and important discrepancy is in the form of the head. Instead of the long, pointed, narrow muzzle of those species, we have here a short, obtusely truncated head, not so long as it is broad, the mouth consequently only capable of being opened to a very short space. These circumstances, with the shortness and equality of the toes, and the strength and curvature of the claws, evidently indicate some striking peculiarity in its food and general habits, on which, however, in the absence of all certain information, I shall abstain from offering any conjecture." The following account of these two lizards, will, I think, show with what judgment Mr. Bell foresaw a variation in habit, accompanying change in structure.

First for the aquatic kind (*Amb. cristatus*). This lizard is extremely common on all the islands throughout the Archipelago. It lives exclusively on the rocky sea-beaches, and is never found, at least I never saw one, even ten yards inshore. It is a hideous-looking creature, of a dirty black colour, stupid and sluggish in its movements. The usual length of a full-grown one is about a yard, but there are some even four feet long: I have seen a large one which

* Zoological Journal, July, 1835.

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weighed twenty pounds. On the island of Albemarle they seem to grow to a greater size than on any other. These lizards were occasionally seen some hundred yards from the shore swimming about; and Captain Collnett, in his Voyage, says, "they go out to sea in shoals to fish." With respect to the object, I believe he is mistaken; but the fact stated on such good authority cannot be doubted. When in the water the animal swims with perfect ease and quickness, by a serpentine movement of its body and flattened tail,—the legs, during this time, being motionless and closely collapsed on its sides. A seaman on board sank one, with a heavy weight attached to it, thinking thus to kill it directly; but when an hour afterwards he drew up the line, the lizard was quite active. Their limbs and strong claws are admirably adapted for crawling over the rugged and fissured masses of lava, which every where form the coast. In such situations, a group of six or seven of these hideous reptiles may oftentimes be seen on the black rocks, a few feet above the surf, basking in the sun with outstretched legs.

I opened the stomach of several, and in each case found it largely distended with minced sea-weed, of that kind which grows in thin foliaceous expansions of a bright green or dull red colour. I do not recollect having observed this sea-weed in any quantity on the tidal rocks; and I have reason to believe it grows at the bottom of the sea, at some little distance from the coast. If such is the case, the object of these animals occasionally going out to sea is explained. The stomach contained nothing but the sea-weed. Mr. Bynoe, however, found a piece of a crab in one; but this might have got in accidentally, in the same manner as I have seen a caterpillar, in the midst of some lichen, in the paunch of a tortoise. The intestines were large, as in other herbivorous animals.

The nature of this lizard's food, as well as the structure of its tail, and the certain fact of its having been seen volun-

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tarily swimming out at sea, absolutely prove its aquatic habits; yet there is in this respect one strange anomaly; namely, that when frightened it will not enter the water. From this cause, it is easy to drive these lizards down to any little point overhanging the sea, where they will sooner allow a person to catch hold of their tail than jump into the water. They do not seem to have any notion of biting; but when much frightened they squirt a drop of fluid from each nostril. One day I carried one to a deep pool left by the retiring tide, and threw it in several times as far as I was able. It invariably returned in a direct line to the spot where I stood. It swam near the bottom, with a very graceful and rapid movement, and occasionally aided itself over the uneven ground with its feet. As soon as it arrived near the margin, but still being under water, it either tried to conceal itself in the tufts of sea-weed, or it entered some crevice. As soon as it thought the danger was past, it crawled out on the dry rocks, and shuffled away as quickly as it could. I several times caught this same lizard, by driving it down to a point, and though possessed of such perfect powers of diving and swimming, nothing would induce it to enter the water; and as often as I threw it in, it returned in the manner above described. Perhaps this singular piece of apparent stupidity may be accounted for by the circumstance, that this reptile has no enemy whatever on shore, whereas at sea it must often fall a prey to the numerous sharks. Hence, probably urged by a fixed and hereditary instinct that the shore is its place of safety, whatever the emergency may be, it there takes refuge.

During our visit (in October) I saw extremely few small individuals of this species, and none I should think under a year old. From this circumstance it seems probable that the breeding season had not commenced. I asked several of the inhabitants if they knew where it laid its eggs: they said, that although well acquainted with the eggs of the other kind, they had not the least knowledge of the

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manner in which this species is propagated;—a fact, considering how common an animal this lizard is, not a little extraordinary.

We will now turn to the terrestrial species (*Amb. subcristatus* of Gray).* This species, differently from the last, is confined to the central islands of the Archipelago, namely to Albemarle, James, Barrington, and Indefatigable. To the southward, in Charles, Hood, and Chatham islands, and to the northward, in Towers, Bindloes, and Abington, I neither saw nor heard of any. It would appear as if this species had been created in the centre of the Archipelago, and thence had been dispersed only to a certain distance.

In the central islands they inhabit both the higher and damp, as well as the lower and sterile parts; but in the latter they are much the most numerous. I cannot give a more forcible proof of their numbers, than by stating, that when we were left at James Island, we could not for some time find a spot free from their burrows, on which to pitch our tent. These lizards, like their brothers the sea-kind, are ugly animals; and from their low facial angle have a singularly stupid appearance. In size perhaps they are a little inferior to the latter, but several of them weighed between ten and fifteen pounds each. The colour of their belly, front legs, and head (excepting the crown which is nearly white), is a dirty yellowish-orange: the back is a brownish-red, which in the younger specimens is darker. In their movements they are lazy and half torpid. When not frightened, they slowly crawl along with their tails and bellies dragging on the ground. They often stop, and doze for a minute with closed eyes, and hind legs spread out on the parched soil.

* Briefly characterized by Mr. Gray in the Zoological Miscellany, from a specimen badly stuffed; from which cause one of its most important characters (the rounded tail, compared to the flattened one of the aquatic kind) was overlooked. Captain Fitz Roy has presented some fine specimens of both species to the British Museum. I cannot omit here returning my thanks to Mr. Gray, for the kind manner in which he has afforded me every facility as often as I have visited the British Museum.

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They inhabit burrows; which they sometimes excavate between fragments of lava, but more generally on level patches of the soft volcanic sandstone. The holes do not appear to be very deep, and they enter the ground at a small angle; so that when walking over these lizard *warrens*, the soil is constantly giving way, much to the annoyance of the tired walker. This animal when excavating its burrow, alternately works the opposite sides of its body. One front leg for a short time scratches up the soil, and throws it towards the hind foot, which is well placed so as to heave it beyond the mouth of the hole. This side of the body being tired, the other takes up the task, and so on alternately. I watched one for a long time, till half its body was buried; I then walked up and pulled it by the tail; at this it was greatly astonished, and soon shuffled up to see what was the matter; and then stared me in the face, as much as to say, "What made you pull my tail?"

They feed by day, and do not wander far from their burrows; and if frightened they rush to them with a most awkward gait. Except when running down hill, they cannot move very fast; which appears chiefly owing to the lateral position of their legs.

They are not at all timorous: when attentively watching any one, they curl their tails, and raising themselves on their front legs, nod their heads vertically, with a quick movement, and try to look very fierce: but in reality they are not at all so; if one just stamps the ground, down go their tails, and off they shuffle as quickly as they can. I have frequently observed small muscivorous lizards, when watching any thing, nod their heads in precisely the same manner; but I do not at all know for what purpose. If this Amblyrhyncus is held, and plagued with a stick, it will bite it very severely; but I caught many by the tail, and they never tried to bite me. If two are placed on the ground and held together, they will fight and bite each other till blood is drawn.

The individuals (and they are the greater number) which inhabit the lower country, can scarcely taste a drop of water

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throughout the year; but they consume much of the succulent cactus, the branches of which are occasionally broken off by the wind. I have sometimes thrown a piece to two or three when together; and it was amusing enough to see each trying to sieze and carry it away in its mouth, like so many hungry dogs with a bone. They eat very deliberately, but do not chew their food. The little birds are aware how harmless these creatures are: I have seen one of the thick-billed finches picking at one end of a piece of cactus (which is in request among all the animals of the lower region), whilst a lizard was eating at the other; and afterwards the little bird with the utmost indifference hopped on the back of the reptile.

I opened the stomachs of several, and found them full of vegetable fibres, and leaves of different trees, especially of a species of acacia. In the upper region they live chiefly on the acid and astringent berries of the guayavita, under which trees I have seen these lizards and the huge tortoises feeding together. To obtain the acacia-leaves, they crawl up the low stunted trees; and it is not uncommon to see one or a pair quietly browsing, whilst seated on a branch several feet above the ground.

The meat of these animals when cooked is white, and by those whose stomachs rise above all prejudices, it is relished as very good food. Humboldt has remarked that in intertropical South America, all lizards which inhabit *dry* regions are esteemed delicacies for the table. The inhabitants say, that those inhabiting the damp region drink water, but that the others do not travel up for it from the sterile country like the tortoises. At the time of our visit, the females had within their bodies numerous large elongated eggs. These they lay in their burrows, and the inhabitants seek them for food.

These two species of Amblyrhyncus agree, as I have already stated, in general structure, and in many of their habits. Neither have that rapid movement, so characteristic of true Lacerta and Iguana. They are both herbivorous,

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although the kind of vegetation consumed in each case is so very different. Mr. Bell has given the name to the genus from the shortness of the snout: indeed, the form of the mouth may almost be compared to that of the tortoise. One is tempted to suppose this is an adaptation to their herbivorous appetites. It is very interesting thus to find a well-characterized genus, having its aquatic and terrestrial species, belonging to so confined a portion of the world. The former species is by far the most remarkable, because it is the only existing Saurian, which can properly be said to be a maritime animal. I should perhaps have mentioned earlier, that in the whole archipelago, there is only one rill of fresh water that reaches the coast; yet these reptiles frequent the sea-beaches, and no other parts in all the islands. Moreover, there is no existing lizard, as far as I am aware, excepting this Amblyrhyncus, that feeds exclusively on aquatic productions. If, however, we refer to epochs long past, we shall find such habits common to several gigantic animals of the Saurian race.

To conclude with the order of reptiles. Of snakes there are several species, but all harmless. Of toads and frogs there are none. I was surprised at this, considering how well the temperate and damp woods in the elevated parts appeared adapted for their habits. It recalled to my mind the singular statement made by Bory St. Vincent,* namely, that none of this family are to be found on the volcanic islands in the great oceans. There certainly appears to be some foundation for this observation; which is the more remarkable, when compared with the case of lizards, which are generally among the earliest colonists of the smallest islet. It may be asked, whether this is not owing to the different facilities of transport through salt-water, of the eggs of the latter protected by a calcareous coat, and of the slimy spawn of the former?

As I at first observed, these islands are not so remarkable

* Voyage aux quatre Iles d'Afrique.

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for the number of species of reptiles, as for that of individuals; when we remember the well-beaten paths made by the many hundred great tortoises—the warrens of the terrestrial Amblyrhyncus—and the groups of the aquatic species basking on the coast-rocks—we must admit that there is no other quarter of the world, where this order replaces the herbivorous mammalia in so extraordinary a manner. It is worthy of observation by the geologist (who will probably refer back in his mind to the secondary periods, when the Saurians were developed with dimensions, which at the present day can be compared only to the cetaceous mammalia), that this archipelago, instead of possessing a humid climate and rank vegetation, cannot be considered otherwise than extremely arid, and for an equatorial region, remarkably temperate.

To finish with the zoology: I took great pains in collecting the insects, but I was surprised to find, even in the high and damp region, how exceedingly few they were in number. The forests of Tierra del Fuego are certainly much more barren; but with that exception I never collected in so poor a country. In the lower and sterile land I took seven species of Heteromera, and a few other insects; but in the fine thriving woods towards the centre of the islands, although I perseveringly swept under the bushes during all kinds of weather, I obtained only a few minute Diptera and Hymenoptera. Owing to this scarcity of insects, nearly all the birds live in the lower country; and the part which any one would have thought much the most favourable for them, is frequented only by a few of the small tyrant-flycatchers. I do not believe a single bird, excepting the water-rail, is confined to the damp region. Mr. Waterhouse informs me that nearly all the insects belong to European forms, and that they do not by any means possess an equatorial character. I did not take a single one of large size, or of bright colours. This last observation applies equally to the birds and flowers. It is worthy of remark, that the only land-bird with bright colours, is that species of tyrant-flycatcher, which

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seems to be a wanderer from the continent. Of shells, there are a considerable number of land kinds, all of which, I believe are confined to this archipelago. Even of marine species, a large proportion were not known, before the collection made by Mr. Cuming on these islands was brought to England.

I will not here attempt to come to any definite conclusions, as the species have not been accurately examined; but we may infer, that, with the exception of a few wanderers, the organic beings found on this archipelago are peculiar to it; and yet that their general form strongly partakes of an American character. It would be impossible for any one accustomed to the birds of Chile and La Plata to be placed on these islands, and not to feel convinced that he was, as far as the organic world was concerned, on American ground. This similarity in type, between distant islands and continents, while the species are distinct, has scarcely been sufficiently noticed. The circumstance would be explained, according to the views of some authors, by saying that the creative power had acted according to the same law over a wide area.

It has been mentioned, that the inhabitants can distinguish the tortoises, according to the islands whence they are brought. I was also informed that many of the islands possess trees and plants which do not occur on the others. For instance the berry-bearing tree, called Guyavita, which is common on James Island, certainly is not found on Charles Island, though appearing equally well fitted for it. Unfortunately, I was not aware of these facts till my collection was nearly completed: it never occurred to me, that the productions of islands only a few miles apart, and placed under the same physical conditions, would be dissimilar. I therefore did not attempt to make a series of specimens from the separate islands. It is the fate of every voyager, when he has just discovered what object in any place is more particularly worthy of his attention, to be hurried from it. In the case of the mocking-bird, I ascertained (and have

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brought home the specimens) that one species (*Orpheus trifasciatus*, Gould) is exclusively found in Charles Island; a second (*O. parvulus*) on Albemarle Island; and a third (*O. melanotus*) common to James and Chatham Islands. The two last species are closely allied, but the first would be considered by every naturalist as quite distinct. I examined many specimens in the different islands, and in each the respective kind was *alone* present. These birds agree in general plumage, structure, and habits; so that the different species replace each other in the economy of the different islands. These species are not characterized by the markings on the plumage alone, but likewise by the size and form of the bill, and other differences. I have stated, that in the thirteen species of ground-finches, a nearly perfect gradation may be traced, from a beak extraordinarily thick, to one so fine, that it may be compared to that of a warbler. I very much suspect, that certain members of the series are confined to different islands; therefore, if the collection had been made on any *one* island, it would not have presented so perfect a gradation. It is clear, that if several islands have each their peculiar species of the same genera, when these are placed together, they will have a wide range of character. But there is not space in this work, to enter on this curious subject.

Before concluding my account of the zoology of these islands, I must describe more in detail the tameness of the birds. This disposition is common to all the terrestrial species; namely, to the mocking-birds, the finches, sylvicolæ, tyrant-flycatchers, doves, and hawks. There is not one which will not approach sufficiently near to be killed with a switch, and sometimes, as I have myself tried, with a cap or hat. A gun is here almost superfluous; for with the muzzle of one I pushed a hawk off the branch of a tree. One day a mocking-bird alighted on the edge of a pitcher (made of the shell of a tortoise), which I held in my hand whilst lying down. It began very quietly to sip the water, and allowed me to lift it with the vessel from the ground.

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I often tried, and very nearly succeeded, in catching these birds by their legs. Formerly the birds appear to have been even tamer than at present. Cowley* (in the year 1684) says that the "Turtle-doves were so tame that they would often alight upon our hats and arms, so as that we could take them alive: they not fearing man, until such time as some of our company did fire at them, whereby they were rendered more shy." Dampier† (in the same year) also says that a man in a morning's walk might kill six or seven dozen of these birds. At present, although certainly very tame, they do not alight on people's arms; nor do they suffer themselves to be killed in such numbers. It is surprising that the change has not been greater; for these islands during the last hundred and fifty years, have been frequently visited by bucaniers and whalers; and the sailors, wandering through the woods in search of tortoises, always take delight in knocking down the little birds.

These birds, although much persecuted, do not become wild in a short time: in Charles Island, which had then been colonized about six years, I saw a boy sitting by a well with a switch in his hand, with which he killed the doves and finches as they came to drink. He had already procured a little heap of them for his dinner; and he said he had constantly been in the habit of waiting there for the same purpose. We must conclude that the birds, not having as yet learnt that man is a more dangerous animal than the tortoise, or the amblyrhyncus, disregard us, in the same manner as magpies in England do the cows and horses grazing in the fields.

The Falkland Islands offer a second instance of this disposition among its birds. The extraordinary tameness of the dark-coloured Furnarius has been remarked by Pernety, Lesson, and other voyagers. It is not, however, peculiar to that bird: the Caracara, snipe, upland and lowland

* Cowley's Voyage, p. 10, in Dampier's Collection of Voyages.

† Dampier's Voyage, vol. i., p. 103.

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goose, thrush, Emberiza, and even some true hawks, are all more or less tame. Both hawks and foxes are present; and as the birds are so tame, we may infer that the absence of all rapacious animals at the Galapagos, is not the cause of their tameness there. The geese at the Falklands, by the precaution they take in building on the islets, show that they are aware of their danger from the foxes; but they are not by this rendered wild towards man. This tameness of the birds, especially the waterfowl, is strongly contrasted with the habits of the same species in Tierra del Fuego, where for ages past they have been persecuted by the wild inhabitants. In the Falklands, the sportsman may sometimes kill more of the upland geese in one day, than he is able to carry home; whereas in Tierra del Fuego, it is nearly as difficult to kill one, as it is in England of the common wild species.

In the time of Pernety* (1763), all the birds appear to have been much tamer than at present. Pernety states that the Furnarius would almost perch on his finger; and that with a wand he killed ten in half an hour. At that period, the birds must have been about as tame as they now are at the Galapagos. They appear to have learnt caution more quickly at the Falklands than at the latter place, and they have had proportionate means of experience; for besides frequent visits from vessels, the islands have been at intervals colonized during the whole period.

Even formerly, when all the birds were so tame, by Pernety's account it was impossible to kill the black-necked swan. It is rather an interesting fact, that this is a bird of passage, and therefore brings with it the wisdom learnt in foreign countries.

I have not met with any account of the *land* birds being so tame, in any other quarter of the world, as at the Galapagos and Falkland Islands. And it may be observed that of the few archipelagoes of any size, which when discovered were

* Pernety, Voyage aux Iles Malouines, vol. ii., p. 20.

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uninhabited by man, these two are among the most important. From the foregoing statements we may, I think, conclude; first, that the wildness of birds with regard to man, is a particular instinct directed against *him*, and not dependent on any general degree of caution arising from other sources of danger; secondly, that it is not acquired by them in a short time, even when much persecuted; but that in the course of successive generations it becomes hereditary. With domesticated animals we are accustomed to see instincts becoming hereditary; but with those in a state of nature, it is more rare to discover instances of such acquired knowledge. In regard to the wildness of birds towards men, there is no other way of accounting for it. Few young birds in England have been injured by man, yet all are afraid of him: many individuals, on the other hand, both at the Galapagos and at the Falklands, have been injured, but yet have not learned that salutary dread. We may infer from these facts, what havoc the introduction of any new beast of prey must cause in a country, before the instincts of the aborigines become adapted to the stranger's craft or power.

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CHAPTER XX.

Tahiti—Aspect—Vegetation on the slope of the mountains—View of Eimeo—Excursion in the interior—Profound ravînes—Succession of waterfalls—Number of wild useful plants—Temperance of inhabitants—Their moral state—Parliament convened—New Zealand—Bay of islands—Hippahs—Absence of all government—Excursion to Waimate—Missionary establishment—English weeds now run wild—Waiomio—Funeral service—Sail from New Zealand.

TAHITI AND NEW ZEALAND.

October 20th.—The survey of the Galapagos Archipelago being concluded, a course was steered towards Tahiti; and we commenced our long passage of 3200 miles. In the course of a few days we sailed out of the gloomy and clouded region, which extends during the winter far from the coast of South America. We then enjoyed bright and clear weather, while running pleasantly along at the rate of 150 or 160 miles a day before a steady trade-wind. The temperature in this more central part of the Pacific, is higher than near the American shore. The thermometer in the poop cabin, both by night and day, ranged between 80° and 83°, which to my feelings was quite delightful; but with one degree higher, the effect became oppressive. We passed through the Dangerous or Low Archipelago, and saw several of those most curious rings of land, just rising above the edge of the water, which have been called Lagoon Islands. A long and brilliantly-white beach is capped by a margin of green vegetation; and this strip appears on both hands rapidly to narrow away in the distance, and then sinks beneath the horizon. From the mast-head a wide expanse of smooth water can be seen within the annular margin of land. These low islands bear no proportion to the vast ocean out of which they abruptly rise; and it seems wonderful, that such weak in-

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truders are not overwhelmed, by the all-powerful and never-tiring waves of that great sea, miscalled the Pacific.

November 15th.—At daylight, Tahiti, an island which must for ever remain as classical to the voyager in the South Sea, was in view. At this distance the appearance was not very inviting. The luxuriant vegetation of the lower parts was not discernible, and as the clouds rolled past, the wildest and most precipitous peaks showed themselves towards the centre of the island. As soon as we came to an anchor in Matavai Bay, we were surrounded by canoes. This was our Sunday, but the Monday of Tahiti: if the case had been reversed, we should not have received a single visit; for the injunction not to launch a canoe on the sabbath is rigidly obeyed. After dinner we landed to enjoy all the delights of the first impressions produced by a new country, and that country the charming Tahiti. A crowd of men, women, and children, was collected on the memorable point Venus, ready to receive us with laughing, merry faces. They marshalled us towards the house of Mr. Wilson, the missionary of the district, who met us on the road, and gave us a very friendly reception. After sitting a short time in his house, we separated to walk about, but returned there in the evening.

The land capable of cultivation is scarcely in any part more than a fringe of low alluvial soil, accumulated round the base of the mountains, and protected from the waves of the sea by a coral reef, which encircles at a distance the entire line of coast. The reef is broken in several parts so that ships can pass through, and the lake of smooth water within thus affords a safe harbour, as well as a channel for the native canoes. The low land which comes down to the beach of coral sand, is covered by the most beautiful productions of the intertropical regions. In the midst of bananas, orange, cocoa-nut, and breadfruit trees, spots are cleared where yams, sweet potatoes, sugar-cane, and pine-apples, are cultivated. Even the brushwood is a fruit-tree, namely, the guava, which from its abundance is as noxious

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as a weed. In Brazil I have often admired the contrast of varied beauty in the banana, palm, and orange tree: here we have in addition the bread-fruit, conspicuous from its large, glossy, and deeply digitated leaf. It is admirable to behold groves of a tree, sending forth its branches with the force of an English oak, loaded with large and most nutritious fruit. However little on most occasions utility explains the delight received from any fine prospect, in this case it cannot fail to enter as an element in the feeling. The little winding paths, cool from the surrounding shade, led to the scattered houses; and the owners of these every where gave us a cheerful and most hospitable reception.

I was pleased with nothing so much as with the inhabitants. There is a mildness in the expression of their countenances, which at once banishes the idea of a savage; and an intelligence, which shows they are advancing in civilization. Their dress is as yet incongruous; no settled costume having taken the place of the ancient one. But even in its present state, it is far from being so ridiculous as it has been described by travellers of a few years' standing. Those who can afford it wear a white shirt, and sometimes a jacket, with a wrapper of coloured cotton round their middles; thus making a short petticoat, like the chilipa of the Gauchos. This dress appears so general with the chiefs, that it will probably become the settled fashion. No one, even to the queen, wears shoes or stockings; and only the chiefs have a straw hat on their heads. The common people, when working, keep the upper part of their bodies uncovered; and it is then that the Tahitians are seen to advantage. They are very tall, broad-shouldered, athletic, and with well-proportioned limbs. It has been somewhere remarked, that it requires little habit to make a darker tint of the skin more pleasing and natural, even to the eye of an European, than his own colour. To see a white man bathing by the side of a Tahitian, was like comparing a plant bleached by the gardener's art, with one growing in the open fields. Most of the men are tattooed; and the orna-

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ments follow the curvature of the body so gracefully, that they have a very pleasing and elegant effect. One common figure, varying only in its detail, branches somewhat like a tuft of palm-leaves* from the line of the backbone, and curls round each side. The simile may be a fanciful one, but I thought the body of a man thus ornamented, was like the trunk of a noble tree embraced by a delicate creeper.

Many of the older people had their feet covered with small figures, placed in order so as to resemble a sock. This fashion, however, is partly gone by, and has been succeeded by others. Here, although each man must for ever abide by the whim which reigned in his early days, yet fashion is far from immutable. An old man has thus his age for ever stamped on his body, and he cannot assume the airs of a young dandy. The women are also tattooed in the same manner as the men, and very commonly on their fingers. An unbecoming fashion in one respect is now almost universal: it is that of cutting the hair, or rather shaving it, from the upper part of the head, in a circular form, so as to leave only an outer ring of hair. The missionaries have tried to persuade the people to change this habit: but it is the fashion, and that is sufficient answer at Tahiti as well as at Paris. I was much disappointed in the personal appearance of the women; they are far inferior in every respect to the men. The custom of wearing a flower in the back of the head, or through a small hole in each ear, is pretty; the flower is generally either white or scarlet, and like the Camelia Japonica. They wear also a sort of crown of woven cocoa-nut leaves, as a shade to their eyes. The women appear to be in greater want of some becoming costume, even than the men.

Nearly all understand a little English;—that is, they know the names of common things, and by the aid of this,

* The similarity is not closer than between the capital of a Corinthian column and a tuft of acanthus.

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together with signs, a lame sort of conversation could be carried on. In returning in the evening to the boat, we stopped to witness a very pretty scene; numbers of children were playing on the beach, and had lighted bonfires, which illuminated the placid sea and surrounding trees. Others, in circles, were singing Tahitian verses. We seated ourselves on the sand, and joined their party. The songs were impromptu, and I believe related to our arrival: one little girl sang a line, which the rest took up in parts, forming a very pretty chorus. The whole scene made us unequivocally aware that we were seated on the shores of an island in the South Sea.

November 17th.—This day is reckoned in the log-book as Tuesday the 17th instead of Monday the 16th, owing to our, so far successful, chase of the sun. Before breakfast the ship was hemmed in by a flotilla of canoes, and when the natives were allowed to come on board, I suppose their numbers could not have been under two hundred. It was the opinion of every one, that it would have been difficult to have picked out an equal number from any other nation, who would have given so little trouble. Every body brought something for sale: shells were the main article of trade. The Tahitians now fully understand the value of money, and prefer it to old clothes or other articles. The various coins, however, of English and Spanish denomination puzzle them, and they never seemed to think the small silver quite secure until changed into dollars. Some of the chiefs have accumulated considerable sums of money. One not long since offered eight hundred dollars (about 160 pounds sterling) for a small vessel; and frequently they purchase whale-boats and horses, at the rate of from fifty to a hundred dollars.

After breakfast I went on shore, and ascended the slope of the nearest part of the mountain, to an elevation between two and three thousand feet. The form of the land is rather singular, and may be understood by explaining its hypothetical origin. I believe the interior mountains once

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stood as a smaller island in the sea; and that around their steep flanks, streams of lava and beds of sediment were accumulated under water, in a conical mass. This, after being raised, has been cut by numerous profound ravines, which all diverge from the common centre; the intervening ridges being flat-topped, and belonging to one slope. Having crossed the narrow girt of inhabited and fertile land, I followed the line of one of these ridges; having on each hand, very steep and smooth-sided valleys. The vegetation is singular, consisting almost exclusively of small dwarf ferns, which, higher up, are mingled with coarse grass. The appearance was not very dissimilar from that on some of the Welsh hills; and this being so close above the orchard of tropical plants on the coast, was very surprising. At the highest point which I reached, trees again appeared. Of these three zones of comparative luxuriance, the lower one owes its moisture, and therefore fertility, to its extreme flatness; for being scarcely raised above the level of the sea, the water, which it receives from the higher land, drains away slowly. The upper zone extends into a moister atmosphere; whilst the intermediate part, not being benefited by either of these advantages, is barren. The wood in the upper part was very pretty; tree-ferns having replaced the cocoa-nuts of the coast. It must not, however, be supposed that these woods at all equal the forests of Brazil. In an island, that vast number of productions which characterizes a continent, cannot be expected to occur.

From the point which I attained, there was a good view of the distant island of Eimeo, dependant on the same sovereign with Tahiti. On the lofty and broken pinnacles, white massive clouds were piled up, which formed an island in the blue sky, as Eimeo itself did in the blue ocean. The island, with the exception of one small gateway is completely encircled by a reef. At this distance, a narrow but well-defined line of brilliant white was alone visible, where the waves first encountered the wall of coral. The glassy water of the lagoon was included within this line;

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and out of it the mountains rose abruptly. The effect was very pleasing, and might aptly be compared to a framed engraving, where the frame represented the breakers, the marginal paper the lagoon, and the drawing the island itself. When in the evening I descended from the mountain, a man, whom I had pleased with a trifling gift, met me, bringing with him hot roasted bananas, a pine-apple, and cocoa-nuts. After having walked under a burning sun, I do not know any thing more delicious than the milk of a young cocoa-nut. Pine-apples are here so abundant, that the people eat them in the same wasteful manner as we might turnips. They are of an excellent flavour,—perhaps even better than those cultivated in England; and this I believe is the highest compliment which can be paid to a fruit, or indeed to any thing else. Before going on board I went to Mr. Wilson, who interpreted to the Tahitian, who had paid me so adroit an attention, that I wanted him and another man to accompany me on a short excursion into the mountains.

November 18th.—In the morning I came on shore early, bringing with me some provisions in a bag, and two blankets for myself and servant. These were lashed to each end of a pole, and thus carried by my Tahitian companions: from custom these men are able to walk for a whole day, with as much as fifty pounds at each end. I told my guides to provide themselves with food and clothing: but for the latter, they said their skins were sufficient, and for the former, that there was plenty of food in the mountains. The line of march was the valley of Tia-auru, in which the river flows that enters the sea by Point Venus. This is one of the principal streams in the island, and its source lies at the base of the loftiest pinnacles, which attain the elevation of about 7000 feet. The whole island may be considered as one group of mountains, so that the only way to penetrate the interior is to follow up the valleys. Our road, at first, lay through the wood which bordered each side of the river; and the glimpses

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of the lofty central peaks, seen as through an avenue, with here and there a waving cocoa-nut tree on one side, were extremely picturesque. The valley soon began to narrow, and the sides to grow lofty and more precipitous. After having walked between three and four hours, we found the width of the ravine scarcely exceeded that of the bed of the stream. On each hand the walls were nearly vertical; yet from the soft nature of the volcanic strata, trees and a rank vegetation sprung from every projecting ledge. These precipices must have been some thousand feet high: and the whole formed a mountain gorge, far more magnificent than any thing which I had ever before beheld. Until the mid-day sun stood vertically over the ravine, the air had felt cool and damp, but now it became very sultry. Shaded by a ledge of rock, beneath a façade of columnar lava, we ate our dinner. My guides had already procured a dish of small fish and fresh-water prawns. They carried with them a small net stretched on a hoop; and where the water was deep and in eddies, they dived, and like otters, by their eyesight followed the fish into holes and corners, and thus secured them.

The Tahitians have the dexterity of amphibious animals in the water. An anecdote mentioned by Ellis shows how much they feel at home in that element. When a horse was landing for Pomarre in 1817, the slings broke, and it fell into the water: immediately the natives jumped overboard, and by their cries and vain efforts at assistance, almost drowned the animal. As soon, however, as it reached the shore, the whole population took to flight, and tried to hide themselves from the man-carrying-pig, as they christened the horse.

A little higher up, the river divided itself into three little streams. The two northern ones were impracticable, owing to a succession of waterfalls, which descended from the jagged summit of the highest mountain; the other to all appearance was equally inaccessible, but we managed to ascend it by a most extraordinary road. The sides of

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the valley were here nearly precipitous; but, as frequently happens with stratified rocks, small ledges projected, which were thickly covered by wild bananas, liliaceous plants, and other luxuriant productions of the tropics. The Tahitians, by climbing amongst these ledges, searching for fruit, had discovered a track by which the whole precipice could be scaled. The first ascent from the valley was very dangerous: for it was necessary to pass the face of a naked rock, by the aid of ropes, which we brought with us. How any person discovered that this formidable spot was the only point where the side of the mountain was practicable, I cannot imagine. We then cautiously walked along one of the ledges, till we came to the stream already alluded to. This ledge formed a flat spot, above which a beautiful cascade, of some hundred feet, poured down its waters, and beneath it another high one emptied itself into the main stream. From this cool and shady recess, we made a circuit to avoid the overhanging cascade. As before, we followed little projecting ledges, the apparent danger being partly hidden by the thickness of the vegetation. In passing from one of the ledges to another, there was a vertical wall of rock. One of the Tahitians, a fine active man, placed the trunk of a tree against this, climbed up it, and then by the aid of crevices reached the summit. He fixed the ropes to a projecting point, and lowered them for us, then hauled up a dog which accompanied us, and lastly our luggage. Beneath the ledge on which the dead tree was placed the precipice must have been five or six hundred feet deep; and if the abyss had not been partly concealed by the overhanging ferns and lilies, my head would have turned giddy, and nothing should have induced me to have attempted it. We continued to ascend sometimes along ledges, and sometimes along knife-edged ridges, having on each hand profound ravines. In the Cordillera, I have seen mountains on a far grander scale, but for abruptness, no part of them at all comparable to this. In the evening we reached a flat little spot on the banks of the same stream,

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which I have mentioned as descending by a chain of waterfalls. Here we bivouacked for the night. On each side of the ravine there were great beds of the Feyé, or mountain-banana, covered with ripe fruit. Many of these plants were from twenty to twenty-five feet high, and from three to four in circumference. By the aid of strips of bark for twine, the stems of bamboos for rafters, and the large leaf of the banana for a thatch, the Tahitians in a few minutes built an excellent house; and with the withered leaves made a soft bed.

They then proceeded to make a fire, and cook our evening meal. A light was procured by rubbing a blunt-pointed stick in a groove made in another (as if with the intention of deepening it), until by friction the dust became ignited. A peculiarly white and very light wood (the *Hibiscus tiliaceus*) is alone used for this purpose: it is the same which serves for poles to carry any burden, and for the floating outrigger to steady the canoe. The fire was produced in a few seconds: but, to a person who does not understand the art, it requires the greatest exertion; as I found, before at last, to my great pride, I succeeded in igniting the dust. The Gaucho in the Pampas uses a different method: taking an elastic stick about eighteen inches long, he presses one end on his breast, and the other (which is pointed) in a hole in a piece of wood, and then rapidly turns the curved part, like a carpenter's centre-bit. The Tahitians having made a small fire of sticks, placed a score of stones, of about the size of cricket-balls, on the burning wood. In about ten minutes' time the sticks were consumed and the stones hot. They had previously folded up in small parcels of leaves, pieces of beef, fish, ripe and unripe bananas, and the tops of the wild arum. These green parcels were laid in a layer between two layers of the hot stones, and the whole then covered up with earth, so that no smoke or steam could escape. In about a quarter of an hour, the whole was most deliciously cooked. The choice green parcels were now laid on a cloth of banana-

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leaves, and with a cocoa-nut shell we drank the cool water of the running stream; and thus we enjoyed our rustic meal.

I could not look on the surrounding plants without admiration. On every side were forests of banana; the fruit of which, though serving for food in various ways, lay in heaps decaying on the ground. In front of us there was an extensive brake of wild sugar-cane; and the stream was shaded by the dark green knotted stem of the Ava,—so famous in former days for its powerful intoxicating effects. I chewed a piece, and found that it had an acrid and unpleasant taste, which would have induced any one at once to have pronounced it poisonous. Thanks be to the missionaries, this plant now thrives only in these deep ravines, innocuous to every one. Close by I saw the wild arum, the roots of which, when well baked, are good to eat, and the young leaves better than spinach. There was the wild yam, and a liliaceous plant called Ti, which grows in abundance, and has a soft brown root, in shape and size like a huge log of wood. This served us for dessert, for it is as sweet as treacle, and with a pleasant taste. There were, moreover, several other wild fruits, and useful vegetables. The little stream, besides its cool water, produced eels and cray-fish. I did indeed admire this scene, when I compared it with an uncultivated one in the temperate zones. I felt the force of the observation, that man, at least savage man, with his reasoning powers only partly developed, is the child of the tropics.

As the evening drew to a close, I strolled beneath the gloomy shade of the bananas up the course of the stream. My walk was soon brought to a close, by coming to a waterfall between two and three hundred feet high; and again above this there was another. I mention all these waterfalls in this one brook, to give a general idea of the inclination of the land. In the little recess where the water fell, it did not appear that a breath of wind had ever entered. The leaves of the banana, damp with spray, possessed an unbroken edge,

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instead of being split, as generally is the case, into a thousand shreds. From our position, almost suspended on the mountain-side, there were glimpses into the depths of the neighbouring valleys; and the lofty points of the central mountains, towering up within sixty degrees of the zenith, hid half the evening sky. Thus seated, it was a sublime spectacle to watch the shades of night gradually obscuring the last and highest pinnacles.

Before we laid ourselves down to sleep, the elder Tahitian fell on his knees, and with closed eyes repeated a long prayer in his native tongue. He prayed as a Christian should do, with fitting reverence, and without the fear of ridicule or any ostentation of piety. At our meals neither of the men would taste food, without saying beforehand a short grace. Those travellers, who think that a Tahitian prays only when the eyes of the missionary are fixed on him, should have slept with us that night on the mountain-side. Before morning it rained very heavily; but the good thatch of banana-leaves kept us dry.

November 19th.—At daylight my friends, after their morning prayer, prepared an excellent breakfast in the same manner as in the evening. They themselves certainly partook of it largely; indeed I never saw any men eat nearly so much. I should suppose such capacious stomachs must be the result of a large part of their diet consisting of fruit and vegetables, which contain, in a given bulk, a comparatively small portion of nutriment. Unwittingly, I was the means of my companions breaking (as I afterwards learned) one of their own laws and resolutions. I took with me a flask of spirits, which they could not resolve to refuse; but as often as they drank a little, they put their fingers before their mouths, and uttered the word "Missionary." About two years ago, although the use of the ava was prevented, drunkenness from the introduction of spirits became very prevalent. The missionaries prevailed on a few good men, who saw their country rapidly going to ruin, to join with them in a Temperance Society. From good sense or shame all the chiefs and the

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queen were at last persuaded to join it. Immediately a law was passed, that no spirits should be allowed to be introduced into the island, and that he who sold and he who bought the forbidden article, should be punished by a fine. With remarkable justice, a certain period was allowed for stock in hand to be sold, before the law came into effect. But when it did, a general search was made in which even the houses of the missionaries were not exempted, and all the ava (as the natives call all ardent spirits) was poured on the ground. When one reflects on the effect of intemperance on the aborigines of the two Americas, I think it will be acknowledged, that every well-wisher of Tahiti owes no common debt of gratitude to the missionaries. As long as the little island of St. Helena remained under the government of the East India Company, spirits, owing to the great injury they had produced, were not allowed to be imported; but wine was supplied from the Cape of Good Hope. It is rather a striking, and not very gratifying fact, that in the same year that spirits were allowed to be sold on that island, their use was banished from Tahiti by the free will of the people.

After breakfast we proceeded on our journey. As my object was merely to see a little of the interior scenery, we returned by another track, which descended into the main valley lower down. For some distance we wound, by a most intricate path, along the side of the mountain which formed the valley. In the less precipitous parts we passed through extensive groves of the wild banana. The Tahitians, with their naked, tattooed bodies, their heads ornamented with flowers, and seen in the dark shade of the woods, would have formed a fine picture of man, inhabiting some primeval forest. In our descent we followed the line of ridges; these were exceedingly narrow, and for considerable lengths steep as a ladder; but all clothed with vegetation. The extreme care necessary in poising each step rendered the walk fatiguing. I am never weary of expressing my astonishment at these ravines and precipices: the mountains may almost be described, as rent by so many crevices. When

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viewing the surrounding country from the knife-edged ridges, the point of support was so small, that the effect was nearly the same, I should think, as from a balloon. In this descent we had occasion to use the ropes only once, at the point where we entered the main valley. We slept under the same ledge of rock, where, the day before, we had dined: the night was fine, but from the depth and narrowness of the gorge, profoundly dark.

Before actually seeing this country, I had difficulty in understanding two facts mentioned by Ellis; namely, that after the murderous battles of former times, the survivors on the conquered side retired into the mountains, where a handful of men could resist a multitude. Certainly half-a-dozen men, at the spot where the Tahitian reared the old tree, could easily have repulsed thousands. Secondly, that after the introduction of Christianity, there were wild men who lived in the mountains, and whose retreats were unknown to the more civilized inhabitants.

November 20th.—In the morning we started early, and reached Matavai at noon. On the road we met a large party of noble athletic men, going for wild bananas. I found that the ship, on account of the difficulty in watering, had moved to the harbour of Papawa, to which place I immediately walked. This is a very pretty spot. The cove is surrounded by reefs, and the water as smooth as that in a lake. The cultivated ground, with all its beautiful productions, and the cottages, comes close down to the water's edge.

From the varying accounts which I had read before reaching these islands, I was very anxious to form, from my own observation, a judgment of their moral state—although such judgment would necessarily be very imperfect. A first impression at all times very much depends on one's previously-acquired ideas. My notions were drawn from Ellis's "Polynesian Researches"—an admirable and most interesting work, but naturally looking at every thing under a favourable point of view; from Beechey's Voyage; and

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from that of Kotzebue, which is strongly adverse to the whole missionary system. He who compares these three accounts, will, I think, form a tolerably accurate conception of the present state of Tahiti. One of my impressions, which I took from the two last authorities, was decidedly incorrect; viz., that the Tahitians had become a gloomy race, and lived in fear of the missionaries. Of the latter feeling I saw no trace, unless, indeed, fear and respect be confounded under one name. Instead of discontent being a common feeling, it would be difficult in Europe to pick out of a crowd half so many merry and happy faces. The prohibition of the flute and dancing is inveighed against as wrong and foolish;—the more than presbyterian manner of keeping the sabbath, is looked at in a similar light. On these points I will not pretend to offer any opinion in opposition to men who have resided as many years as I was days on the island.

On the whole it appears to me, that the morality and religion of the inhabitants is highly creditable. There are many who attack, even more acrimoniously than Kotzebue, both the missionaries, their system, and the effects produced by it. Such reasoners never compare the present state with that of the island only twenty years ago; nor even with that of Europe at this day; but they compare it with the high standard of Gospel perfection. They expect the missionaries to effect that, which the Apostles themselves failed to do. In as much as the condition of the people falls short of this high order, blame is attached to the missionary, instead of credit for that which he has effected. They forget, or will not remember, that human sacrifices, and the power of an idolatrous priesthood—a system of profligacy unparalleled in the world, and infanticide a consequence on that system—bloody wars, where the conquerors spared neither women nor children — that all these have been abolished; and that dishonesty, intemperance, and licentiousness have been greatly reduced by the introduction of Christianity. In a voyager to forget these things is base ingratitude; for should he chance to be at the point of shipwreck on some unknown

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coast, he will most devoutly pray that the lesson of the missionary may be found to have extended thus far.

In point of morality the virtue of the women, it has been often said, is most open to exception. But before they are blamed too severely, it will be well distinctly to call to mind the scenes described by Captain Cook and Mr. Banks, in which the grandmothers and mothers of the present race played a part. Those who are most severe, should consider how much of the morality of the women in Europe is owing to the system early impressed by mothers on their daughters, and how much in each individual case to the precepts of religion. But it is useless to argue against such reasoners:—I believe that disappointed in not finding the field of licentiousness quite so open as formerly, they will not give credit to a morality which they do not wish to practice, or to a religion which they undervalue, if not despise.

Sunday 22d.—The harbour of Papiete, which may be considered as the capital of the island, is about seven miles distant from Matavai, to which point the Beagle had returned. The queen resides there, and it is the seat of government, and the chief resort of shipping. Captain FitzRoy took a party there to hear divine service, first in the Tahitian language, and afterwards in our own. Mr. Pritchard, the leading missionary in the island, performed the service, which was a most interesting spectacle. The chapel consisted of a large airy framework of wood; and it was filled to excess by tidy, clean people, of all ages and both sexes. I was rather disappointed in the apparent degree of attention; but I believe my expectations were raised too high. At all events the appearance was quite equal to that in a country church in England. The singing of the hymns was decidedly very pleasing; but the language from the pulpit, although fluently delivered, did not sound well. A constant repetition of words, like "*tata ta, mata mai,*" rendered it monotonous. After English service, a party returned on foot to Matavai. It was a pleasant walk, sometimes along the sea-beach and sometimes under the shade of the many beautiful trees.

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About two years ago, a small vessel under English colours was plundered by the inhabitants of the Low Islands, which were then under the dominion of the Queen of Tahiti. It was believed that the perpetrators were instigated to this act by some indiscreet laws issued by her majesty. The British government demanded compensation; which was acceded to, and a sum of nearly three thousand dollars was agreed to be paid on the first of last September. The commodore at Lima ordered Captain FitzRoy, to inquire concerning this debt, and to demand satisfaction if it were not paid. Captain FitzRoy accordingly requested an interview with the queen: and a parliament was held to consider the question; at which all the principal chiefs of the island and the queen were assembled. I will not attempt to describe what took place, after the interesting account given by Captain FitzRoy. The money it appeared had not been paid. Perhaps the alleged reasons for the failure were rather equivocating: but otherwise I cannot sufficiently express our general surprise, at the extreme good sense, the reasoning powers, moderation, candour, and prompt resolution, which were displayed on all sides. I believe every one of us left the meeting with a very different opinion of the Tahitians, from that which we entertained when entering. The chiefs and people resolved to subscribe and complete the sum which was wanting: Captain FitzRoy urged that it was hard that their private property should be sacrificed for the crimes of distant islanders. They replied, that they were grateful for his consideration, but that Pomarre was their Queen, and they were determined to help her in this her difficulty. This resolution and its prompt execution (for a book was opened early the next morning), made a perfect conclusion to this very remarkable scene of loyalty and good feeling.

After the main discussion was ended, several of the chiefs took the opportunity of asking Captain FitzRoy many intelligent questions, concerning international customs and laws. These related to the treatment of ships and foreigners. On

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some points, as soon as the decision was made, the law was issued verbally on the spot. This Tahitian parliament lasted for several hours; and when it was over Captain FitzRoy invited the queen to pay the Beagle a visit.

NOVEMBER 26TH.—In the evening, with a gentle land-breeze, a course was steered for New Zealand, and as the sun set we took a farewell look at the mountains of Tahiti,—the island to which every voyager has offered up his tribute of admiration.

DECEMBER 19TH.—In the evening we saw New Zealand in the distance. We may now consider ourselves as having nearly crossed the Pacific ocean It is necessary to sail over this great sea to understand its immensity. Moving quickly onwards for weeks together we meet with nothing, but the same blue, profoundly deep, ocean. Even within the Archipelagoes, the islands are mere specks, and far distant one from the other. Accustomed to look at maps, drawn on a small scale, where dots, shading, and names are crowded together, we do not judge rightly how infinitely small the proportion of dry land is to the water of this great sea. The meridian of the Antipodes likewise has now been passed; and every league, thanks to our good fortune, which we travel onwards, is one league nearer to England. These Antipodes call to mind old recollections of childish doubt and wonder. Only the other day, I looked forward to this airy barrier, as a definite point in our voyage homewards; but now I find it, and all such resting-places for the imagination, are like shadows which a man moving onwards cannot catch. A gale of wind, which lasted for some days, has lately given us time and inclination to measure the future stages in our long voyage, and to wish most earnestly for its termination.

DECEMBER 21ST.—Early in the morning we entered the Bay of Islands, and being becalmed for some hours near the mouth, we did not reach the anchorage till the middle of the day. The country is hilly, but with a smooth outline; and it is deeply intersected by numerous arms, extending from the bay. The surface appears from a distance, as if clothed

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with coarse pasture, but this in truth is nothing but fern. On the more distant hills, as well as in patches in some of the valleys, there is a good deal of wood-land. The general tint of the landscape is not a bright green; and it resembles the country a short distance to the southward of Concepcion in Chile. In several parts of the bay, little villages of square tidy-looking houses were scattered close down to the water's edge. Three whaling ships were lying at anchor; but with the exception of these, and of a few canoes, now and then crossing from one shore to the other, an air of extreme quietness reigned over the whole district. Only a single canoe came alongside. This, and the aspect of the whole scene, afforded a remarkable, and not very pleasing contrast, with our joyful and boisterous welcome at Tahiti.

In the afternoon we went on shore to one of the larger groups of houses, which yet hardly deserves the title of a village. Its name is Pahia: it is the residence of the missionaries; and with the exception of their servants and labourers, there are no native residents. In the vicinity of the Bay of Islands, the number of Englishmen, including their families, amounts to between two and three hundred. All the cottages, many of which are white washed, and look as I have said very neat, are the property of the English. The hovels of the natives are so diminutive and paltry, that they can scarcely be perceived from any distance. At Pahia, it was quite pleasing to behold the English flowers in the platforms before the houses; there were roses of several kinds, honeysuckle, jasmine, stocks, and whole hedges of sweetbriar.

DECEMBER 22D.—In the morning I went out walking; but I soon found, that the country was very impracticable. All the hills are thickly covered by tall fern, together with a low bush which grows like a cypress; and very little ground has been cleared or cultivated in this neighbourhood. I then tried the sea-beach; but proceeding towards either hand, my walk was soon stopped short, by creeks and deep streams of fresh water. The communication between the inhabitants

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of the different parts of the bay, is (as in Chiloe) almost entirely kept up by boats. I was surprised to find that almost every hill, which I ascended, had been at some former time more or less fortified. The summits were cut into steps or successive terraces, and they had been frequently protected by deep trenches. I afterwards observed that the principal hills inland, in like manner showed an artificial outline. These are the Pas, so frequently mentioned by Captain Cook under the name of "hippah"; the difference of sound being owing to the prefixed article.

That the Pas had formerly been used, was evident from the piles of shells, and the pits in which, as I was informed, sweet potatoes were kept as reserved provisions. As there was no water on these hills, the defenders could never have anticipated a long siege, but only a hurried attack for plunder; under which circumstances the successive terraces would have afforded good protection. The general introduction of fire-arms has changed the whole system of warfare; and an exposed situation on the top of a hill would now be worse than useless. The Pas in consequence, is at the present day, always built on a level piece of ground. It consists of a double stockade of thick and tall posts, placed in a zigzag line, so that every part can be flanked. Within the stockade a mound of earth is thrown up, behind which the defenders can rest in safety, or use their fire-arms over it. On the level of the ground, little archways sometimes pass through this breastwork, by which means the defenders can crawl out to the stockade, to reconnoitre their enemies. The Rev. W. Williams, who gave me this account, added, that in one Pas he had noticed spurs or buttresses projecting from the inside of the mound of earth. On asking the chief the use of them, he replied, that if two or three of his men should be shot their neighbours would not see the bodies, and so be discouraged.

These Pases are considered by the New Zealanders as very perfect means of defence: for the attacking force is never so well disciplined as to rush in a body to the stockade, cut

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it down, and effect their entry. When a tribe goes to war, the chief cannot order one party to go here, and another there; but every man fights in the manner which best pleases himself; and for individuals to approach a stockade defended by fire-arms, must appear certain death. I should think a more warlike race of inhabitants could not be found in any part of the world, than the New Zealanders. Their conduct on first seeing a ship, as described by Captain Cook, strongly illustrates this: the act of throwing volleys of stones at so great and novel an object, and their defiance, of "Come on shore and we will kill and eat you all," shows uncommon boldness. This warlike spirit is evident in many of their customs, and even in their smallest actions. If a New Zealander is struck, although but in joke, the blow must be returned; and of this I saw an instance with one of our officers.

At the present day, from the progress of civilization, there is much less warfare. When Europeans first traded here, muskets and ammunition far exceeded in value any other article: now they are in little request, and are indeed often offered for sale. Among some of the southern tribes, however, there is still much hostility. I heard a characteristic anecdote of what took place there some time ago. A missionary found a chief and his tribe in preparation for war;—their muskets clean and bright, and their ammunition ready. He reasoned long on the inutility of the war, and the little provocation which had been given for it. The chief was much shaken in his resolution, and seemed in doubt: but at length it occurred to him, that a barrel of his gunpowder was in a bad state, and that it would not keep much longer. This was brought forward as an unanswerable argument for the necessity of immediately declaring war: the idea of allowing so much good gunpowder to spoil was not to be thought of; and this settled the point.

I was told by the missionaries, that in the life of Shongi, the chief who visited England, the love of war was the one and lasting spring of every action. The tribe in which he

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was a principal chief, had at one time been much oppressed, by another from the Thames river. A solemn oath was taken by the men, that when their boys should grow up, and they should be powerful enough, they would never forget or forgive these injuries. To fulfil this appears to have been Shongi's chief motive for going to England; and when there it was his sole object. Presents were valued only as they could be converted into arms; of the arts, those alone were interesting, which were concerned with the manufacture of arms. When at Sydney, Shongi, by a strange coincidence, met the hostile chief of the Thames river at the house of Mr. Marsden: their conduct was civil to each other; but Shongi told him, that when again in New Zealand he would never cease to carry war into his country. The challenge was accepted; and Shongi on his return fulfilled the threat to the utmost letter. The tribe on the Thames river was utterly overthrown, and the chief to whom the challenge had been given, was himself killed. Shongi, although harbouring such deep feelings of hatred and revenge, is described as having been a goodnatured person.

In the evening I went with Captain FitzRoy, and Mr. Baker, one of the missionaries, to pay a visit to Kororadika. This is the largest village, and will one day, no doubt increase till it becomes the chief town: besides a considerable native population, there are many English residents. These latter are men of the most worthless character: and among them are many runaway convicts from New South Wales. There are many spirit-shops; and the whole population is addicted to drunkenness and all kinds of vice. As this is the capital, a person would be inclined to form his opinion of the New Zealanders from what he here saw; but in this case his estimate of their character would be too low. This little village is the very stronghold of vice. Although many tribes in other parts have embraced Christianity, here the greater part yet remain in heathenism. In such places the missionaries are held in little esteem: but they complain far more of the conduct of their countrymen, than of that of the natives. It is strange,

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but I have heard these worthy men say, that the only protection which they need, and on which they rely, is from the native chiefs against Englishmen.

We wandered about the village, and saw and conversed with many of the people, both men, women, and children. Looking at the New Zealander, one naturally compares him with the Tahitian; both belonging to the same family of mankind. The comparison, however, tells heavily against the New Zealander. He may, perhaps, be superior in energy, but in every other respect, his character is of a much lower order. One glance at their respective expressions, brings conviction to the mind, that one is a savage, the other a civilized man. It would be vain to seek in the whole of New Zealand, a person with the face and mien of the old Tahitian chief, Utamme. No doubt the extraordinary manner in which tattooing is here practised, gives a disagreeable expression to their countenances. The complicated but symmetrical figures covering the whole face, puzzle and mislead an unaccustomed eye: it is moreover probable, that the deep incisions, by destroying the play of the superficial muscles, give an air of rigid inflexibility. But besides this, there is a twinkling in the eye, which cannot indicate any thing but cunning and ferocity. Their figures are tall and bulky; but in elegance are not comparable with those of the working classes in Tahiti.

Both their persons and houses are filthily dirty and offensive: the idea of washing either their bodies or their clothes never seems to enter their heads. I saw a chief, who was wearing a shirt black and matted with filth; and when asked how it came to be so dirty, he replied, with surprise, "Do not you see it is an old one?" Some of the men have shirts; but the common dress is one or two large blankets, generally black with dirt, which are thrown over their shoulders in a very inconvenient and awkward fashion. A few of the principal chiefs have decent suits of English clothes; but these are only worn on great occasions.

Considering the number of foreigners residing in New

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Zealand, and the amount of commerce carried on there, the state of government of the country is most remarkable. It is, however, incorrect to use the term government, where absolutely no such thing exists. The land is divided, by well-determined boundaries, between various tribes, independent of each other. The individuals in each tribe consist of freemen, and slaves taken in war; and the land is common to all the free born; that is, each may occupy and till any part that is vacant. In a sale, therefore, of land, every such person must receive part payment. Among the freemen, there will always be some one, who from riches, from talents, or from descent from some noted character, will take the lead; and in this respect he may be considered as the chief. But if the united tribe should be asked, who was their chief, no one would be acknowledged. Without doubt, in many cases, individuals have obtained great influence; but as far as I can understand the system, their power is not legitimate. Even the authority of a master over his slave, or a parent over his child, appears to be regulated by no kind of ordinary custom. Proper laws of course are quite unknown: certain lines of action are generally considered right, and others wrong: if such customs are infringed, the injured person and his tribe, if they have power, seek retribution; if not, they treasure up the recollection of the injury till the day of revenge arrives. If the state in which the Fuegians live should be fixed at zero in the scale of government, I am afraid New Zealand would rank but a few degrees higher; while Tahiti, even when first discovered, would have occupied a respectable position.

December 23d.—At a place called Waimate, about fifteen miles from the Bay of Islands, and midway between the eastern and western coasts, the missionaries have purchased some land for agricultural purposes. I had been introduced to the Rev. W. Williams, who, upon my expressing the wish, invited me to pay him a visit there. Mr. Bushby, the British Resident, offered to take me in his boat by a creek, where I should see a pretty waterfall, and by which means my

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walk would be shortened. He likewise procured for me a guide. Upon asking a neighbouring chief to recommend a man, the chief himself offered to go; but his ignorance of the value of money was so complete, that at first he asked how many pounds I would give him; but, afterwards was well contented with two dollars. When I showed the chief a very small bundle, which I wanted carried, it became absolutely necessary to take a slave for that purpose. These feelings of pride are beginning to wear away; but formerly a leading man would sooner have died than undergone the indignity of carrying the smallest burden. My companion was a light active man, dressed in a dirty blanket, and with his face completely tattooed. He had formerly been a great warrior. He appeared to be on very cordial terms with Mr. Bushby; but at various times they had quarrelled violently. Mr. Bushby remarked that a little quiet irony would frequently silence any one of these natives in their most blustering moments. This chief has come and harangued Mr. Bushby in a hectoring manner, saying, "A great chief, a great man, a friend of mine, has come to pay me a visit—you must give him something good to eat, some fine presents, &c." Mr. Bushby has allowed him to finish his discourse, and then has quietly replied by some such answer as, "What else shall your slave do for you?" The man would then instantly, with a very comical expression, cease his braggadocio.

Some time ago, Mr. Bushby suffered a far more serious attack. A chief and a party of men tried to break into his house in the middle of the night, and not finding this so easy, commenced a brisk firing with their muskets. Mr. Bushby was slightly wounded; but the party was at length driven away. Shortly afterwards it was discovered who was the aggressor; and a general meeting of the chiefs was convened to consider the case. It was considered by the New Zealanders as very atrocious, inasmuch as it was a night attack, and that Mrs. Bushby was lying ill in the house: this latter circumstance, much to their honour, being con-

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sidered in all cases as a protection. The chiefs agreed to confiscate the land of the aggressor to the King of England. The whole proceeding, however, in thus trying and punishing a chief was entirely without precedent. The aggressor, moreover, lost cast in the estimation of his equals; and this was considered by the British as of more consequence, than the confiscation of his land.

As the boat was shoving off, a second chief stepped into her, who only wanted the amusement of the passage up and down the creek. I never saw a more horrid and ferocious expression, than this man had. It immediately struck me, I had somewhere seen his likeness: it will be found in Retzsch's outlines to Schiller's ballad of Fridolin, where two men are pushing Robert into the burning iron furnace. It is the man who has his arm on Robert's breast. Physiognomy here spoke the truth; this chief had been a notorious murderer, and was to boot an arrant coward. At the point where the boat landed, Mr. Bushby accompanied me a few hundred yards on the road: I could not help admiring the cool impudence of the hoary old villain, whom we left lying in the boat, when he shouted to Mr. Bushby, "Do not you stay long, I shall be tired of waiting here."

We now commenced our walk. The road lay along a well-beaten path, bordered on each side by the tall fern, which covers the whole country. After travelling some miles, we came to a little country village, where a few hovels were collected together, and some patches of ground cultivated for potato crops. The introduction of the potato, has been the most essential benefit to the island; it is now much more used, than any native vegetable. New Zealand is favoured by one great natural advantage; namely, that the inhabitants can never perish from famine. The whole country abounds with fern; and the roots of this plant, if not very palatable, yet contain much nutriment. A native can always subsist on these, and on the shells which are abundant on all parts of the sea-coast. The villages are chiefly conspicuous, by

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the platforms which are raised on four posts ten or twelve feet above the ground, and on which the produce of the fields is kept secure from all accidents.

On coming near one of the huts, I was much amused by seeing in due form the ceremony of rubbing, or as it should more properly be called, pressing noses. The women, on our first approach, began uttering something in a most dolorous voice; they then squatted themselves down and held up their faces; my companions standing over them, placed the bridge of their own noses at right angles to theirs, and commenced pressing. This lasted rather longer than a cordial shake of the hand would with us; and as we vary the force of the grasp of the hand in shaking, so do they in pressing. During the process they uttered comfortable little grunts, very much in the same manner as two pigs do, when rubbing against each other. I noticed, that the slave would press noses with any one he met, indifferently either before or after his master the chief. Although among savages the chief has absolute power of life and death over his slave, yet there is an entire absence of ceremony between them. Mr. Burchell has remarked the same thing in Southern Africa with respect to the rude Bachapins. Where civilization has arrived at a certain point, as among the Tahitians, complex formalities are soon instituted between the different grades of society. For instance, in the above island, formerly all were obliged to uncover themselves as low as the waist in presence of the king.

The ceremony of pressing noses having been completed with all present, we seated ourselves in a circle in the front of one of the houses, and rested there half-an-hour. All the native hovels which I have seen, have nearly the same form and dimensions, and all agree in being filthily dirty. They resemble a cow-shed with one end open, but having a partition a little way within, with a square hole in it, which thus cuts off a part, and makes a small gloomy chamber. In this the inhabitants keep all their property, and when the

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weather is cold they sleep there. They eat, however, and pass their time in the open part in front.

My guides having finished their pipes, we continued our walk. The path led through the same undulating country, the whole uniformly clothed as before with fern. On our right hand, we had a serpentine river, the banks of which were fringed with trees, and here and there on the hill-sides there were clumps of wood. The whole scene, in spite of its green colour, bore rather a desolate aspect. The sight of so much fern impresses the mind with an idea of sterility. This, however, is not the case; for wherever the fern grows thick and breast-high, the land by tillage becomes productive. Some of the residents, with much probability think that all this extensive open country was originally covered with forests, and that it has been cleared by the aid of fire. It is said that by digging in the barest spots, lumps of the kind of resin which flows from the kauri pine, are frequently found. The natives had an evident motive in thus clearing the country; for in such parts the fern, formerly so staple an article of food, flourishes best. The almost entire absence of associated grasses, which forms so remarkable a feature in the vegetation of this island, may perhaps be accounted for, by the open parts being the work of man, while nature had designed the country for forest land.

The soil is volcanic; in several parts we passed over slaggy and vesicular lavas, and the form of a crater could clearly be distinguished in several of the neighbouring hills. Although the scenery is nowhere beautiful, and only occasionally pretty, I enjoyed my walk. I should have enjoyed it more, if my companion, the chief, had not possessed extraordinary conversational powers. I only knew three words; "good," "bad," and "yes:" and with these I answered all his remarks, without of course having understood one word he said. This, however, was quite sufficient: I was a good listener, an agreeable person, and he never ceased talking to me.

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At length we reached Waimate. After having passed over so many miles of an uninhabited useless country, the sudden appearance of an English farm-house, and its well-dressed fields, placed there as if by an enchanter's wand, was exceedingly pleasing. Mr. Williams not being at home, I received in Mr. Davies's house a cordial and pleasant welcome. After drinking tea with his family party, we took a stroll about the farm. At Waimate there are three large houses, where the missionary gentlemen Messrs. Williams, Davies, and Clarke, reside; and near them are the huts of the native labourers. On an adjoining slope fine crops of barley and wheat in full ear were standing; and, in another part, fields of potatoes and clover. But I cannot attempt to describe all I saw; there were large gardens, with every fruit and vegetable which England produces; and many belonging to a warmer clime. I may instance, asparagus, kidney beans, cucumbers, rhubarb, apples, pears, figs, peaches, apricots, grapes, olives, gooseberries, currants, hops, gorze for fences, and English oaks; also many different kinds of flowers. Around the farm-yard there were stables, a thrashing-barn with its winnowing machine, a blacksmith's forge, and on the ground ploughshares and other tools: in the middle was that happy mixture of pigs and poultry, which may be seen so comfortably lying together in every English farm-yard. At the distance of a few hundred yards, where the water of a little rill was dammed up into a pool, a large and substantial water-mill had been erected.

All this is very surprising, when it is considered, that five years ago, nothing but the fern flourished here. Moreover, native workmanship, taught by the missionaries, has effected this change:—the lesson of the missionary is the enchanter's wand. The house has been built, the windows framed, the fields ploughed, and even the trees grafted, by the New Zealander. At the mill, a New Zealander may be seen powdered white with flour, like his brother miller in England. When I looked at this whole scene, I thought it admirable. It was not merely that England was vividly brought before my mind;

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yet, as the evening drew to a close, the domestic sounds, the fields of corn, the distant country with its trees now appearing like pasture-land, all might well be mistaken for some part of it. Nor was it the triumphant feeling at seeing what Englishmen could effect, but it was something of far more consequence; the object for which this labour had been bestowed—the moral effect on the aborigines of this fine country.

The missionary system here appears to me different from that of Tahiti; much more attention is there paid to religious instruction, and to the direct improvement of the mind; here, more to the arts of civilization. I do not doubt that in both cases, the same object is kept in view. Judging from the success alone, I should rather lean to the Tahiti side; probably, however, each system is best adapted to the country where it is followed. The mind of a Tahitian is certainly one of a higher order; and on the other hand, the New Zealander, not being able to pluck from the tree that shades his house the bread-fruit and banana, would naturally turn his attention with more readiness to the arts. When comparing the state of New Zealand with that of Tahiti, it should always be remembered, that from the respective forms of government of the two countries, the missionaries here have had to labour at a task, many times more difficult. The reviewer of Mr. Earle's travels in the Quarterly Journal, by pointing out a more advantageous line of conduct for the missionaries, evidently considers that too much attention has been paid to religious instruction, in proportion to other subjects. This opinion being so very different from the one at which I arrived, any third person hearing the two sides, would probably conclude, that the missionaries had been the best judges, and had chosen the right path.

Several young men were employed about the farm, who had been brought up by the missionaries; having been redeemed by them from slavery. They were dressed in a shirt, jacket and trousers, and had a respectable appearance. Judging from one trifling anecdote, I should think they must be

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honest. When walking in the fields, a young labourer came up to Mr. Davies, and gave him a knife and gimlet, saying he had found them on the road, and did not know to whom they belonged! These young men and boys appeared very merry and good-humoured. In the evening I saw a party of them at cricket: when I thought of the austerity of which the missionaries have been accused, I was amused by observing one of their own sons taking an active part in the game. A more decided and pleasing change was manifested in the young women, who acted as servants within the houses. Their clean, tidy, and healthy appearance, like that of dairy-maids in England, formed a wonderful contrast with the women of the filthy hovels in Kororadika. The wives of the missionaries tried to persuade them not to be tattooed; but a famous operator having arrived from the south, they said, "We really must just have a few lines on our lips; else when we grow old our lips will shrivel, and we shall be so very ugly." Tattooing is not nearly so much practised as formerly; but as it is a badge of distinction between the chief and the slave, it will not probably very soon be disused. So soon does any train of ideas become habitual, that the missionaries told me, that even in their eyes, a plain face looked mean, and not like that of a New Zealand gentleman.

Late in the evening I went to Mr. Williams's house, where I passed the night. I found there a very large party of children, collected together for Christmas-day, and all sitting round a table at tea. I never saw a nicer or more merry group: and to think, that this was in the centre of the land of cannibalism, murder, and all atrocious crimes! The cordiality and happiness so plainly pictured in the faces of the little circle, appeared equally felt by the older persons of the mission.

December 24th.—In the morning, prayers were read in the native tongue to the whole family. After breakfast, I rambled about the gardens and farm. This was a market-day, when the natives of the surrounding hamlets bring

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their potatoes, Indian corn, or pigs, to exchange for blankets, tobacco, and sometimes, through the persuasions of the missionaries, for soap. Mr. Davies's eldest son, who manages a farm of his own, is the man of business in the market. The children of the missionaries, who came while young to the island, understand the language better than their parents, and can get any thing more readily done by the natives.

A little before noon, Messrs. Williams and Davies walked with me to part of a neighbouring forest, to show me the famous Kauri pines. I measured one of these noble trees, in a part which was not enlarged near the roots, and found it to be thirty-one feet in circumference. There was another close by, which I did not see, thirty-three; and I heard of one, no less than forty feet. The trunks are also very remarkable from their smoothness, cylindrical figure, absence of branches, and having very nearly the same girth through a length from sixty to even ninety feet. The crown of this tree, where it is irregularly branched, is small, and out of proportion to the trunk; and the foliage is likewise diminutive as compared with the branches. The forest in this part was almost composed of the Kauri; and the largest, from the parallelism of their sides, stood up like gigantic columns of wood. The timber of this tree is the most valuable product of the island: moreover, a quantity of resin oozes from the bark, which is collected and sold at a penny a pound to the Americans, but its use is kept secret.

On the outskirts of the wood, I saw the New Zealand flax growing in the swamps: this is the second most valuable export. This plant somewhat resembles (but not botanically) the common iris; the under surface of the leaf is lined by a layer of strong silky fibres; and the upper consists of green vegetable matter, which is scraped off with a broken shell, and the hemp remains in the hand of the workwoman. In the forest, besides the kauri, there are some other fine timber trees. I saw numbers of beautiful tree-ferns, and was told of palms. Some of the New Zealand forests must

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be impenetrable to an extraordinary degree. Mr. Matthews gave me an account of one, which, although only thirty-four miles wide, and separating two inhabited districts, like the central forest of Chiloe, had never been passed until lately. He and another missionary, each with a party of about fifty men, undertook to open a road: but it cost them more than a fortnight's labour! In the woods I saw very few birds. With regard to animals, it is a most remarkable fact, that so large an island, extending over more than 700 miles in latitude, and in many parts ninety broad, with varied stations, a fine climate, and land of all heights, from 14,000 feet downwards, with the exception of a small rat, should not possess one indigenous animal. It is moreover said, that the introduction of the common Norway kind, has annihilated from the northern extremity of the island, the New Zealand species, in the short space of two years. In many places I noticed several sorts of weeds, which, like the rats, I was forced to own as countrymen. A leek, however, which has overrun whole districts, and will be very troublesome, was imported lately by the favour of a French vessel. The common dock is widely disseminated, and will, I am afraid, for ever remain a proof of the rascality of an Englishman, who sold the seeds for those of the tobacco-plant.

On returning from our pleasant walk to the houses, I dined with Mr. Williams; and then, a horse being lent me, I returned to the Bay of Islands. I took leave of the missionaries, with thankfulness for their kind welcome, and with feelings of high respect for their gentleman-like, useful, and upright characters. I think it would be difficult to find a body of men better adapted for the high office which they fulfil.

CHRISTMAS-DAY.—In a few more days, the fourth year of our absence from England will be completed. Our first Christmas-day was spent at Plymouth; the second at St. Martin's Cove, near Cape Horn; the third at Port Desire, in Patagonia; the fourth at anchor in a harbour in the

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Peninsula of Tres Montes; this fifth here; and the next, I trust in providence, will be in England. We attended divine service in the chapel of Pahia; part of the service was read in English, and part in the New Zealand language.

As far as I was able to understand, the greater number of people in this northern part of the island profess Christianity. It is curious, that the religion even of those who do not profess it, has been modified and is now partly Christian, partly heathen. Moreover, so excellent is the Christian faith, that the outward conduct even of the unbelievers is said to have been decidedly improved by the spread of its doctrines. It is beyond doubt, however, that much immorality still exists;—that there are many who would not hesitate to kill a slave for a trifling offence; and that polygamy is still common,—indeed, I believe, general.

We did not hear of any recent act of cannibalism; but Mr. Stokes found burnt human bones, strewed round an old fireplace, on a small island near the anchorage: these remains of some quiet banquet might, indeed, have been lying there for several years. Notwithstanding the above facts, it is probable that the moral state of the people will rapidly improve. Mr. Bushby mentioned one pleasing anecdote as a proof of the sincerity of some, at least, of those who profess Christianity. One of his young men left him, who had been accustomed to read prayers to the rest of the servants. Some weeks afterwards, happening to pass late in the evening by an outhouse, he saw and heard one of his men reading the bible with difficulty, by the light of the fire, to the others. After this, the party knelt and prayed: in their prayers they mentioned Mr. Bushby and his family, and the missionaries, each separately in his respective district.

December 26th.—Mr. Bushby offered to take Mr. Sulivan and myself in his boat, some miles up the river to Cawa-Cawa; and proposed afterwards to walk on to the village of Waiomio, where there are some curious rocks. Following one of the arms of the bay, we enjoyed a pleasant row,

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and passed through pretty scenery, until we came to a village, beyond which the boat could not proceed. From this place a chief and a party of men volunteered to walk with us to Waiomio, a distance of four miles. The chief was at this time rather notorious, from having lately hung one of his wives and a slave, for adultery. When one of the missionaries remonstrated with him, he seemed surprised, and said he thought he was exactly following the English method. Old Shongi, who happened to be in England during the Queen's trial, expressed great disapprobation at the whole proceeding: he said he had five wives, and he would rather cut off all their heads, than be so much troubled about one. Leaving this village, we crossed over to another, seated on a hill-side at a little distance. The daughter of a chief, who was still a heathen, had died here five days before. The hovel in which she had expired had been burnt to the ground: her body being enclosed between two small canoes was placed upright on the ground, and protected by an enclosure bearing wooden images of their gods, and the whole was painted bright red, so as to be conspicuous from afar. Her gown was fastened to the coffin, and her hair being cut off was cast at its foot. The relatives of the family had torn the flesh of their arms, bodies, and faces, so that they were covered with clotted blood; and the old women looked most filthy, disgusting objects. On the following day some of the officers visited this place, and found the women still howling and cutting themselves.

We continued our walk, and soon reached Waiomio. Here there are some singular masses of limestone, resembling ruined castles. These rocks have long served for burial-places, and in consequence are held sacred. One of the young men cried out, "Let us all be brave," and ran on ahead; but when within a hundred yards, the whole party thought better of it, and stopped short. With perfect indifference, however, they allowed us to examine the whole place. At this village we rested some hours, during which

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time there was a long discussion with Mr. Bushby, concerning the right of sale of certain lands. One old man, who appeared a perfect genealogist, illustrated the successive possessors by bits of stick driven into the ground. Before leaving the houses, a little basketful of roasted sweet-potatoes was given to each of our party; and we all, according to the custom, carried them away to eat on the road. I noticed that among the women employed in cooking, there was a man-slave: it must be an humiliating thing for a man in this warlike country to be employed in doing that which is considered as the lowest woman's work. Slaves are not allowed to go to war; but this perhaps can hardly be considered as a hardship. I heard of one poor wretch who, during hostilities, ran away to the opposite party; being met by two men, he was immediately seized; but they not agreeing to whom he should belong, each stood over him with a stone hatchet, and seemed determined that the other at least should not take him away alive. The poor man, almost dead with fright, was only saved by the address of a chief's wife. We afterwards enjoyed a pleasant walk back to the boat, but did not reach the ship till late in the evening.

DECEMBER 30TH.—In the afternoon we stood out of the Bay of Islands on our course to Sydney. I believe we were all glad to leave New Zealand. It is not a pleasant place. Amongst the natives there is absent that charming simplicity which is found at Tahiti; and the greater part of the English are the very refuse of society. Neither is the country itself attractive. I look back but to one bright spot, and that is Waimate, with its Christian inhabitants.

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CHAPTER XXI.

Sydney—Prosperity—Excursion to Bathurst—Aspect of woods—Party of Natives—Gradual extinction of aborigines — Blue Mountains—Weatherboard—View of a grand gulf-like valley—Sheep farm—Lion-ant—Bathurst, general civility of lower orders—State of society—Van Diemen's Land — Hobart Town—Aborigines all banished—Mount Wellington—King George's Sound—Cheerless aspect of country—Bald Head, calcareous casts like branches of trees—Party of natives—Leave Australia.

AUSTRALIA.

JANUARY 12TH, 1836.—Early in the morning, a light air carried us towards the entrance of Port Jackson. Instead of beholding a verdant country scattered over with fine houses: a straight line of yellowish cliff brought to our minds the coast of Patagonia. A solitary lighthouse, built of white stone, alone told us we were near a great and populous city. Having entered the harbour, it appeared fine and spacious; but the level country, showing on the cliff-formed shores bare and horizontal strata of sandstone, was covered by woods of thin scrubby trees, that bespoke useless sterility. Proceeding further inland, the country improved; beautiful villas and nice cottages were here and there scattered along the beach. In the distance stone houses, two and three stories high, and windmills, standing on the edge of a bank, pointed out to us the neighbourhood of the capital of Australia.

At last we anchored within Sydney Cove. We found the little basin occupied by many large ships, and surrounded by warehouses. In the evening I walked through the town, and returned full of admiration at the whole scene. It is a most magnificent testimony to the power of the British nation. Here, in a less promising country, scores of years have effected many times more, than the same number of centuries have done in South America. My first feeling

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was to congratulate myself that I was born an Englishman. Upon seeing more of the town afterwards, perhaps my admiration fell a little; but yet it is a fine town; the streets are regular, broad, clean, and kept in excellent order; the houses are of a good size, and the shops well furnished. It may be faithfully compared to the large suburbs, which stretch out from London and a few other great towns in England: but not even near London or Birmingham is there an appearance of such rapid growth. The number of large houses just finished and others building was truly surprising; nevertheless, every one complained of the high rents and difficulty in procuring a house. In the streets, gigs, phaetons, and carriages with livery servants, were driving about; and of the latter, many were extremely well equipped. Coming from South America, where in the towns every man of property is known, no one thing surprised me more than not being able to ascertain readily to whom this or that carriage belonged.

Many of the older residents say, that formerly they knew every face in the colony, but now that in a morning's ride it is a chance if they know one. Sydney has a population of twenty-three thousand, and is rapidly increasing: it must contain much wealth. It appears that a man of business can hardly fail to make a large fortune. I saw on all sides fine houses,—one built from the profits of steam-vessels,—another from building, and so on. An auctioneer, who was a convict, it is said, intends to return home, and will take with him 100,000 pounds. Another has an income so large that scarcely any body ventures to guess at it—the least sum assigned being fifteen thousand a year. But the two crowning facts are,—first, that the public revenue has increased 60,000*l.* during this last year; and secondly, that less than an acre of land within the town of Sydney sold for 8000*l.* sterling.

I hired a man and two horses to take me to Bathurst; a village about one hundred and twenty miles in the interior, and the centre of a great pastoral district. By this means I hoped to get a general idea of the appearance of the

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country. On the morning of the 16th (January) I set out on my excursion. The first stage took us to Paramatta, a small country-town, the second to Sydney in importance. The roads were excellent, and made upon the MacAdam principle: whinstone having been brought for the purpose from the distance of several miles. The road appeared much frequented by all sorts of carriages; and I met two stage-coaches. In all these respects there was a close resemblance to England; perhaps the number of alehouses was here in excess. The iron gangs, or parties of convicts, who have here committed some trifling offence, appeared the least like England; they were working in chains, under the charge of sentries with loaded arms. The power, which the government possesses, by means of forced labour, of at once opening good roads throughout the country, has been, I believe, one main cause of the early prosperity of this colony.

I slept at night at a very comfortable inn at Emu ferry, thirty-five miles from Sydney, and near the ascent of the Blue Mountains. This line of road is the most frequented, and has been longest inhabited of any in the colony. The whole land is enclosed with high railings, for the farmers have not succeeded in rearing hedges. There are many substantial houses and good cottages scattered about; but although considerable pieces of land are under cultivation, the greater part yet remains as when first discovered. Making allowances for the cleared parts, the country here resembled all that I saw during the ten succeeding days.

The extreme uniformity of the vegetation is the most remarkable feature in the landscape of the greater part of New South Wales. Every where we have an open woodland; the ground being partially covered with a very thin pasture. The trees nearly all belong to one family; and mostly have the surface of their leaves placed in a vertical, instead of as in Europe, a nearly horizontal position: the foliage is scanty, and of a peculiar, pale green tint, without any gloss. Hence the woods appear light and shadowless: this,

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although a loss of comfort to the traveller under the scorching rays of summer, is of importance to the farmer, as it allows grass to grow where it otherwise could not. The leaves are not shed periodically: this character appears common to the entire southern hemisphere, namely, South America, Australia, and the Cape of Good Hope. The inhabitants of this hemisphere and of the intertropical regions, thus lose perhaps one of the most glorious, though to our eyes common, spectacles in the world,—the first bursting into full foliage of the leafless tree. They may, however, say that we pay dearly for our spectacle, by having the land covered with mere naked skeletons for so many months. This is too true; but our senses thus acquire a keen relish for the exquisite green of the spring, which the eyes of those living within the tropics, sated during the long year with the gorgeous productions of those glowing climates, can never experience. The greater number of the trees, with the exception of some of the blue gums, do not attain a large size; but they grow tall and tolerably straight, and stand well apart. The bark of some falls annually, or hangs dead in long shreds, which swing about with the wind; and hence the woods appear desolate and untidy. Nowhere is there an appearance of verdure, but rather that of arid sterility. I cannot imagine a more complete contrast in every respect than between the forests of Valdivia, or Chiloe, and the woods of Australia.

Although this colony flourishes so remarkably, the appearance of infertility is to a certain degree real. The soil without doubt is good, but there is so great a deficiency both of rain and running water, that it cannot produce much. The agricultural crops, and often those in gardens, are estimated to fail once in three years; and this has even happened on successive years. Hence the colony cannot supply itself with the bread and vegetables, which its inhabitants consume. It is essentially pastoral, and chiefly so for sheep, and not the larger quadrupeds. The alluvial land near Emu ferry was some of the best cultivated which I saw; and certainly the scenery on the banks of the

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Nepean, bounded to the west by the Blue Mountains, was pleasing even to the eye of a person thinking of England.

At sunset, a party of a score of the black aborigines passed by, each carrying, in their accustomed manner, a bundle of spears and other weapons. By giving a leading young man a shilling, they were easily detained, and threw their spears for my amusement. They were all partly clothed, and several could speak a little English; their countenances were goodhumoured and pleasant; and they appeared far from being such utterly degraded beings as they are usually represented. In their own arts they are admirable: a cap being fixed at thirty yards distance, they transfixed it with a spear, delivered by the throwing stick, with the rapidity of an arrow from the bow of a practised archer. In tracking animals or men they show most wonderful sagacity; and I heard of several of their remarks which manifested considerable acuteness. They will not, however, cultivate the ground, or build houses and remain stationary, or even take the trouble of tending a flock of sheep when given to them. On the whole they appear to me to stand some few degrees higher in the scale of civilization than the Fuegians.

It is very curious thus to see in the midst of a civilized people, a set of harmless savages wandering about without knowing where they shall sleep at night, and gaining their livelihood by hunting in the woods. As the white man has travelled onwards, he has spread over the country belonging to several tribes. These, although thus enclosed by one common people, keep up their ancient distinctions, and sometimes go to war with each other. In an engagement which took place lately, the two parties most singularly chose the centre of the village of Bathurst, for the field of battle. This was of service to the defeated side, for the runaway warriors took refuge in the barracks.

The number of aborigines is rapidly decreasing. In my whole ride, with the exception of some boys brought up in the houses, I saw only one other party; these were rather

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more numerous than the first, and not so well clothed. This decrease, no doubt, must be partly owing to the introduction of spirits, to European diseases (even the milder ones of which, as the measles,* prove very destructive), and to the gradual extinction of the wild animals. It is said that numbers of their children invariably perish in very early infancy from the effects of their wandering life. As the difficulty of procuring food increases, so must their wandering habits; and hence the population, without any apparent deaths from famine, is repressed in a manner extremely sudden compared to what happens in civilized countries, where the father may add to his labour, without destroying his offspring.

Besides these several evident causes of destruction, there appears to be some more mysterious agency generally at work. Wherever the European has trod, death seems to pursue the aboriginal. We may look to the wide extent of the Americas, Polynesia, the Cape of Good Hope, and Australia, and we shall find the same result. Nor is it the white man alone, that thus acts the destroyer; the Polynesian of Malay extraction has in parts of the East Indian archipelago, thus driven before him the dark-coloured native. The varieties of man seem to act on each other; in the same way as different species of animals—the stronger always extirpating the weaker. It was melancholy at New Zealand to hear the fine energetic natives saying, they knew the land was doomed to pass from their children. Every one has heard of the inexplicable reduction of the population in the beautiful and healthy island of Tahiti since the date of Captain Cook's voyages: although in that case we might have expected it would have been otherwise; for infanticide, which formerly

* It is remarkable how the same disease is modified in different climates. At the little island of St. Helena, the introduction of scarlet fever is dreaded as a plague. In some countries, foreigners and natives are as differently affected by certain contagious disorders, as if they had been different animals; of which fact some instances have occurred in Chile; and, according to Humboldt, in Mexico. (Polit. Essay on Kingdom of New Spain, vol. iv.)

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prevailed to so extraordinary a degree, has ceased, and the murderous wars have become less frequent.

The Rev. J. Williams, in his interesting work,* says, that the first intercourse between natives and Europeans, "is invariably attended with the introduction of fever, dysentery, or some other disease, which carries off numbers of the people." Again he affirms, "It is certainly a fact, which cannot be controverted, that most of the diseases which have raged in the islands during my residence there, have been introduced by ships;† and what renders this fact remarkable is, that there might be no appearance of disease among the crew of the ship, which conveyed this destructive importation." This statement is not quite so extraordinary as it at first appears; for several cases are on record of the most malignant fevers having broken out, although the parties themselves, who were the cause, were not affected. In the early part of the reign of George III., a prisoner who had been confined in a dungeon, was taken in a coach with four constables before a magistrate; and, although the man himself was not ill, the four constables died from a short putrid fever; but the contagion extended to no others.

* Narrative of Missionary Enterprise, p. 282.

† Captain Beechey (chap. iv., vol. i.) states that the inhabitants of Pitcairn Island, are firmly convinced that after the arrival of every ship they suffer cutaneous and other disorders. Captain Beechey attributes this to the change of diet during the time of the visit. Dr. Macculloch (Western Isles, vol. ii., p. 32) says, "It is asserted, that on the arrival of a stranger (at St. Kilda) all the inhabitants, in the common phraseology, catch a cold." Dr. Macculloch considers the whole case, although often previously affirmed, as ludicrous. He adds, however, that "the question was put by us to the inhabitants who unanimously agreed in the story." In Vancouver's Voyage, there is a somewhat similar statement with respect to Otaheite: nor are these (as I believe) the only instances. Humboldt (Polit. Essay on King. of New Spain, vol. iv.) says, that the great epidemics at Panama and Callao are "marked" by the arrival of ships from Chile, because the people from that temperate region, first experience the fatal effects of the torrid zones. I may add, that I have heard it stated in Shropshire, that sheep, which have been imported from vessels, although themselves in a healthy condition, if placed in the same fold with others, frequently produce sickness in the flock.

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From these facts it would almost appear as if, the effluvium of one set of men shut up for some time together, was poisonous when inhaled by others (and perhaps more so, if the men be of different races). Mysterious as this circumstance appears to be, it is not more surprising than that the body of one's fellow-creature, directly after death, and before putrefaction has commenced, should often be of so deleterious a quality, that the mere puncture from an instrument used in its dissection should prove fatal.

JANUARY 17TH.—Early in the morning we passed the Nepean in a ferry-boat. The river, although at this spot both broad and deep, had a very small body of running water. Having crossed a low piece of land on the opposite side, we reached the slope of the Blue Mountains. The ascent is not steep, the road having been cut with much care on the side of a sandstone cliff. At no great elevation an almost level plain extends, which, rising imperceptibly to the westward, at last attains a height of more than three thousand feet. From so grand a title as Blue Mountains, and from their absolute altitude, I expected to have seen a bold chain of mountains crossing the country; but instead of this, a sloping plain presents merely an inconsiderable front to the low land of the coast. From this first slope, the view of the extensive woodland to the eastward, was striking, and the surrounding trees grew bold and lofty. But when once on the sandstone platform, the scenery becomes exceedingly monotonous; each side of the road is bordered by scrubby trees of the never-failing Eucalyptus family; and with the exception of two or three small inns, there are no houses, or cultivated land: the road, moreover, is solitary; the most frequent object being a bullock-waggon, piled up with bales of wool.

In the middle of the day we baited our horses at a little inn, called the Weatherboard. The country here is elevated 2800 feet above the sea. About a mile and a half from this place, there is a view exceedingly well worth visiting. By following down a little valley and its tiny rill of water, an

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immense gulf is unexpectedly seen through the trees which border the pathway, at the depth of perhaps 1500 feet. Walking on a few yards one stands on the brink of a vast precipice, and below is the grand bay or gulf (for I know not what other name to give it), thickly covered with forest. The point of view is situated as if at the head of a bay, the line of cliff diverging on each side, and showing headland behind headland, as on a bold sea-coast. These cliffs are composed of horizontal strata of whitish sandstone; and so absolutely vertical are they, that in many places, a person standing on the edge, and throwing down a stone, can see it strike the trees in the abyss below. So unbroken is the line, that it is said, in order to reach the foot of the waterfall, formed by this little stream, it is necessary to go a distance of sixteen miles round. About five miles distant in front, another line of cliff extends, which thus appears completely to encircle the valley; and hence the name of bay is justified, as applied to this grand amphitheatrical depression. If we imagine a winding harbour, with its deep water surrounded by bold cliff-like shores, laid dry, and a forest sprung up on its sandy bottom, we should then have the appearance and structure here exhibited. This kind of view was to me quite novel, and extremely magnificent.

In the evening, we reached the Blackheath. The sandstone plateau has here attained the elevation of 3400 feet; and is covered, as before, with the same kind of scrubby wood. From the road there were occasional glimpses into a profound valley, of the same character as the one described; but from the steepness and depth of its sides, the bottom was scarcely ever to be seen. The Blackheath is a very comfortable inn, kept by an old soldier; and it reminded me of the small inns in North Wales. I was surprised to find that here, at the distance of more than seventy miles from Sydney, fifteen beds could be made up for travellers.

JANUARY 18TH.—Very early in the morning, I walked about three miles to see Govett's Leap: a view of a similar but even perhaps more stupendous character than that near

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the Weatherboard. So early in the day the gulf was filled with a thin blue haze, which, although destroying the general effect, added to the apparent depth at which the forest was stretched below the country on which we were standing. Soon after leaving the Blackheath, we descended from the sandstone platform by the pass of Mount Victoria. To effect this pass, an enormous quantity of stone has been cut through; the design, and its manner of execution, would have been worthy of any line of road in England,—even that of Holyhead. We now entered upon a country less elevated by nearly a thousand feet, and consisting of granite. With the change of rock, the vegetation improved; the trees were both finer, and stood further apart; and the pasture between them was a little greener, and more plentiful.

At Hassan's Walls, I left the high road, and made a short detour to a farm called Walerawang; to the superintendent of which, I had a letter of introduction from the owner in Sydney. Mr. Browne had the kindness to ask me to stay the ensuing day, which I had much pleasure in doing. This place offers an example of one of the large farming, or rather sheep-grazing, establishments of the colony. Cattle and horses are, however, in this case, rather more numerous than usual, owing to some of the valleys being swampy, and producing a coarser pasture. The sheep were 15,000 in number, of which the greater part were feeding under the care of different shepherds, on unoccupied ground, at the distance of more than a hundred miles, and beyond the limits of the colony. Mr. Browne had just finished, this day, the last of the shearing of seven thousand sheep; the rest being sheared in another place. I believe the profit of the average produce of wool from 15,000 sheep, would be more than 5000*l.* sterling. Two or three flat pieces of ground near the house were cleared and cultivated with corn, which the harvest men were now reaping: but no more wheat is sown than sufficient for the annual support of the labourers employed on the establishment. The usual number of assigned convict servants here is about

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forty, but at the present time there were rather more. Although the farm was well stocked with every requisite, there was an apparent absence of comfort; and not even a single woman resided here. The sunset of a fine day will generally cast an air of happy contentment on any scene; but here, at this retired farm-house, the brightest tints on the surrounding woods could not make me forget that forty hardened, profligate men, were ceasing from their daily labours, like the slaves from Africa, yet without their just claim for compassion.

Early on the next morning, Mr. Archer, the joint superintendent, had the kindness to take me out Kangaroo-hunting. We continued riding the greater part of the day, but had very bad sport, not seeing a kangaroo, or even a wild dog. The greyhounds pursued a kangaroo rat into a hollow tree, out of which we dragged it: it is an animal as big as a rabbit, but with the figure of a kangaroo. A few years since, this country abounded with wild animals; but now the emu is banished to a long distance, and the kangaroo is become scarce; to both, the English greyhound is utterly destructive. It may be long before these animals are altogether exterminated, but their doom is fixed. The natives are always anxious to borrow the dogs from the farm-houses: the use of them, the offal when an animal is killed, and milk from the cows, are the peace-offerings of the settlers, who push further and further towards the interior. The thoughtless aboriginal, blinded by these trifling advantages, is delighted at the approach of the white man, who seems predestined to inherit the country of his children.

Although having bad sport, we enjoyed a pleasant ride. The woodland is generally so open that a person on horseback can gallop through it. It is traversed by a few flat-bottomed valleys, which are green and free from trees: in such spots the scenery was like that of a park, and pretty. In the whole country I scarcely saw a place without the marks of fire; whether these had been more or less recent—whether the stumps were more or less black, was the greatest change which varied the uniformity, so wearisome to the

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traveller's eye. In these woods there are not many birds; I saw, however, some large flocks of the white cockatoo feeding in a corn-field, and a few most beautiful parrots; crows like our jackdaws were not uncommon, and another bird something like the magpie. The English have not been very particular in giving names to the productions of Australia; trees of one genus (Casuarina) are called oaks for no one reason that I can discover, without it is that there is no one point of resemblance. Some quadrupeds are called tigers and hyenas, simply because they are carnivorous, and so on in many other cases.

In the dusk of the evening I took a stroll along a chain of ponds, which in this dry country represented the course of a river, and had the good fortune to see several of the famous Platypus, or *Ornithorhyncus paradoxus*. They were diving and playing about the surface of the water, but showed so little of their bodies that they might easily have been mistaken for water-rats. Mr. Browne shot one: certainly it is a most extraordinary animal; the stuffed specimens do not at all give a good idea of the recent appearance of its head and beak; the latter becoming hard and contracted.

A little time before this I had been lying on a sunny bank, and was reflecting on the strange character of the animals of this country as compared with the rest of the world. An unbeliever in every thing beyond his own reason might exclaim, "Two distinct Creators must have been at work; their object, however, has been the same, and certainly the end in each case is complete." While thus thinking, I observed the hollow conical pitfall of the lion-ant: first a fly fell down the treacherous slope and immediately disappeared; then came a large but unwary ant; its struggles to escape being very violent, those curious little jets of sand, described by Kirby* as being flirted by the insects tail, were promptly directed against the expected

* Kirby's Entomology, vol. i., p. 425. The Australian pitfall is only about half the size of the one made by the European species.

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victim. But the ant enjoyed a better fate than the fly, and escaped the fatal jaws which lay concealed at the base of the conical hollow. There can be no doubt but that this predacious larva belongs to the same genus with the European kind, though to a different species. Now what would the sceptic say to this? Would any two workmen ever have hit upon so beautiful, so simple, and yet so artificial a contrivance? It cannot be thought so: one Hand has surely worked throughout the universe.

JANUARY 20TH.—A long day's ride to Bathurst. Before joining the high road we followed a mere path through the forest; and the country, with the exception of a few squatters' huts, was very solitary. A "squatter" is a freed, or "ticket of leave" man, who builds a hut with bark on unoccupied ground, buys or steals a few animals, sells spirits without a licence, receives stolen goods,—and so at last becomes rich and turns farmer: he is the horror of all his honest neighbours. A "crawler" is an assigned convict, who runs away, and lives how he can, by labour and petty theft. The "bush ranger" is an open villain, who subsists by highway robbery and plunder: generally he is desperate, and will sooner be killed than taken alive. In the country it is necessary to understand these three names, for they are in common use.

This day we experienced the sirocco-like wind of Australia, which comes from the parched deserts of the interior. Clouds of dust were travelling in every direction; and the wind felt like that which has passed over a fire. I afterwards heard that the thermometer out of doors stood at 119°, and in a room in a closed house at 96°. In the afternoon we came in view of the downs of Bathurst. These undulating, but nearly level plains are very remarkable in this country, from being absolutely destitute of a single tree. They support only a very thin brown pasture. We rode some miles across this kind of country, and then reached the township of Bathurst, which is seated in the middle of what may be called either a very broad valley or narrow plain.

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Bathurst has a singular and not very inviting appearance. Groups of small houses and a few large ones are scattered rather thickly over two or three miles of a bare country, which is divided into numerous fields by lines of rails. A good many gentlemen live in the neighbourhood, and some possess very comfortable houses. A hideous little red brick church stands by itself on a hill; and barracks and government buildings occupy the centre of the township. I was told not to form too bad an opinion of the country by judging from that on the road-side, nor too good a one from Bathurst; in this latter respect I did not feel myself in the least danger of being prejudiced. It must be confessed that the season had been one of great drought, and that the country did not wear a favourable aspect; although I understand it was incomparably worse two or three months before. The secret of the rapidly growing prosperity of Bathurst is, that the brown pasture which appears to the stranger's eye so wretched is excellent for sheep-grazing.

The town stands on the banks of the Macquarie: this is one of the rivers whose waters flow into the vast and scarcely known interior. The line of watershed, which divides the inland streams from those of the coast, has an elevation of about 3000 feet (Bathurst is 2200), and runs in a north and south direction at the distance of about eighty or a hundred miles from the sea-side. The Macquarie figures in the map as a respectable river, and is the largest of those that drain this part of the inland slope; yet to my surprise I found it a mere chain of ponds, separated from each other by spaces almost dry. Generally a small stream is running, and sometimes there are high and impetuous floods. Scanty as the supply of the water is throughout this district, it becomes still scantier further inland.

JANUARY 22D.—I commenced my return, and followed a new road, called Lockyer's Line, in which the country is rather more hilly and picturesque. This was a long day's ride; and the house where I wished to sleep was some way off the road, and not easily found. I met on this, and in-

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deed on all other occasions, a very general and ready civility among the lower orders; which, when one considers what they are, and what they have been, would scarcely have been expected. The farm where I passed the night was owned by two young men who had only lately come out, and were beginning a settler's life. The total want of almost every comfort was not very attractive; but future and certain prosperity was before their eyes, and that not far distant.

The next day we passed through large tracts of country in flames, volumes of smoke sweeping across the road. Before noon we joined our former track, and ascended Mount Victoria. I slept at the Weatherboard, and before dark took another walk to the amphitheatre. On the road to Sydney I spent a very pleasant evening with Captain King at Dunheved: and thus ended my little excursion in the colony of New South Wales.

Before arriving here the three things which interested me most were,—the state of society amongst the higher classes, the condition of the convicts, and the degree of attraction sufficient to induce persons to emigrate. Of course, after so very short a visit one's opinion is worth scarcely any thing; but it is as difficult not to form some opinion, as it is to form a correct judgment. On the whole, from what I heard, more than from what I saw, I was disappointed in the state of society. The whole community is rancorously divided into parties on almost every subject. Among those, who from their station in life ought to be the best, many live in such open profligacy, that respectable people cannot associate with them. There is much jealousy between the children of the rich emancipist and the free settlers; the former being pleased to consider honest men as interlopers. The whole population, poor and rich, are bent on acquiring wealth; amongst the higher orders wool and sheep-grazing form the constant subject of conversation. The very low ebb of literature is strongly marked by the emptiness of the booksellers' shops; for they are inferior even to those in the smaller country-towns of England.

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There are many serious drawbacks to the comforts of families; the chief of which, perhaps, is being surrounded by convict servants. How thoroughly odious to every feeling to be waited on by a man, who the day before, perhaps, was flogged, from your representation, for some trifling misdemeanor. The female servants are of course much worse; hence children learn the vilest expressions, and it is fortunate if not equally vile ideas.

On the other hand, the capital of a person without any trouble on his part, produces him treble interest to what it will in England; and with care he is sure to grow rich. The luxuries of life are in abundance and very little dearer, and most articles of food cheaper, than in England. The climate is splendid and quite healthy; but to my mind its charms are lost by the uninviting aspect of the country. Settlers possess a great advantage in finding their sons of service, when very young. At the age of from sixteen to twenty they frequently take charge of distant farming stations; this, however, must happen at the expense of their boys associating entirely with convict servants. I am not aware that the tone of society has assumed any peculiar character; but with such habits, and without intellectual pursuits, it can hardly fail to deteriorate. My opinion is such, that nothing but rather severe necessity should compel me to emigrate.

The rapid prosperity and future prospects of this colony are to me, not understanding these subjects, very puzzling. The two main exports are wool and whale-oil; and to both of these productions there is a limit. The country is totally unfit for canals; therefore there is a line not very distant, beyond which the land carriage of wool will not repay the expense of shearing and tending sheep. Pasture every where is so thin, that settlers have already pushed far into the interior: moreover the country further inland becomes extremely poor. I have before said that agriculture can never succeed on a very extended scale; therefore so far as I can see, Australia must ultimately depend upon being the centre of commerce for the southern hemisphere, and perhaps on

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her future manufactories. Possessing coal, she always has the moving power at hand. From the habitable country extending along the coast, and from her English extraction she is sure to be a maritime nation. I formerly imagined that Australia would rise to be as grand and powerful a country as North America; but now it appears to me such future grandeur is rather problematical.

With respect to the state of the convicts, I had still fewer opportunities of judging than on other points. The first question is, whether their condition is at all one of punishment: no one will maintain that it is a very severe one. This, however, I suppose is of little consequence as long as it continues to be an object of dread to criminals at home. The corporeal wants of the convicts are tolerably well supplied; their prospect of future liberty and comfort is not distant, and after good conduct certain. A "ticket of leave," which, as long as a man keeps clear of suspicion as well as of crime, makes him free within a certain district, is given upon good conduct after years proportional to the length of the sentence. For life, eight years is the time of probation; for seven years, four, &c. Yet with all this, and overlooking the previous imprisonment and wretched passage out, I believe the years of assignment are passed away with discontent and unhappiness. As an intelligent man remarked to me, the convicts know no pleasure beyond sensuality, and in this they are not gratified. The enormous bribe which government possesses in offering free pardons, together with the deep horror of the secluded penal settlements, destroys confidence between the convicts, and so prevents crime. As to a sense of shame, such a feeling does not appear to be known, and of this I witnessed some very singular proofs. Though it is a curious fact, I was universally told, that the character of the convict population is one of arrant cowardice: not unfrequently some become desperate and quite indifferent of life, yet a plan requiring cool or continued courage is seldom put into execution. The worst feature in the whole case is, that although there

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exists what may be called a legal reform, and comparatively little which the law can touch is committed, yet that any moral reform should take place appears to be quite out of the question. I was assured by well-informed people, that a man who should try to improve, could not while living with other assigned servants:—his life would be one of intolerable misery and persecution. Nor must the contamination of the convict ships and prisons both here and in England be forgotten. On the whole, as a place of punishment the object is scarcely gained; as a real system of reform it has failed, as perhaps would every other plan: but as a means of making men outwardly honest,—of converting vagabonds most useless in one hemisphere into active citizens of another, and thus giving birth to a new and splendid country—a grand centre of civilization—it has succeeded to a degree perhaps unparalleled in history.

VAN DIEMEN'S LAND.

JANUARY 30TH.—The Beagle sailed for Hobart Town in Van Diemen's Land. On the 5th of February, after a six days' passage, of which the first part was fine, and the latter very cold and squally, we entered the mouth of Storm Bay: the weather justified this awful name. The bay should rather be called an estuary, for it receives at its head the waters of the Derwent. Near the mouth there are some extensive basaltic platforms; but higher up, the land becomes mountainous and is covered by a light wood. The lower parts of the hills which skirt the bay are cleared; and the bright yellow fields of corn, and dark green ones of potatoes appeared very luxuriant. Late in the evening we anchored in the snug cove, on the shores of which stands the capital of Tasmania, as Van Diemen's Land is now called. The first aspect of the place was very inferior to that of Sydney; the latter might be called a city, this only a town.

In the morning I walked on shore. The streets are fine

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and broad; but the houses rather scattered: the shops appeared good. The town stands at the base of Mount Wellington, a mountain, 3100 feet high, but of very little picturesque beauty: from this source, however, it receives a good supply of water. Round the cove there are some fine warehouses, and on one side a small fort. Coming from the Spanish settlements, where such magnificent care has generally been paid to the fortifications, the means of defence in these colonies appeared very contemptible. Comparing the town to Sydney, I was chiefly struck with the comparative fewness of the large houses, either built or building. This circumstance must indicate that fewer people are gaining large fortunes. The growth, however, of small houses has been most abundant; and the vast number of little red brick dwellings, scattered on the hill behind the town, sadly destroys its picturesque appearance. Hobart Town, from the census of this year, contained 13,826 inhabitants, and the whole of Tasmania 36,505.

All the aborigines have been removed to an island in Bass's Straits, so that Van Diemen's Land enjoys the great advantage of being free from a native population. This most cruel step seems to have been quite unavoidable, as the only means of stopping a fearful succession of robberies, burnings, and murders, committed by the blacks; but which sooner or later must have ended in their utter destruction. I fear there is no doubt that this train of evil and its consequences, originated in the infamous conduct of some of our countrymen. Thirty years is a short period, in which to have banished the last aboriginal from his native island,—and that island nearly as large as Ireland. I do not know a more striking instance of the comparative rate of increase of a civilized over a savage people.

The correspondence to show the necessity of this step, which took place between the government at home and that of Van Diemen's Land, is very interesting: it is published in an appendix to Bischoff's History of Van Diemen's Land. Although numbers of natives were shot and taken prisoners in the skirmishing which was going on at intervals

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for several years; nothing seems fully to have impressed them with the idea of our overwhelming power, until the whole island, in 1830, was put under martial law, and by proclamation the whole population desired to assist in one great attempt to secure the entire race. The plan adopted was nearly similar to that of the great hunting-matches in India: a line reaching across the island was formed, with the intention of driving the natives into a *cul-de-sac* on Tasman's peninsula. The attempt failed; the natives, having tied up their dogs, stole during one night through the lines. This is far from surprising, when their practised senses, and accustomed manner of crawling after wild animals is considered. I have been assured that they can conceal themselves on almost bare ground, in a manner which until witnessed is scarcely credible. The country is every where scattered over with blackened stumps, and the dusky natives are easily mistaken for these objects. I have heard of a trial between a party of Englishmen and a native who stood in full view on the side of a bare hill. If the Englishmen closed their eyes for scarcely more than a second, he would squat down, and then they were never able to distinguish the man from the surrounding stumps. But to return to the hunting-match; the natives understanding this kind of warfare, were terribly alarmed, for they at once perceived the power and numbers of the whites. Shortly afterwards a party of thirteen belonging to two tribes came in; and, conscious of their unprotected condition, delivered themselves up in despair. Subsequently by the intrepid exertions of Mr. Robinson, an active and benevolent man, who fearlessly visited by himself the most hostile of the natives, the whole were induced to act in a similar manner. They were then removed to Gun Carriage Island, where food and clothes were provided them. I fear from what I heard at Hobart Town, that they are very far from being contented: some even think the race will soon become extinct.

The Beagle staid here ten days, and in this time I made several pleasant little excursions, chiefly with the object of

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examining the geological structure of the immediate neighbourhood. The main points of interest consist, first in the presence of certain basaltic rocks which evidently have flowed as lava; secondly, in some great unstratified masses of greenstone; thirdly, in proofs of an exceedingly small rise of the land; fourthly, in some ancient fossiliferous strata, probably of the age of the Silurian system of Europe; and lastly, in a a solitary and superficial patch of yellowish limestone or travertin, which contains numerous impressions of leaves of trees and plants, not now existing. It is not improbable that this one small quarry, includes the only remaining record of the vegetation of Van Diemen's Land during one former epoch.

Mr. Frankland, the surveyor-general, was kind enough to give me much interesting information, and to take me several pleasant rides. The climate here is damper than in New South Wales, and hence the land is more fertile. Agriculture flourishes here: the cultivated fields looked well, and the gardens abounded with thriving vegetables and fruit-trees. Some of the farm-houses, situated in retired spots, had a very tempting appearance. The general aspect of the vegetation is similar to that of Australia: perhaps it is a little more green and cheerful; and the pasture between the trees rather more abundant. One day I took a long walk on the side of the bay opposite to the town: I crossed in a steam-boat, two of which are constantly plying backwards and forwards. The machinery of one of these vessels was entirely manufactured in this colony, which, from its very foundation then numbered only three-and-thirty years! If I was obliged to emigrate, I think I would choose this place in preference to Sydney: the climate and aspect of the country alone would almost determine me. Moreover, I suspect society is here on a pleasanter footing; certainly it is free from the contamination of rich convicts, and the dissensions consequent on the existence of two classes of wealthy residents. The colony appeared extremely well governed; the streets at night being kept even more orderly than those of an English town.

On another day I ascended Mount Wellington; I took

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with me a guide, for I failed in a first attempt, from the thickness of the wood. My guide, however, was a stupid fellow, and conducted us to the southern and damp side of the mountain, where the vegetation was very luxuriant, and the labour of the ascent, from the number of rotten trunks, almost as great as on a mountain in Tierra del Fuego or in Chiloe. It cost us five and a half hours of hard climbing before we reached the summit. In many parts the gum-trees grew to a great size, and the whole composed a noble forest. In some of the dampest ravines, tree-ferns flourished in an extraordinary manner; I saw one which must have been, at least, twenty feet high to the base of the fronds, and was in girth exactly six feet. The foliage of these trees, forming so many most elegant parasols, created a gloomy shade, like that of the first hour of night. The summit of the mountain is broad and flat, and is composed of huge angular masses of naked greenstone. Its elevation is 3100 feet above the level of the sea. The day was splendidly clear, and we enjoyed a most extensive view; to the northward the country appeared a mass of wooded mountains, of about the same elevation and tame outline with the one on which we were standing: to the south, the outline of the broken land and water, forming many intricate bays, was mapped with clearness before us. After staying some hours on the summit, we found a better way to descend, but did not reach the Beagle till eight o'clock, after a severe day's work.

February 17th.—The Beagle sailed from Tasmania, and, on the 6th of the ensuing month, reached King George's Sound, situated near the S.W. corner of Australia. We staid there eight days; and I do not remember, since leaving England, having passed a more dull, uninteresting time. The country, viewed from an eminence, appears a woody plain, with here and there rounded and partly bare hills of granite protruding. One day I went out with a party, in hopes of seeing a kangaroo hunt, and walked over a good many miles of country. Every where we found the soil sandy, and very poor; it either supported a coarse vegetation of thin,

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low brushwood and wiry grass, or a forest of stunted trees. The scenery resembled the elevated sandstone platform of the Blue Mountains; the Casuarina (a tree somewhat resembling a Scotch fir) is, however, here in greater number, as the Eucalyptus is in rather less. In the open parts there were many grass-trees;—a plant which, in appearance, has some affinity with the palm; but, instead of being surmounted by a crown of noble fronds, it can boast merely of a tuft of coarse grass. The general bright green colour of the brushwood and other plants, viewed from a distance, seemed to bespeak fertility. A single walk, however, will quite dispel such an illusion; and he who thinks with me, will never wish to walk again in so uninviting a country.

One day I accompanied Captain FitzRoy to Bald Head; the place mentioned by so many navigators, where some imagined they saw coral, and others petrified trees, standing in the position in which they grew. According to our view, the rock was formed by the wind heaping up calcareous sand, during which process, branches and roots of trees, and land-shells were enclosed; the mass being afterward consolidated by the percolation of rain-water. When the wood had decayed, lime was washed into the cylindrical cavities, and became hard, sometimes even like that in a stalactite. The weather is now wearing away the softer rock, and in consequence the casts of roots and branches project above the surface: their resemblance to the stumps of a dead shrubbery was so exact, that, before touching them, we were sometimes at a loss to know which were composed of wood, and which of calcareous matter.

A large tribe of natives, called the White Cockatoo men, happened to pay the town a visit while we were there. These men, as well as those of the tribe belonging to King George's Sound, being tempted by the offer of some tubs of rice and sugar, were persuaded to hold a "corrobery," or great dancing-party. As soon as it grew dark, small fires were lighted, and the men commenced their toilet, which consisted in painting themselves white in spots and lines. As soon as all was ready, large fires were kept blazing,

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round which the women and children were collected as spectators; the Cockatoo and King George's men formed two distinct parties, and danced generally in answer to each other. The dancing consisted in the whole set running either sideways or in Indian file, into an open space, and stamping the ground with great force as they marched together. Their heavy footsteps were accompanied by a kind of grunt, and, by beating their clubs and weapons, and various other gesticulations, such as extending their arms, and wriggling their bodies. It was a most rude, barbarous scene, and, to our ideas, without any sort of meaning; but we observed that the women and children watched the whole proceeding with the greatest pleasure. Perhaps these dances originally represented some scenes, such as wars and victories; there was one called the Emu dance, in which each man extended his arm in a bent manner, so as to imitate the neck of that bird. In another dance, one man took off the movements of a kangaroo grazing in the woods, whilst a second crawled up, and pretended to spear him. When both tribes mingled in the dance, the ground trembled with the heaviness of their steps, and the air resounded with their wild cries. Every one appeared in high spirits, and the group of nearly naked figures, viewed by the light of the blazing fires, all moving in hideous harmony, formed a perfect representation of a festival amongst the lowest barbarians. In Tierra del Fuego, we have beheld many curious scenes in savage life, but never, I think, one where the natives were in such high spirits, and so perfectly at their ease. After the dancing was over, the whole party formed a great circle on the ground, and the boiled rice and sugar was distributed, to the delight of all.

After several tedious delays from clouded weather, on the 14th of March, we gladly stood out of King George's Sound on our course to Keeling Island. Farewell, Australia! you are a rising infant and doubtless some day will reign a great princess in the south: but you are too great and ambitious for affection, yet not great enough for respect. I leave your shores without sorrow or regret.

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CHAPTER XXII.

Keeling Island—Singular appearance—Scanty Flora—Transport of seeds—Birds and insects—Ebbing and flowing springs—Coral formations resisting power of ocean—Fields of dead coral—Stones transported by roots of trees—Great crab—Stinging corals—Structure of lagoon islands—Encircling and Barrier reefs—General proofs of subsidence in the Pacific—Theory of lagoon islands caused by subsidence of the land—Pacific and Indian oceans divided into alternate areas of elevation and subsidence—Points of eruption lie within the areas of elevation.

CORAL FORMATIONS.

April 1st.—We arrived in view of the Keeling or Cocos Islands, situated in the Indian ocean, and about six hundred miles distant from the coast of Sumatra. This is one of the lagoon islands of coral formation, similar to those we passed in the Dangerous Archipelago. An excellent idea of the general appearance of these extraordinary rings of land, which rise out of the depths of the ocean, may be obtained from the characteristic sketch of Whitsunday Island, in Beechey's Voyage.

When the ship was in the channel at the entrance, Mr. Liesk, an English resident, came off in his boat. The history of the inhabitants of this place, in as few words as possible, is as follows. About nine years ago, a Mr. Hare, a very worthless character, brought from the East Indian archipelago a number of Malay slaves, which now, including children, amount to more than a hundred. Shortly afterwards, Captain Ross, who had before visited these islands in his merchant-ship, arrived from England, bringing with him his family and goods for settlement. Along with him came Mr. Liesk, who had been a mate in his vessel. The Malay slaves soon ran away from the island on which Mr. Hare was settled, and joined Captain Ross's party. Mr. Hare upon this was ultimately obliged to leave these islands.

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The Malays are now nominally in a state of freedom, and certainly are so, as far as regards their personal treatment; but in most other points they are considered as slaves. From the discontented state of the people, the repeated removals, and, perhaps, also from a little mismanagement, things are not very prosperous. The island has no quadruped, excepting the pig, and no vegetable in any quantity excepting the cocoa-nut. On the latter the whole prosperity of the place depends. The only exports are oil from the nut, and the cocoa-nut* itself. On it the pigs, which are loaded with fat, almost entirely subsist, as likewise do the poultry and ducks. Even a huge land-crab is furnished by nature with a curious instinct and form of legs to open and feed on this same fruit.

The annular reef of this lagoon island is surmounted in the greater part of its length by linear islets. On the northern or leeward side there is an opening, through which vessels reach the anchorage. On entering, the scene was very curious and rather pretty; its beauty, however, being solely dependant on the brilliancy of the surrounding colours. The shallow, clear, and still water of the lagoon, resting in its greater part on white sand, is, when illuminated by a vertical sun, of a most vivid green. This brilliant expanse, several miles in width, is on all sides divided, either from the dark heaving water of the ocean by a line of snow-white breakers, or from the blue vault of heaven by the strips of land, crowned at an equal height by the tops of the cocoa-nut trees. As a white cloud here and there affords a pleasing contrast with the azure sky, so in the lagoon, dark bands of living coral appear through the emerald green water.

The next morning after anchoring, I went on shore on Direction Island. The strip of dry land is only a few hundred yards wide; on the lagoon side we have a white calcareous beach, the radiation from which in such a climate is

* The nuts are carried to Singapore and to Mauritius; the white part being grated into a pulp, is used in making curries, and is said greatly to improve that dish.

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very oppressive; and on the outer coast, a solid broad flat of coral rock, which serves to break the violence of the open sea. Excepting near the lagoon where there is some sand, the land is entirely composed of rounded fragments of coral. In such a loose, dry, stony soil, the climate of the intertropical regions alone could produce a vigorous vegetation. On some of the smaller islets, nothing could be more elegant, than the manner in which the young and full-grown cocoa-nut trees, without destroying each other's symmetry, were mingled into one wood. A beach of glittering white sand formed a border to these fairy spots.

I will now give a sketch of the natural history of these islands, which, from its very paucity, possesses a peculiar interest. The cocoa-nut tree, at the first glance, seems to compose the whole wood; there are, however, five or six other kinds. One of these grows to a very large size, but, from the extreme softness of its wood, is useless; another sort affords excellent timber for ship-building. Besides the trees, the number of plants is exceedingly limited, and consists of insignificant weeds. In my collection, which includes, I believe, nearly the perfect Flora, there are twenty species, without reckoning a moss, lichen, and fungus. To this number two trees must be added; one of which was not in flower, and the other I only heard of. The latter is a solitary tree of its kind in the whole group, and grows near the beach, where, without doubt, the one seed was thrown up by the waves. I do not include in the above list, the sugar-cane, banana, some other vegetables, fruit-trees, and imported grasses. As these islands consist entirely of coral, and at one time probably existed as a mere water-washed reef, all the productions now living here, must have been transported by the waves of the sea. In accordance to this, the Flora has quite the character of a refuge for the destitute: Professor Henslow informs me, that of the twenty species, nineteen belong to different genera, and these again to no less than sixteen orders!

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In Holman's* Travels, an account is given on the authority of Mr. A. S. Keating, who resided twelve months on these islands, of the various seeds, and other bodies, which have been known to have been washed on shore. "Seeds and plants from Sumatra and Java have been driven up by the surf on the windward side of the islands. Among them have been found the Kimiri, native of Sumatra and the peninsula of Malacca; the cocoa-nut of Balci, known by its shape and size; the Dadass, which is planted by the Malays with the pepper-vine, the latter intwining round its trunk, and supporting itself by the prickles on its stem; the soap-tree; the castor-oil plant; trunks of the sago palm; and various kinds of seeds unknown to the Malays who settled on the islands. These are all supposed to have been driven on shore by the N.W. monsoon to the coast of New Holland, and thence to these islands by the S.E. trade-wind. Large masses of Java teak, and yellow wood, have also been found, besides immense trees, of red and white cedar, and the blue gum-wood of New Holland, in a perfectly sound condition. All the hardy seeds, such as creepers, retain their germinating power, but the softer kinds, among which is the mangostin, are destroyed in the passage. Fishing-canoes, apparently from Java, have at times been washed on shore." It is interesting thus to discover how numerous the seeds are, which, coming from several countries, are drifted over the wide ocean. Professor Henslow tells me, he believes that nearly all the plants which I brought from this island, are common littoral species in the East Indian archipelago. From the direction, however, of the winds and currents, it seems scarcely possible that they can have come here in a direct line. If, as suggested with much probability by Mr. Keating, they have first been carried towards the coast of New Holland, and thence drifted back again, together with the productions of

* Holman's Travels, vol. iv., p. 378.

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that country, the seeds, before germinating, must have travelled between 1800 and 2400 miles.

Chamisso,* when describing the Radack Archipelago, situated in the central part of the Western Pacific, states that, "The sea brings to these islands the seeds and fruits of many trees, most of which have yet not grown here. The greater part of these seeds appear to have not yet lost the capability of growing." It is also said that trunks of northern firs are washed on shore, which must have been floated from an immense distance. These facts are highly interesting. It cannot be doubted, if there were land-birds to pick up the seeds when first cast on shore, and a soil more adapted for their growth than the loose blocks of coral, that such islands, although so isolated, would soon possess a more abundant Flora.

The list of land-animals is even poorer than that of plants. Some of the islets are inhabited by rats; and their origin is known to be due to a ship from the Mauritius, which was wrecked here. These rats have rather a different appearance from the English kind; they are smaller and much more brightly coloured. There are no true land-birds; for a snipe and a rail (*Rallus phillippensis*), though living entirely among the dry herbage, belong to the order of Waders. Birds of this order are said to occur on several of the low islands in the Pacific. At Ascension a rail (*Porphyrio?*) was shot near the summit of the mountain; and it was evidently a solitary straggler. From these circumstances, I believe, the waders are the first colonists of any island, after the innumerable web-footed species. I may add, that whenever I have noticed birds, which were not pelagic, very far out at sea, they always belonged to this order; and hence they would naturally become the earliest colonist of any distant point.

Of reptiles, I saw only one small lizard. Of insects, I took pains to collect every kind. Exclusive of spiders, which

* Kotzebue's First Voyage, vol. iii., p. 155.

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were numerous, there were thirteen species.* Of these, one only was a beetle. A small species of ant, swarmed by thousands under the loose dry blocks of coral, and was the only true insect which was abundant. Although the productions of the land are thus scanty; if we look to the waters of the surrounding sea, the number of organic beings is indeed infinite.

Chamisso† has described the natural history of Romanzoff, a lagoon island in the Radack Archipelago. The number and kind of productions there is very nearly the same with those here. One small lizard was seen: wading birds (Numenius and Scolopax) were numerous, and very tame. Of plants, he states there were nineteen species (including one fern); and some of them are the same species with those I collected here, although on an island situated in a different ocean.

These strips of land are raised only to that height, to which the surf can throw fragments, and the wind heap up sand. Their protection is due to the outward and lateral increase of the reef, which thus breaks the sea. The aspect and constitution of these islets at once call up the idea, that the land and the ocean are here struggling for mastery: although terra-firma has obtained a footing, the denizens of the other element think their claim at least equal. In every part one meets hermit-crabs of more than one species,‡ carrying on their backs the houses they have stolen from the neighbouring beach. Overhead, the trees are occupied by numbers of gannets, frigate-birds, and terns.

* The thirteen species belong to the following orders. *Coleoptera*, a species of minute Elater; *Orthoptera*, a Gryllus and Blatta; *Hemiptera*, one; *Homoptera*, two; *Neuroptera*, a Chrysopa; *Hymenoptera*, two ants; *Lepidoptera Nocturna*, a Diopæa, and a Pterophorus (?). *Diptera*, two.

† Kotzebue's First Voyage, vol. iii., p. 222.

‡ The large claws or pincers of some of these crabs, are most beautifully adapted, when drawn back, to form an operculum to the shell, which is nearly as perfect as the proper one that belonged to the original molluscous animal. I was assured, and as far as my observation went it was confirmed, that there are certain kinds of these hermits, which always use certain kinds only of old shells.

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From the many nests and smell of the atmosphere, this might be called a sea-rookery. The gannets, sitting on their rude nests, look at an intruder with a stupid, yet angry air. The noddies, as their name expresses, are silly little creatures. But there is one charming bird; it is a small and snow-white tern, which smoothly hovers at the distance of an arm's length from your head; its large black eye scanning with quiet curiosity your expression. Little imagination is required to fancy, that so light and delicate a body must be tenanted by some wandering fairy spirit.

Sunday, April 3d.—After service I accompanied Captain FitzRoy to the settlement, situated at the distance of some miles, on a point thickly scattered over with tall cocoa-nut trees. Captain Ross and Mr. Liesk live in a large barn-like house open at both ends, and lined with mats made of woven bark. The houses of the Malays are arranged along the shore of the lagoon. The whole place had rather a desolate aspect, because there were no gardens to show the signs of care and cultivation. The natives belong to different islands in the East Indian Archipelago, but all speak the same language: we saw inhabitants of Borneo, Celebes, Java, and Sumatra. In the colour of their skin they resemble the Tahitians, nor do they widely differ from them in form of features. Some of the women, however, showed a good deal of the Chinese character. I liked both their general expression and the sound of their voices. They appeared poor, and their houses were destitute of furniture; but it was evident, from the plumpness of the little children, that cocoa-nuts and turtle afford no bad sustenance.

On this island the wells are situated from which ships obtain water. At first sight it appears not a little remarkable that the fresh water should regularly ebb and flow with the usual tide.* We must believe that the compressed sand

* These ebbing and flowing wells are common in parts of the West Indies. The simple fact, that in low islands of small extent, and composed of porous materials, the rain-water can have no tendency to sink lower than the level of the surrounding sea, and must therefore accumulate

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or porous coral rock acts like a sponge; and that the rain water which falls on the ground being specifically lighter than the salt merely floats on its surface, and is subject to the same movements. There can be no actual attraction between salt and fresh water, and the spongy texture must tend to prevent all admixture from slight disturbances. On the other hand, where the foundation consists only of loose fragments, upon a well being dug, salt or brackish water enters; of which fact we saw an instance on this same island.

After dinner we stayed to see a half superstitious scene acted by the Malay women. They dress a large wooden spoon in garments, carry it to the grave of a dead man, and then at the full of the moon they pretend it becomes inspired, and will dance and jump about. After the proper preparations, the spoon held by two women became convulsed, and danced in good time to the song of the surrounding children and women. It was a most foolish spectacle, but Mr. Liesk maintained that many of the Malays believed in its spiritual movement. The dance did not commence till the moon had risen, and it was well worth remaining to behold her bright globe so quietly shining through the long arms of the cocoa-nuts, as they waved in the evening breeze. These scenes of the tropics are in themselves so delicious, that they almost equal those dearer ones to which we are bound by each best feeling of the mind.

The next day I employed myself in examining the very interesting yet simple structure and origin of these islands. The water being unusually smooth I waded in as far as the living mounds of coral, on which the swell of the open sea breaks. In some of the gullies and hollows there were beautiful green and other coloured fishes, and the forms and tints of many of the zoophytes were admirable. It is excusable to grow enthusiastic over the infinite numbers of organic beings with which the sea of the tropics, so prodigal

near the surface, having been overlooked; it has been supposed that sand possesses the power of filtering the salt which is dissolved in the sea-water.

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of life, teems; yet I must confess I think those naturalists who have described in well-known words the submarine grottoes decked with a thousand beauties, have indulged in rather exuberant language.

April 6th.—I accompanied Captain FitzRoy to an island at the head of the lagoon: the channel was exceedingly intricate, winding through fields of delicately branched corals. We saw several turtle, and two boats were then employed in catching them. The method is rather curious: the water is so clear and shallow, that although at first a turtle quickly dives out of sight, yet in a canoe, or boat under sail, the pursuers after no very long chase come up to it. A man standing ready in the bows, at this moment dashes through the water upon the turtle's back; then clinging with both hands by the shell of its neck, he is carried away till the animal becomes exhausted and is secured. It was quite an interesting chase to see the two boats thus doubling about, and the men dashing into the water trying to seize their prey.

When we arrived at the head of the lagoon, we crossed the narrow islet and found a great surf breaking on the windward coast. I can hardly explain the cause, but there is to my mind a considerable degree of grandeur in the view of the outer shores of these lagoon islands. There is a simplicity in the barrier-like beach, the margin of green bushes and tall cocoa-nuts, the solid flat of coral rock, strewed here and there with great fragments, and the line of furious breakers, all rounding away towards either hand. The ocean throwing its waters over the broad reef appears an invincible, all-powerful enemy, yet we see it resisted and even conquered by means which at first seem most weak and inefficient.

It is not that the ocean spares the rock of coral; the great fragments scattered over the reef, and accumulated on the beach, whence the tall cocoa-nut springs, plainly bespeak the unrelenting power of its waves. Nor are there any periods of repose granted. The long swell, caused by the gentle but steady action of the trade-wind always blowing in

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one direction over a wide area, causes breakers, which even exceed in violence those of our temperate regions, and which never cease to rage. It is impossible to behold these waves without feeling a conviction that an island, though built of the hardest rock, let it be porphyry, granite, or quartz, would ultimately yield and be demolished by such irresistible forces. Yet these low, insignificant coral islets stand and are victorious: for here another power, as antagonist to the former, takes part in the contest. The organic forces separate the atoms of carbonate of lime one by one from the foaming breakers, and unite them into a symmetrical structure. Let the hurricane tear up its thousand huge fragments; yet what will this tell against the accumulated labour of myriads of architects at work night and day, month after month. Thus do we see the soft and gelatinous body of a polypus, through the agency of the vital laws, conquering the great mechanical power of the waves of an ocean, which neither the art of man, nor the inanimate works of nature could successfully resist.

We did not return on board till late in the evening, as we staid some time in the lagoon collecting specimens of the giant Chama, and looking at the coral fields. Near the head of the lagoon I was much surprised to find a wide area, considerably more than a mile square, covered with a forest of branching coral, which though standing upright was all dead and rotten. At first I was quite at a loss to understand the cause; afterwards it occurred to me that it was owing to the following rather curious combination of circumstances. It should, however, first be stated, that corals are never able to survive even a short exposure in the air to the sun's rays, so that their upward limit of growth is determined by that of lowest water at spring tides. It appears from some old charts, that the long island to windward was formerly separated by wide channels into several islets; this fact is likewise indicated by the less age of the trees in certain portions. Under this former condition of the reef, a strong breeze, by throwing more water over the barrier, would tend to raise

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the level of the lagoon. Now it acts in a directly contrary manner; for the water, not only is not increased by currents from the outside, but is blown outwards by the force of the wind. Hence, it is observed, that the tides near the head of the lagoon do not rise so high during strong breezes as on ordinary occasions. This difference of level, although no doubt very small, has I believe caused the death of those coral groves, which under the former condition of things had attained the utmost possible limit of upward growth.

A few miles north of Keeling there is another small lagoon island, the centre of which is nearly filled up. Captain Ross found in the conglomerate of the outer coast a well rounded fragment of greenstone, rather larger than a man's head; he and the men with him were so much surprised at this, that they brought it away and preserved it as a curiosity. The occurrence of this one stone, where every other particle of matter is calcareous, certainly is very puzzling. The island has scarcely ever been visited, nor is it probable that a ship had been wrecked there. From the absence of any better explanation, I came to the conclusion that it must have come there entangled in the roots of some large tree: when, however, I considered the great distance from the nearest land, the combination of chances against a stone thus being entangled, the tree washed into the sea, floated so far, then landed safely, and the stone finally so embedded as to allow of its discovery, I was almost ashamed of imagining a means of transport so improbable. It was therefore with great interest that I found Chamisso,* the justly distinguished naturalist who accompanied Kotzebue, stating that the inhabitants of the Radack Archipelago,

* Kotzebue's first voyage, vol. iii., p. 155. It is said, "The sea throws up on the reefs of Radack the trunks of northern firs (!) and trees of the torrid zone (palms, bamboos). It provides the inhabitants not only with timber for boats, but it also brings them in wrecks of European ships, the iron which they want."—"They receive, in a similar manner, another treasure, hard stones, fit for whetting. They are sought for in the roots and hollows of the trees which the sea throws up."

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a group of lagoon islands in the midst of the Pacific, obtained stones for sharpening their instruments by searching the roots of trees which are cast up on the beach. It will be evident that this must have happened several times, since laws have been established that such stones belong to the chief, and a punishment is inflicted on any one who attempts to defraud him of this right. When the isolated position of these small islands in the midst of a vast ocean—their great distance from any land excepting that of coral formation, a fact well attested by the value which the inhabitants, who are such bold navigators, attach to a stone of any kind,* —and the slowness of the currents of the open sea are all considered, the occurrence of pebbles thus transported does appear wonderful. Stones may often be thus transported; and if the island on which they are stranded is constructed of any other substance besides coral, they would scarcely attract attention, and their origin at least would never have been guessed. Moreover this agency may long escape discovery from the probability of trees, especially those loaded with stones, floating beneath the surface. In the channels of Tierra del Fuego large quantities of drift timber are cast upon the beach, yet it is extremely rare to meet a tree swimming on the water. It is easy to conceive that waterlogged wood might be transported, when floating close to the bottom, and occasionally even just touching it. The knowledge of any result which (with sufficient time allowed) can be produced by causes, though appearing infinitely improbable, is valuable to the geologist, for he by his creed deals with centuries and thousands of years as others do with minutes. If a few isolated stones are discovered in a mass of fine sedimentary strata, it cannot, after the above facts, be considered as very improbable that they may have been drifted there by the floating timber of a former epoch.

During another day I visited Horsburg and West Island.

* Some natives carried by Kotzebue to Kamtschatka collected stones among other valuable articles to take back to their country.

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In the latter, the vegetation was perhaps more luxuriant than in any other part. The cocoa-nut trees generally grow separate, but here the young ones flourished beneath their tall parents, and formed with their long and curved fronds the most shady arbours. Those alone who have tried it know how delicious it is to be seated in such shade, and drink the cool pleasant fluid of the cocoa-nut, which hangs in great bunches close by. In this island there is a large bay or little lagoon, composed of the finest white sand: it is quite level, and is only covered by the tide at high water; from this large bay smaller creeks penetrated the surrounding woods. To see a field of glittering sand, representing water, and around the border of which the cocoa-nut trees extended their tall and waving trunks, formed a singular and very pretty view.

I will now briefly mention a few zoological observations which I made during our stay at these islands. I have before alluded to a crab which lives on the cocoa-nuts; it is very common on all parts of the dry land, and grows to a monstrous size. It is closely allied or identical with *Birgos latro*. This crab has its front pair of legs terminated by very strong and heavy pincers, and the last pair by others which are narrow and weak. It would at first be thought quite impossible for a crab to open a strong cocoa-nut covered with the husk; but Mr. Liesk assures me he has repeatedly seen the operation effected. The crab begins by tearing the husk, fibre by fibre, and always from that end under which the three eye holes are situated; when this is completed, the crab commences hammering with its heavy claws on one of these eye holes, till an opening is made. Then turning round its body, by the aid of its posterior and narrow pair of pincers, it extracts the white albuminous substance. I think this is as curious a case of instinct as ever I heard of, and likewise of adaptation in structure between two objects apparently so remote from each other in the scheme of nature as a crab and a cocoa-nut tree. The Birgos is diurnal in its habits, but every night it is said to pay

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a visit to the sea, no doubt for the purpose of moistening its branchiæ. The young are likewise hatched, and live for some time, on the coast. These crabs inhabit deep burrows, which they excavate beneath the roots of trees; and here they accumulate surprising quantities of the picked fibres of the cocoa-nut husk, on which they rest as on a bed. The Malays sometimes take advantage of their labour by collecting the course fibrous substance and using it as junk. These crabs are very good to eat; moreover under the tail of the larger ones there is a great mass of fat, which when melted sometimes yields as much as a quart bottle full of limpid oil. It has been stated by some authors that the *Birgos latro* crawls up the *cocoa-nut trees* for the purpose of stealing the nuts: I very much doubt the possibility of this; but with the *Pandanus** the task would be very much easier. I understood from Mr. Liesk that on these islands the Birgos lives only on the nuts which fall to the ground.

I was a good deal surprised by finding two species of coral of the genus Millepora, possessed of the property of stinging. The stony branches or plates when taken fresh from the water have a harsh feel and are not slimy, although possessing a strong and disagreeable odour. The stinging property seems to vary within certain limits in different specimens: when a piece was pressed or rubbed on the tender skin of the face or arm, a pricking sensation was generally caused, which came on after the interval of a second, and lasted only for a short time. One day, however, by merely touching my face with one of the branches the pain was instantaneous; it increased as usual after a few seconds, and remaining sharp for some minutes, was perceptible for half an hour afterwards. The sensation was as bad as that from a nettle, but more like that caused by the Portuguese man-of-war (*Physalia*). Little red spots were produced on the tender skin of the arm, which appeared as if they would have formed watery pustules, but did not. The circumstance of this sting-

* See Proceedings of Zoological Society, 1832, p. 17.

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ing property is not new, though it has scarcely been sufficiently remarked on. M. Quoy* mentions it, and I have heard of stinging corals in the West Indies. In the East Indian sea a stinging sea-weed also is found.

There was another and quite distinct kind of coral, which was remarkable from the change of colour, which it underwent shortly after death; when alive it was of a honey-yellow, but some hours after being taken out of water, it became as black as ink. I may just mention, as partly connected with the above subjects, that there are here two species of fish, of the genus Sparus, which exclusively feed on coral. Both are coloured of a splendid bluish-green, one living invariably in the lagoon, and the other amongst the outer breakers. Mr. Liesk assured us that he had repeatedly seen whole shoals grazing with their strong bony jaws on the tops of the coral branches.† I opened the intestines of several, and found them distended with a yellowish calcareous matter. These fish, together with the lithophagous shells and nereidous animals, which perforate every block of dead coral, must be very efficient agents in producing the finest kind of mud, and this, when derived from such materials, appears to be the same with chalk.

April 12th.—In the morning, we stood out of the Lagoon. I am glad we have visited these islands: such formations surely rank high amongst the wonderful objects of this world. It is not a wonder, which at first strikes the eye of the body, but rather, after reflection, the eye of reason. We feel surprised, when travellers relate accounts of the vast extent of certain ancient ruins; but how utterly insignificant are the greatest of these, when compared to the pile of stone here accumulated by the work of various minute animals. Throughout the whole group of islands, every single atom,‡

* Freycinet's Voyage, vol. i., p. 597.

† It has sometimes been thought (*vide* Quoy in Freycinet's Voyage), that coral-eating fish were poisonous; such certainly was not the case with these Spari.

‡ I exclude, of course, the soil which has been brought here in vessels

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even from the smallest particle to large fragments of rock, bears the stamp of having been subjected to the power of organic arrangement. Captain FitzRoy, at the distance of but little more than a mile from the shore, sounded with a line, 7200 feet long, and found no bottom. This island is, therefore, a lofty submarine mountain, which has a greater inclination than even those of volcanic origin on the land. I will now give a sketch* of the general results at which I have arrived, respecting the origin of the various classes of reefs, which occur scattered over such large spaces of the intertropical seas.

The first consideration to attend to, is, that every observation leads to the conclusion that those lamelliform corals, which are the efficient agents in forming a reef, cannot live at any considerable depth. As far as I have personally seen, I judge of this from carefully examining the impressions on the soundings, which were taken by Captain FitzRoy at Keeling Island, close outside the breakers, and from some others which I obtained at the Mauritius. At a depth under ten fathoms, the arming came up as clean as if it had been dropped on a carpet of thick turf; but as the depth increased, the particles of sand brought up became more and more numerous, until, at last, it was evident the bottom consisted of a smooth layer of calcareous sand, interrupted only at intervals by shelves, composed probably of dead coral rock. To carry on the analogy, the blades of grass grew thinner and thinner, till, at last, the soil was so sterile, that nothing sprung from it.

As long as no facts, beyond those relating to the structure of lagoon islands were known, so as to establish some more comprehensive theory, the belief that corals constructed their habitations, or, speaking more correctly, their skeletons, on the circular crests of submarine craters, was

from Malacca and Java, and the small fragments of pumice, drifted here, together with the seeds of East Indian plants. The one block of greenstone, moreover, on the Northern Lagoon must be excepted.

* This sketch was read before the Geological Society, May, 1837.

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both ingenious and very plausible. Yet the sinuous margin of some, as in the Radack Islands of Kotzebue, one of which is fifty-two miles long, by twenty broad, and the narrowness of others, as in Bow Island (of which there is a chart on a large scale, forming part of the admirable labours of Captain Beechey), must have startled every one who considered this subject.

The very general surprise of all those who have beheld lagoon islands, has perhaps been one chief cause why other reefs, of an equally curious structure have been almost overlooked:* I allude to the encircling reefs. We will take, as an instance, Vanikoro, celebrated on account of the shipwreck of La Peyrouse. The reef there runs at the distance of nearly two, and in some parts three miles from the shore, and is separated from it by a channel having a general depth between thirty and forty fathoms, and, in one part, no less than fifty, or three hundred feet. Externally, the reef rises from an ocean profoundly deep. Can any thing be more singular than this structure? It is analogous to that of a lagoon, but with an island standing, like a picture in its frame, in the middle. A fringe of low alluvial land in these cases generally surrounds the base of the mountains; this, covered by the most beautiful productions of a tropical land, backed by the abrupt mountains and fronted by a lake of smooth water, only separated from the dark waves of the ocean by a line of breakers, form the elements of the beautiful scenery of Tahiti—so well called the Queen of Islands. We cannot suppose these encircling reefs are based on an external crater, for the central mass sometimes consists of primary rock, or on any accumulation of sedimentary deposits, for the reefs follow indifferently the island itself, or its submarine prolongation. Of this latter case there is a grand instance

* Mr. De la Beche, however, seems to have been fully aware of the difficulty. He says, "there are certain situations, where coral reefs run, as it were, in a line with the coast, but separated from it by deep water, which would seem to require a different explanation." — *Geological Manual*, p. 142.

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in New Caledonia, where the reefs extend no less than 140 miles beyond the island.

The great Barrier which fronts the N.E. coast of Australia, forms a third class of reef. It is described by Flinders as having a length of nearly one thousand miles, and as running parallel to the shore, at a distance of between twenty and thrty miles from it, and, in some parts, even of fifty and seventy. The great arm of the sea thus included, has a usual depth of between ten and twenty fathoms, but this increases towards one end to forty and even sixty. This probably is both the grandest and most extraordinary reef now existing in any part of the world.

It must be observed, that the reef itself in the three classes, namely, lagoon, encircling, and barrier, agrees in structure, even in the most minute details: but these I have not space here even to allude to. The difference entirely lies in the absence or presence of neighbouring land, and the relative position which the reefs bear to it. In the two last-mentioned classes, there is one difficulty in undertaking their origin, which must be pointed out. Since the time of Dampier it has been remarked, that high land and deep seas go together. Now when we see a number of mountainous islands coming abruptly down to the sea-shore, we must suppose the strata of which they are composed, are continued with nearly the same inclination beneath the water. But, in such cases, where the reef is distant several miles from the coast, it will be evident upon a little consideration, that a line drawn perpendicularly from its outer edge down to the solid rock on which the reef must be based, very far exceeds that small limit at which the efficient lamelliform corals exist.

In some parts of the sea, as we shall hereafter mention, reefs do occur which fringe rather than encircle islands—the distance from the shore being so small, where the inclination of the land is great, that there is no difficulty in understand-the growth of the coral. Even in these "fringing" reefs, as I shall call them in contradistinction to the "encircling," the

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reef is not attached quite close to the shore. This appears to be the result of two causes: namely, first, that the water immediately adjoining the beach is rendered turbid by the surf, and therefore injurious to all zoophytes; and, secondly, that the larger and efficient kinds only flourish on the outer edge amidst the breakers of the open sea. The shallow space between the skirting reef and the shore has, however, a very different character from the deep channel, similarly situated with respect to those of the encircling order.

Having thus specified the several kinds of reefs, which differ in their forms and relative position with regard to the neighbouring land, but which are most closely similar in all other respects (as I could show if I had space), it will, I think, be allowed that no explanation can be satisfactory which does not include the whole series. The theory which I would offer, is simply, that as the land with the attached reefs subsides very gradually from the action of subterranean causes, the coral-building polypi soon raise again their solid masses to the level of the water: but not so with the land; each inch lost is irreclaimably gone;—as the whole gradually sinks, the water gains foot by foot on the shore, till the last and highest peak is finally submerged.

Before I explain this view more in detail, I must enter on a few considerations, which render such changes of level not improbable. Indeed, the simple fact of a large portion of the continent of South America, still rising under our eyes, and abounding with proofs of similar elevations on a grander scale during the recent period, takes away any excessive improbability of a movement similar in kind, but in an opposite direction. Mr. Lyell, who first suggested the idea of a general subsidence with reference to coral reefs, has remarked that the existence of so small a portion of land in the Pacific, where so many causes both aqueous and igneous tend to its production, renders such sinking of the foundation probable. There is, however, another argument of much greater weight, which may be inferred from the inconsiderable depth at which corals grow. We see large extents

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of ocean, of more than a thousand miles in one direction and several hundreds in another, scattered over with islands, none of which rise to a greater height than that to which waves can throw fragments, or the wind heap up sand. Now if we leave out of the question subsidence, the foundation on which these reefs are built, must in every case come to the surface within that small limit (we may say twenty fathoms) at which corals can live. This conclusion is so extremely improbable that it may at once be rejected: for in what country can there be found a broad and grand range of mountains of the same height within a hundred and twenty feet? But on the idea of subsidence, the case is at once clear: as each point, one after the other according to its altitude, was submerged, the coral grew upwards, and formed the many islets now standing at one level.

Having endeavoured on general grounds not only to remove any extreme degree of improbability in the belief of a general subsidence, but likewise to show that it is almost necessary to account for the existence of a vast number of reefs on one level, we will now see how far the same idea will apply to the peculiar configuration in the several classes. Let us imagine an island merely fringed by reefs extending to a short distance from the shore; in which case, as we have before remarked, there is no difficulty in understanding their structure. Now let this island subside by a series of movements of extreme slowness, the coral at each interval growing up to the surface. Without the aid of sections it is not very easy to follow out the result, but a little reflection will show that a reef encircling the shore at a greater or less distance, according to the amount of subsidence, would be produced. If we suppose the sinking to continue, the encircled island must, by the submergence of the central land but upward growth of the ring of coral, be converted into a lagoon island. If we take a section of some encircled island on a true scale, as for instance Gambier, which has been so well described by Captain Beechey, we shall not find

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the amount of movement very great, which would be necessary to change a well-characterized encircling reef, into as characteristic a lagoon island.

It will at once be evident that a coral reef, closely skirting the shore of a continent, would, in like manner after each subsidence, rise to the surface; the water, however, always encroaching on the land. Would not a barrier reef necessarily be produced, similar to the one extending parallel to the coast of Australia? It is indeed but uncoiling one of those reefs which encircle at a distance so many islands.

Thus the three great classes of reef, lagoon, encircling, and barrier, are connected by one theory. It will perhaps be remarked, if this be true, there ought to exist every intermediate form between a closely-encircled and a lagoon island. Such forms actually occur in various parts of the ocean: we have one, two, or more islands encircled in one reef; and of these some are of small proportional size to the area enclosed by the coral formation; so that a series of charts might be given, showing a gradation of character between the two classes. In New Caledonia, where the double line of reef projects 140 miles beyond the island, we may imagine we see this change in progress. At the northern extremity, reefs occur, some of which are of the encircling kind, and others almost with the character of true lagoon islands. The line of reef which fronts the whole west coast of this great island, has by some been called a barrier. It is four hundred miles long; and may be said thus to form a link between an ordinary encircling reef and the great Australian barrier.

I should perhaps have entered before into the consideration of one apparent difficulty in the origin of lagoon islands. It may be said, granting the theory of subsidence, a mere circular disc of coral would be formed, and not a cup-shaped mass. In the first place, even in reefs closely fringing the land (as before remarked), the corals do not grow on the shore itself, but leave a shallow channel. Secondly, the strong and vigorous species which

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alone build a solid reef, are never found within the lagoon; they only flourish amidst the foam of the never-tiring breakers. Nevertheless, the more delicate corals, though checked by several causes, such as strong tides and deposits of sand, do constantly tend to fill up the lagoon; but the process must become slower and slower, as the water in the shallow expanse is rendered subject to accidental impurities. A curious instance of this happened at Keeling Island, where a heavy tropical storm of rain killed nearly all the fish. When the coral at last has filled up the lagoon to the height of lowest water at spring-tides, which is the extreme limit possible,—how, afterwards, is the work to be completed? There is no high land whence sediment can be poured down; and the dark-blue colour of the ocean bespeaks its purity. The wind, carrying calcareous dust from the outer coast, is the only agent which can finally convert the lagoon island into solid land, and how slow must this process be!

Subsidence of the land must always be most difficult to detect, excepting in countries long civilized,—for the movement itself tends to conceal all evidence of it. Nevertheless, at Keeling Island, tolerably conclusive evidence of such movement could be observed. On every side of the lagoon, in which the water is as tranquil as in the most sheltered lake, old cocoa-nut trees were undermined and falling. Captain FitzRoy likewise pointed out to me on the beach the foundation-posts of a storehouse, which the inhabitants said had stood, seven years before, just above high-water mark, but now was daily washed by the tide. Upon asking the people whether they ever experienced earthquakes, they said, that lately the island had been shaken by a very bad one; and that they remembered two others during the last ten years. I no longer doubted concerning the cause which made the trees fall, and the storehouse to be washed by the daily tide.

At Vanikoro, the encircled island already mentioned, I gathered from Captain Dillon's account, that the alluvial

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land at the foot of the mountain was very small in quantity, the channel extremely deep, and the islets on the reef itself, which result from the gradual accumulation of fragments, singularly few in number; all of which, together with the wall-like structure of the reef both inside as well as outside, indicated to my mind, that, without doubt, the movements of subsidence had lately been rapid. At the end of the chapter, it is stated that this island is shaken by earthquakes of extreme violence.

I may here mention a circumstance, which to my mind had the same weight as positive evidence, though bearing on another part of the question. M. Quoy, when discussing in general terms the nature of coral reefs, gives a description which is applicable only to those which, *skirting* the shore, do not require a foundation at any greater depth than that from which the coral-building polypi can spring. I was at first astonished at this, as I knew he had crossed both the Pacific and Indian oceans, and must, as I thought, have seen the class of widely-encircling reefs, which indicate a subsiding land. He subsequently mentions several islands as instances of his description of the general structure; by a singular chance, the whole can be shown, by his own words, in different parts of his account, to have been recently elevated. Therefore, that which appeared so adverse to the theory, became as strong in its confirmation.

Continental elevations, as observed in South America and other parts, seem to act over wide areas with a very uniform force; we may therefore suppose that continental subsidences act in a nearly similar manner. On this assumption, and taking on the one hand, lagoon islands, encircling and barrier reefs, as indications of subsidence; and on the other, raised shells and corals, together with mere skirting reefs, as our proof of elevation, we may test the truth of the theory,—that their configuration has been determined by the kind of subterranean movement,—by observing whether any uniform results can be obtained. I think it can be shown that such is the case in a very

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remarkable degree; and that certain laws may be inferred from the examination, of far more importance than the mere explanation of the origin of the circular or other kinds of reef.

If there had been space, I should have made a few general remarks, before entering into any detail. I may, however, just notice the remarkable absence of the reef-building polypi over certain wide areas within the tropical sea: for instance, on the whole west coast of America, and, as I believe, of Africa (?), and round the eastern islands in the Atlantic ocean. Although certain species of lamelliform zoophytes are found on the shores of the latter islands, and though calcareous matter is abundant to excess, yet reefs are never formed. It would appear that the effective species do not occur there; of which circumstance I apprehend no explanation can be given, any more than why it has been ordained that certain plants, as heaths, should be absent from the New World, although so common in the Old.

Without entering into any minute geographical details, I must observe, that the usual direction of the island groups in the central parts of the Pacific, is N.W. and S.E. This must be noticed, because subterranean disturbances are known to follow the coast lines of the land. Commencing on the shores of America, there are abundant proofs that the greater part has been elevated within the recent period, but as coral reefs do not occur there, it is not immediately connected with our present subject. Immediately adjoining the continent there is an extent of ocean remarkably free from islands, and where of course there exists no possible indication of any change of level. We then come to a N.W. by W. line dividing the open sea from one strewed with lagoon islands, and including the two beautiful groups of encircled islands the Society and Georgian Archipelagoes. This great band having a length of more than four thousand miles by six hundred broad must, according to our view, be an area of subsidence. We will at present for convenience sake

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pass over the space of ocean immediately adjoining it, and proceed to the chain of islands including the New Hebrides, Solomon, and New Ireland. Any one who examines the charts of the separate islands in the Pacific, engraved on a large scale, will be struck with the absence of all distant or encircling reefs round these groups: yet it is known that coral occurs abundantly close in shore. Here, then, according to the theory, there are no proofs of subsidence; and in conformity to this we find in the works of Forster, Lesson, Labillardière, Quoy, and Bennett, constant allusion to the masses of elevated coral. These islands form, therefore, a well-determined band of elevation: between it and the great area of subsidence first mentioned there is a broad space of sea irregularly scattered with islets of all classes; some with proofs of recent elevation and merely fringed by reefs; others encircled; and some lagoon islands. One of the latter is described by Captain Cook as a grand circle of breakers without a single spot of land; in this case we may believe that an ordinary lagoon island has been recently submerged. On the other hand, there are proofs of other lagoon islands having been lifted up several yards above the level of the sea, but which still retain a pool of salt water in their centres. These facts show an irregular action in the subterranean forces; and when we remember that the space lies directly between the well-marked area of elevation and the enormous one of subsidence, an alternate and irregular movement seems almost probable.

To the westward of the New Hebrides line of elevation we have New Caledonia, and the space included between it and the Australian barrier, which Flinders, on account of the number of reefs, proposed to call the Corallian Sea. It is bounded on two sides by the grandest and most extraordinary reefs in the world, and is likewise terminated to the northward by the coast of Louisiade,—most dangerous on account of its distant reefs. This, then, according to our theory, is an area of subsidence. I may here remark, that as the Barrier is supposed to be produced by the subsidence

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of the coast of the mainland, it may be expected that any outlying islands would have formed lagoon islands. Now Bligh and others distinctly state that some of the islands there are precisely similar to the well-known lagoon islands in the Pacific; there are also encircled islands, so that the three classes supposed to be produced by the same movement are there found in juxtaposition; as likewise happens, but in a less evident manner, at New Caledonia and in the Society Archipelago.

The New Hebrides line of islands, may be observed to bend abruptly at New Britain, thence to run nearly east and west; and, lastly, to resume its former north-west direction in Sumatra and the peninsula of Malacca. The figure may be compared to the letter S laid obliquely, but the line is often double. We have shown that the southern part, as far north as New Ireland, abounds with proofs of elevation, so is it with the rest. Since the time of Bougainville every voyager adduces some fresh instance of such changes throughout a great part of the East Indian archipelago. I may specify New Guinea, Wageeoo, Ceram, Timor, Java, and Sumatra. Coral reefs are abundant in the greater part of these seas, but they merely skirt the shores. In the same manner as we have followed the curved line of elevation, so may we that of subsidence. At Keeling Island, I have already mentioned that there exist proofs of the latter movement: and it is a very interesting circumstance, that during the last earthquake, by which that island was affected, Sumatra, though distant nearly 600 miles, was violently shaken. Bearing in mind that there is evidence of recent elevation on the coast of the latter, one is strongly tempted to believe that as one end of the lever goes up, the other goes down: that as the East Indian archipelago rises, the bottom of the neighbouring sea sinks and carries with it Keeling Island, which would have been submerged long ago in the depths of the ocean, had it not been for the wonderful labours of the reef-building polypi.

As I have remarked, the islands in this great archipelago are only skirted with reefs; and it appears from the state-

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ments of those who have visited them, as well as from an examination of the charts, that lagoon islands are not found there. This in itself is remarkable, but it becomes far more so when it is known, that according to all accounts (and distinctly stated by Mr. De la Beche*) they are likewise absent in the West Indian sea, where coral is most abundant: now every one is aware of the numerous proofs of recent elevation in most parts of that archipelago. Again, Ehrenberg has observed that lagoon islands do not occur in the Red Sea: in Lyell's Geology, and in the Geographical Journal, proofs are given of recent elevation on the shores of a large part of that sea. Excepting on the theory of the form of reefs being determined by the kind of movement to which they have been subjected; it is a most anomalous circumstance, and which has never been attempted to be solved, that the lagoon structure being universal and considered as characteristic in certain parts of the ocean, should be entirely absent in others of equal extent.

I may here also just recal to mind the cases of skirting reefs mentioned by M. Quoy (to which number several others might be added), where proofs of elevation occurred. Some general law must determine the marked difference between reefs merely skirting the shore, and others rising from a deep ocean in the form of distant rings. We have endeavoured to show that with a subsiding movement, the first and simple class must necessarily pass into the second, and more remarkable structure.

To proceed with our examination: to the westward of the prolongation of the line of subsidence, of which Keeling Island is the index, we have an area of elevation. For on the northern end of Ceylon and on the eastern shores of India, elevated shells and corals, such as now exist in the neighbouring sea, have been observed. Again in the middle of the Indian ocean, the Laccadive, Maldive, and Chagos line of atolls or lagoons show a line of subsidence. The

* Geological Manual, p. 141.

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best characterized of these, namely, the Maldive islands, extend in length for 480 miles, with an average breadth of sixty. These atolls agree in most respects with the lagoons of the Pacific; they differ, however, in several of them being crowded together—such little groups being separated from other groups by profoundly deep channels. Now if we look in a chart, at the prolongation of the reef towards the northern end of New Caledonia, and then complete the work of subsidence, so as to continue producing the same results; we should have the original reef broken up into many patches; each of which, from the vigorous growth of coral on the outside, would have a constant tendency to assume a rounded form. Every accidental break in the continuity of the first line would determine a fresh circle. In the case, therefore, of the Low or Dangerous Archipelago in the Pacific, I believe that the lagoon islands were moulded round the flanks of so many distinct islands; but in the Maldives, that one single mountainous island, bordered by reefs, and very nearly of the same actual figure and dimensions with New Caledonia, formerly occupied that part of the ocean.

Lastly, to the extreme westward, the coast of Africa is closely skirted by coral reefs, and according to facts stated in Captain Owen's voyage, has probably been uplifted within a recent period. The same remark applies to the northern part of Madagascar, and, judging from the reefs likewise at the Seychelles, situated on the submarine prolongation of that great island. Between these two, N.N.E. and S.S.W. lines of elevation, some lagoon and widely-encircled islands indicate a band of subsidence.

When we consider the absence both of widely-encircling reefs and lagoon islands in the several archipelagoes and wide areas, where there are proofs of elevations; and on the other hand the converse case of the absence of such proof where reefs of those classes do occur; together with the juxtaposition of the different kinds produced by movements of the same order, and the symmetry of the whole, I think it will be difficult (even independently of the explanation it

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offers of the peculiar configuration of each class) to deny a great probability to this theory. Its importance, if true, is evident; because we get at one glance an insight into the system by which the surface of the land has been broken up, in a manner somewhat similar, but certainly far less perfect, to what a geologist would have done who had lived his ten thousand years, and kept a record of the passing changes. We see the law almost established, that linear areas of great extent undergo movements of an astonishing uniformity, and that the bands of elevation and subsidence alternate. Such phenomena at once impress the mind with the idea of a fluid most gradually propelled onwards, from beneath one part of the solid crust to another.

I cannot at present do more than allude to some of the results which may be deduced from these views. If we examine the points of eruption over the Pacific and Indian oceans, we shall find that all the *active volcanoes* occur within *the areas of elevation.* (The Asiatic band must be excepted; inasmuch as we are entirely in want of information of all kinds respecting it.) On the other hand, in the great spaces supposed to be now subsiding, between the Radack and Dangerous Archipelagoes, in the Corallian sea, and among the atolls which front the west coast of India, not one occurs. If we look at the changes of level as a consequence of the propulsion of fluid matter beneath the crust, as before suggested, then the area to which the force is directed might be expected to yield more readily than that whence it was gradually retiring. I am the more convinced that the above law is true, because, if we look to other parts of the world, proofs of recent elevation almost invariably occur, where there are active vents: I may instance the West Indies, the Cape de Verds, Canary Islands, southern Italy, Sicily, and other places. But in answer to this, those geologists, who, judging from the history of the isolated volcanic mounds of Europe, were inclined to believe that the level of the ground was constantly oscillating up and down, might maintain that on these same areas, the amount of subsidence had been equal to that

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of elevation, but that we possessed no means of knowing it. I conceive it is by eliminating this source of doubt, that the alternate bands of opposite movement, deduced from the configuration of the reefs, directly bear on this law. I need not do more than simply state, that we thus obtain (if the view is correct) a means of forming some judgment of the prevailing movements, during the formation of even the oldest series, where volcanic rocks occur interstratified with sedimentary deposits.

Any thing which throws light on the movements of the ground is well worthy of consideration; and the history of coral reefs may, in another manner, elucidate such changes in the older formations. As there is every reason to believe that the lamelliform corals grow only abundantly at a small depth, we may feel sure, where a great thickness of coral limestone occurs, that the reefs on which the zoophytes flourished, must have been sinking. Until we are enabled to judge by some means what were the prevailing movements at different epochs, it will scarcely ever be possible to speculate with any safety on the circumstances under which the complicated European formations, composed of such different materials and in such different states, were accumulated.

Nor can I quite pass over the probability of the above views illustrating those admirable laws first brought forward by Mr. Lyell,—of the geographical distribution of plants and animals, as consequent on geological changes. M. Lesson has remarked on the singular uniformity* of the Indio-Polynesian Flora throughout the immense area of the Pacific;—the dispersion of forms having been directed against the course of the trade-wind. If we believe that lagoon islands, those monuments raised by infinite numbers of minute architects, record the former existence of an archipelago or continent in the central part of Polynesia, whence the

* Perhaps this is stated rather too strongly; but M. Lesson, of course, had grounds for his assertion.

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germs could be disseminated, the problem is rendered far more intelligible. Again, if the theory should hereafter be so far established, as to allow us to pronounce that certain districts fall within areas either of elevation or subsidence, it will directly bear upon that most mysterious question,—whether the series of organized beings peculiar to some isolated points, are the last remnants of a former population, or the first creatures of a new one springing into existence.

Briefly to recapitulate. In the first place, reefs are formed around islands, or on the coast of the mainland, at that limited depth at which the efficient classes of zoophytes can live; and where the sea is shallow, irregular patches may likewise be produced. Afterwards from the effects of a series of small subsidences, encircling reefs, grand barriers, or lagoon islands, are mere modifications of one necessary result. Secondly, it can be shown on the above views, that the intertropical ocean, throughout more than a hemisphere, may be divided into linear and parallel bands, of which the alternate ones have undergone, within a recent period, the opposite movements of elevation and subsidence. Thirdly, that the points of eruption seem invariably to fall within areas subject to a propulsion from below. The traveller who is an eyewitness of some great and overwhelming earthquake, at one moment of time loses all former associations of the land being the type of solidity, so will the geologist, if he believe in these oscillations of level (the deeply-seated origin of which is betrayed by their forms and vast dimensions), perhaps be more deeply impressed with the never-ceasing mutability of the crust of this our World.

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CHAPTER XXIII.

Mauritius, beautiful appearance—Hindoos—Cape of Goo Hope—St. Helena—Geology—History of changes in vegetation, probable cause of extinction of land-shells—Ascension—Green Hill—Curious incrustations of calcareons matter on tidal rocks—Bahia—Brazil—Splendour of tropical scenery—Pernambuco—Singular reef—Azores—Supposed crater—Hints to collectors—Retrospect of the most impressive parts of the voyage.

MAURITIUS TO ENGLAND.

April 29th.—In the morning we passed round the northern extremity of the Isle of France. From this point of view the aspect of the island equalled the expectations raised by the many well-known descriptions of its beautiful scenery. The sloping plain of the Pamplemousses, scattered over with houses, and coloured bright green from the large fields of sugar-cane, composed the foreground. The brilliancy of the green was the more remarkable, because it is a colour which generally is only conspicuous from a very short distance. Towards the centre of the island, groups of wooded mountains rose out of this highly-cultivated plain; their summits, as so commonly happens with ancient volcanic rocks, being jagged into the sharpest points. Masses of white clouds were collected around their pinnacles, as if for the sake of pleasing the stranger's eye. The whole island, with its sloping border and central mountains, was adorned with an air of perfect elegance: the scenery, if I may use such an expression, appeared to the senses harmonious.

I spent the greater part of the next day in walking about the town, and visiting different people. The town is of considerable size, and is said to contain 20,000 inhabitants; the streets are very clean and regular. Although the island has been so many years under the English government, the general character of the place is quite French: Englishmen

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speak to their servants in French, and the shops are all French; indeed I should think that Calais or Boulogne was much more Anglefied. There is a very pretty little theatre, in which operas are excellently performed, and are much preferred by the inhabitants to plays. We were also surprised at seeing large booksellers' shops, with well-stored shelves;—music and reading bespeak our approach to the old world of civilization; for in truth both Australia and America may be considered as new worlds.

One of the most interesting spectacles in Port Louis, is to observe the various races of men which may be met in walking the streets. Convicts from India are banished here for life; at present there are about 800, and they are employed in various public works. Before seeing these people, I had no idea that the inhabitants of India were such noble-looking figures. Their skin is extremely dark, and many of the older men had large mustaches and beards of a snow-white colour; this, together with the fire of their expressions, gave them quite an imposing aspect. The greater number have been banished for murder and the worst crimes; others for causes which can scarcely be considered as moral faults, such as for not obeying, from superstitious motives, the English laws. These men are generally quiet and well-conducted; from their outward conduct, their cleanliness and faithful observance of their strange religious enactments, it was impossible to look at them with the same eyes as on our wretched convicts in New South Wales. Besides these prisoners, large numbers of free people are yearly imported from India: for the planters were afraid that the negroes, when emancipated, would not work. From these causes the Indian population is here very considerable.

May 1st.—Sunday. I took a quiet walk along the sea-coast to the northward of the town. The plain in that part is quite uncultivated; it consists of a field of black lava, smoothed over with coarse grass and bushes, the latter being chiefly mimosas. Captain FitzRoy, before arriving here, said he expected the island would have a character

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intermediate between that of the Galapagos and Tahiti. This is a very exact comparison; but it will convey a definite idea to few, excepting to those who were on board the Beagle. It is a very pleasant country, but it has not the charms of Tahiti, or the grandeur of a Brazilian landscape.

The next day I ascended La Pouce, a mountain so called from a thumb-like projection, which rises close behind the town to a height of 2600 feet. M. Lesson, in the voyage of the Coquille, has stated, that the central plain of the island appeared like the basin of a grand crater, and that La Pouce and the other mountains once formed parts of a connected wall. From our elevated position we enjoyed an excellent view over this great mass of volcanic matter. The country on this side of the island appears pretty well cultivated, the whole being divided into fields, and studded with farm-houses. I was however assured, that of the whole land not more than half is yet in a productive state; if such is the case, considering the present great export of sugar, this island, at some future period when thickly peopled, will be of very great value. Since England has taken possession of it, a period of only twenty-five years, the export of sugar is said to have increased seventy-five fold.

One great cause of this prosperity is due to the excellent roads and means of communication throughout the island. At the present day, in the neighbouring Isle of Bourbon, which remains under the French government, the roads are in the same miserable state as they were only a few years past in this place. The Macadamizing art has, perhaps, been of even greater advantage to the colonies, than to the mother country. Although the French residents must have largely profited by the increased prosperity of their island, yet the English government is far from popular. It is unfortunate that there appears to exist scarcely any intercourse among the higher orders of French and English.

May 3d.—In the evening Captain Lloyd, the Surveyor-general, so well known from his examination of the Isthmus of Panama, invited Mr. Stokes and myself to his country-

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house, which is situated on the edge of Wilhelm plains, and about six miles from the port. We staid at this delightful place two days: being elevated nearly 800 feet above the sea, the air was pleasantly cool and fresh, and on every side there were delightful walks. Close by there is a grand ravine, which is worn to a depth of about 500 feet through the slightly inclined streams of lava which have flowed from the central platform.

5TH.—Captain Lloyd took us to the Rivière Noire, which is several miles to the southward, in order that I might examine some rocks of elevated coral. We passed through pleasant gardens, and fine fields of sugar-cane growing amidst huge blocks of lava. The roads were bordered by hedges of mimosa, and near many of the houses there were avenues of the mango. Some of the views, where the peaked hills and the cultivated farms were seen together, were exceedingly picturesque; and we were constantly tempted to exclaim, "How pleasant it would be to pass one's life in such a quiet abode!" Captain Lloyd possessed an elephant; he sent it half way with us on the road, that we might enjoy a ride in true Indian fashion. I should think, as is commonly said to be the case, that the motion must be fatiguing for a long journey. The circumstance which surprised me most, was the quite noiseless step; a ride on so wonderful an animal was extremely interesting. This elephant is the only one at present on the island; but it is said others will be sent for.

MAY 9TH.—We sailed from Port Louis, on our way to the Cape of Good Hope, and on the evening of the 31st anchored in Simon's Bay. The little town offers but a cheerless aspect to a stranger's eye. About a couple of hundred, square, whitewashed houses, with scarcely a single tree in the neighbourhood, and very few gardens, are scattered along the beach, at the foot of a lofty, steep, bare wall, of horizontally-stratified sandstone.

The next day I set out for Cape Town, which is twenty miles distant. Both towns are situated within the head-

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lands, but at the opposite extremities of a range of mountains, which extending parallel to the mainland, is joined to it by a low sandy flat. The road skirted the base of these mountains: for the first fourteen miles the country is very desert, and with the exception of the pleasure which the sight of an entirely new vegetation never fails to communicate, there was very little of interest. The view however of the mountains on the opposite side of the flat, brightened by the declining sun, was fine. Within seven miles of Cape Town, in the neighbourhood of Wynberg, a great improvement was visible, and here the country-houses of the more wealthy residents of the capital are situated. The numerous woods of young Scotch firs and stunted oak-trees form the chief attraction of this locality. There is, indeed, a great charm in shade and retirement, after the unconcealed bleakness of so open a country as this. The houses and plantations are backed by a grand wall of mountains, which gives the scene a degree of uncommon beauty. I arrived late in the evening in Cape Town, and had a good deal of difficulty in finding quarters. In the morning several ships from India had arrived at this great inn on the great highway of nations, and they had disgorged on shore a host of passengers, all longing to enjoy the delights of a temperate climate. There is only one good hotel, so that strangers generally live in boarding-houses;—a very uncomfortable fashion to which I was obliged to conform, although I was fortunate in my quarters.

In the morning I walked to a neighbouring hill to look at the town. It is laid out with the rectangular precision of a Spanish city: the streets are in good order, and Macadamized, and some of them have rows of trees on each side; the houses are all whitewashed, and look clean. In several trifling particulars the town had a foreign air, but it is daily becoming more English. There is scarcely a resident, excepting amongst the lowest order, who does not speak some English. In this facility in becoming Anglefied, there appears to exist a wide difference between this colony and

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that of the Mauritius. It does not, however, arise from the popularity of the English; for the Dutch as well as the French, although they have profited to an immense degree by the English government, yet thoroughly dislike our whole nation.

All the fragments of the civilized world which we have visited in the southern hemisphere, appear to be flourishing: little embryo Englands are springing into life in many quarters. Although the Cape colony possesses only a moderately fertile country, it appears in a very prosperous condition. In one respect it suffers like New South Wales, namely, in the absence of water communication, and in the interior being separated from the coast by a high chain of mountains. This country does not possess coal; and there is no timber, excepting at a considerable distance. Hides, tallow, and wine are the chief exports, and latterly a considerable quantity of corn. The farmers are beginning also to pay attention to sheep-grazing,—a hint taken from Australia. It is no small triumph to Van Diemen's Land, that live sheep have been exported from a colony of thirty-three years standing, to this which was founded in 1651.

In Cape Town it is said that the present number of inhabitants is about 15,000, and in the whole colony, including coloured people, 200,000. Many different nations are here mingled together; the Europeans consist of Dutch, French, and English, and scattered people from other parts. The Malays, descendants of slaves brought from the East Indian archipelago, form a large body. They are a fine set of men, and can always be distinguished by a conical hat, like the roof of a circular thatched cottage, or by a red handkerchief on their heads. The number of negroes is not very great; and the Hottentots, the ill-treated aborigines of the country, are, I should think, in a still smaller proportion. The first object in Cape Town which strikes the eye of a stranger, is the number of bullock-waggons. Several times I saw eighteen, and I heard of twenty-four oxen being all yoked together in one team. Besides these, waggons with

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four, six, and eight horses in hand, go trotting about the streets. I have as yet not mentioned the well-known Table Mountain. This great mass of horizontally stratified sandstone rises quite close behind the town to a height of 3500 feet: the upper part forms an absolute wall, often reaching into the region of the clouds. I should think so high a mountain, not forming part of an extensive platform, and yet being composed of horizontal strata, must be a rare phenomenon. It certainly gives the landscape a very peculiar, and from some points of view, a grand character.

June 4th.—I set out on a short excursion to see the neighbouring country, but I saw so very little, that I have scarcely any thing to say. I hired a couple of horses, and a young Hottentot groom to accompany me as a guide. He spoke English very well, and was most tidily dressed; he wore a long coat, beaver hat, and white gloves! The Hottentots, or Hodmadods as old Dampier calls them, to my eye look like partially bleached negroes. They are of a small stature, and have most singularly-formed heads and faces: the temple and cheek-bones project so much, that the whole face is hidden from a person standing in the same side position in which he would be enabled to see part of the features of a European. Their hair is very short and curly.

Our first day's ride was to the village of the Paarl, situated between thirty and forty miles to the N.E. of Cape Town. After leaving the neighbourhood of the town, where white houses stand as if picked out of a street and then by chance dropped on the open country, we had to cross a wide level sandy flat, totally unfit for cultivation. In the hopes of finding some hard materials for making a road, the sands had been bored along the whole line to the depth of forty feet, but without any success. Leaving the flat, we crossed a low undulating country, thinly clothed with a slight green vegetation. It was not the flowering season, but even at this time of the year there were some very pretty oxalises and mesembryanthemums, and on the sandy

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spots fine tufts of heaths. There were also several beautiful little birds:—if a person could not find amusement in observing the animals and plants, there was very little else during the whole day to interest him: only here and there we passed a solitary farm-house.

Directly after arriving at the Paarl, I ascended a singular group of rounded granite hills, which rise close behind the village. From the summit I enjoyed a fine view of the line of mountains which I had to cross on the following morning. Their colours were gray or partly rusty red, and their outlines irregular, but far from picturesque: the general tint of the lower country was a pale brownish green, and the whole entirely destitute of woodland.* From the naked state of the mountains, seen likewise through a very clear atmosphere, I was reminded of Northern Chile; but the rocks there, possess at least a brilliant colouring. Immediately beneath the hill, the long village of the Paarl extended; all the houses were whitewashed, and appeared very comfortable; and there was not a single hovel. Each house had its garden and a few trees planted in straight rows; and there were many vineyards of considerable size, which at this time of year were destitute of leaves. The whole village possessed an air of quiet and respectable comfort.

JUNE 5TH.—After riding about three hours, we came near to the French Hoeck pass. This is so called from a number of emigrant protestant Frenchmen, who formerly settled in a flat valley at the foot of the mountain: it is one of the prettiest places I saw in my excursion. The pass is a considerable work, an inclined road having been cut along the steep side

* When the extreme southern part of Africa was first colonized, rhinoceroses (as I am informed by Dr. Andrew Smith) abounded over the whole of this district, and especially in the wooded valleys at the base of Table Mountain, where Cape Town now stands. I mention this in corroboration of the statement (p. 98), that a luxuriant vegetation is not at all necessary for the support of the larger quadrupeds. Having myself seen this district, which was formerly frequented by the huge rhinoceros, I am fully impressed with the truth of those views.

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of the mountain: it forms one of the principal roads from the low land of the coast, to the mountains and great plains of the interior. We reached the foot of the mountains on the opposite, or S. E. side of the pass, a little after noon. Here, at the toll-bar, we found comfortable lodgings for the night. The surrounding mountains were destitute of trees, and even of brushwood; but they supported a scattered vegetation of rather a brighter green than usual: the quantity, however, of white siliceous sandstone, every where protruding itself uncovered, gave to the country a bleak and desolate aspect.

6TH.—My intention was to return by Sir Lowry Cole's pass, over the same chain of mountains as before, but a little further to the south. Following unfrequented paths, we crossed an irregular hilly country until we joined the other line of road. During the whole long day, I met scarcely a single person, and saw but few inhabited spots, or any number of cattle. A few roebucks were grazing on the sides of the hills, and some large dirty white vultures, like the condors of America, slowly wheeled over the place where probably some dead animal was lying. There was not even a tree to break the monotonous uniformity of the sandstone hills: I never saw a much less interesting country. At night we slept at the house of an English farmer; and at an early hour the next day we descended by Sir Lowry's pass, which, like that of the French Hoeck, has been cut, at a great expense, along the flank of a steep mountain. From the summit, there was a noble view of the whole of False Bay, and of the Table Mountain, and, immediately below, of the cultivated country of Hottentot Holland. The flat, covered with sand-dunes did not appear, when viewed from this height, of the tedious length which we found it before we reached in the evening Cape Town.

JUNE 18TH.—We put to sea, and, on the 29th, crossed the Tropic of Capricorn for the sixth and last time. On the 8th of July, we arrived off St. Helena. This island, the forbidding aspect of which has been so often described, rises

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like a huge castle from the ocean. A great wall, built of successive streams of black lava, forms around the whole circuit a bold coast. Near the town, as if in aid of the natural defence, small forts and guns are every where built up, and mingled with the rugged rocks. The town extends up a flat and very narrow valley; the houses look respectable, and they are interspersed with a very few green trees. When approaching the anchorage there is one striking view: an irregular castle perched on the summit of a lofty hill, and surrounded by a few scattered fir-trees, boldly projects against the sky.

The next day I obtained lodgings within a stone's throw of Napoleon's tomb.* I confess, however, this had little attraction for me: but it was a capital central situation, whence I could make excursions in every direction. During the four days I staid here, from morning to night I wandered over the island, and examined its geological history. The house was situated at an elevation of about 2000 feet; here the weather was cold and very boisterous, with constant showers of rain; and every now and then the whole scene was veiled in thick clouds.

Near the coast the rough lava is entirely destitute of vegetation: in the central and higher parts, a different series of rocks have from extreme decomposition produced a clayey soil, which, where not covered by vegetation, is stained in broad bands of many bright colours. At this season the land, moistened by constant showers, produces a singularly bright green pasture; this lower and lower down, gradually fades away, and at last disappears. In latitude 16°, and at the trifling elevation of 1500 feet, it is surprising to behold a vegetation possessing a character decidedly English. The hills are crowned with irregular plantations of Scotch firs;

* After the volumes of eloquence which have poured forth on this subject, it is dangerous even to mention the tomb. A modern traveller in twelve lines, burdens the poor little island with the following titles,—it is a grave, tomb, pyramid, cemetery, sepulchre, catacomb, sarcophagus, minaret, and mausoleum!

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and the sloping banks are thickly scattered over with thickets of gorze, covered with its bright yellow flowers. Weeping-willows are common along the course of the rivulets, and the hedges are made of the blackberry, producing its well-known fruit. When we consider that the number of plants now found on the island is 746, and that out of these, fifty-two alone are native species, the rest being imported, and many of them from England, we see a good reason for this English character in the vegetation. The numerous species which have been so recently introduced can hardly have failed to have destroyed some of the native kinds. I believe there is no accurate account of the state of the vegetation at the period when the island was covered with trees; such would have formed a most curious comparison with its present sterile condition, and limited Flora. Many English plants appear to flourish here better than in their native country; some also from the opposite quarter of Australia succeed remarkably well. It is only on the highest and steepest ridges, where the native Flora is still predominant.

The English, or rather the Welsh character of the scenery, is preserved by the numerous cottages and small white houses; some buried at the bottom of the deepest valleys, and others stuck up on the crests of the lofty hills. Some of the views are very striking; I may instance that from near Sir W. Doveton's house, where the bold peak called Lott is seen over a dark wood of firs, the whole being backed by the red water-worn mountains of the Southern shore.

On viewing the island from an eminence, the first circumstance which strikes one, is the very great number of roads, and forts: the labour bestowed on the public works, if one forgets its character as a prison, seem out of all proportion to its extent or value. There is so little level or useful land, that it seems surprising how so many people (about 5000) can subsist here. The lower orders, or the emancipated slaves, are I believe extremely poor: they complain of want of work, a fact which is likewise shown by the very cheap

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labour. From the reduction in the number of public servants owing to the island having been given up by the East India Company, and the consequent emigration of many of the richer people, the poverty probably will increase. The chief food of the working class is rice with a little salt meat; as neither of these articles are the products of the island, but must be purchased with money, the low wages tell heavily on the poor people. The fine times, as my old guide called them, when "Bony" was here, can never return again. Now that the people are blessed with freedom, a right which I believe they value fully, it seems probable that their numbers will quickly increase: if so, what is to become of the little state of St. Helena?

My guide was an elderly man, who had been a goatherd when a boy, and knew every step amongst the rocks. He was of a race many times mixed, and although with a dusky skin, he had not the disagreeable expression of a mulatto. He was a very civil, quiet old man, and such appears the character of the greater number among the lower classes. It was strange to my ears to hear a man, nearly white, and respectably dressed, talking with indifference of the times when he was a slave. With my companion who carried our dinner and a horn of water, which latter is quite necessary as all in the lower valleys is saline, I every day took long walks.

Beneath the limits of the elevated and central green circle, the wild valleys are quite desolate and untenanted. Here, to the geologist, there are scenes of high interest, which show the successive changes, and complicated disturbances which have in past times happened. According to my views, St. Helena has existed as an island from a very remote epoch: some obscure proofs, however, of the elevation of the land are still extant. I believe that the central and highest peaks form parts of the rim of a great crater; the southern half of which has been removed by the waves of the sea. There is, moreover, an external margin of black volcanic rocks, which belong to an anterior condition of things. These have been dislocated and broken up by forces acting

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from below, so that the confusion in structure from these different causes is extreme. On the higher parts of the island considerable numbers of shells occur embedded in the soil, which have always been supposed to be of marine origin: and the fact has been adduced as a proof of the retreat of the sea. The shell turns out to be a Bulimus, or terrestrial species. It is however very remarkable, that it is not now found in a living state: a circumstance which in all probability may be attributed to the entire destruction of the woods, and consequent loss of food and shelter, which occurred during the early part of the last century.

The history of the changes, which the elevated plains of Longwood and Deadwood have undergone, as given in General Beatson's account of the island, is extremely curious. It is said the plain in former times was covered with wood, and was therefore called the Great Wood. So late as the year 1716 there were many trees upon it, but in 1724 the old trees had mostly fallen; and as goats and hogs were at that time suffered to range about, all the young trees had been devoured. It appears also from the official records, that the trees were unexpectedly, some years afterwards, succeeded by indigenous wire grass, which now spreads over its whole extent.* He then adds, "These are curious facts, since they trace the changes which this remarkable spot of land has undergone, for now this formerly naked plain (after the trees had fallen) is covered with fine sward, and is become the finest piece of pasture on the island." The extent of surface, which was probably covered by wood at a former period is estimated at no less than two thousand acres; at the present day scarcely a tree can be found there. It is said, that in 1709 there were quantities of dead wood in Sandy Bay: this place is now so utterly desert, that nothing but so well-attested an account could make me believe that trees had ever existed there. The fact, that the goats and hogs destroyed all the young trees as they sprung up, and that in the course of time

* Beatson's St. Helena. Introductory chapter, p. iv.

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the old ones, which were safe from their attacks, perished from age, seems clearly made out. Goats were introduced in the year 1502; eighty-six years afterwards, in the time of Cavendish, it is known they were exceedingly numerous. More than a century afterwards, in 1731, when the evil was completed and found irretrievable, an order was issued that all stray animals should be destroyed.

When at Valparaiso, I heard it positively affirmed, that the Sandal-wood tree had been found on the island of Juan Fernandez in considerable numbers, but that all without exception were standing dead. At the time, I thought it was some mysterious case of the natural death of a species; but when it is remembered, that goats for very many years have abounded on that island, it seems most probable that the young trees were prevented growing, and that the old ones perished from age. It is a very interesting fact, to observe that the arrival of animals at St. Helena in 1501 did not change the whole aspect of the island, until a period of two hundred and twenty years had elapsed: for they were introduced in 1502, and in 1724 it is said "the old trees had mostly fallen." There can be no doubt, this change affected not only the Bulimus and probably some other land shells (of which I obtained specimens from the same bed), but likewise a multitude of insects.

St. Helena, situated so remote from any continent, in the midst of a great ocean, and possessing a unique Flora,—this little world within itself,—excites our curiosity. Birds and insects,* as might have been expected, are very few in number;

* Among these few insects, I was surprised to find a small Aphodius (*nov. spec.*) and an Oryctes, both extremely common under dung. When the island was discovered it certainly possessed no quadruped, excepting *perhaps* a mouse; it becomes, therefore, a difficult point to ascertain, whether these stercovorous insects have since been imported by accident, or if aborigines, on what food they formerly subsisted. On the banks of the Plata, where, from the vast number of cattle and horses, the fine plains of turf are richly manured, it is vain to seek the many kinds of dung-feeding beetles, which occur so abundantly in Europe. I observed only an Oryctes (the insects of this genus in Europe generally feed

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indeed I believe all the birds have been introduced within late years. Partridges and pheasants are tolerably abundant: the island is much too English, not to be subject to strict game-laws. I was told of a more unjust sacrifice to such ordinances, than I ever heard of even in England. The poor people formerly used to burn a plant, which grows on the coast rocks, and export soda; but a peremptory order came out prohibiting this practice, and giving as a reason, that the partridges would have nowhere to build!

In my walks, I passed more than once over the grassy plain, bounded by deep valleys, on which Longwood stands. Viewed from a short distance, it appears like a respectable gentleman's country-seat. In front there are a few cultivated fields, and beyond them, the hill of coloured rocks called the Flagstaff,

on decayed vegetable matter) and two species of Phanæus, common in such situations. On the opposite side of the Cordillera in Chiloe, another species of this genus is exceedingly abundant, and it buries the dung of cattle in large earthen balls beneath the ground. There is reason to believe that the genus Phanæus, before the introduction of cattle acted as scavengers to man. In Great Britain those beetles, which find support in the matter, which has already contributed towards the life of other and larger animals, are so numerous, that I suppose there are at least one hundred different kinds. Considering this, and observing what a quantity of food is thus lost on the plains of La Plata, I imagined I saw an instance where man had disturbed that chain, by which so many animals are linked together in their native country. To this view, however, Van Diemen's Land offers an exception (in the same manner as St. Helena does in a much lesser degree), for I found there four species of Onthophagus, two of Aphodius, and one of a third genus, very abundant under the dung of cows; yet these latter animals had then been introduced only thirty-three years. Previously to that time, the Kangaroo and some other small animals were the only quadrupeds; and their dung is of a very different quality from that of their successors introduced by man. In England the greater number of stercovorous beetles are confined in their appetites; that is, they do not depend indifferently on any quadruped for the means of subsistence. The change, therefore, in habits, which must have taken place in Van Diemen's Land, is the more remarkable.—I am indebted to the Rev. F. W. Hope, who, I hope, will permit me to call him my master in Entomology, for information respecting the foregoing, and other insects.

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and the square black mass of the Barn. On the whole the view is rather bleak and uninteresting.

The scrupulous degree to which the coast must formerly have been guarded, is quite extraordinary: there are alarm houses, alarm guns, and alarm stations on every peak. I was much struck with the number of forts and picket houses, on the line leading down to Prosperous Bay. One would have supposed that this at least was an easy descent: I found it however a mere goat-path, and in one spot the use of ropes, which were fixed into rings in the cliff, were almost indispensable. At the present day two artillery-men are kept there; for what use it is not easy to conjecture. Prosperous Bay, although with so flourishing a name, has nothing more attractive than a wild sea-beach, and black utterly barren rocks. The only inconvenience I suffered in my walks, was from the impetuous winds. One day I noticed a curious circumstance: standing on the edge of a plain, terminated by a great cliff of about a thousand feet in depth, I saw at the distance of a few yards right to windward, some tern, struggling against a very strong breeze, whilst, where I stood, the air was quite calm. Approaching close to the brink, I stretched out my arm, which immediately felt the full force of the wind: an invisible barrier of two yards wide, separated a strongly agitated from a perfectly calm air. The current meeting the bold face of the cliff, must have been reflected upwards at a certain angle, within which plane there necessarily would be either an eddy or a calm.

I so much enjoyed my rambles among the rocks and mountains of St. Helena, that I felt almost sorry on the morning of the 14th to descend to the town. Before noon I was on board, and the Beagle made sail for Ascension.

We reached the anchorage of the latter place on the evening of the 19th (July). Those who have beheld a volcanic island, situated within an arid climate, will be able at once to picture to themselves the aspect of Ascension. They will imagine smooth conical hills of a bright red colour, with

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their summits generally truncated, rising distinct out of a level surface of black rugged lava. A principal mound in the centre of the island, seems the father of the lesser cones. It is called Green Hill; its name is taken from the faintest tinge of that colour, which at this time of the year was barely perceptible from the anchorage. To complete this desolate scene, the black rocks on the coast are lashed by a wild and turbulent sea.

The settlement is near the beach; it consists of several houses and barracks placed irregularly, but well built of white freestone. The only inhabitants are marines, and some negroes liberated from slave-ships, who are paid and victualled by government. There is not a private person on the island. Many of the marines appeared well contented with their situation; they think it better to serve their one-and-twenty years on shore, let it be what it may, than in a ship: in which choice, if I were a marine, I would most heartily agree.

The next morning I ascended Green Hill, 2840 feet high, and thence walked across the island to the windward point. A good cart-road leads from the coast settlement to the houses, gardens, and fields, placed near the summit of the central mountain. On the roadside there are milestones, and likewise cisterns, where each thirsty passer-by, can drink some good water. Similar care is displayed in each part of the establishment, and especially in the management of the springs, so that a single drop of water shall not be lost: indeed the whole island may be compared to a huge ship kept in first-rate order. I could not help, when admiring the active industry which had created such effects out of such means, at the same time regretting that it was wasted on so poor and trifling an end. M. Lesson has remarked with justice, that the English nation alone would have thought of making the island of Ascension a productive spot; any other people would have held it without any further views, as a mere fortress in the ocean.

Near the coast nothing grows; a little inland an occa-

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sional green castor-oil plant, and a few grasshoppers (true friends of the desert), may be met with. Some grass is scattered over the surface of the central elevated region, and the whole much resembles the worse parts of the Welsh mountains. But scanty as the pasture appears, about six hundred sheep, many goats, a few cows and horses, all thrive well on it. Of native animals, rats and land-crabs swarm in numbers: of native birds, there are none; but the guinea-fowl, imported from the Cape de Verd Islands, is abundant, and the common fowl has likewise run wild. Some cats, which were originally turned out to destroy the rats and mice, have increased so as to become a great plague. The island is entirely destitute of trees, in which, and in every other respect, it is very far inferior to St. Helena. Mr. Dring tells me, that the witty people of the latter place say, "we know we live on a rock, but the poor people of Ascension live on a cinder:" the distinction in truth is very just.

On the succeeding days, I took long walks and examined some rather curious points in the mineralogical composition of some of the volcanic rocks, to which I was guided by the kindness of Lieut. Evans. On the basaltic masses, which are daily washed by the tide, most curious calcareous incrustations have been deposited. They resemble in form certain cryptogamic plants, especially the Marchantiæ; their surface is perfectly smooth and glossy, and their colour black, which seems owing to animal matter. I have shown these incrustations to several geologists, and not one guessed their true origin. Any one would suppose that they had been the product of fire, rather than of a deposition of calcareous matter, now constantly undergoing a round of decay and renovation from the action of the breakers. Near the settlement where these incrustations occur, there is a large beach of calcareous sand, entirely composed of comminuted and rounded fragments of shells and corals. The lower part of this, from the percolation of water containing calcareous matter in solution, soon becomes consolidated, and is used

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as a building stone; but some of the layers are too hard for freestone, and when struck by the hammer ring like flint.

The main line of beach is directed N.E. and S.W.; Lieutenant Evans informs me, that during the six months included between the 1st of April and the 1st of October, the sand accumulates towards the N.E. extremity, and during the other six it travels back again towards the S.W. end. This periodical movement is due to a change in the direction of the swell, which is influenced by the general direction of the trade-wind, during the two periods of the year. Lieutenant Evans also informs me that during the six years he has resided on this island, he has always observed, that in the months of October and November, when the sand commences travelling towards the S.W., the rocks which are situated at that end of the long beach, become coated by a white, thick, and very hard calcareous layer. I saw portions of this remarkable deposit, which had been protected by an accumulation of sand. In the year 1831 it was much thicker than during any other period. It would appear that the water, charged with calcareous matter by the disturbance of a vast mass of calcareous particles, only partially cemented together, deposits this substance on the first rocks against which it impinges. But the most singular circumstance is, that in the course of a couple of months this layer is either abraded or redissolved, so that after that period, it entirely disappears. It is curious thus to trace the origin of a periodical incrustation on certain isolated rocks, to the motion of the earth with relation to the sun; for this determines the atmospheric currents, which give the direction to the swell of the ocean, and this acts on the arrangement of the sea-beach, and this again on the quantity of calcareous matter held in solution by the waters of the neighbouring sea.

One of my excursions took me towards the S.W. extremity of the island. The day was clear and hot, and I saw the island, not smiling with beauty, but staring with naked

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hideousness. The lava streams are covered with hummocks, and are rugged to a degree, which, geologically speaking, is not of easy explanation. The intervening spaces are concealed with layers of pumice, ashes, and volcanic tuft. In some parts rounded volcanic bombs, which must have assumed this form, when projected red-hot from the crater, lie strewed on the surface. Whilst passing at sea this end of the island, I could not imagine what was the nature of the white patches, with which the whole plain was mottled; I now found they were seafowl, which were sleeping in such full confidence, that even in midday a man could walk up to, and seize hold of them. These birds were the only living creatures I saw during the day. On the beach a great surf, although the breeze was light, was tumbling over the broken lava rocks.

Upon leaving Ascension the ship's head was directed towards the coast of South America, and on August 1st, we anchored at Bahia or San Salvador. We staid here four days, in which time I took several long walks. I was glad to find my enjoyment of tropical scenery had not decreased even in the slightest degree, from the want of novelty. The elements of the scenery are so simple, that they are worth mentioning, as a proof on what trifling circumstances exquisite natural beauty depends.

The country may be described as a level plain of about three hundred feet in elevation, which in every part has been worn into flat-bottomed valleys. This structure is remarkable in a granitic land, but is nearly universal in all those softer formations, of which plains usually are composed. The whole surface is covered by various kinds of stately trees, interspersed with patches of cultivated ground, out of which houses, convents, and chapels arise. It must be remembered that within the tropics, the wild luxuriance of nature is not lost even in the vicinity of large cities; for the natural vegetation of the hedges and hill-sides, overpowers in picturesque effect the artificial labour of man. Hence, there

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are only a few spots where the bright red soil affords a strong contrast with the universal clothing of green. From the edges of the plain there are distant glimpses either of the ocean, or of the great bay bordered by low wooded shores, and on the surface of which numerous boats and canoes show their white sails. Excepting from these points, the range of vision is very limited: following the level pathways, on each hand alternate peeps into the wooded valleys below can alone be obtained. Finally, I may add that the houses, and especially the sacred edifices, are built in a peculiar and rather fantastic style of architecture. They are all whitewashed; so that when illuminated by the brilliant sun of midday, and as seen against the pale blue sky of the horizon, they stand out more like shadows than substantial buildings.

Such are the elements of the scenery, but to paint the effect is a hopeless endeavour. Learned naturalists describe these scenes of the tropics by naming a multitude of objects, and mentioning some characteristic feature of each. To a learned traveller, this possibly may communicate some definite ideas: but who else from seeing a plant in an herbarium can imagine its appearance when growing in its native soil? Who from seeing choice plants in a hothouse can magnify some into the dimensions of forest trees, and crowd others into an entangled jungle? Who when examining in the cabinet of the entomologist the gay exotic butterflies, and singular cicadas, will associate with these objects, the ceaseless harsh music of the latter, and the lazy flight of the former,—the sure accompaniments of the still, glowing, noonday of the tropics. It is, when the sun has attained its greatest height, that such views should be beheld: then the dense splendid foliage of the mango hides the ground with its darkest shade, whilst the upper branches are rendered from the profusion of light of the most brilliant green. In the temperate zones, as it appears to me, the case is different, the vegetation there is not so dark

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or so rich, and hence the rays of the declining sun, tinged of a red, purple, or yellow colour, add most to the beauties of the scenery of those climes.

When quietly walking along the shady pathways, and admiring each successive view, one wishes to find language to express one's ideas. Epithet after epithet is found too weak to convey to those, who have not visited the intertropical regions, the sensation of delight which the mind experiences. I have said the plants in a hothouse fail to communicate a just idea of the vegetation, yet I must recur to it. The land is one great wild, untidy, luxuriant hothouse, which nature made for her managerie, but man has taken possession of it, and has studded it with gay houses and formal gardens. How great would be the desire in every admirer of nature to behold, if such were possible, another planet; yet to every one in Europe, it may be truly said, that at the distance of a few degrees from his native soil, the glories of another world are open to him. In my last walk, I stopped again and again to gaze on these beauties, and endeavoured to fix for ever in my mind an impression, which at the time I knew, sooner or later must fail. The form of the orange-tree, the cocoa-nut, the palm, the mango, the tree-fern, the banana, will remain clear and separate; but the thousand beauties which unite these into one perfect scene must fade away; yet they will leave, like a tale heard in childhood, a picture full of indistinct, but most beautiful figures.

August 6th.—In the afternoon we stood out to sea, with the intention of making a direct course to the Cape de Verd Islands. Unfavourable winds, however, having delayed us, on the 12th we ran into Pernambuco,—a large city on the coast of Brazil in latitude 8° south. We anchored outside the reef; but in a short time a pilot came on board, and took us into the inner harbour, where we lay close to the town.

Pernambuco is built on some narrow and low sandbanks, which are separated from each other by shoal channels of salt water. The three parts of the town are connected together

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by two long bridges built on wooden piles. The town is in all parts disgusting, the streets being narrow, ill-paved, and filthy; the houses are very tall and gloomy. The number of white people, which during the morning may be met with in the streets, bears about the proportion of foreigners in any other nation; all the rest are black or of a dusky colour. The latter, as well as the Brazilians, are far from prepossessing in their appearance. The poor negroes, wherever they may be, are cheerful, talkative, and boisterous. There was nothing in the sight, smell, or sounds within this large town, which conveyed to my mind any pleasing impressions.

The season of heavy rains had hardly come to an end, and hence the surrounding country, which is scarcely elevated above the level of the sea, was flooded with water. I failed in all my attempts to take any long walks. I was, however, enabled to observe that many of the country-houses in the outskirts, had like those of Bahia a gay appearance, which harmonized well with the luxuriant character of the vegetation.

The flat swampy land on which Pernambuco stands, is surrounded at the distance of a few miles, by a semicircle of low hills, or rather by the edge of a country elevated perhaps two hundred feet above the sea. The old city of Olinda stands on one extremity of this range. One day I took a canoe, and proceeded up one of the channels to visit it; I found the old town from its situation both sweeter and cleaner than that of Pernambuco. I must here commemorate what happened for the first time during the four-and-a-half years we have been wandering about, namely, having met with a want of politeness amongst any class of people: I was refused in a sullen manner at two different houses, and obtained with difficulty from a third, permission to pass through their gardens, to an uncultivated hill, for the purpose of taking a view of the country. I feel quite glad that this happened in the land of the "Brava Gente," for I bear them no good will—a land also of slavery, and therefore of moral debasement. A Spaniard would have been ashamed

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at the thought of refusing such a request, or of behaving to a stranger with rudeness. The channel by which we went to, and returned from Olinda, was bordered on each side by mangroves, which sprang like a miniature forest out of the greasy mud-banks. The bright green colour of these bushes always reminded me of the rank grass in a churchyard: both are nourished by putrid exhalations; the one speaks of death past, and the other too often of death to come.

The most curious thing which I saw in this neighbourhood, was the reef that forms the harbour. It runs for a length of several miles in a perfectly straight line, parallel to, and not far distant from, the shore. It varies in width from thirty to sixty yards; it is dry at low water, has a level smooth surface, and is composed of obscurely-stratified hard sandstone. Hence, at first sight, it is difficult to credit that it is the work of nature, and not of art. Its utility is great; close within the inner wall there is a good depth of water, and ships lie moored to old guns, which are fixed in holes on its summit. A lighthouse stands on one extremity, and around it the sea breaks heavily. In entering the harbour, a ship passes within thirty yards of this point, and amidst the foam of the breakers; close by, on the other hand, are other breakers, which thus form a narrow gateway. It is almost fearful to behold a ship running, as it appears, headlong into such dangers.

With respect to the origin of the reef, I believe a bar composed of sand and pebbles formerly existed beneath the water (a circumstance no ways improbable) when the low land, on which the town now stands, was occupied by a large bay; and that this bar was first consolidated, and then elevated. These two processes are of such frequent occurrence in South America, that there can be no objection to using them in accounting for any remarkable structure in the land. There is another and slightly different explanation which possesses equal probability, namely, that a long spit of sand, like some that now run parallel to parts of the neighbouring coast, had its central part consolidated, and

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then by a slight change in the set of currents, the loose matter removed, so that the hard nucleus alone was left. Although the swell of the open ocean breaks heavily on the outside of this narrow and insignificant line of reef, yet there is no record of its decay. This durability is much the most curious circumstance in its history. Its protection appears due to a layer of calcareous matter, formed by the successive growth of several kinds of organic bodies, chiefly serpulæ, balani, nulliporæ, but no true corals. It is a process strictly analogous to the formation of peat; and like that substance, its effects are to preserve from degradation the matter on which it rests. In true coral reefs, when the upper extremities of the living mass are killed by the rays of the sun, they become enveloped and protected by a nearly similar process. It is probable, that if a breakwater, such as that at Plymouth, was built in these tropical seas, it would be imperishable; that is, as imperishable as any part of the solid land, all of which must some day suffer decay and renovation.

On the 17th we took our final leave of the coast of South America, and on the last day of the month anchored at Porto Praya. We staid there only five days, and on the 5th of September steered for the Azores. On the 19th we anchored off the town of Angra, the capital of Terceira.

This island is moderately lofty, and has a rounded outline, with detached conical hills evidently of volcanic origin. The land is well cultivated, and is divided into a multitude of rectangular fields by stone walls, extending from the water's edge to high up on the central hills. There are few or no trees, and the yellow stubble land at this time of the year gave a burnt-up and unpleasant character to the scenery. Small hamlets and single whitewashed houses are scattered in all parts. In the evening a party went on shore: we found the city a very clean and tidy little place, containing about 10,000 inhabitants, which includes nearly the fourth part of the total number on the island. There are no good shops, and there is little appearance of activity, excepting

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the intolerable creaking of an occasional bullock-waggon. The churches are very respectable, and there were formerly a good many convents; but Dom Pedro destroyed several. He levelled three nunneries to the ground, and gave permission to the nuns to marry, which, except by some very old ones, was gladly received.

Angra was formerly the capital of the whole Archipelago, but it has now only one division of the islands under its government, and its glory has departed. The city is defended by a strong castle on Mount Brazil, and by a line of batteries encircling the base of this extinct volcano, which overlooks the town. Terceira was the first place that received Dom Pedro, and from this beginning he conquered the other islands, and finally Portugal. A loan was scraped together in this one island of no less than 400,000 dollars, of which sum not one farthing has ever been paid to these first supporters of the present right royal and honourable family.

The next day the Consul kindly lent me his horse, and furnished me with guides to proceed to a spot in the centre of the island, which was described as an active crater. Ascending in deep lanes, bordered on each side by high stone walls, for the three first miles we passed many houses and gardens. We then entered on a very irregular country, consisting of more recent streams of hummocky basaltic lava. The rocks are covered in some parts by a thick brushwood about three feet high, and in others by heath, fern, and short pasture: a few broken down old stone walls completed the resemblance with the mountains of Wales. I saw, moreover, some old English friends amongst the insects; and of birds, the starling, water-wagtail, chaffinch, and blackbird. There are no houses in this elevated and central part, and the ground is only used for the pasture of cattle and goats. On every side besides the ridges of more ancient lavas, there were cones of various dimensions, which still partly retained their crater-formed summits; and where broken down, showed a pile of cinders, such as those from an iron-foundry.

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When we reached the so-called crater, I found it consisted of a slight depression, or rather of a short valley abutting against a higher range and without any exit. The bottom was traversed by several large fissures, out of which, in nearly a dozen places, small jets of steam issued as from the cracks in the boiler of a steam engine. The steam close to the irregular orifices was far too hot for the hand to endure it. It had but little smell, yet from every thing made of iron being blackened, and from a peculiar rough sensation communicated to the skin, the vapour cannot be pure; I imagine it contains some muriatic acid. The effect on the surrounding trachytic lava was singular, the solid stone being entirely converted either into pure snow-white porcelain clay, or into a kind of the brightest red, or the two colours were marbled together. The steam has thus been emitted during many years; and it is said that flames once issued from the cracks. During rain, the water from each bank must flow into these cracks; and it is probable that this same water trickling down to the neighbourhood of some heated subterranean lava, causes the above effects. Throughout the island, the powers from below have been unusually active during the last year; several small earthquakes have been felt, and during a few days a jet of steam issued from a bold precipice (part of Mount Brazil) overhanging the sea, not far from the town of Angra.

I enjoyed my day's ride, though I did not find much worth seeing. It was pleasant to meet the peasantry; I do not recollect ever having beheld a set of handsomer young men, with more goodhumoured expressions. The greater number whom we met, were employed in the mountains gathering sticks for firewood. A whole family, from the father to the least boy, might be seen, each carrying his bundle on his head to sell in the town. Their burdens were very heavy; this hard labour and the ragged state of their clothes plainly bespoke poverty; yet I am told it is not that they want food, but there is an absence of all luxuries,—a case parallel to that of Chiloe. Hence, although the whole land

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is not cultivated, numbers are emigrating to Brazil, where the contract to which they are bound differs but little from slavery. It seems a great pity that so fine a population should be compelled to leave a land of plenty, where every article of food—meat, vegetables, and fruit—is exceedingly cheap and most abundant: but the labourer finds his labour of proportionally little value.

Another day I set out early in the morning to visit the town of Praya situated towards the N.E. extremity of the island. The distance is about fifteen miles; the road ran during the greater part of the way, not far from the coast. The country is all cultivated, and scattered over with houses and small villages. I noticed in several places, that the solid lava, which in part formed the road, was worn into ruts of the depth of twelve inches from the long traffic of the bullock-waggons. This circumstance has been noticed with surprise in the ancient pavement of Pompeii, for it does not occur in any of the present towns of Italy. The waggon-wheels here have a tire surmounted by singularly large knobs of iron; perhaps the old Roman wheels were thus furnished. The country during our morning's ride was not interesting; excepting always when enlivened by the pleasant sight of the healthy peasantry. The harvest was lately over, and near the houses, the fine yellow heads of the Indian corn were tied in large bundles, to be dried, to the poplar-trees; and these, seen from a distance, appeared weighed down by some beautiful fruit,—the very emblem of fertility.

One part of the road crossed a broad stream of lava, which from its rocky and black surface seemed to be of comparatively recent origin: indeed, the crater, whence it had flowed, could be distinguished. The industrious inhabitants have turned this space into vineyards; but for this purpose it was necessary to clear away the loose fragments, and to pile them up into a multitude of walls, which enclose little patches of ground a few yards square, thus covering the country with a network of black lines.

The town of Praya is a quiet, forlorn, little place: many

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years since a large city was here overwhelmed by an earthquake. It is asserted that the land then subsided, and a wall of a convent now bathed by the sea, is shown as a proof of it: the fact is probable, but the supposed proof not conclusive. I returned home by another road, which first led along the northern shore, and then crossed the central part of the island. This north-eastern extremity is particularly well cultivated, and produces a large quantity of fine wheat. The square open fields, and small villages with whitewashed churches, gave to the view, as seen from the heights, an aspect resembling the less picturesque parts of central England. We soon reached the region of clouds, which during our whole visit hung very low and concealed the tops of the mountains. For a couple of hours we crossed this central and elevated part, which is not inhabited and has a desolate appearance. When we descended from the clouds to the city, I heard the good news that astronomical observations had been obtained, and that we should go to sea the same evening.

On the 25th we called at the island of St. Michael's for letters, and then steered a direct course for England. On October 2d the Beagle anchored at Falmouth, where I left her, having lived on board the little vessel very nearly five years.

As this volume may possibly fall into the hands of some one about to undertake a similar expedition, I will offer a few pieces of advice, some of which I observed with much advantage, but others, to my cost, neglected. Let the collector's motto be, "Trust nothing to the memory;" for the memory becomes a fickle guardian when one interesting object is succeeded by another still more interesting. Keep a list with the date of the ships by which *every* box of specimens, or even a letter, is transmitted to England; let the receiver do the same: it will afterwards save much anxiety. Put a number on every specimen, and every fragment of a specimen; and during the very same minute let it be

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entered in the catalogue, so that if hereafter its locality be doubted, the collector may say in good truth, "Every specimen of mine was ticketed on the spot." Any thing which is folded up in paper, or put into a separate box, ought to have a number on the outside (with the exception perhaps of geological specimens), but more *especially* a duplicate number on the inside attached to the specimen itself. A series of small numbers should be printed from 0 to 5000; a stop must be added to those numbers which can be read upside down (as 699. or 86.). It is likewise convenient to have the different thousands printed on differently coloured paper, so that when unpacking, a single glance tells the approximate number.

For specimens in spirits of wine, I found the following plan answered admirably: Get a set of steel dies from 0 to 9, a small punch, and some sheets of *trebly*-thick tinfoil. The numbers may at any time be stamped in a line, with a hole punched in front of each, and then cut off with a pair of scissors as wanted. These tickets cost little trouble in making, and *do not corrode*. Each specimen in spirits should be loosely folded up in *very open* gauze, or some such stuff; the string which ties up the corners may likewise secure the number. Use nothing but glass jars; but these are difficult to be obtained of any size out of Europe. Jars of earthenware, and wooden casks, either leak, or allow of evaporation; and when such are used, it is not easy to know whether the specimens are too much crowded (a very common fault), or in what state the spirit is in, which through glass can be judged of by its colour. Bear in mind, that in nine out of ten specimens which are spoiled, it is owing to the spirit being too weak. The jars should be closed with a bung covered by bladder, twice by common tinfoil, and by bladder again; let the bladder soak till half putrid. I found this plan quite worth the trouble it cost.

Few, excepting those who have travelled in ships, know the extreme inconvenience of want of room; and on this much depends: but if it be practicable, keep three or four sets of

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bottles open at the same time, so that one may serve for crustacea, another for animals for dissection, another for minute specimens, another for fish, always putting the latter into the strongest spirit. Any how it is absolutely necessary to keep a couple of receiving bottles in which every thing can at first be put, and afterwards transferred to the permanent bottles with *fresh spirits*. Without assistance from government, and plenty of room, it is most disheartening work to attempt to bring home many specimens in spirits, although without doubt in such a state they are very far the most valuable. I should recommend any one circumstanced as I was to preserve the skins only of large fish and reptiles. But with room and means at command, let the collector place no limit to the number of his glass jars.

With respect to the catalogues it is inconvenient to have many; but there must at least be two, one for the tin labels or specimens in spirits, and another for the paper numbers, which should be applied indiscriminately to every kind of specimen. If the observer has any particular branch to which he devotes much attention, a third catalogue exclusively for such specimens is desirable: I kept a third for geological specimens and fossils. In a like manner notes should be as simple as possible: I kept one set for geology, and another for zoological and all other observations. It is well to endeavour to write upon separate pages remarks on different specimens; for much copying will thus be saved. My journal was likewise kept distinct from the other subjects. I found an arrangement carried thus far very useful: a traveller by land would, I suppose, be obliged to adopt a still more simple plan.

Use arsenical soap* for all skins, but do not neglect to brush the legs and beak with a solution of corrosive sublimate.

* Seeds must not be sent home in the same case with skins prepared with poison, camphor, or essential oils; scarcely any of mine germinated, and Professor Henslow thinks they were thus killed.

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Likewise slightly brush over all dried plants with the solution. For collecting insects use a plain strong sweeping-net, and pack the specimens of all orders, excepting lepidoptera, between layers of rag in pill-boxes, placing at the bottom a bit of camphor; this costs *scarcely any* trouble, and the insects, especially thousands of unknown minute ones, arrive in an excellent state. Take a good stock of chip pill-boxes—a simple plain strong microscope, such as that long ago described by Ellis—a good stock of lace-needles, with glass tubes and sealingwax, for the purpose of making dissecting instruments. I need not mention small collecting bottles covered with leather, tin boxes, dissecting scissors, blowpipe case, compasses, mountain barometer, &c. I should recommend a sort of work-box fitted up to hold watch-glasses, glass micrometers, pins, string, printed numbers, &c.; and I found a small cabinet with drawers, some lined with cork, and others with cross partitions, most useful as a temporary storehouse.

Pack up for shipment *every* specimen of *every* kind in boxes lined with tinned plates, and *soldered* together: if the case be large the specimens should further be packed into light pasteboard or other boxes, for by long pressure even skins of quadrupeds are injured. On no account whatever put bottles with spirits of wine, though ever so well packed, in the same case with other specimens, for if one should break every thing near it will be spoiled, as I found to my cost in one instance.

When limited either in time, funds, or space, let not the collector crowd too many specimens either into one bottle, or into one case. For he should *constantly* bear in mind as his second motto, that "It is better to send home a few things well preserved, than a multitude in a bad condition." As long as due steps are taken that the harvest may not be spoiled, let him not be disheartened, because he may for a long time be labouring by himself; let him work hard from morning to night, for every day and every hour is precious

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in a foreign clime; and then most assuredly his own satisfaction will one day well repay him.

Our voyage having come to an end, I will take a short retrospect of the advantages and disadvantages, the pains and pleasures, of our five years' wandering. If a person should ask my advice, before undertaking a long voyage, my answer would depend upon his possessing a decided taste for some branch of knowledge, which could by such means be improved. No doubt it is a high satisfaction to behold various countries, and the many races of mankind, but the pleasures gained at the time do not counterbalance the evils. It is necessary to look forward to a harvest, however distant it may be, when some fruit will be reaped, some good effected.

Many of the losses which must be experienced are obvious; such as that of the society of all old friends, and of the sight of those places, with which every dearest remembrance is so intimately connected. These losses, however, are at the time partly relieved by the exhaustless delight of anticipating the long wished-for day of return. If, as poets say, life is a dream, I am sure in a voyage these are the visions which serve best to pass away the long night. Other losses, although not at first felt, tell heavily after a period; these are, the want of room, of seclusion, of rest;—the jading feeling of constant hurry;—the privation of small luxuries, the comforts of civilization and domestic society, and, lastly, even of music and the other pleasures of imagination. When such trifles are mentioned, it is evident that the real grievances (excepting from accidents) of a sea life are at an end. The short space of sixty years has made an astonishing difference in the facility of distant navigation. Even in the time of Cook, a man who left his comfortable fireside for such expeditions, underwent severe privations. A yacht now with every luxury of life might circumnavigate the globe. Besides the vast improvements in ships and naval resources, the whole western shores of America are thrown open, and

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Australia has become the metropolis of a rising continent. How different are the circumstances to a man shipwrecked at the present day in the Pacific, to what they were in the time of Cook! since his voyage a hemisphere has been added to the civilized world.

If a person suffer much from sea-sickness, let him weigh it heavily in the balance. I speak from experience: it is no trifling evil which may be cured in a week. If, on the other hand, he takes pleasure in naval tactics, he will assuredly have full scope for his taste. But it must be borne in mind, how large a proportion of the time, during a long voyage, is spent on the water, as compared with the days in harbour. And what are the boasted glories of the illimitable ocean? A tedious waste, a desert of water, as the Arabian calls it. No doubt there are some delightful scenes. A moonlight night, with the clear heavens and the dark glittering sea, and the white sails filled by the soft air of a gently-blowing trade-wind;—a dead calm, with the heaving surface polished like a mirror, and all still, except the occasional flapping of the sails. It is well once to behold a squall with its rising arch and coming fury, or the heavy gale of wind and mountainous waves. I confess, however, my imagination had painted something more grand, more terrific in the full-grown storm. It is an incomparably finer spectacle when beheld on shore, where the waving trees, the wild flight of the birds, the dark shadows and bright lights, the rushing of the torrents, all proclaim the strife of the unloosed elements. At sea the albatross and petrel fly as if the storm were their proper sphere, the water rises and sinks as if fulfilling its usual task, the ship alone and its inhabitants seem the objects of wrath. On a forlorn and weather-beaten coast, the scene is indeed different, but the feelings partake more of horror than of wild delight.

Let us now look at the brighter side of the past time. The pleasure derived from beholding the scenery and the general aspect of the various countries we have visited, has

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decidedly been the most constant and highest source of enjoyment. It is probable that the picturesque beauty of many parts of Europe exceeds any thing we have beheld. But there is a growing pleasure in comparing the character of scenery in different countries, which to a certain degree is distinct from merely admiring its beauty. It depends more on an acquaintance with the individual parts of each view. I am strongly induced to believe that, as in music, the person who understands every note will, if he also possesses a proper taste, more thoroughly enjoy the whole, so he who examines each part of a fine view, may also thoroughly comprehend the full and combined effect. Hence, a traveller should be a botanist, for in all views plants form the chief embellishment. Group masses of naked rock even in the wildest forms, and they may for a time afford a sublime spectacle, but they will soon grow monotonous. Paint them with bright and varied colours, they will become fantastic; clothe them with vegetation, they must form at least a decent, if not a most beautiful picture.

When I said that the scenery of Europe was probably superior to any thing which we have beheld, I excepted, as a class by itself, that of the intertropical regions. The two classes cannot be compared together; but I have already often enlarged on the grandeur of these climates. As the force of impressions generally depends on preconceived ideas, I may add, that all mine were taken from the vivid descriptions in the Personal Narrative of Humboldt, which far exceed in merit any thing I have read on the subject. Yet with these high-wrought ideas, my feelings were far from partaking of any tinge of disappointment on first landing on the shores of Brazil.

Among the scenes which are deeply impressed on my mind, none exceed in sublimity the primeval forests undefaced by the hand of man; whether those of Brazil, where the powers of Life are predominant, or those of Tierra del Fuego, where Death and Decay prevail. Both are temples

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filled with the varied productions of the God of Nature:—no one can stand in these solitudes unmoved, and not feel that there is more in man than the mere breath of his body. In calling up images of the past, I find the plains of Patagonia frequently cross before my eyes: yet these plains are pronounced by all most wretched and useless. They are characterized only by negative possessions; without habitations, without water, without trees, without mountains, they support merely a few dwarf plants. Why then, and the case is not peculiar to myself, have these arid wastes taken so firm possession of the memory? Why have not the still more level, the greener and more fertile Pampas, which are serviceable to mankind, produced an equal impression? I can scarcely analyze these feelings: but it must be partly owing to the free scope given to the imagination. The plains of Patagonia are boundless, for they are scarcely practicable, and hence unknown: they bear the stamp of having thus lasted for ages, and there appears no limit to their duration through future time. If, as the ancients supposed, the flat earth was surrounded by an impassable breadth of water, or by deserts heated to an intolerable excess, who would not look at these last boundaries to man's knowledge with deep but ill-defined sensations?

Lastly, of natural scenery, the views from lofty mountains, though certainly in one sense not beautiful, are very memorable. When looking down from the crest of the highest Cordillera, the mind undisturbed by minute details, was filled with the stupendous dimensions of the surrounding masses.

Of individual objects, perhaps no one is more certain to create astonishment than the first sight in his native haunt of a real barbarian,—of man in his lowest and most savage state. One's mind hurries back over past centuries, and then asks, could our progenitors have been such as these? Men, whose very signs and expressions are less intelligible to us than those of the domesticated animals; men, who do not possess the instinct of those animals, nor yet appear to boast of

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human reason, or at least of arts consequent on that reason. I do not believe it is possible to describe or paint the difference between savage and civilized man. It is the difference between a wild and tame animal: and part of the interest in beholding a savage, is the same which would lead every one to desire to see the lion in his desert, the tiger tearing his prey in the jungle, the rhinoceros on the wide plain, or the hippopotamus wallowing in the mud of some African river.

Among the other most remarkable spectacles which we have beheld, may be ranked the stars of the southern hemisphere—the water-spout—the glacier leading its blue stream of ice in a bold precipice overhanging the sea—a lagoon island raised by the coral-forming polypi—an active volcano—and the overwhelming effects of a violent earthquake. The three latter phenomena, perhaps, possess for me a peculiar interest, from their intimate connexion with the geological structure of the world. The earthquake must however, be to every one a most impressive event: the earth, considered from our earliest childhood as the type of solidity, has oscillated like a thin crust beneath our feet; and in seeing the most beautiful and laboured works of man in a moment overthrown, we feel the insignificance of his boasted power.

It has been said, that the love of the chase is an inherent delight in man—a relic of an instinctive passion. If so, I am sure the pleasure of living in the open air, with the sky for a roof, and the ground for a table, is part of the same feeling: it is the savage returning to his wild and native habits. I always look back to our boat cruises, and my land journeys, when through unfrequented countries, with a kind of extreme delight, which no scenes of civilization could have created. I do not doubt that every traveller must remember the glowing sense of happiness he experienced, from the simple consciousness of breathing in a foreign clime, where the civilized man has seldom or never trod.

There are several other sources of enjoyment in a long voyage, which are, perhaps, of a more reasonable nature.

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The map of the world ceases to be a blank; it becomes a picture full of the most varied and animated figures. Each part assumes its true dimensions: continents are not looked at in the light of islands, or those islands considered as mere specks, which are, in truth, larger than many kingdoms of Europe. Africa, or North and South America, are well-sounding names, and easily pronounced; but it is not till having sailed for some weeks along small portions of their coasts that one is thoroughly convinced how large a portion of our immense world these names imply.

From seeing the present state, it is impossible not to look forward with high expectation to the future progress of nearly an entire hemisphere. The march of improvement, consequent on the introduction of Christianity throughout the South Sea, probably stands by itself on the records of history. It is the more striking when we remember that only sixty years since, Cook, whose most excellent judgment none will dispute, could foresee no prospect of such change. Yet these changes have now been effected by the philanthropic spirit of the British nation.

In the same quarter of the globe Australia is rising, or indeed may be said to have risen, into a grand centre of civilization, which at some not very remote period, will rule as empress over the southern hemisphere. It is impossible for an Englishman to behold these distant colonies, without a high pride and satisfaction. To hoist the British flag, seems to draw with it as a certain consequence, wealth, prosperity, and civilization.

In conclusion, it appears to me that nothing can be more improving to a young naturalist, than a journey in distant countries. It both sharpens, and partly likewise allays that want and craving, which, as Sir J. Herschel* remarks, a man experiences although every corporeal sense is fully satisfied. The excitement from the novelty of objects, and the chance of success, stimulate him to increased activity. Moreover as

* Discourse on the Study of Natural Philosophy.

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a number of isolated facts soon become uninteresting, the habit of comparison leads to generalization. On the other hand, as the traveller stays but a short space of time in each place, his descriptions must generally consist of mere sketches, instead of detailed observation. Hence arises, as I have found to my cost, a constant tendency to fill up the wide gaps of knowledge, by inaccurate and superficial hypotheses.

But I have too deeply enjoyed the voyage, not to recommend any naturalist, although he must not expect to be so fortunate in his companions as I have been, to take all chances, and to start, on travels by land if possible, if otherwise on a long voyage. He may feel assured, he will meet with no difficulties or dangers (excepting in rare cases) nearly so bad as he beforehand anticipated. In a moral point of view, the effect ought to be, to teach him good-humoured patience, freedom from selfishness, the habit of acting for himself, and of making the best of every thing, or in other words contentment. In short he should partake of the characteristic qualities of the greater number of sailors. Travelling ought also to teach him distrust; but at the same time he will discover, how many truly goodnatured people there are, with whom he never before had, or ever again will have any further communication, who yet are ready to offer him the most disinterested assistance.

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ADDENDA.

Page 76.

I HAVE said that crystals of sulphate of magnesia, called by the Spanish inhabitants, *madre del sal*, are scattered on the borders of the Salinas in Patagonia. By a mistake a wrong bottle was examined; and the crystals, I now find, are the sulphate of soda; but it appears that some sulphate of magnesia is dissolved in the underlying fetid mud.

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In enumerating the fossils, which I collected at Bahia Blanca, I mention a tusk like that of a boar, and some very flat grinders. These are now found to belong to the lower jaw of *Toxodon Platensis*. For an admirable description of this wonderful animal, and likewise of the great fossil (*Macrauchenia Patachonica*), mentioned at p. 208, which in some respects is allied to the Camelidæ, I must refer to the first part of the Zoology of the Voyage of the Beagle by Mr. Owen.

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The remains just referred to, are said to be embedded with existing species of shells. This expression requires some qualification; the details are given in my geological introduction to Mr. Owen's account of the Fossil Mammalia, above mentioned.

Page 150.

With reference to what I have said, about the bones of horses having been several times brought to this country from North America, with those of the Mastodon, I see Mr. Rogers, in his Report to the British Association (vol. iii., p. 24) says, "It is possible that the horse ought to

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be added to this list of animals as indigenous to America;" and it is evident from a previous passage, that the bones have been found fossil. Mr. Rogers states, that the remains of two kinds of elephant and three kinds of oxen have been discovered there; as have, on two occasions, parts of the Megatherium. At Big Bone Lick, where the remains of the elephant, mastodon, and ox, are so extraordinarily numerous, the megalonyx has been found; and this is a parallel case to the contemporaneous embedment, in the southern hemisphere, of the mastodon, horse, megatherium, and the other Edentata. The more I reflect on the geographical distribution in the Old and New World of these gigantic mammifers, during the period antecedent to the present, in relation to the existing faunas of North and South America, now so strongly contrasted with each other, the more pregnant with interest the case appears to be. I know of no other instance, in which we can thus almost mark the period of the splitting up of one great region into two well characterized zoological provinces. With respect to the ancient range of the genus Equus, I may add to what has already been said, that its remains have been found from England in the west, to the Himalaya in the east, (*Buckland's Reliquiæ Diluvianæ*, p. 222,) and from the western coast of North America, to the eastern plains of America in the southern hemisphere. We may, therefore, suspect that a very little research would discover the remains of the horse, embedded in the frozen soil of Kamtschatka, with those of the fossil ox and elephant; and thus render complete the evidence, that we there see the ancient, but perhaps temporary line of junction, since interrupted, between the fauna of what we call the New World with that of the Old. But I doubt not, that the snow-clad heights of Chimborazo, Illimani and Aconcagua have seen as many, and as strange forms of animals, pass by and become extinct, as ever did the Alpine pinnacles, or those loftiest ones of the Himalaya.

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When contrasting the productions of the eastern coast of South America, with those of the western, and likewise with those of the corresponding parallels of latitude in Europe, I should have added (line 15) after the grape and fig, as flourishing in lat. 41°, the peach, and the nectarine (both of course standards), water and musk melons, batatas dulces (*Convolvulus batatas*), the olive and the orange; the latter, however, had only been lately introduced, but it promised to succeed well.

Page 272.

I have spoken of the low latitudes in which tropical forms of vegetation

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are found in the southern hemisphere, and likewise of some mammalia and of birds. With respect to the parrot of the Strait of Magellan, Macquarrie Island in lat. 55° S. and long. 160° E. offers an analogous instance, in possessing a species of this genus. I am, however, now enabled to bring forward a more important observation, as directly bearing on the evidence by which geologists have chiefly judged of the climate of ancient Europe, namely, on the character of the marine productions of the southern hemisphere. In my journal I have remarked that the southern seas teem with life, under innumerable forms; and the truth of this remark is amply attested by the vast herds of great unwieldy seals with which the shores of Patagonia, the Falkland and the Antarctic islands, were, according to the narratives of all the early navigators, almost covered. Having mentioned these facts to Mr. George B. Sowerby, he informs me, that the shells of the southern part of the southern hemisphere have some affinity in general character with those of the intertropical seas, or rather that they are of much larger size and of more vigorous growth than the analogous species (excepting the chitons of California) under corresponding zones in the northern hemisphere. Thus the immense size of the Patellæ, Fissurellæ, Chitons, and Barnacles of the Strait of Magellan, and the large size of the former at the Cape of Good Hope, may be taken as instances. On the east coast of South America (in lat. 39°) three species of Oliva (one of large size), a Voluta (and perhaps a second species), and a Terebra, are amongst the *most abundant* shells on the mud-banks of Bahia Blanca. Another species of Voluta is found as far south as 45°, and there is some reason to believe, even much further. Oliva, Voluta, and Terebra are amongst the best-characterized tropical forms, that is, both the individuals and species of these genera are extremely abundant in the intertropical seas, whilst they are very rare, or do not exist, on the shores of temperate countries. It is doubtful even if one small species of these three genera, an Oliva, inhabits the southern shores of Europe; whilst in a *higher* latitude, on the coast of South America, species of all three are the most *abundant* kinds.

At Bahia Blanca many of these shells are embedded in gravel, and have been raised above the level of the sea. Now let us suppose that the climate of South America and of the surrounding seas were to undergo some change, so as to become in every respect like that of Europe; it can, I think, scarcely be doubted, that the shells of the abovementioned genera would gradually become extinct, and be replaced by others better adapted to the new climate. What, then, would a geologist say, who entertained the generally-received opinions on the distribution of organic beings in accordance with our knowledge of the northern hemisphere (or, rather, in this imaginary case of both hemispheres), when he found these gravel beds abounding with Olivas, Volutas, and Terebras?—such

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shells not existing there. We may also suppose that he had discovered that the limits of the more tropical forms, both animal and vegetable, of the productions of the land, had likewise during this former period extended further south: what, then, would he say? Would he not at once infer, with the strongest appearance of truth, that the climate formerly had a more tropical character, properly so called, and therefore had a higher annual mean temperature than at present? Nevertheless, we know such an inference would have been absolutely erroneous. To put the case in another point of view: should a geologist find, in lat. 39°, on the coast of Spain, a tertiary deposit, abounding with Olivas, Volutas, and Terebras; or in lat. 45°, on the coast of France, other beds, containing a large Voluta, and numerous Patellæ, Fissurellæ, Chitons, and Balani, larger and of stronger growth than the existing species, would he be justified, after what is now known, in pronouncing that the climate formerly had a higher mean temperature? I think it may be safely asserted that he would not be so justified, but rather would be bound to search for other evidence. In the actual case of Europe, we have knowledge (as will be shown in a following note*) of another element in the problem, namely of the lower descent during former times of the snow-line,—as is inferred from the former low descent of glaciers, on the same mountains, where they now occur only at great heights, and likewise from the congelation during this same period of the soil in a low latitude—and this new element, I believe, gives the key to the solution of the problem, which is, that the climate of Europe was formerly more equable, but so far from being strictly more tropical, that it probably even had a lower mean annual temperature than it now possesses. I need scarcely say that I here refer *only* to the later tertiary periods: in the more ancient epochs, the plainest analogies tell us of an equatorial climate, whilst on the other hand, we are very far from having the smallest reason to suppose that the snow-line then descended low; and this is the key, as Ihave called it, to the problem of later times.

Page 282.

With respect to ice transporting fragments of rock in the Antarctic regions, M. Cordier, in his instructions *(L'Institut*, 1837, p. 283*)* to the voyage of the Astrolabe and the Zélée, has this passage: " Les relations de l'expédition anglo-américaine de découverte exécutée en 1830, nous ont

* As these notes are appended to the Journal, I have found it scarcely possible to classify them properly. I have been obliged to allude to the lower descent of the glaciers in Europe during former periods—facts which are first brought forward in a succeeding note to p. 294.

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fait connaître que les plages des Nouvelles-Shetland sont couvertes de grands blocs erratiques formés de granite, et par conséquent d'une nature différente des autres roches du pays. M. James Eights, naturaliste de l'expédition, n'hésite pas à considérer ces blocs comme ayant été apportés par les glaces, qui viennent annuellement s'échouer et se fondre sur les plages dont il s'agit et comme étant les indices de terres inconnues situées plus près du pôle que la terre la Trinité." I have not been able to find any account of this expedition. Lieutenant Kendall describes (*Geograph. Journal*, 1830) pinnacles of syenite in Smith's Island, one of the South Shetland group; so that the inferences regarding the distances, from which the blocks are supposed to have come, probably are erroneous.

In speaking (p. 272) of the rigour of the climate of Deception Island in South Shetland, I might have mentioned that Lieut. Kendall says (*Geograph. Journal*, 1830, p. 66), that on March the 8th, "We took the hint of the freezing over of the cove (lat. 62° 55′) and effected our retreat." This is the same as if, in the northern hemisphere, the harbour of Christiansund in Norway, were to freeze on the 8th of September!

Page 285.

I have described the dimensions of the great glacier which in lat. 46° 50′, sends down an arm to Kelly Harbour, and another to a flat swamp; I now find from information communicated to me by Captain FitzRoy, that it must communicate with the channels and bays northward, which extend behind the peninsula of Tres Montes. Agüeros, in giving an account of an expedition of the missionaries (*Descripcion Historial de la Provincia de Chiloe*, p. 227), says, they encountered in the Laguna de San Rafael (lat. 46° 33′ to 46° 48′) "many icebergs (*muchos farallones de nieve*), some great, some small, and others middle sized." This was on the 22d of November, 1778. Captain FitzRoy also tells me, that in the account of another missionary voyage, it is said that the boats had difficulty, on account of the islands of ice, in passing through the Caño de Perdon, a strait connecting the Laguna de San Rafael, with the other bays behind Tres Montes. Transposing in imagination, as I have done at p. 291, the places in the southern hemisphere to corresponding ones in Europe, these facts are the same as if, in a channel of the sea stretching from the Mediterranean between the Alps and the Jura, a boat should encounter *in the latitude of the lake of Geneva*, and *on the 22d of June*, (but not on one occasion only,) so many icebergs, and of such dimensions, that the historian of the voyage should describe them as being "some great, some small, and others middle sized"!

Having insisted so strongly, in this part of my Journal, that it is in the southern hemisphere, where tropical forms encroach on the temperate

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zones, that solid glaciers descend to the sea in low latitudes; I might have added that it is in this same hemisphere, that the icebergs, which have been formed in the Polar Regions, are drifted furthest from their birth-place. Horsburgh (*Philosoph. Transact.*, 1830) describes several great icebergs seen by a ship, in her passage to India, in 35° 50′ S.: that is, far to the northward of the latitude, where tree-ferns, arborescent grasses, parasitical orchideous plants, and even palm-trees grow; and within sixty miles of the land, where the rhinoceros, elephant, hippopotamus, lion, and hyena, are very numerous.

Page 289.

Until lately I was not aware that there were sufficient data to speak with some precision of the southern limits of erratic blocks in the northern half of the New World. In Canada, and in the northern parts of the United States, innumerable great scattered fragments of rocks have been described by Bayfield, Bigsly, Hitchcock, and others. In parts of Massachusetts, according to Professor Hitchcock (*Report on the Geology of*), boulders seem to cover the whole face of the country. Further southward we hear from Mr. Rogers (*Report to Brit. Assoc.*, vol. iii.) that boulders are common over the great valley which crosses Pennsylvania, Maryland, and Virginia (lat. 36° 30′ to 42°): and likewise in the states of Ohio, Kentucky, and Indiana, which are in nearly the same latitude. Mr. Rogers having described some blocks of sandstone at Washington and on the Susquehanna, which must have come from some distance northward, adds that "Drake in his picture of Cincinnati (39° 10′) mentions large masses of granite in that part of the Ohio, resting on the ordinary finer diluvium. The nearest granite to the north is at least one hundred leagues distant; while no primary rock occurs south or east, within even a much greater limit." He then proceeds, "We are reminded here of the great detached blocks, which strew the plains of northern Europe, and the explanation suggested, that they have been carried there upon floating ice;" and concludes with the important remark, that Mr. Conrad, who has explored the state of Alabama (30° to 35°) was never once able to perceive a boulder upon its surface. It would hence appear that 36° 30′ is the southern limit of the dispersion of erratic blocks in the United States; and these are spoken of, as having come from the north. Therefore, there is no occasion to suppose that the ice, in which by the theory they are believed to have been embedded, was formed in so low a latitude as that here mentioned; and at present, in the southern hemisphere, icebergs are *drifted* to latitudes, though not formed in them, nearer the tropic than 36° 30′. In Europe I cannot hear of erratic blocks having been found further south than the southern flanks of the Alps, in lat. 45°; and Hum-

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boldt has said (see *Cuvier's Theory of the Earth, translated by Professor Jameson*, p. 346) that they do not occur in Lombardy. I may here remark, that care should be taken to separate the phenomenon of great *angular* blocks, from that of rounded ones, although of considerable size; for torrents, and more especially the waves of the sea, during its slow oscillation of level, are agents sufficiently powerful to produce great effects. The lowest latitude in South America, in which I found large angular fragments, which must have been transported by ice there formed, or by some unknown means, was in latitude 41°. But as I did not examine the country immediately north of it, I am not prepared to say that this is their extreme limit; but between latitude 27° and 33°, I found no appearance, on either side of the Cordillera, which indicated a power of transportation of the kind required to remove boulders from a distance. Thus, we find that the limit of their dispersion in the two Americas is nearly the same; although they approach the warmer zones rather more closely in the northern than in the southern division of the continent, and in both, probably, more so than in Europe.

In the note, in which I have considered the apparent exceptions to the law, that erratic boulders are not found in the intertropical regions, I have said that the internal evidence of the Macao case led me to doubt its reality, and I now find it is distinctly stated by M. Chevalier that the rounded blocks result from the secular disintegration of the fundamental rock (*L'Institut*, 1838, p. 151—*Analysis of the Voyage of the Bonite*). I may here add, that M. Puillon Boblaye, in his description of Bone and Constantine on the northern coast of Africa (*L'Institut*, 1838, p. 248, says, "Je n'ai rien vu que pût indiquer le phénomène des blocs erratiques." My statement that erratic boulders are not found in Australia, is fully borne out by information communicated to me by Major Mitchell, who, in his repeated expeditions, has traversed so much of the south-east division of that continent. With the several facts given here and in the Journal (p. 289), I can scarcely doubt that the law of the distribution of erratic blocks is finally determined; and it is needless to specify the great, not to say conclusive, importance of this law on the theory of the means of their transportation, — a problem which has so long perplexed geologists.

Page 294.

In my discussion on the climate of the southern hemisphere, I have shown that a low altitude of the line of perpetual snow, and consequently the descent of glaciers to the level of the sea in latitudes relatively low to what occurs in the northern hemisphere, and likewise the perpetual congelation of the soil a little beneath the surface in countries without the

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frigid zone, are the results of a climate which appears favourable to the passage of tropical forms beyond their proper limits, and to a vigorous native vegetation. The climate is one of an equable nature; and this must, to a considerable degree, be the effect of the great area of ocean compared with the land of the southern hemisphere. In the northern hemisphere we have proofs, that the productions both of the land and water, during the period antecedent to the present, had a more tropical character than they now have, and there is, also, a high degree of probability that the proportional area of water was much greater.

If then we judge from the analogy of the southern hemisphere, the first and simple inference from these facts, is, that the temperature of Europe was formerly more equable, though perhaps with a lower mean, than it now is. It may be asked, as a test of this inference, did the snow-line formerly descend lower than it now does? Was the soil formerly frozen a little beneath the surface in a low latitude? The congealed carcasses of the great Pachydermata of Siberia answer the second question; and in my journal, I have indirectly considered the first one as answered, by the fact of the many erratic boulders of Europe having travelled from mountains, situated in regions where great bodies of ice do not at present descend to the level of the sea. For on the theory that these boulders were transported by icebergs from glaciers, which formerly descended into the sea in latitudes where perpetual snow is not now found, or if so, only at great heights, the problem receives so simple a solution, that I did not hesitate, having the other data, to assume, that the snow-line in Europe formerly did descend much lower than it does at present. But, had I studied my subject more attentively, I might have taken a higher ground: in a note, indeed (p. 294), I have stated that according to Professor Esmark, it is certain, that the glaciers of Norway formerly descended to a lower level; and I now found that some time since, Messrs. Venetz and Charpentier, and more lately M. Agassiz, have incontestably shown, from the presence of glacier-dikes or moraines, and from the polished and scratched surface of the rocks, that in the Alps enormous bodies of ice formerly descended to the borders even of the lake of Geneva, and therefore much lower than the line of present lowest descent.* With these several facts it might have been boldly asserted, that the climate of Europe formerly was like

* No doubt if much more snow fell formerly than at present, the glaciers would formerly have descended somewhat lower; but as Europe now has a moderately humid climate, it is improbable in the highest degree (if indeed possible) that a difference of that kind could have caused the former extremely low descent of the ancient glaciers of the Alps: therefore we are compelled to attribute the difference to a change of temperature of some kind.

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that of the southern hemisphere as it now is; and consequently, as we know, that the sea within recent tertiary periods stood at a higher level over a large portion of our continent, it might have been affirmed, had there been no record of the existence of erratic blocks on this side of the globe, that it would be an anomaly, difficult of explanation, should there not be found around the eminences of central and northern Europe great unrolled fragments, scattered at long distances from their parent sources, and often separated from them by profound valleys.

M. Agassiz has lately (*Address to the Helvetic Society, July* 1837, *translated in Jameson's New Philosophical Journal*, vol. xxiii., p. 364, *and in several communications in the French periodical L'Institut*) written on the subject of the glaciers and boulders of the Alps. He clearly proves, as it appears to me, that the presence of the boulders on the Jura cannot be explained by any debacle, or by the power of ancient glaciers driving before them moraines, or by the subsequent elevation of the surface on which the boulders now lie. M. Agassiz also denies that they were transported by floating ice, but he does not fully state his objections to this theory; nor does he oppose it, by the argument of the apparent anomaly of a low descent of glaciers, with the generally-received opinion of the more tropical character of the productions of the antecedent periods,—which was philosophical, until the effects of a temperate and equable climate were considered.* On the contrary, he assumes that, during the gradual cooling of the earth, there have been periods of excessive refrigeration. It is needless to state that such an hypothesis is not supported by a single fact—without, indeed, the *assumed* sudden renewal of life on the surface of the world at successive periods be considered such. During this imagined period of excessive refrigeration, the Alps and the greater part of Europe, and even of Asia, are supposed to have been covered by one immense sheet of ice, and during the *assumed* sudden elevation of the Alps, fragments of rocks are supposed to have been shot over the frozen surface, and, when the ice melted, to have dropped on the surface where they now lie. M. Agassiz considers that this view explains the position of the boulders on pinnacles, and their absence in the valleys. I confess I should have thought, after the flexure and elevation of the ice, these would have been the least probable situations: but neither this, or some

* M. Charpentier (*in his account of M. Venetz's investigations on the Glaciers of the Valais—Edinburgh New Philosophical Journal*, vol. xxi., p. 215) was fully aware of this difficulty. His explanation rests on a supposed enormous oscillation of level in the Alps,—an assumption which is unsupported by other facts, and is not applicable to the general case of Europe.

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other facts (p. 381), are quite intelligible to me from the briefness, with which they are alluded to. M. Agassiz says (p. 375), "The erratic blocks of the Jura every where repose on polished surfaces, all those at least which have not been carried beyond the crest of our mountains, and which have not fallen to the bottom of our longitudinal valleys, as may be seen throughout the valleys of the Creux du Vent. But they do not repose immediately upon these polished surfaces. Wherever the rounded pebbles which accompany the great blocks have not been removed by subsequent influences, it is remarked that small blocks, in other words pebbles of different sizes, form a bed of some inches, and sometimes even of many feet, upon which the great angular blocks repose. These pebbles are also much rounded, even polished, and are heaped up in such a way that the larger are above the smaller, and that the last often pass below into a fine sand, lying immediately over the polished surfaces. This order of superposition, which is constant, is opposed to all idea of a transport by currents; for in this latter case the order of the superposition of the pebbles would have been precisely reversed." Further on (p. 379) he remarks that the action of the glaciers is immense; "for these masses, continually moving upon each other, and on the surface, bruise and grind down every thing moveable, and polish the solid surfaces on which they repose; at the same time that they push before them all that they encounter, with a force which is irresistible. It is to these movements (of the great stratum of ice) we must attribute the strange superposition of the rolled pebbles, and of the sand, which immediately reposes upon the polished surfaces; and it is unquestionably to the grating of this sand upon these surfaces that the fine lines which we find (previously compared to the scratches made by a diamond on glass) are owing, and which would never have existed, if the sand had been acted upon by a current of water." Now it may be demanded, by what possible means can such violent action arrange the large pebbles above the smaller ones, and these again above the sand? The fact appears to me utterly inexplicable on this view. Again it is said, that the surface of the rock is marked by furrows and gibbosities, as well as by scratches, and that these "never follow the direction of the slope of the mountain, but are oblique and longitudinal (that is, in the line of the mountain, and therefore nearly horizontal), a direction which excludes every idea of a stream of water being the cause of these erosions." What explanation will it be believed is offered for this fact?—It is, that the fine lines and furrows "must have resulted from the much greater facility which the ice had in dilating itself in the direction of the great Swiss valley, than transversely, confined as it were between the Jura and the Alps."!

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I will now endeavour to show how far these very curious facts, which we owe to M. Agassiz's observation, can be explained by the theory of floating ice: and the theory, I may add, if applicable to this case, solves that which presents far greater difficulties, than any other of the kind in Europe. I should first state that I make two *assumptions*, and if these be rejected, the theory is not applicable to the case of the erratic blocks of the Alps:—first, that an arm of the sea extended between the Jura and the Alps, during that period in which, as I have before shown, it is probable, that the proportional area of water in Europe was greater, and certain, that the productions of the land and water had a more tropical character, at the same time that the snow-line descended lower. The age of the Molasse, which occupies this area, between the Jura and Alps, has not been accurately determined; but it is supposed to be miocene, and is said to contain leaves of the Chamærops, a genus of palms, at present found further from the equator than any other kind. It is not, however, evident that the Molasse was deposited by the sea during the latest period, when it occupied a confined limit between the Alps and Jura; but even if this should be found to be the case, it would be rash in any one positively to conclude that glaciers could not have descended to the shores of a sea, on which the Chamærops flourished, after that we know they descend in the southern hemisphere so near the limits of several tropical forms.

My second *assumption* is, that the elevation of this much of Switzerland, whenever it took place, was slow and gradual: this is supported by the strongest analogies of South America, Scandinavia, and other parts of the world; whilst on the other hand, the *assumption* that it had been sudden, would be unsupported by a single ascertained fact in nature. Now, as the numerous masses of ice, which fall from the glaciers at the head of the sounds on the South American coast, are slowly drifted outwards (owing to the fresh water flowing in from the foot of the glaciers), and in the more open channels are left to be acted on by the winds and currents; so must it have been with the icebergs from the glaciers of the Alps, situated in the same latitude, and under similar conditions. These icebergs would in most cases be driven on some part of the surrounding shore; but from floating deep they would ground a little way from the beach, and then being packed together, and driven to and fro, as the winds changed, and as the tides rose and fell, would they not, like a glacier on the land, though in a lesser degree, "bruise and grind down every thing and polish the solid surface, on which they reposed?" In the rapids of the North American rivers, over which large bodies of ice are driven, carrying with them pebbles and fragments of rocks, I am informed by Dr. Richardson, that the primitive rocks are scooped and hollowed, and have their surfaces polished and glossy. Dr. Richardson, however, is not prepared to say, whether this

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is caused by the passage of the ice or of the pebbles.* Although the icebergs might be drifted from side to side of the sound, if they were moved after having grounded, it would be along the shore by the set of the currents or wind, and perhaps slightly up and down by the tidal changes. Would not the necessary effect of this be, that the scratches formed by the sand grating between the rocks and the bottom of the icebergs should be, with some irregularities, longitudinal, or (from the effect of the tidal movement) oblique? And as the mountains slowly emerged during ages, every part would be thus acted on; and consequently the whole surface would be marked by longitudinal scratches.

The icebergs on the South American coast sometimes transport angular fragments of rock, to the distance of many miles from the glacier whence they were detached; and as the winds and currents generally have sufficient steadiness to drive any floating object soon on shore, (as is known to be the case with a capsized boat, a barrel, or floating carcass, &c.), so the blocks of rock would be *generally*† landed on the shores of the chan-

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* It must be remembered, that I am here considering the effect of icebergs, in inland and protected sounds. Dr. Richardson tells me, that the great icebergs in the Arctic sea are packed together, and are driven with such force against the shore, that they push up before them, to the height of several feet, every pebble and boulder which lies on the bottom; and consequently the submarine ledges of rock are kept absolutely bare. If a fragment were to be wedged beneath one of these mountain-masses of ice, when forced upward with such overwhelming power, it is impossible to doubt that the underlying surface of solid rock would be deeply scored. As it is known that the shingle on most beaches has a tendency to travel in one direction, so must the icebergs; and hence we may conjecture, that the grooves, would generally be slightly oblique to the line of coast, and parallel to each other.

† We might expect that they would *sometimes* be launched into the deep, whilst on their passage. M. Charpentier (*Edinburgh New Phil. Journal*, vol. xxi., p. 217) observes, speaking of another theory, "This view is equally insufficient to account for the extraordinary position of immense single blocks, which we sometimes find planted vertically in the soil, in the *valleys*, as on the sides of a mountain, and split up throughout their whole extent from top to bottom,—a phenomenon which would force us to believe that these blocks, had fallen perpendicularly from a certain height on the very spots where we now see them, and had been rent asunder by the fall, into the several fragments lying near one another." M. Charpentier considers this owing to the fragments having fallen through fissures in the enormous glaciers, which, as he believes, extended from the Alps, across the lake of Geneva, and up the Jura. The explanation above suggested is, at least, as simple as this.

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nels between the Alpine ranges, and not dropped in the intervening spaces. If any pointed rock came so near the surface that a floating mass of ice thus charged, grounded on it, the block would, when the ice melted, be there left. But it may be asked, would the blocks usually be deposited on the bare surface of the rocky bottom off the shore, or on an intervening layer of gravel or sediment? From what I have observed when passing in boats through the channels of Tierra del Fuego, and from frequent examinations of the armings of the lead used in sounding, I feel nearly sure that *absolutely bare* submarine rock is not very common. Moreover, where matter is depositing near a shore, the finer the particles are, the further they are drifted: in approaching a coast I have actually traced *every step in the series*, from the finest sand to large pebbles. But as the land in any case is slowly elevated, the same forces which carried the large pebbles to a certain distance from the beach, and the smaller ones to a still further distance, will, after each little elevation, carry them somewhat further:—a layer of little pebbles thus covering the sand, and a layer of large pebbles the smaller ones. Hence, when the part near the shore is converted into dry land, a section of the bed which was originally the bottom of the sea will necessarily show solid rock covered by sand, this by fine pebbles, and these again by others, gradually increasing in size. Such then, I conclude, must have been the nature of the sublittoral deposits of the Alps, during their assumed slow elevation. Finally, as icebergs of large size would seldom be driven up on the beach of a sheet of water, if, like the channel between the Jura and the Alps, it were protected from the open sea, any fragments of rock transported by them would have been dropped some way outside, and therefore when upraised with the whole country, they would be found in most cases reposing on beds (where the loose matter had not been subsequently removed), characterized by the order of superposition just described.

Such is the explanation I would suggest of the very curious facts observed by M. Agassiz. I make no assumptions which are not supported by strong analogies and the foundation of the theory—namely, a change of climate of a peculiar kind—can be shown by reasoning, independent of the existence of erratic blocks, to be probable in a high degree: whether this is the case with the theory of M. Agassiz, I leave the reader to decide.

Having said thus much on the scratched rocks of the Alps, I am tempted to make a few remarks on those of Scotland, described by Sir James Hall* in his celebrated paper (*Edinburgh Phil. Transact.*, vol. vii.)

* Sir James Hall believes that erratic boulders were transported by debacles, when embedded in ice. He seems to have been led to this opinion, by a clear perception of the difficulty of supposing the existence

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on the Revolutions of the Earth's Surface:—a case which has always appeared to me to be the strongest ever adduced in favour of the theory of an overwhelming debacle having rushed, at least in that country, over hill and valley. The furrows and scratches in the same district are parallel to each other, and hence run in the same direction:—thus, near Edinburgh, they extend in a line a little north of west and south of east, that is parallel to the valley of the estuary; but both to the eastward and westward they deviate from this line by more than half a right angle; and on the south-west part of Scotland they have no uniform direction. In the north of Scotland, however, near Brora, Mr. Murchison (*Geolog. Transact. 2d Series*, vol. ii., p. 357) found the hills marked in parallel lines, directed north-west and south-east. The furrows and scratches near Edinburgh seem generally to traverse the less inclined surfaces, but Sir James, speaking of one part, says "the *perpendicular* face as well as the rest is covered with lines, which are horizontal, or nearly so." In these respects the case appears very similar to that of the Alps: the rocks, however, are not polished;* but this may be owing to their nature, sandstone and trap, and not to any difference in the cause; for Dr. Richardson tells me that in the same rivers in North America, in which the granitic rocks are much polished, those of laminated limestone are not at all so. Near Edinburgh, where the lines extend west and east, the western face of the hills (of which the highest mentioned is four hundred and seventy feet above the sea) is chiefly marked, whilst on the opposite or protected side, a long tail of (so called) *diluvium* extends, which consists of blue clay, with large erratic boulders embedded in it. These boulders, as I am informed by Mr. James Hall, and by Mr. Smith of Jordanhill, are themselves marked with parallel lines, having one direction, which shows that they were held fast whilst drifted across the country, and not rolled over and over, like a pebble in a stream. It is

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of glaciers in the Alps and in other regions of central Europe, excepting at great altitudes; and from such situations a debacle was absolutely requisite to transport fragments on ice. Sir James rejects the belief of M. Wrede (given on the authority of De Luc), that the boulders of the Baltic may have been brought into their present place by ice, acting, during a steady and slow change in the level of the ocean. M. Wrede, therefore, appears to have been the originator of the theory advocated in this volume; and no country was more likely than Sweden to have given birth to such a theory.

* It is, however, said in Professor Buckland's *Reliquiæ Diluvianæ*, p. 202, that Colonel Imrie found the surface of some trap-rocks in the southern parts of Stirlingshire, having "a considerable degree of polish; and this polish is almost always seen marked by long linear scratches."

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admitted by all that the grooves on the solid rock were formed by the passage of these boulders over it. Although the minor inequalities of the surface of the land appear to have had no influence whatever on the action which produced the scratches, yet the larger features, as the general bearing of the main valleys, appear to have determined their direction. Sir James distinctly states that the scoopings and furrows have precisely that form which the long action of torrents tends to produce on a solid rock; but he adds, and I believe most truly, that the furrowed surface produced by such means is smooth, and not deeply scored and scratched. It is indeed utterly inconceivable that large stones should be carried along as if "*independently of their gravity*" by any ordinary means, with such velocity, as to mark with horizontal lines the *perpendicular* face of a rock. From these facts,—from the presence of great erratic blocks, from the steepness of one face of the grooved hills, and the tail of sediment stretching out from the other, Sir James Hall, having in his mind the recorded cases of the great waves consequent on earthquakes, inferred that a vast deluge had burst over the country from the westward.

M. Brongniart, and lately M. Sefström (*L'Institut, February* 22d, 1837), have described phenomena in Sweden almost identical with those of Scotland. The rocks are there grooved and scratched,* even to the height of 1500 feet, in north and south lines, parallel to the valley of the Baltic and of the Gulf of Bothnia; but they are considerably deflected by the larger inequalities of surface. The north side of the hills are most affected, whilst from the southern side, long ridges, called *oasars*, stretch out; they are composed of sand and waterworn materials, and appear to be similar, but on a much larger scale, to the *tails of diluvium* in Scotland. In Sweden, however, the erratic blocks always lie on the surface of these ridges, and are not embedded within them: but M. Sefström says, that at the time when the grooves were formed, enormous masses of rock were torn from the mountains. In the United States, the phenomenon of the grooved rocks appears to be developed in an extraordinary manner. Pro-

* Mr. Lyell, moreover, describes (*Philosoph. Transact.*, 1835, p. 18), the rocks of gneiss on the beach near Oregrund in Sweden, as being so "smooth and polished, that it is difficult to walk on them." Further on (p. 21), he describes the large bodies of ice, which are annually packed on this coast, so as to be eighteen feet thick: here then we have the same phenomena as in the Alps; and great icebergs in movement, instead of solid glaciers. More lately M. Berzelius has sent specimens of these rocks, "polished as if by emery in a constant rectilinear direction" (*Edinb. New Phil. Journal*, vol. I., p. 313), to Paris, accompanied by a letter to M. Elie de Beaumont.

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fessor Hitchcock (*Report on the Geolog. of Massachusetts*, p. 167) describes a tract about two hundred miles in width, over which nearly all the bare rock on the hills, even to the height of three thousand feet, is scored by parallel lines. In some parts boulders, weighing from fifty to one hundred tons, are yet lying on the surfaces, which bear the marks of their passage. The furrows are generally directed a little west of north, but in the western part of Massachusetts, and in the eastern of New York, they extend in a north-west and south-east line, and in one part even to W. 20° N. M. Sefström and Professor Hitchcock explain these appearances in their respective countries by the same agency, as Sir James Hall does in Scotland.

The theory of a great debacle is in these cases based on the united presence of erratic boulders, ridges of waterworn materials, forming tails to scarped hills, and parallel furrows and scratches on the surface of the rocks. 1st. With respect to the boulders, it would be superfluous to repeat the arguments in favour of the idea of their transportation by ice: and in the case of Sweden, it would be pre-eminently superfluous, as we know (see *Lyell on the Rising of the Land in Sweden, Phil. Transact.*, 1835) that blocks are there transported yearly by this means. 2d. Every one who has examined a great estuary, or a channel where the tides run strongly, is aware that linear banks are formed behind any obstacle. Therefore these tails of diluvium might have been formed, as far as regards their external form, by ordinary means; and with respect to their internal structure, which appears extremely irregular, and without any stratification, it must be difficult for any one to speak with certainty, until the joint effects of ice transporting coarse fragments and gentle currents of water, fine mud, are better known. Mr. Lyell, indeed (*Phil. Transact.*, 1835, p. 15) has advanced strong reasons, showing from the structure and composition of the *oasars* that they could not have been formed by any sudden debacle. Whilst such linear banks were depositing on one side of the hills, the other, or exposed front, would almost necessarily become scarped. 3d. We have the admission of Sir James Hall, that the scoopings and grooves resemble those produced by the slow action of running water: therefore the scratches appear to be the only part of the phenomenon which remains unexplained.

In the Alps, we are told, that scratches are formed on rocks by glaciers grinding over them. According to the theory of floating ice, we have evidence in the erratic blocks near Edinburgh, that ice was formerly in action there; and, from the analogies given in this volume, it might well have been so, since the scene of supposed action lies two degrees nearer the Pole than Georgia, in the southern ocean, "almost wholly covered with everlasting snow." What then would be the effect of the tides and gales of wind, driving packed icebergs with irresistible force, through chan-

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nels, and over rocky shoals ;—each part of the surface being exposed for centuries, as the country was elevated, to this action? Would not the fragments of rock embedded in the ice grate in a direct path over the surface, regardless of *minor inequalities?* and would not the fragments themselves be grooved and scored in one direction? Can we for one moment believe it possible that boulders, either in water or in the thickest mud, could be driven over a rugged surface, or along a perpendicular face of solid rock, with such enormous velocity as with their points to groove and scratch it, and nevertheless not to be rolled over and over, like a stone descending a mountain, but to be marked with parallel lines of abrasion, equally with the fixed, underlying mass? It appears to me that we assuredly can make no such admission. Travellers in the Arctic regions tell us that the drift-ice, with its irresistible power, can force up the gravel and sand into mounds (see *Geograph. Journal*, vol. viii., p. 221), and drive before it great boulders, and even ships, and masses of ice, high and dry on the beach. What then would be the effect of a few pebbles, or a single fragment, between such masses of ice and a steep coast-wall of rock? Would not scratches "horizontal, or nearly so" be formed, "indicating (to use Sir James Hall's words) that grinders had been pressed against the rock;" as if "independently of their gravity"?

In this explanation only *veræ causæ* are introduced, and reasons can be assigned, for the belief that these causes have been in action in these districts. On the theory of debacles, it still remains to be proved that rocks can be thus *scooped* and *furrowed*, or hills *scarped;* although I am far from affirming they cannot,—and scratched, I presume, they certainly would be. With respect to Sweden, where the land is now rising, and where ice even still is a transporting agent, it is undoubtedly the part of the geologist, to endeavour by long and laborious research to account for the phenomena by these real agencies. For to introduce, before it is absolutely forced on us, the hypothesis of a deluge of mud and stones, fifteen hundred feet deep in Sweden, or three thousand in North America, which rushing over the country, rounded the northern fronts of the hills, and rolling by their eastern and western flanks, left them marked with oblique furrows, is to violate, as it appears to me, every rule of inductive philosophy.

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With reference to the embedment of the Siberian animals with their flesh, I have mentioned in a note, the case of ice described as rising from the bottom of the sea, off the coast of Greenland. Messrs. Dease and Simpson, during their late memorable journey along the shores of the Arctic ocean, speaking of one part (*Geograph. Journal*, vol. viii., p. 218)

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say, " The ice lay much closer here ; and numerous masses adhered to the bottom, under the water, which obliged us to search a passage out from the shore." Further on (p. 220) they say, " But nowhere had the thaw penetrated more than two inches beneath the surface (of the land), while under water along the shore, the bottom was still *impenetrably frozen*." This was on the second of August. It should, however, be observed, that the sea along this part of the American coast is extremely shallow.

Page 321.

I have given my reasons for believing that the temperature of the mineral springs of Cauquenes, was permanently changed by the earthquake of 1822. This inference is altogether false, for I find that Schmidtmeyer, in his Travels in Chile during the years 1820 and 1821, says (p. 311) that the temperature of the different springs was 83°, 103°, 106°, 112°, 117° and 118° of Fahrenheit. Now Mr. Caldcleugh says, after the earthquake of February, 1835, the temperature fell from 118° to 92°. Previously, therefore, to this shock, it had regained the temperature which it had in 1820.

Page 377.

When I offered my views on the cause of the great waves, which follow earthquakes on certain coasts, I was not aware of the paper on this subject by Sir James Hall in the *Edinburgh Royal Transactions*, vol. vii., p. 154. I cannot, however, perceive the necessity of a sudden elevation of the bottom, to produce the observed effects, as supposed by that distinguished philosopher. Having read the abstract of a *Notice on the Resistance of Water*, by Mr. Russell, I perceive the subject is far more intricate, than I was at the time aware.

Page 381.

I have said that during the *few months* subsequently to the great shock of February, 1835, at Concepcion, upwards of three hundred tremours were felt, but I should have said, within *twelve days*. (See *Geograph. Journal*, vol. vi., p. 322. *Sketch of Surveying Voyage of the Adventure and Beagle, by Captain FitzRoy*). From some additional information which I have met with since finishing this chapter, I find the train of volcanic phenomena, which followed this earthquake, affected a larger area than that mentioned (seven hundred by four hundred miles), and affected it in a manner which gives great additional weight to the argument that South America is in that part a mere crust resting over a sheet of fluid rock ;

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and likewise to the generalization that the action of volcanoes, and the permanent elevation of the land (and consequently, as I believe, the elevation of mountain chains) are parts of the same phenomenon, and due to the same cause.

Page 446.

When I put together the few and exceedingly imperfect remarks on the subject of Miasmata, I did not know of Dr. Ferguson's remarkable dissertation—the result of his investigations in Holland, Spain, Portugal, and the West Indies—on the Nature and History of Marsh Poison (*Edinburgh Royal Transact.*, vol. ix., p. 273). He there clearly proves the fact, which had struck me with so much surprise, namely, that the driest districts, which, according to common notions, would be considered as the most healthy, are often singularly the contrary. In his concluding remarks, Dr. Ferguson says (p. 290), "One only condition, then, seems to be indispensable to the production of the marsh poison, on all surfaces capable of absorption, and that is the *paucity* of water, where it has previously or recently *abounded*. To this there is no exception in climates of high temperature; and from thence we may justly infer, that the poison is produced at a highly advanced stage of the *drying process*." And, from facts previously stated, it would appear that even in barren hilly countries, the banks of mountain torrents, which had been overflowed, sometimes became extremely insalubrious. In another place, Dr. Ferguson says, "It is from these (the dried and half-dried margins of lakes and marshes) that the poison uniformly emanates, and never from the body of the lake or pool; and I think it may be fairly presumed, that water, as long as it can preserve the figure of its particles above the surface, is innoxious, and that it must first be absorbed into the soil, and disappear from the eye, before it can produce any mischievous effects. Whoever in malarious countries waits for the evidence of putrefaction will, in all the most dangerous places, wait too long, as every one can testify who has seen pestilence teem forth, to the paralyzation of armies,—from the bare barren sands of the Alentejo in Portugal, the arid burnt plains of Estremadura in Spain, and the recently flooded table-lands of Barbadoes." I cannot forbear quoting here a remarkable fact, mentioned by Humboldt, though interpreted in a different manner by that illustrious traveller. Speaking of the intermittent fevers which are so common near the great cataracts, or *raudales*, of the Orinoko, he says (*Pers. Nar.*, vol. v., p. 17) the causes "are violent heats, joined with the excessive humidity of the air, bad nutriment, and, if we may believe the natives (as well as the missionaries), the pestilent exhalations that arise from the bare rocks of the *raudales*." Further on (p. 85), he says, "many examples are adduced of persons, who

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having passed the night on these black and naked rocks, have awakened in the morning with a strong paroxysm of fever." Humboldt thinks that these cases may be explained by the effect produced on the body by the high temperature, which the black rocks, coated with a layer of the oxides of manganese and iron, retain during the night. But it appears to me that the relation is too remarkable to be thus explained, between this fact and those mentioned by Dr. Ferguson, in which the desiccation of nearly bare rock in Spain, and of a very thin bed of earth overlying dry coral-rock in the West Indies, has given rise to the most pestiferous exhalations.

Page 461.

The sixth bird, mentioned as an inhabitant of the Galapagos, Mr. Gould now finds is not like the rest, peculiar to these islands, but is a known North American species of Ammodramus.

Page 465.

I have given my reason for believing that the *Testudo*, inappropriately called *Indicus*, is an aboriginal species of the Galapagos. I now find (*Kerr's Voyages*, vol. x., p. 373) that as far back as 1708, Woods, Rogers, and Courtney, in their voyage round the world, speaking of the tortoises of these islands, say that it is the opinion of the *Spaniards* that there is no other in *these seas*, except at the Galapagos: it is, however, then added, that they are common in Brazil,—a mistake which may be attributed to two different species not having been distinguished. It has been said that the bones of *Testudo Indicus* were found in numbers in the Isle of France, with some fragments of those of the Dodo; but M. Bibron—one of the best authorities in Europe on reptiles—informs me that he has reason to believe that a second species has been confounded under this name.

In the same page I remark that there is every reason for believing that several of the islands possess their own peculiar varieties or species of tortoise, but that my specimens were too small to decide this question. M. Bibron now informs me, that he has seen full-grown animals, brought from this Archipelago, which he considers undoubtedly to be distinct species. At p. 467, I have observed that the specimens of the *Amblyrhyncus cristatus*—that extraordinary marine herbivorous lizard—were larger from Albemarle, than from any other island. In this case, also, M. Bibron tells me, he has seen what he considers two species of the aquatic Amblyrhyncus, besides the terrestrial species. Doubtless the several islands have their own representatives of the Amblyrhyncus, like

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they have of some of the birds, and of the tortoises. With respect to the plants from this Archipelago, Professor Henslow writes to me, that although he has not yet examined them attentively, he finds that "there are several instances of distinct species of the same genus, sent from one island only: that is, whilst the genus is common to two or three islands, the species are often different in the different islands. In some cases the species seem to run very close to each other, but are, I believe, *distinct*." I may observe that, from my ignorance of botany, I collected more blindly in this department of natural history than in any other; so that certainly it was not *intentionally* that I brought the different species from different islands. If, indeed, I at all noticed their resemblance, I probably collected the second and third species as duplicate specimens of the first. It is useless to repeat here my regrets at not having procured a perfect series in every order of nature from the several islands: my excuse must be, the entire novelty of the fact, that islands in sight of each other should be characterized by peculiar faunas: I ought, perhaps, rather to think it fortunate, that sufficient materials were obtained to establish so remarkable a circumstance in the geographical distribution of organic beings, although they are insufficient to determine to what extent the fact holds good.

Page 477.

To the two cases of land-birds being extremely tame in islands only lately inhabited by man, I might have added Tristan da Acunha. Captain D. Carmichael (*Linn. Transact.*, vol. xii., p. 496), speaking of the thrush and bunting—the only true land-birds—says, "they fly about the cantonment, and are so tame as to suffer themselves to be caught with a hand-net."

Page 552.

One of the species of Millepora, which is mentioned as having the property of stinging, is the *M. complanata;* and the other, I believe, is *M. alcicornis*. In the Voyage of the Astrolabe (vol. iv., p. 19), an Actinia is said to have this property, and even to infect the water, which it squirts from its mouth. A flexible coralline, allied to Sertularia, was observed (p. 337) at New Ireland to have the same stinging power.

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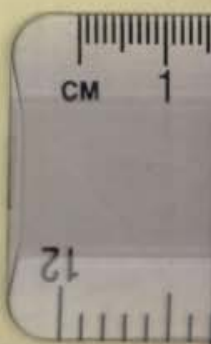

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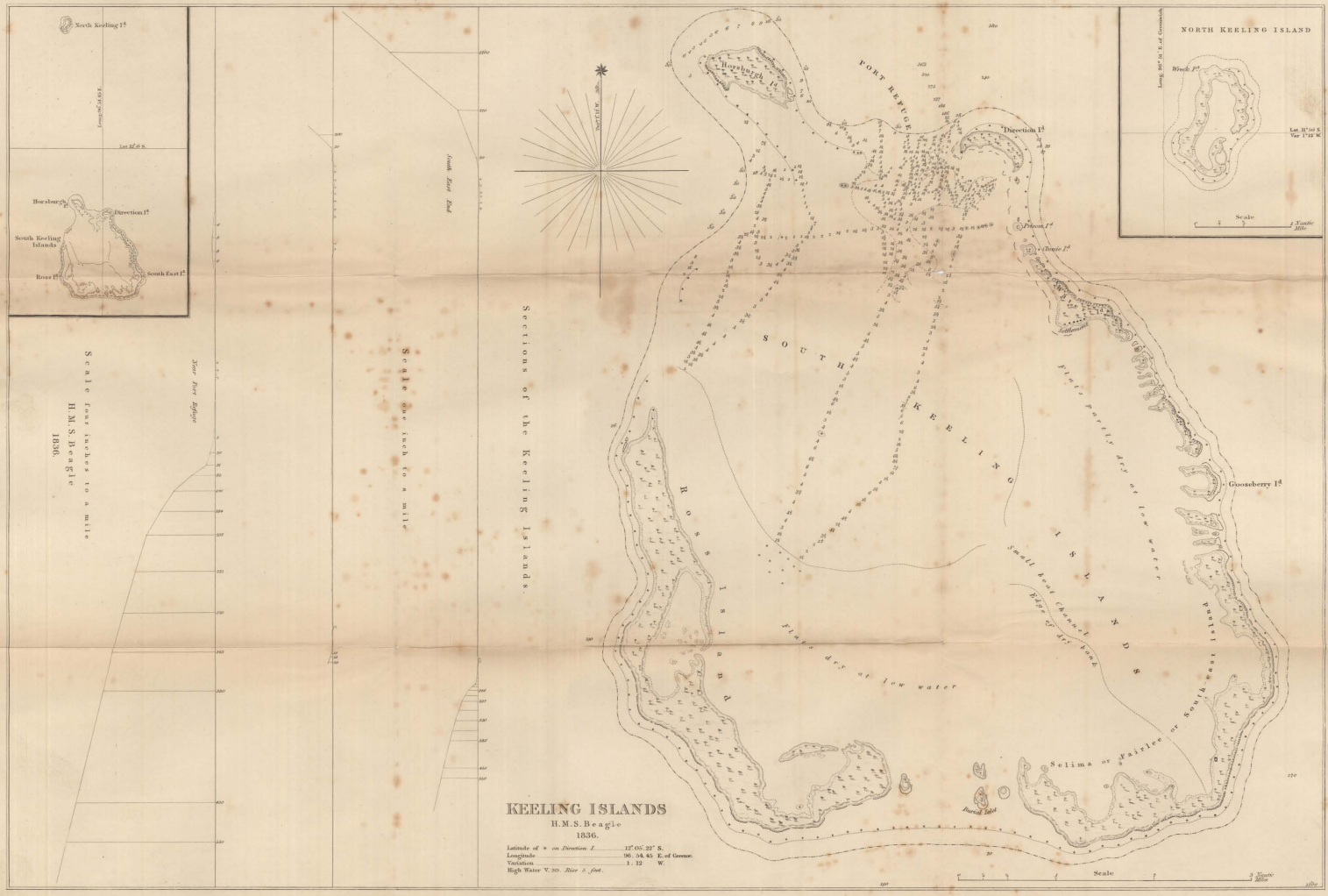

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