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THE NATIONAL GEOGRAPHIC MAGAZINE

ON DANISH BY-LANES

An American Cycles Through the Quaint City of Lace, the Curiosity Town Where Time Stands Still, and Even Finds a Frontier in the Farming Kingdom

By WILLIS LINDQUIST

LESS than two miles north of the German border on the western edge of the Peninsula of Jutland, half concealed by beeches and willows that crowd along the lazy little stream of Arn, lies the town of famous lace, Tønder.

While pushing up toward the Danish border from Hamburg on a new twelve-dollar bicycle, I discovered that the Germans still spoke of Tønder as if it belonged to them, harking back to the years (1864-1920) when it was under the German flag. Tønder is decidedly Danish, but special schools are provided for children of the German minority.

I wandered along Tønder streets all morning. The sky was a gray lid; drab, misty-looking clouds swept in from the North Sea, and let down a cold May drizzle.

Cobblestones of the deserted streets shone, and here and there a little pool of water, catching a bit of sky, looked like a sheet of lead. An old horse with a long mane and tail stood before an unpainted cart, his head hanging almost to the pavement; and on each side of the street frowned the gray-black walls of baroque buildings. It was as if I had happened upon the old town in the privacy of her bath.

LIFE BEGINS AT THE MARKET PLACE

The street made an unexpected twist and brought me out upon the market place. Here at last was life, and in no uncertain terms! I felt as if I had been whisked suddenly into a town a hundred miles away.

White poles erected along the curbs of the cobblestoned square were being hung with garlands and flowers. People walked about with quick steps, congregated in small knots, held low, animated conversations. Here and there, among the dark second-story windows facing on the square, white faces pressed against the panes.

"His Majesty, King Christian X of Denmark and Iceland, and his royal party are to make a visit this very afternoon," one of the decorators paused to tell me.

About noon an icy wind came up and swept down the streets with such pomp and power that one could easily believe it to be a blast from the royal horn. Men, women, and children in their Sunday best had been swarming to the square and now milled about, trying to keep warm.

Officers cleared the center of the square, and the last of the drizzle, which had been tapering off for some time, whipped across the square like puffs of smoke.

All nine members of the town band were out in top hats and tails, and they poured out slow, brassy music as they kept one eye on the notes and the other fixed on the officer who was to signal the King's approach.

Just when the strain of waiting was becoming unbearable, the officer gave the

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DEMOCRATIC CHRISTIAN—EVERY 6 FEET 6 INCHES A KING—GREETS SUBJECTS AT THE BACK DOOR

At a celebration in his honor, when all the official guests had departed from the royal castle, Denmark's monarch made this surprise appearance at a rear door to shake hands with some of his subjects, including open-mouthed youngsters. His Majesty has been called "the people's king."

Drawn by Ralph E. McAfee

LIKE A GIANT'S THUMB IN THE BALTIC'S BOTTLE NECK IS STRATEGIC DENMARK

The "Farming Kingdom" consists of the Jutland Peninsula and some 500 islands which fleck the narrow entrance to the busy Baltic. South, in Germany, appears the Kiel Canal, vital short-cut between the Baltic and North Seas; also, the island of Helgoland, German naval Gibraltar. The inset shows where the British and German fleets fought the World War Battle of Jutland. It includes the Firth of Forth and Scapa Flow, important British naval bases, and the Aland Islands, between Sweden and Finland.

signal, and the music slipped to a kind of complaining halt.

There was dead silence. Now we could hear an approaching motor. There was a thrusting of necks for the first precious glimpse; the band stood ready with instruments raised for the royal salute.

This, I thought to myself, is beginning to be impressive. You can't help being impressed by smart execution even if it is on a small scale.

Then two stout Danish women on my right broke into peals of laughter! We all joined in, for into the square came a lumbering, muck-covered fertilizer truck with a whiskered farmer at the wheel. He

Photograph by Willis Lindquist

A BLACKOUT, FOR COMPLEXION'S SAKE!

On the wind-swept island of Fanø, where the women spend much time outdoors, traditional masks still are worn to protect the skin from flying sand and the hot sun. Even the old women have pink, fresh-looking skin.

seemed more amazed than anyone. Guided by the incensed officers, the truck moved across the square and began pressing through the crowd at the far end.

A TALL KING ARRIVES

So absorbed were some of us in this seemingly impossible task that we did not notice the royal party until after their cars stopped in front of the town hall. The real tragedy was that the band had missed out completely.

King Christian, the Queen, Crown Prince Frederik, and Ingrid, the Crown Princess, were formally greeted by the mayor. Little girls in fluffy white dresses presented flowers to the Queen and Crown Princess, and curtsied like bobbing powder puffs while the King, towering head and shoulders above his subjects, shook hands with the old soldiers lined up at one side.

It wasn't a stiff affair. He stopped several times to chat and occasionally listened to what must have been good jokes, if his face was any clue.

After greeting them, he wandered about the square without escort, stopping here and there to pat the head of some small child, or to talk with some old man or woman. Without pomp or ceremony, he returned to his car and the royal party rolled slowly away, waving us a cheery goodby to a tune of the lusty band.

Tønder has the reputation for an unusual type of lacework little made in other parts of the country. "Knipling," they call it. I was not long in finding one of the kniplers, a tall, stoutish woman with a kind smile and a particularly keen enthusiasm for showing things.

HOMES CLUTTERED, BUT DUSTLESS

The walls of her sitting room were done in a solid, deep shade of red and were so cluttered with a hodgepodge of water colors, drawings, photographs, various knickknacks, souvenirs, and oil paintings that

they imparted the musty air of an antique shop.

The Danish homes I saw were characterized by dark-red, dark-green, or dark-blue walls, every square foot of which was separately decorated in its own right. These dust collectors are kept as bright and spotless as the day they were put up. The Danish home has such an air of polished cleanliness that one feels a reluctance to enter.

In one corner of the knipler's living room, on a small table of its own, rests the knipling board, a circular padded affair with a felt-covered wheel at one edge and two or three dozen thread bobs hanging over the side. My hostess beamed as she sat down to illustrate the mechanism, first twisting and braiding, then tying, pinning, and knotting. So fast did her skilled fingers play among the thread bobs and pins that following them with the eye was all but impossible.

Photograph by Willis Lindquist

MAKING LACE THE DANISH WAY, SHE TENDS TO HER "KNIPLING"

Ask a Dane about the village of Tønder and he will tell about knipling, a type of lacework made by the women of southern Jutland. Thread bobs are used instead of needles or hooks, from 30 to 230 for a single pattern.

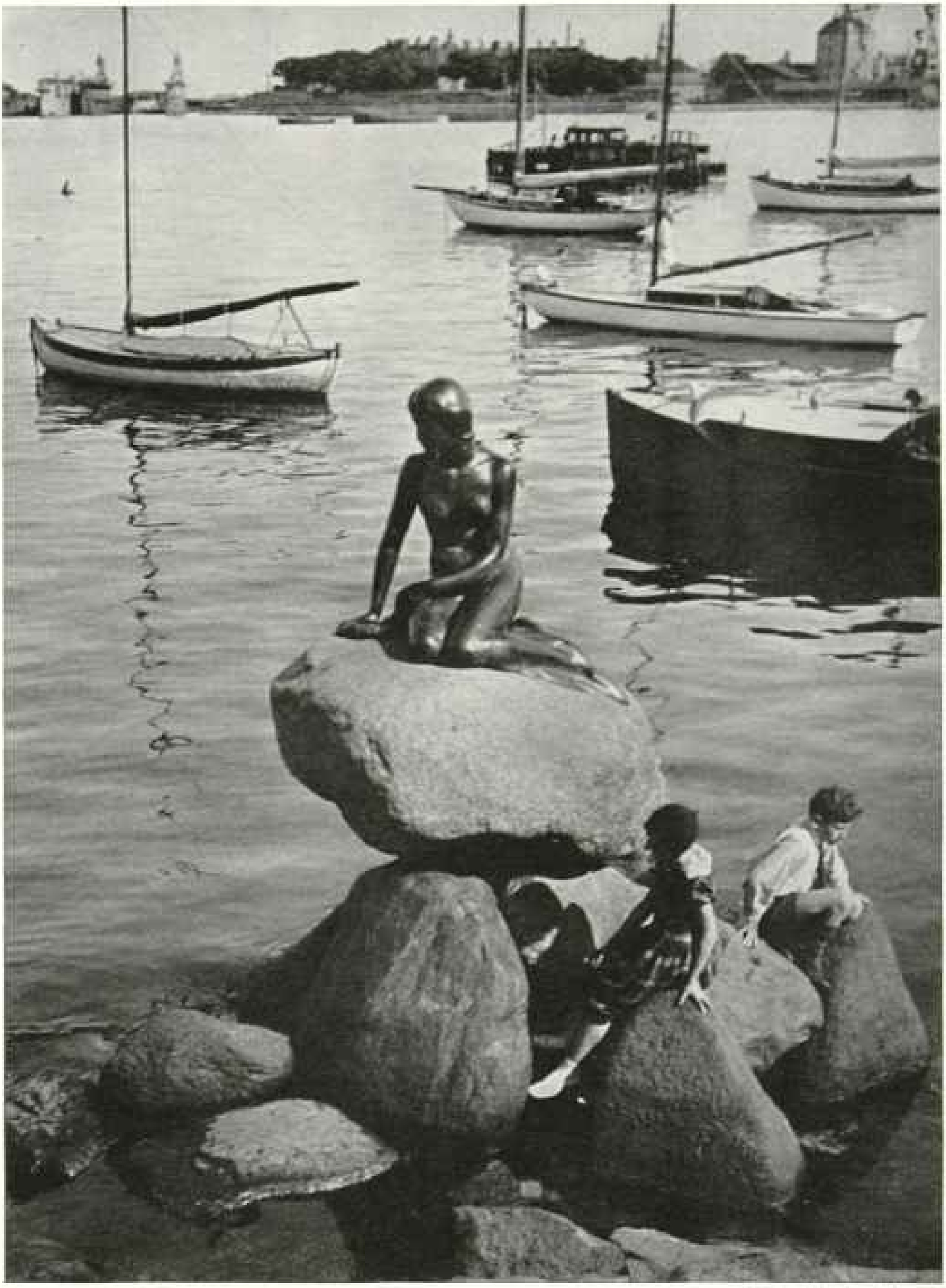
EVERYTHING STOPS FOR COFFEE

Silvery low chimes in the next room announced 3:30 o'clock. I had to rush the picture-taking because, of course, it was time for coffee, and that is one thing that can't wait. Sweet cakes and a kind of flaky roll were served with the strong coffee at the dining-room table.

You can't be in Denmark long without discovering that the Danes never feel quite satisfied with what they have done for you. There must always be something extra, some pleasant little surprise. Before you know it, they have won your heart and threaten to become bosom friends for life.*

While I drained my second cup of coffee, the lady of the house looked through a chest of drawers, emerging every minute

*See, in the NATIONAL GEOGRAPHIC MAGAZINE, "Royal Copenhagen, Capital of a Farming Kingdom," by J. R. Hildebrand, February, 1932; and "Denmark and the Danes," by Maurice Francis Egan, August, 1922.



Photograph by Jonais Co.

THE GLAMOUR GIRL OF DENMARK IS THE PENSIVE "LITTLE MERMAID"

On the promenade Langelinie in Copenhagen, Edvard Eriksen's figure of the heroine of Hans Christian Andersen's fairy tale is immortalized in bronze. She has been exported all over the world in reproductions on the famed Copenhagen china. Once she rested in a park, but was moved to her rock on the water's edge at the suggestion of Dr. Maurice Francis Egan when he was United States Minister to Denmark.

or so with a smile of triumph and another sample of knipling for me "to take home to your mother," as she put it. Some of them were narrow and simple; others were broad and intricate in design, requiring as many as 230 threads and thread bobs.

"Sometimes," she explained, "the thread bobs are made of ivory, cut sharp, and decorated just like chessmen."

THROUGH FARMS ONCE FEUDAL

The broad white road northward out of Tønder to Ribe and Esbjerg curves gently through rich farmlands of Danish North Schleswig (Slesvig); it passes small clusters of humble thatch-roofed huts, shrouded in groves of old beech trees, as they were long ago when serfs built and lived in them under the feudal system.

An hour's pedaling and this faint echo of Danish history fell away gradually. The flat country seemed to lose much of its snug, Old World appearance and in spots took on the newness of a fresh pine splinter.

I could have believed I was riding over the plains of Wyoming if it had not been for the sea gulls landing in flocks on the barren, yellow, thirsty-looking fields, and the ragged, dusty-green heather which lined the ditches and appeared in occasional patches between fields.

The westerly wind drove in mercilessly from the North Sea and kept me standing first on one pedal, then on the other.

FRONTIERS STILL—IN A SMALL LAND

Clean-swept fields are fenced with barbed wire, new steel-roofed brick buildings stand alone and desolate on the frontier of heather land where a few years ago lay an almost uninhabited waste of bogs and moors. It seems surprising that in a country as small and as old as Denmark, man is still rolling back the heaths and swamplands, reclaiming large areas of wasteland for farms. Stranger still, these frontiers extend almost to the back door of Ribe, one of the oldest towns in Denmark.

As evening sun and shadows turned the landscape into a tapestry of mauve and gold, I saw the glinting spires of Ribe Cathedral and a swirl of red tile roofs mounting skyward above the green lowlands that creep off westward to the sea.

To my left, solitary and abrupt, stood an old windmill, an occasional tree, and several widely scattered farmhouses silhouetted against the light, their outlines as brittle as if they had been cut from tin and pasted against the sky.

The wind died down. Storks flapped awkwardly above the roofs of Ribe, and beyond them, suspended in the pale-green sky, white clouds shone like a halo over the venerable town.

A farmer had just unhitched his horse from a drag and was leading it home. A black and white dog tagged at his heels. The clicking of hoofs on the hard road died away and into the hush of May evening came the sound of distant church bells, floating over the land like a benediction.

I entered a narrow, twisting street with the grim walls of half-timbered houses flanking it in the strange light of dusk. They appeared grotesque, as if part of a ghost city. Rude cobblestones brought me back to earth and gave me such a bouncing that I got off the bicycle and walked.

A round, unwrapped loaf of bread, fully a yard in length, came down the street under the bare arm of a small boy. There was more body to the loaf than to the child.

"Click, clack, click, clack"—heavy wooden shoes rang out as they struck the pavement. Their owner, an old man with a beard and a black cap, eyed me suspiciously and drew on a long Danish pipe, the curved stem almost two feet long.

I came upon an old woman with a full gray skirt, and a white cloth tied about her head, following a pigeon-toed cow. She hurried ahead, opened the low front door of an ancient, half-timbered house, and drove the cow right through to the stables in the rear court.

A STORK GUARDS HIS CHIMNEY TOP

The sound of hissing water on millraces rose from beneath several small bridges. I was stopped suddenly by an unfamiliar noise. I looked up and saw a lone stork. It stood perfectly still for a while in the big nest on a chimney top, then raised its long beak skyward and on over until the tip of it almost touched its back, and made a hollow, rattling sound like the beating of a bamboo cane against a cement walk.

Had it not been for an occasional truck and a few bicycles, I could have believed I had walked into another age. To say that Ribe is old, perhaps the oldest town in Denmark, is not enough.

It is the complete fulfillment of a dreamer's medieval cathedral town, a living, breathing relic of the twelfth and

Photograph from Three Lions

A HIGH TIME AT HIGH NOON IN THE FIELDS OF ZEALAND

When the lunch hour comes, all hands relax. There's a wild joyride across the stubble, with the farm dog leaping ecstatically and even the dignified horses showing signs of enjoying the fun. On the rich flat plains of the island of Zealand (Sjælland) are some of the finest farms in Denmark.

Photograph by Jonals Co.

FIELDS TO BURN: DRYING PEAT ON A JUTLAND MOOR

Peat is still an important fuel for the farmers of western and northwestern Jutland where coal is expensive and occasional trees are little more than stumpy bushes. "Peating" the moors in this manner also is the first step in reclaiming the bogs for the plowshare.

Photograph by Jonals Co.

NEAR "HAMLET'S CASTLE" AT ELSINORE, FERRIES PLY THE SOUND TO SWEDEN

The storied Kronborg (upper left) was made world-famous by Shakespeare as the setting for *Hamlet*. As if in return for the publicity, the Avon bard's plays are often presented in Denmark. Magnet for thousands who come to see the haunts of the gloomy Dane, Elsinore (Helsingør) is known also for its yacht regattas and shipbuilding. Ferries shuttle back and forth to Hälsingborg on the Swedish coast, some three miles across the Öresund.

Photograph by Jimls Co.

BATHHOUSES GO BATHING, TOO—TILL THE OCCUPANTS HOIST THE LITTLE RED FLAG

At one of Denmark's principal summer resorts on the island of Fanø, the wheeled shelters are drawn into the North Sea by horses. The bathers are flying the flag that means: "We've had enough. Please tow us ashore."

Photograph by Willis Lindquist

DAGMAR ARRIVES FROM BOHEMIA TO WED KING VALDEMAR

Denmark's beloved queen of seven centuries ago is depicted as she came to Ribe to marry Valdemar the Victorious, who reigned from 1202 to 1241. The statue, by Anne Marie Nielsen, stands on Castle Hill, on the west side of Ribe, once the site of the royal castle Riberhus.

thirteenth centuries, a town whose population has been almost the same for the past 400 years. The old cathedral bells still ring at seven, quarter to eight, and ten each morning, and at quarter to two each afternoon, calling the ghosts of monks to prayer as they did the real ones for centuries before the Reformation.

Contorted streets, tile roofs, and stork nests; "curiosity mirrors" that project from windows at an angle to permit looking down the street unobserved (page 15); placid mill pond; the old man ringing a bell in the street to advertise verbally for shopkeepers; the grinding of wagon wheels and the crisp clicking of hoofs and wooden shoes on time-worn cobblestones; the lofty towers of Ribe Cathedral rising majestically out of the clutter of red tile—all these seem like echoes of the Denmark that was, a Denmark of clashing armor and the conquests of Vikings.

Here the apostle of the north, St. Ansgar, erected a Christian church about the year 852. It was of wood. Construction of the present cathedral was begun on the same site about 1130 with a light-gray stone, imported from the shores of the Rhine; the architecture was in the Romanesque style, with addition of the square tower in the Gothic about 1594.

Centuries ago, Ribe was the principal seaport in western Jutland. Then slowly the River Ribe diminished. Later, the war of 1864 with Prussia and Austria brought the boundary within sight of town. A new harbor was built a few miles to the northwest at Esbjerg, and Ribe was left to sleep, undisturbed.

THE IRON HAND WARNING

In medieval times when Ribe was surrounded by a town wall, an iron hand hung over one gate as a graphic warning that anyone who cornered the foodstuffs for his own personal gain would have his right

hand severed above the wrist. So well known was the severity of Ribe justice that a mother once cried to her son, hanging on the gallows at Varde, "Oh, my son, you can thank Heaven you were not brought before Ribe court!"

A man convicted of stealing something worth more than two dollars was hanged, along with the stolen goods. But even in Ribe court there was discrimination. Women were given a special concession under the famous twenty-ninth article of the Ribe Code. It read: "A woman who has stolen and is subject to be hanged, together with the thing stolen, shall, instead, be buried alive because she is a woman."

Photograph by Willis Lindquist

BABIES RIDE BICYCLES BEFORE THEY WALK

In the land of bikes rumble seats are in front. The baby is strapped into a small seat with a back rest. Then shopping bag, bicycle, baby, and all, go to the Esbjerg market.

All that remains of gallows hill where these burials took place is a grass-covered mound.

Head-chopping was another form of justice meted out by that sober court. It was inflicted for making counterfeit money, for murder, for running off with the wife of another, and also, if you please, for the adulteration of honey. The great cleaver still hangs in the town hall.

WHEN A WATCHMAN SANG THE TIME

At the western edge of town lies a grass-covered hill surrounded by a swampy, reed-filled ditch that was once the moat of the storied castle Riberhus, where Valdemar II, the "Victorious," King of Denmark from 1202 to 1241, held royal court with his beautiful Queen Dagmar (page 12).

An aged Ribe mother told me she could remember the days of the watchman who used to clatter about town in his wooden clogs all night long, armed with a huge spiked club and singing a doleful song about the time, a different verse for every hour from eight in the evening until four in the morning.

This system had its weak points, however. About a century ago, money was stolen one night from the customhouse. In solemn council the city elders decided

Photograph by Gustav Hewlin

ALARM CLOCK AND MORNING PAPER, TOO, IS THE DANISH MILKMAN

The visitor to almost any small town in Denmark is awakened by the milkman's bell. Housewives and children meet him with containers which he fills from a tap in the rear of the wagon, meanwhile recounting the latest news of the neighborhood.

the thief could not possibly be caught so long as the night watchman clogged about the streets singing the hours. So he was ordered to stop his song and to wear rubber boots instead of his wooden clogs.

No sooner had the tunes and clatter ceased than all the good townsfolk were struck by a distressing malady, insomnia. It was too quiet to sleep! The question was whether the people were to be robbed of their sleep or their money. Finally, the town elders were forced to compromise. The watchman was to retain his rubber boots (a moral victory for the elders, you see), but was to resume his singing that found such favor with Morpheus. Once again Ribe slept soundly.

THE DEVIL'S PRIVATE ENTRANCE

A cat-head door leads into the transept of the cathedral. That door, so called because of a large cat's head in its center, was built as a private entrance for the Devil, who was permitted in the cathedral on dark nights when it was empty. Such concessions were often made by medieval church builders as a peace offering so the Evil One, in his anger at the construction of another church, would not hamper building.

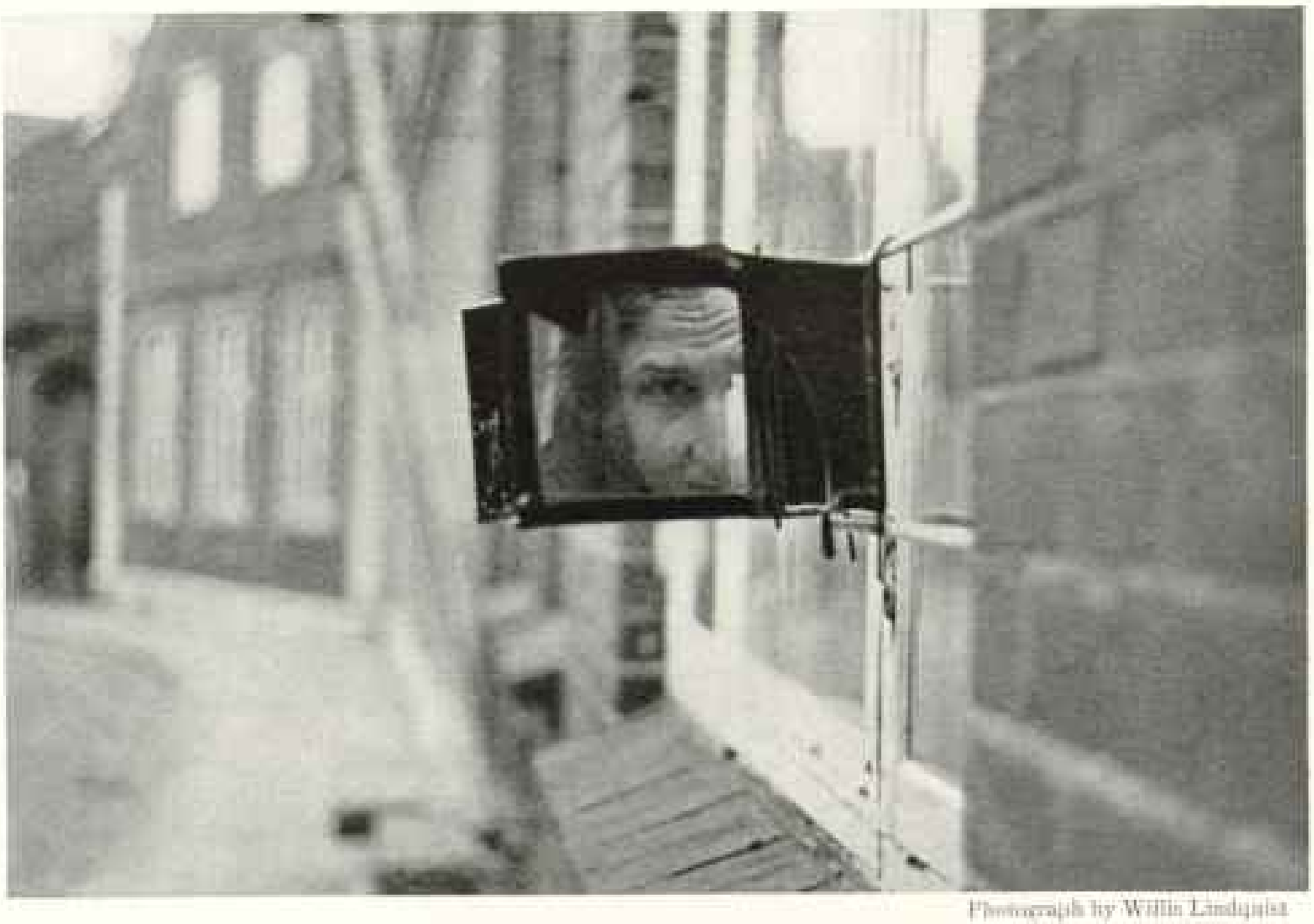
Even in daylight the people of Ribe cast furtive glances at the unholy entrance as they pass, and they say that on a dark night, if one walks around the cathedral three times and then shouts through the keyhole in the cat-head door, the portal will fall back and His Majesty of the Black Robes will come forth.

A TOWN THE WORLD PASSES BY

Four days in Ribe are not nearly enough; its mire of philosophic calm threatened to make me forget there are other places in Denmark. So I cycled north and west to Esbjerg, a comparatively new city, a fishing center and the principal seaport in western Jutland. It has a vigor and a shine to it, suggesting a small American city.

From its docks you can see the little island of Fanø across the narrows, lying as if it were the far shore of a broad river.

It is only fifteen minutes by ferry to Nordby, a provincial little town on the northern tip of the island. My first impression was that I had landed in another



Photograph by Willis Lindquist

RIBE STREETS HAVE A THOUSAND EYES

The "curiosity mirror" is so arranged in front of the window that its owner can look up and down without leaving the parlor rocker. Unattached "eyes" project over the sidewalk and scan the passers-by. These mirrors are used all over Denmark, but they are especially numerous in the old town of western Jutland. Some residential streets of Philadelphia and Baltimore, with houses rising from the sidewalk in the Old World style, have them, too.

country. True, the thatch-roofed brick huts are much like those on the mainland, but the people are different. They are taller, rawboned, with sober faces and a cold way of looking at you; and even to a person like myself, who doesn't understand a word of Danish, their dialect is noticeable.

The road southward out of Nordby is little more than a cowpath. It curves and dips into a wilderness of heath with scarcely a sign of life upon it. Pushing through loose gravel under the glare of a midday sun, with heat of parched sand dunes glancing up into my face, I found it slow, cruel going.

Tufts of grass wrack, ragged gray-green carpets of heather mounting the lips of dunes, and yellow blossoms of broom that look like daubs of gold, gleam in the white heat of the sun. Here and there long patches of stubby mountain pine, bent eastward by the constant press of sea winds, fight to live on the hardpan. Beyond them, far to the westward, are the bleak sand ridges of Fanø.

As you ride through the dusty heat, the glare of white sand, the sigh of lonely wind through pines and grasses, the hush of barren sand peaks, you feel this place has slept since the beginning of time.

The only sign of life is an occasional golden sparrow or corn bunting launching itself into space, or the tiny trill of a chaffinch from the wild grasses. Once I heard the distant whistling of a train on the mainland; then silence as deep as the ocean, only the steady crunching of gravel and the ping of a stone under my tires.

The road winds lazily over a series of low-lying dunes and coasts downward in a graceful arc to the quaint little fisherman's village of Sønderho, nestled peacefully in a snug hollow by the sea.

"NEEDLEWORK" ON A THATCHED ROOF

Threatened by the pitiless march of sand dunes, the squat red-brick, thatch-roofed cottages huddle together on the coast like a flock of frightened sheep. There are only two or three unhappy-looking trees, and there is no discernible order in the village except that every one of the turf-trimmed

gables faces east and west for protection against the west wind that rakes the island.

I wheeled my bicycle between the cottages on narrow sand paths used as walks. On a roof so low I could easily reach the eaves with my hand, a man worked busily with a huge needle, sewing in place a new yellow roof of thatch. A man on the inside drew the needle through and passed it back.

There are so many things of the sea here that one has the feeling of walking through a nautical museum. Over one of the yard gates is mounted the figurehead of an ill-fated English schooner. Trim little gardens and flower beds planted in soil shipped over from Jutland are bordered by ornate green glass balls, once the floats of fishing nets. A German mine decorates the base of the village flagpole.

In the old church hangs a five-foot model of a square-rigger. It was found on the beach more than 150 years ago by Fanø women gathering driftwood. On its stern are ornate figures and the date 1747. Stranger still, it was filled with tea! (Page 28.)

MANY WIDOWED BY STORMS

Sønderho truly belongs to its women. Except for a few artists who paint here during the summer, the occupants of the small huts are almost invariably old women, widowed years ago by angry seas. They were father and mother to their children. When the children were old enough to work, they went to the fisheries in Esbjerg.

The women still spend hours gathering driftwood along the coast and harvesting dry heather, the only two kinds of fuel available on the island. You see them at dusk tending their goats and watering their small gardens.

The fortitude of these stoic women matches the bravery of their seafaring husbands who lived their adult years on fishing smacks and trawlers or sailed the seas during the glamorous era of the clippers and barkentines. In those days it was an all too sober fact that the number of trips a husband had made since his marriage was usually reckoned by the number of his children.

BOY FINDS A "PICTURE FATHER"

One island veteran told me of a childhood experience typical of those times. His father had sailed with a windjammer around the Horn and up the coast to California. It was an old hulk, and met with so many adversities that the round trip took nearly two and a half years. The boy, then five years old, was shown his father's picture and sent down to meet him at the ferry.

Many strange sailors came home that trip, but the boy spotted one who looked like his father's photograph. Not being too sure, he hung back and followed the man until his direction removed all doubt. Then he made bold and drew alongside.

"Are you my father?"

The tall man came to a halt, studied the upturned face for a moment and then in a strange, husky voice he asked, "What is your name, boy? Martin?"

"It is."

"Yes," he said simply, "I am your father," and that being that he turned on his heel without more ado and continued toward the house, with Martin tagging uncertainly behind.

ISLAND GRAVE OF AN UNKNOWN SAILOR

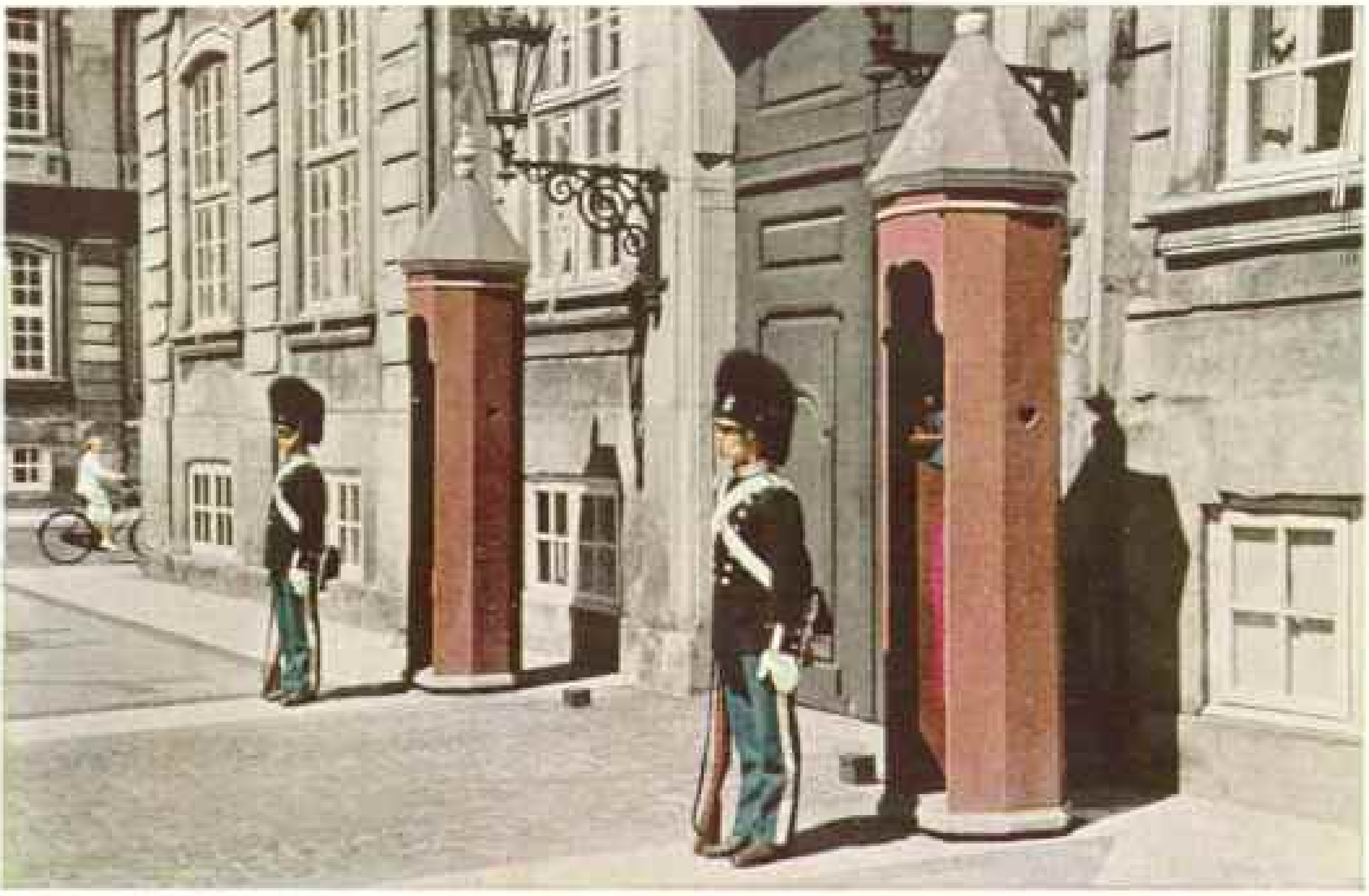
Such happy reunions were not always to be. In two years near the close of the last century storms at sea brought widowhood to more than forty women on the island.

The sound of big guns during the Battle of Jutland terrified the island people. They talk about it yet, and about the bodies of German and English sailors that were cast ashore. All except one Englishman could be identified by neck tags. So it happens that in the little village cemetery of Sønderho is the grave of an unknown sailor. On the simple headstone beneath a small cross is inscribed, "Known Unto God."

On the far side of the island rises the last high ridge of dunes. To the west lies the restless North Sea and somewhere beyond, far over the water's rim, Scotland.

I returned to Nordby along the broad, hard-packed western shore which only a few years ago promised to be the automobile racing center of northern Europe, past the large hotels and beaches, the fashionable seaside resort of Denmark. An 18-hole golf course was laid out among the sand dunes. The entire course looked like a gigantic sand trap.

Once again on the ferry, with a wrinkle-faced woman and her market basket on my left, and a young fellow in the sky-blue uniform of the King's cavalry on my right, with the throb of engines and the squealing of pigs from a truck on the lower deck sounding in my ears, I watched the fading sands and the cluster of thatched roofs of



FROM GUARDED PORTALS OF AMALIENBORG, DENMARK'S KING STROLLS UNATTENDED

The winter palace of tall, democratic Christian X stands near the docks of Copenhagen. At 8 o'clock each morning the monarch leaves its gates for a horseback ride through the city streets.

 Agfacolors by Jonas Company

ROGUISH JUTLAND GIRLS ADD A MODERN TOUCH TO NATIVE COSTUME

Shiny new silk toppers conceal old-fashioned lace caps. Today these girls hear naval guns boom and aerial bombs crash in the North Sea. Part of the famous naval Battle of Jutland in the World War took place within earshot of the peninsula.

Agfacolor by Jonals Company

CYCLISTS WHEEL PAST COPENHAGEN'S OLD BOURSE, WITH ITS GREEN COPPER TOWER OF FOUR ENTWINED DRAGON TAILS

Denmark, land of a bicycle for every three persons, leads the world in cycling, with the Netherlands and Japan serious contenders. A tabulation at two of the capital's principal bridges showed four times as many bicycles as all other traffic combined. Christiansborg, where parliament sits, rises in background.

Agfacolor by Jonals Company

YOUTHFUL DANES AT THE SEASHORE ON A MIDSUMMER DAY RAISE A MUSHROOM GROWTH OF BATH TENTS

Legions of cyclists pedal to the miles of public beach near Copenhagen. A popular resort is Klampenborg, north of the capital, with big hotels and riding schools. In July it still is twilight at 10 P. M. in this northern clime. Near by is the Deer Park, where 4,000 deer roam at will.

Agfacolor by Jonas Company

OTHER PEOPLES' WARS SHUT DOWN THIS NEW FILLING STATION IN NYBODER, A THREE-CENTURY-OLD COMMUNITY

Nearly every automobile in neutral Denmark now is in storage. Sale of motor fuel, scarce and expensive, is forbidden by law except to physicians and a few others to whom transportation by car is an absolute necessity. Christian IV built this community three hundred years ago, near the Copenhagen naval wharf, for the men of his fleet. Sailors still live there.

FISHWOMEN SEATED BESIDE THEIR EELS AND SHRIMP, MACKEREL AND COD, CLING TO OLD-FASHIONED HEADDRESS

Gammel Strand, in Copenhagen, is one of the few places in Denmark where national costume still is worn daily. Across the street from the venders is the famous Fiskehusets Restaurant. Here a customer may choose alive from large tanks the fish which he wants baked or broiled.

Agfacolor by Jonals Company

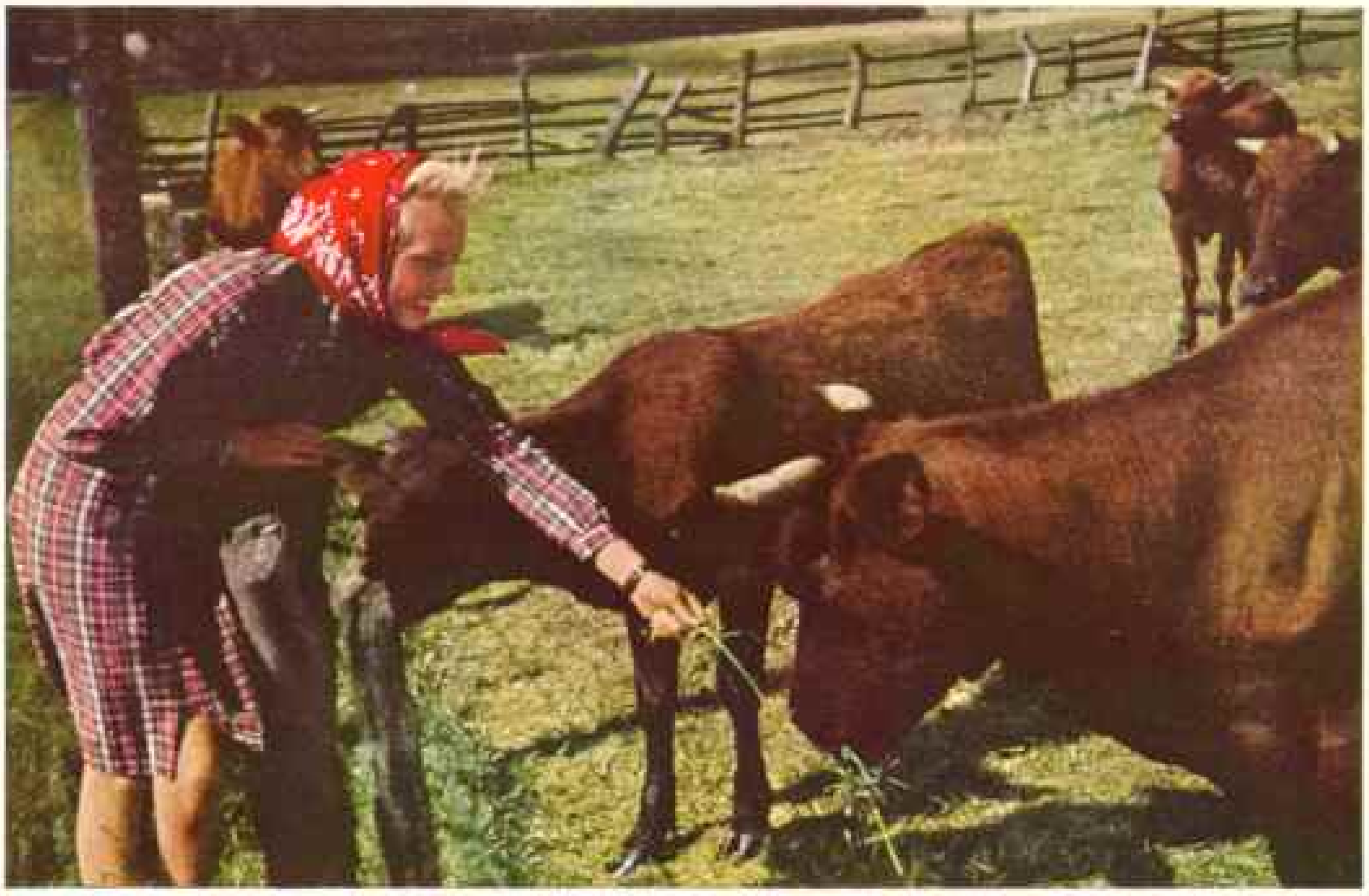
CITY SCHOOLBOYS AND GIRLS BIKE TO RURAL REGIONS TO TRADE PLACES WITH THEIR COUNTRY COUSINS

While these classes from Silkeborg schools are getting a taste of life in the open, rural pupils go to learn the ways of the city. Such exchanges of city and country students are an established custom in Denmark.

Aqfacolor by Jonala Company

LIKE A CARDBOARD TOWN IN A TOY LANDSCAPE, SILKEBORG NESTLES IN THE JUTLAND HILLS

The small town hall, with its central tower crowned by a slender spire and weathervane, looks out upon the spacious village square. Vacationists here pass the summer months exploring the chain of crystal lakes, and the nearby moorland and heather-clad hills. Not far away is Himmelbjerget, or Sky Mountain. Although only 515 feet in altitude, it is one of the highest points in the farming kingdom.



SKEPTICAL BOSSY IS WARY OF GIFTS, EVEN FROM DAINTY FINGERS

Red Danish cows, prolific milk producers, are mettlesome and cautious. Descendants of cattle native to the Danish islands, they make up about four-fifths of the 3,000,000 head in this rich dairy country.

 Agfacolors by Jonals Company

"LOOK AT ME IF YOU WANT TO SEE HOW PLEASANT KØGE CAN BE"

This mild-mannered patriarch is a better advertisement for the east coast resort town than the poster behind. The shape of his whiskers recalls the early Danish King, Sven Forkbeard. Tasseled stocking cap, part of his national dress, was knitted for him by his womenfolk.

Nordby, and I knew that some day, somehow, I would come back to Fanø.

I pushed northward from Esbjerg to the little fishermen's village of Ringkøbing. Here the fields roll slightly. The soil seems richer and darker. Gray marl pits with steam shovels in them yawn at the roadside. Marl from these pits is spread over the hardpan of the heaths and worked in to convert these wastes into arable land.

Ahead of me, on the yellow sand of the road, was a dark spot that seemed to move. I came closer and, discovering it to be a shadow, looked up. My first skylark, his wings outspread and vibrating, hung in the sky and sent forth an unforgettable song.

Toward evening I saw a girl with a milk pail in each hand, her bare legs flashing like honey in the sun. She turned into a fenceless pasture and joined a boy waiting by a row of tethered cows. These animals are usually tethered in Denmark, rather than pastured behind fences, to permit regulation of grazing.

Beyond the meadow and rising above it with mantles of dark heather were huge mounds of earth 20 or 30 feet high—Viking tombs a thousand or more years old.

As I looked, the thought came to me that if I were a Dane I would have this scene painted, perhaps with a windmill of the Middle Ages off to one side, because this scenic tapestry is the prehistoric, the medieval, and the modern Denmark—the Denmark of Vikings and windmills and dairy products and, more than that, it is the Denmark of beauty and peace and contentment.

From Ringkøbing the road turns eastward through Herning and on up into the hills around Silkeborg (Color Plate VII), cleaving to the round shoulders of spruce-covered hills, then diving into rich little valleys and up again on the other side.

I came suddenly down into Silkeborg and its long lacy chain of lakes as crystal blue as the waters of Minnetonka.

THE ETIQUETTE OF OATMEAL

At the hotel breakfast table the next morning I was seated with three Danes. Steaming dishes of oatmeal were placed before us, and I poured milk over mine. The Danes watched closely; they tried to be polite, but couldn't help smiling.

"What's the matter?" I asked.

One of them pointed to my oatmeal.

"Your porridge, you put milk over it?"

They all laughed. The proper way, I soon learned by watching the others, is to take a spoonful of hot oatmeal in your mouth and wash it down with a sip of cold milk. It seemed as bad form here to pour milk over your oatmeal as it would be to dunk doughnuts at the Ritz.

ON JUTLAND'S "SKYLINE DRIVE"

If I had been seeking scenic beauty alone, I would have lingered long at Silkeborg, with its wild woodlands and hills and lakes. As it was, I got an early start northward along the top of the range of hills on a road that might well be called "The Skyline Drive." This road was one of the first and most important in Jutland.

Along the Jutland watershed, which forms a natural highway to Slesvig, the commerce of olden times passed. Viborg, at the northern end of this road, was the needle's eye for the thread of trade shuttling north and south. There the national assembly, or "Rigsmøde," met to elect the Danish king and it was the objective of raiding parties, being captured, burned, and pillaged many times.

Little is left of the old Viborg except the cathedral, which is almost as old as the one at Ribe. It was thoroughly restored in 1860—too thoroughly, I think, because it gives the impression of newness rather than age.

While in Viborg I heard of some unusual mines on the northern coasts of the islands of Mors and Fur in Limfjorden and set off to investigate, going to the northernmost tip of Mors.

At the water's edge are cliffs of black-ribbed, clayish-looking alluvial deposits called "moler." Moler is a form of diatomaceous earth naturally mixed with about 15 per cent of plastic clay. Not the diatomaceous earth, but the mixture of diatoms and clay is the rare feature, the characteristic which gives moler its commercial value. Containing just enough clay to permit molding, it forms a brick both fireproof and soundproof, and so light that it will float upon water (page 29).

The black and gray strata in the moler deposits were at first thought to be sand containing coal, and mining for that product was actually carried on from 1803 to 1813. Then, in 1883, two Belgian investigators found these strata to be volcanic ash. This discovery of evidence of volcanic activity in Denmark, according to Profes-

Photograph by Jonals Co.

THE PRIVATE LINES OF MR. AND MRS. STORK

On the road to Skive in northern Jutland the storks are homesteading a telephone pole. For a while they were more or less up a tree because the nest was torn down time after time, but persistence won out. Although storks usually nest on chimney tops, where they cause some inconvenience, they are welcomed as birds of good omen.

sor Boggild of the University of Copenhagen, who counted a total of 179 layers, was the most extraordinary single discovery in the history of Danish geology. The volcanoes are thought to have been located along a line drawn through the waters of the Skagerrak and the Kattegat.

From Skarrehage Molerworks I crossed Feggesund into a lonely, weary-looking country with fields that seemed to be little more than sand and heather. In a peat bog by the roadside a poorly dressed farmer, his wife, and his son were shaving off the turf, cutting the peat into bricks with sharp knives and shovels, and piling the bricks in the sun to dry.

A RACECOURSE OF THE WINDS

The few trees in this country, like those on the western plains of Jutland, are stubby, bushy things. A tall tree couldn't last long in this racecourse of winds.

With a good blow at my back, I made a wide circle to the east, then turned down through bustling Aalborg, a city of white chalk pits and cement works, and on southward over the wilderness of Himmerland hills.

Children, university students, and old farmers told me of the new bridge across the Lille Belt (Little Belt), connecting Jutland and the island of Fyn. Their enthusiasm was boundless. I saw small models of this bridge on mantels and tables all over Jutland.

Now I finally saw and passed over the bridge I had heard so much about. Although in length it does not compare with Europe's longest bridge, the two-mile span linking the Danish islands of Sjælland and Falster, the Lille Belt bridge is a remarkable engineering feat, particularly in view of the depth of the water and the strength of the current in the strait.

THICK SLICES OF HOSPITALITY

After a day in Odense and in the Hans Christian Andersen Museum, I stopped an elderly man in the street and inquired the way to Faaborg on the southern coast.

"I'll show you," he said, and, getting onto his wheel, he led me ten minutes beyond the city limits to show me a fork in the road that he might easily have described.

Danes are like that. Once I stopped at a farmhouse on a hot afternoon to ask for a drink of water. The occupants insisted on serving coffee and cakes. Another time, a man came up to me in the street of a fair-sized town and invited me to have dinner at his house because he saw that I was alone and a stranger. Hospitality, in Denmark, is cut from that same rare loaf of generosity and kindliness and in slices so thick they become embarrassing.

Riding southward through the plains of Odense and into the gentle rolling country that finally becomes the substantial hills about Faaborg is, from the topographical standpoint, like going from the plains of western Ohio into the foothills at the eastern edge.

Photograph by Jonals Co.

THIS LITTLE PIG'S LAST ROUNDUP WILL BE DANISH BACON AT A BRITISH BREAKFAST

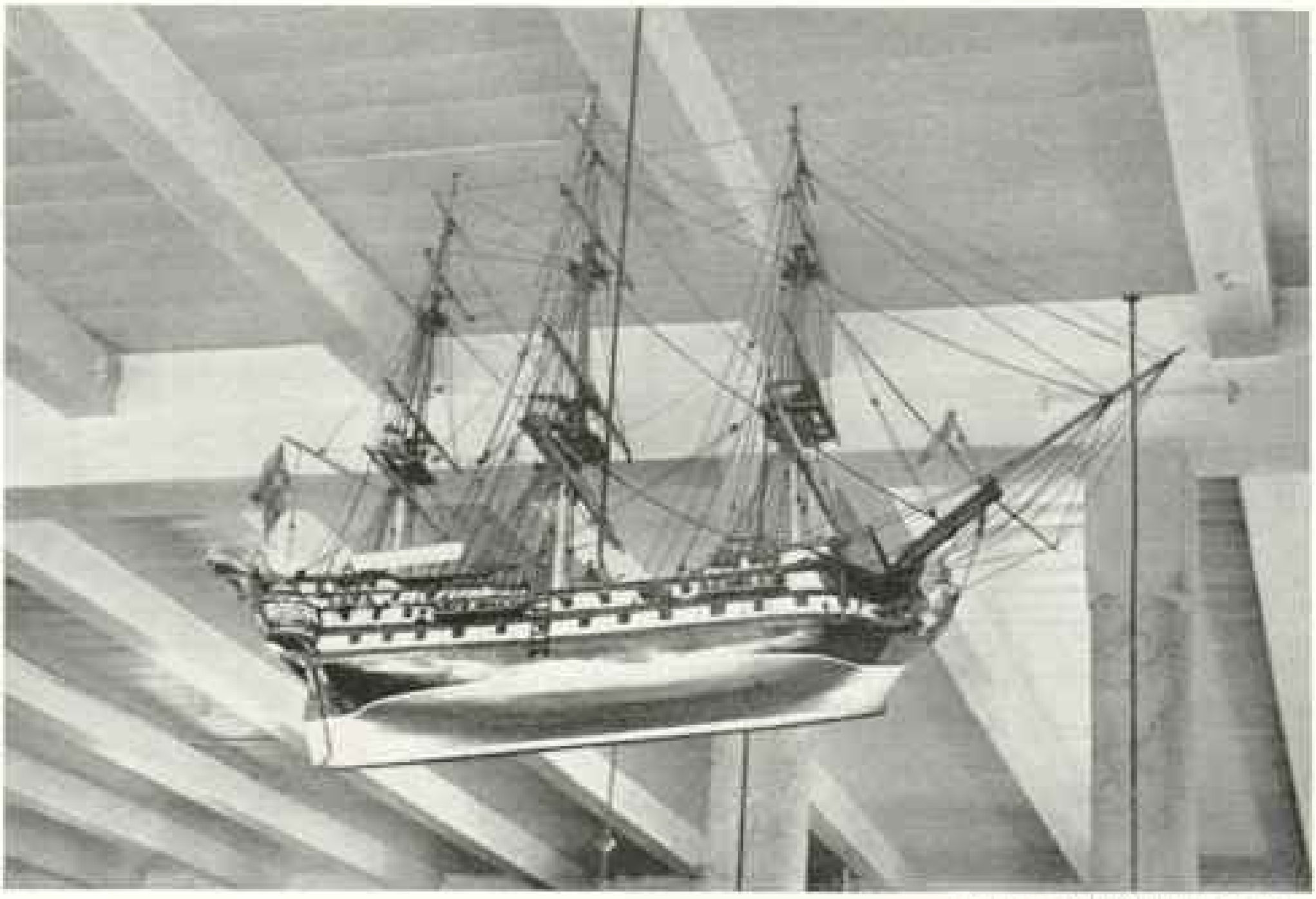
He seems resigned to his export fate as he is held by his owner at the pig market in Silkeborg. "Even the porkers are spotless in Denmark!" exclaimed a visitor.

Again there is the feeling of Old World peace that you find in the country around Tønder and in the old town of Ribe. But here is a new kind of Danish beauty. Protected from prevailing winds, the willows, beeches, and poplars grow tall and fernlike. Lilac hedges grow by the side of the roads and between the fields, and in the ditch yellow broom and wild roses bloom among the weeds. The landscape has the warmth and dreamy charm of an English countryside in June.

Then the fishermen's village, Faaborg, comes into view after the last hill—a quaint little place with its old town gate still intact. It is said to be the most painted place in Denmark. And that is saying a great deal, because Denmark is as free with the brush as Germany is with the camera. Everyone seems to paint. Every house has its originals in oil and, more than likely, paintings by the family artist or artists.

By ferry I went to the islands of Aerø, Langeland, Laaland, which is the Danish Netherlands, and Møn, where the blinding white chalk cliffs rise out of the Baltic Sea like apparitions.

Here in the hills of Møn, where small roads have their bumps, the sharp ends of



Photograph by Willis Lindquist

WHENCE CAME THIS MIDGET MYSTERY SHIP WITH ITS CARGO OF TEA?

In the old church at Sønderho, Fanø, hangs the model vessel found more than 150 years ago by Fanø women gathering driftwood. On its stern are ornate alien figures and the date 1747. The curious fact that the boat was filled with tea led to the belief that it represented an attempt at smuggling, but prosaic villagers believe the tea was used to protect the craft from woodworms (page 16). Many churches in nautical-minded Denmark are decorated with model ships.

the springs on my bicycle seat pushed through the leather. I stuck boards and tobacco tins between the springs and the leather, but they always worked loose. I kept up the business of mending until I limped into Copenhagen (København).

TO DENMARK'S MOST SECLUDED SPOT

There was good news. A letter awaited me from the doctor at Christiansø, containing a welcome to that small island in the mid-Baltic, and the pleasant advice that the island is the only place in Denmark where there isn't room enough for a bicycle.

"Where are you going?" a friend in Copenhagen asked.

"Christiansø."

"Where is that?"

I had better luck that night on the steamer. When I answered, "Christiansø" to the same question, my fellow passenger, leaning against the rail with his eyes on the distant twinkling lights of Malmö on the Swedish coast, replied, "Oh, that is nothing but a rock."

It takes ten hours from Copenhagen to Svaneke by steamer and two more out of that Bornholm port by small mail boat to Christiansø, the last Danish outpost in the Baltic, a small rocky island less than half a mile in its greatest dimension and certainly the most secluded spot in all Denmark (map, page 3).

I strained my eyes for it in the blue distance of sea and sky. An uncertain gray speck at first, it mounted the horizon and seemed to bear down upon us. Its stone bulwarks rose out of the sea in grand defiance and the lighthouse thrust its peak up, up, and up into the sky, shrouded in the lonely mystery of a ship at sea. Rocky crags and squat buildings wedged between them slowly took form and became distinguishable.

The afternoon sun shone brightly as we sailed into the narrows between Christiansø and the still smaller island of Fredriksø. This natural harbor was once the home port of Viking pirates; then, about 250 years ago, an impregnable Danish naval base, and now the peaceful cove of fishermen, eider ducks, and white-winged sea gulls. A row

Photograph by Willis Lindquist

FROM THIS OPEN PIT COMES "MOLER," USED IN MAKING BRICKS THAT FLOAT

A form of diatomaceous earth which is molded into lightweight fireproof and soundproof bricks is mined on the island of Mors in Limfjorden (page 25). The strata in the cliff at the left are layers of fine volcanic ash, indicating the one-time existence of volcanoes in the vicinity.

of white fishing smacks gleamed in the sun and bobbed at their moorings along the stone quay as we passed.

Doctor was on the dock waving. He was a tall, rawboned old man with small, smile-squinted eyes, a white handlebar mustache, and a very ancient-looking straw hat. He doffed the relic as I came ashore and held it out for inspection.

"Fifteen years old that hat is. Bought in Chicago."

We turned into the main street, a flagged path running between two low yellow buildings that were formerly the barracks. On the rock prominence to one side rose the circular stone walls of the citadel, and above that the large glass cage of the lighthouse. The tower, one of the first defensive structures on the island, was built by Norwegian soldiers in 1684.

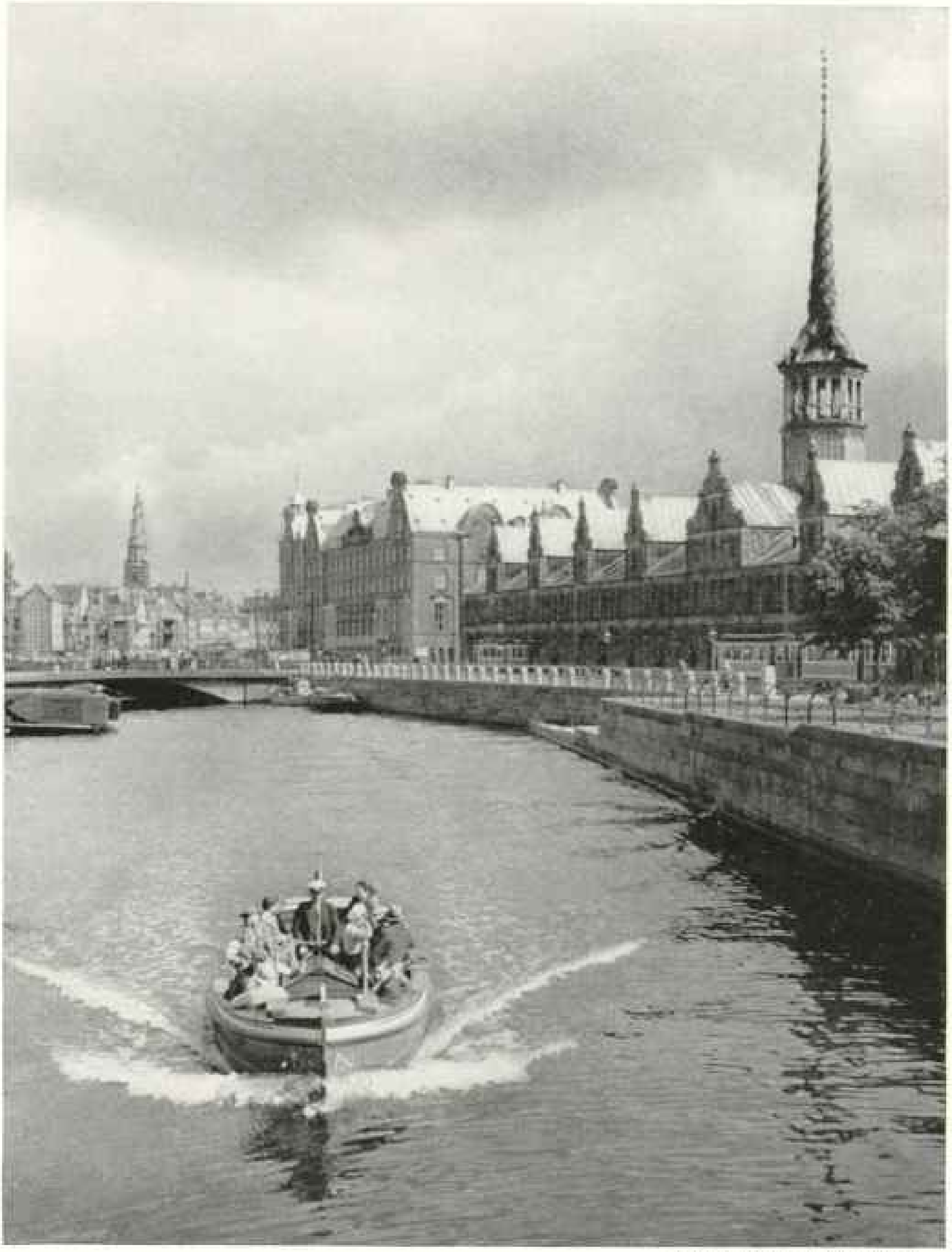
Exactly why Christian V of Denmark began fortification at that time on a rock where nothing but the skull and crossbones had fluttered to the breeze for centuries is a mystery, though it is believed he had in mind a more adequate defense against the frequent attacks by the Swedes.

There is an old legend that Charles XI of Sweden gave orders to take the islands as a protective measure against the pirates. It happened that Wrangel, one of the Swedish admirals, had a Danish manservant who saw the king's order and straightway decamped with it for Copenhagen and the royal court of Christian V.

So the Danes and not the Swedes leaped in, took over the rock, built the fortresses, and erected stalwart battlements of gray stone about the edge of the island. Upon them they mounted a hundred-odd guns at strategic places, cannons now scarred and rust-eaten that still frown down upon the Baltic at every compass point. They have not seen service since the bombardment by the British in 1807. No enemy ever came within range of their fire.

ISLAND OF NOMINAL RENT AND TAXES

In the center of the island an old blacksmith shop has been renovated to serve as a church. Its half-timbered bell tower stands a few yards to one side. Yet there is no parish, for there is no private ownership of property. Taxes are less



Photograph by Mrs. Branson De Cou

"WATER BUSES" BEAR SIGHT-SEERS THROUGH THE BROAD CANALS OF COPENHAGEN

Scenic and restful are the capital's many wide avenues of water, now used mainly by pleasure craft and by workaday fishing smacks that haul their catch to the fish market. The city's skyline is punctuated by historic copper-green towers. The spire of twisted dragon tails (right) rises from the Royal Stock Exchange, or Børsen (Plate II). One of the strangest spires is that of the Church of Our Redeemer, in the distance. Around the outside of the steeple winds a spiral stairway of 397 steps.

Photograph by Acme

A FRONT STREET DISPLAY ADVERTISEMENT, DANISH STYLE

When a Copenhagen clothier turned his store into one vast expanse of overcoat, draping nearly a thousand coats from roof to walk, the stunt almost caused a riot. Soon came the bargain hunters and the curious bystanders—by tens, by scores, by hundreds. Then the police were called to control the crowds. By the time the harassed policemen had convinced the storekeeper that his coats must come down, they had all been sold!

Photograph by Willis Lindquist

STYLES OF HER GRANDMOTHER'S YOUTH ARE PIQUANT ENOUGH FOR THIS ISLAND OF FANÖ BELLE

One charm of the little sand-dune isle off the western coast of Jutland is the colorful costume worn by the women. This brown-eyed girl in the garb of her ancestors showed the author about the island. "You should see the heather in autumn!" she exclaimed. "Very lively is it, so excited with color."

than one-tenth what they are in other parts of Denmark. Rent, which is paid to the Government, is nominal. The children are provided with free education and free medical attention.

More powerful than the captain of a ship, the lighthouse keeper is absolute lord and master, a magistrate, customs and harbor official, with complete authority in matters of salvage and the allotment of old age pensions.

"Fastelavn," the Monday before Lent, is a general holiday in all the schools of Denmark. On Christianso the children still observe the old custom of rising on that day at 4 or 5 o'clock in the morning and, with decorated branches, beating upon the bedcovers of their parents and neighbors to awaken them; whereupon the sleepers, or rather, the pretending sleepers, must reward them with cake or candy.

The custom had its inception long before the dawn of the Christian Era at the time when holy trees were planted to Thor and Odin. Branches were taken from these trees each spring to beat the women, cows, and sheep, and so make them productive.

Customs die hard in Denmark. At a small country church in the northern part of Jutland the people had the peculiar habit of bowing to a white wall at the church entrance each time they went in or out. Everyone did it because everyone else did it and because their fathers had done it.

A sharp-minded gentleman from a Copenhagen museum heard about this and upon investigation found a painting of the Madonna under the whitewash. It had evidently been covered at the time of the Reformation, but the humble bow continued until a few years ago.

It was a hot afternoon with not a breath of wind, not a cloud in the steel-blue sky. I was sitting in a rock-walled garden under a sunshade, listening to the doctor spinning yarns. He had just finished telling me that the island was inhabited by fishermen who catch herring in the summer time and

salmon in the winter. For some unhappy reason I mentioned the word "philosophy" and he made the most of it.

"The philosophy of the islanders is smoked herring in the summer and salmon in the winter; their religion is smoked herring in the summer and salmon in the winter. The chief topics of conversation are religion and philosophy, or, in other words, smoked herring in the summer and salmon in the winter."

The fishermen have their small gardens, about twice the size of a kitchen table, and enclosed by a thick wall of stone.

Soil for the gardens was shipped in from Bornholm. The minister is also the schoolteacher. The lighthouse keeper has his one hundred and one duties, but finds time to care for his garden and beautiful dwarf trees; and one of his assistants paints and does historical research with the idea of writing a book about the island.

The doctor looks after his pet goldfish, which he keeps in the reservoir to purify the water, writes poetry, and has just published his memoirs.

Every inhabitant of these bleak rocks seemed an individual in his own right. One of the most outstanding was a fisherman. He told me in his faltering sailor English that he had sailed the seas for thirty years, come back to his birthplace, married, and settled down to the happiest years of his life. His little tragedy is that the people of the island are inclined to forget his sober marital state and refer to him as "the tough old sailor who still dreams of his sweetheart in Cardiff."

Photograph by Willis Lindquist

A PHILOSOPHER OF SMOKED HERRING AND SALMON HIDES BEHIND A DANISH PIPE

Once a hand on the square-riggers that sailed the high seas, this Christianso fisherman now spends his nights on a fishing smack in the Baltic. He first sets his nets, then hauls in the herring caught in those set out the previous night. Such long curved pipes are classic symbols of old Denmark.

I don't know about that, but he certainly didn't leave much time for dreaming that night at the weekly dancing party. He was the life of the place. It was one of these come young, come old affairs; even the unshaven fishermen, who had to leave in their boats at one o'clock in the morning, arrived in their rough outfits smelling of fish.

In one corner of the soap-shaving floor an accordion player swayed over his box and squeezed out Danish folk tunes for the

Photograph by Willis Lindquist

THE CHARGE OF THE BIKE BRIGADE

The strangely assorted riders are not starting a six-day bicycle race, but awaiting the green light in downtown Copenhagen. The city's cyclists must observe the rules of the road, using hand signals for stops and turns as motorists do. On a twelve-dollar bicycle the author pedaled from town to town through Denmark.

twists, the bobs, the turns, the clapping of hands, the hooking of arms, the skirt-flying twirls, and something that looked like the Russian heel crush.

THE LURE OF CHRISTIANSØ

In his letter of welcome the doctor had expressed a hope that the sun would shine during my visit "because Christianső must be seen in the sun." I think he was wrong. The island lies bare to the four winds and the four seas, a barometer to their every whim. It is that moment-to-moment change, that habit the people have of looking into the sky for the unexpected, like a skipper on the quarter-deck of a windjammer, which makes for the real charm of the island and puts zest in living.

Here wild gales howl, sea gulls pipe and screech 24 hours of the day on their private rock sanctuary close by, the unearthly lowing of the foghorn continues for as long as two weeks at a time, and the combers thunder against the rocks. There is a solitude here that seems to conspire with eternity. There is the might of the sea and the wind, and the stern gray grimness of rocky coast. These are the stuff of existence for these people, the unbending forces which inspire a self-reliance and a desire for self-expression in the island's children.

During the last night of my visit the wind rose suddenly and began scudding over the sea. I made my way along a narrow winding path to the coast, stopping once to examine a hedgehog playing possum in the middle of the way. Then, at the sea, I wormed to the edge of a flat-topped buttress, with a bastion of patient black cannons behind me, and lost myself in the fury of movement far below.

The next morning I stood at the stern of the cutter, looking back through a curtain of silvery mist to the grand palisades rising out of the sea like the walls of a feudal castle. White-winged combers advanced row on row and dashed against the rocks.

Then the ramparts began to dim and the misty veil thickened until all was lost but the white wake in the green tossing water.

It was as if I had suddenly awakened from a dream that had taken me to a magic land where men bow their heads to the deities of smoked herring and salmon.

WHALES, GIANTS OF THE SEA

Wonder Mammals, Biggest Creatures of All Time, Show Tender Affection for Young, But Can Maim or Swallow Human Hunters

By Remington Kellogg

United States National Museum

THE mightiest mammal that ever lived on our planet is a whale. Some of the great Blue Whales, which may weigh 115 tons or more, would equal in length and far surpass in weight even the gigantic extinct dinosaurs, which were not mammals but reptiles (pages 57 and 68).

Other facts about the whale are as amazing as its size. The largest type of whale in existence, sometimes 100 feet long, can swallow nothing larger than a herring, and lives mostly on shrimplike creatures no bigger than grasshoppers.

Though it looks like a fish and can live only in water, the whale would drown like any land animal if it could not come up frequently to breathe, and it suckles its young on milk which is not essentially different from cow's milk.

Wounded whales sometimes are so ferocious that they have stove in and sunk small ships in their charges; yet many female whales seem almost human in their affection for, and defense of, their calves.

Dolphins, or porpoises, though smaller, belong to the same class of animals as whales, for they, too, breathe air and suckle their young. The two types are known collectively as cetaceans, and will be described together in this article.

There are two main kinds of whales, distinguished chiefly by their equipment for eating—the toothed whales and the "whalebone" or baleen whales. Toothed whales have teeth in the lower jaws or in both.

WHALE COULD HAVE SWALLOWED JONAH

Larger toothed whales, such as the Sperm and Killer, have throats big enough to swallow almost anything that lives in the sea, including giant squids,* seals, and sharks.

These whales could swallow a man, but even if he were not bitten in half he could not long survive the action of the powerful gastric juices. All dolphins and porpoises have at least a few teeth in their jaws and capture living prey such as fish and squids.

The baleen whales, on the other hand, have no teeth, and their throats are only a few inches in diameter. Instead of teeth, they are equipped with whalebone, or baleen, which hangs down from either side of the upper jaws in long strips, with hairlike bristles on the inner edges.

The whale swims with open mouth through thick masses of small shrimplike crustaceans that live near the surface. When its mouth is full the whale closes it. Then, with its huge tongue, it forces the water out at the sides through the strips of baleen (page 37). This acts like a sieve, retaining the food, which is thereupon swallowed. A large baleen whale may eat several barrels of such food in a day. Toothed whales have only one blowhole, or nostril; baleen whales have two.

MACHINE AGE IMPERILS SUPPLY

Whales once roamed by the millions in the oceans of the world, but today they may be heading toward the same fate that pursued the once-vast herds of American buffalo. Three-quarters of a million whales have been killed since 1900.

Today whales are hunted with harpoons shot from cannon, and the carcasses are processed at sea on huge "factory ships" equipped to reduce them quickly to oil and other products (pages 66, 67, 70). As a result of these improved methods of pursuit and handling, as well as the discovery of new uses for whale oil in such things as margarine and soap, the search for whales is now more active than ever before.

It was only about 300 years ago that naturalists discovered that whales and other cetaceans are not fishes, but are related to

* See "Marauders of the Sea," by Roy Waldo Miner, with 8 paintings of squids and octopuses, National Geographic Magazine, August, 1935.

The remarkable series of 31 paintings by Else Bostelmann accompanying this article is the first complete set of full-color pictures of the better-known whales, dolphins, and porpoises to be printed.—Editor.

Photographs © N. Y. T. and St. L. P.-D.

THREE STAGES IN A WHALE'S BREATHING

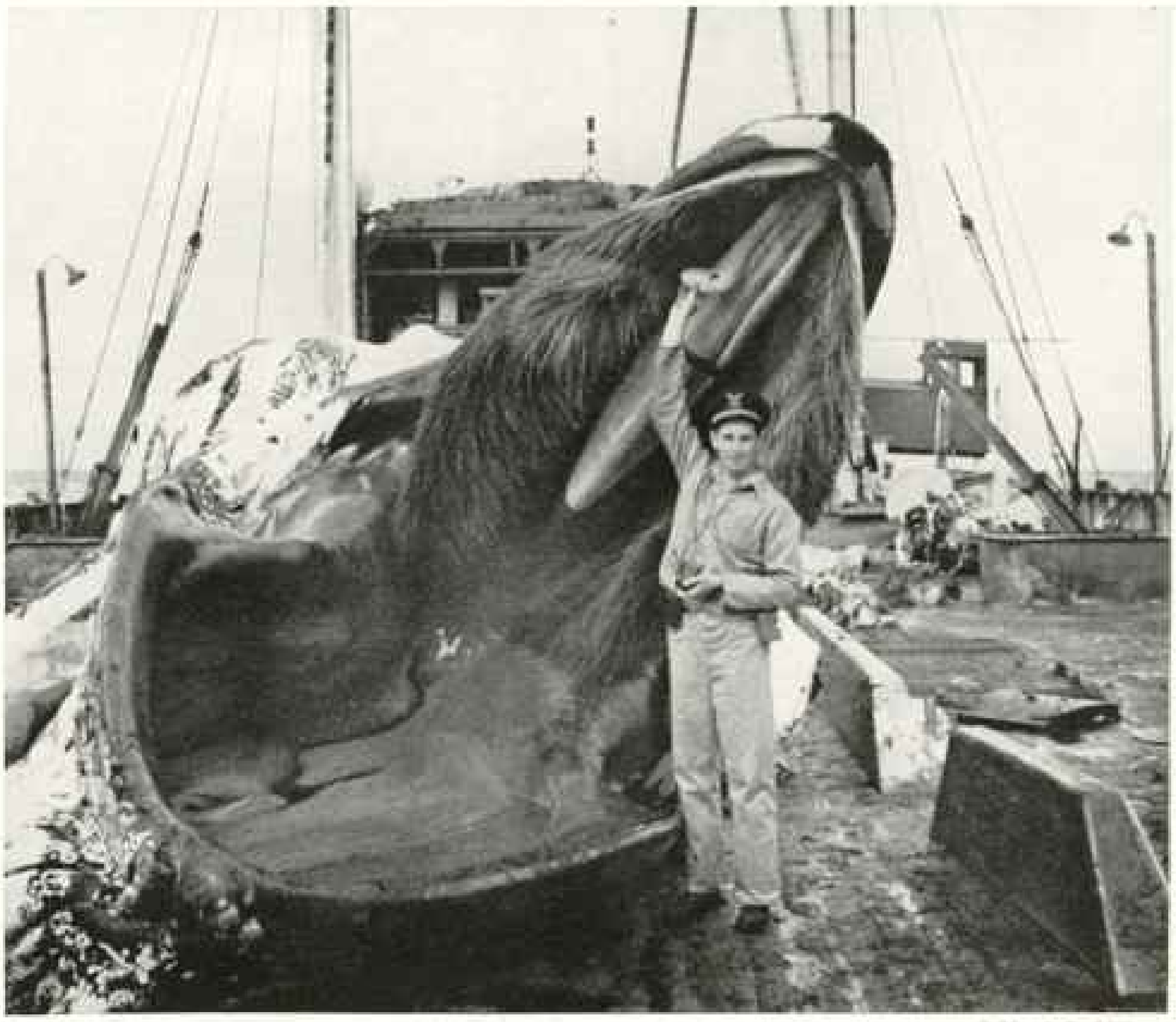
Little Pikes (Plate II), photographed on the Byrd Antarctic Expedition I, are shown in all three pictures. Bottom: Blowholes start to open as head rises above water. Middle: Blowholes open, just after discharge of breath. Top: Blowholes (left) distended as whale inhales air. Other whale is diving. All appear in open leads in the ice.

mammals that live on dry land. All cetaceans have smooth skins, devoid of hair or scales. All have a streamlined form superficially similar to that of fish, though their lengths vary from 100 to 5 feet.

Flippers of cetaceans bear little resemblance to the fore limbs of land mammals, for they are fashioned like paddles and are employed mainly for steering and balancing. No external trace of hind limbs persists in any of the living cetaceans. We are fairly certain that these limbs were present in their immediate ancestors, since living cetaceans have one or two vestigial hind limb bones buried deep in the flesh.

Hind limbs apparently served no useful purpose and the propelling function was taken over by the powerful flukes at the end of the tail. Unlike the tail of a fish, these flukes are horizontal. The greatest velocity is obtained by alternate upward and downward strokes of these flukes.

Since the external nostrils, or blowholes, of cetaceans are located on the top of the head, they can breathe without exposing much of the body above the surface. Water does not enter the lungs when the animal rushes with open mouth in pur-



© Morris D. Miller

WHALEBONE HANGS LIKE HEAVY FRINGE IN A HUMPBACK'S YAWNING MOUTH

The bushy material, also called baleen, is attached to either side of the upper jaws of the Humpback Whale (Plate VI). It serves to strain the whale's food of small shrimplike creatures from sea water (pages 35 and 38). The gigantic tongue lies in the lower jaws, below. Note barnacles on the chin and throat. This whale carcass is on the deck of the American "factory ship" *Frango* off the west coast of Australia. Lieutenant T. R. Midtlyng, U. S. Coast Guard, whaling inspector on the ship, is pointing to a peculiar growth on the bony ridge of the upper jaws.

suit of food because the nasal passages, instead of opening into the throat as in land mammals, are connected directly with the windpipe.

THE TECHNIQUE OF "SPOUTING"

The popular belief that water enters the mouth when the whale is feeding and is spouted out of the blowholes on top of the head is wholly erroneous. Actually, the "spouting" is produced by air forcibly discharged from the lungs. When the atmosphere is cold enough to condense the warm, moisture-laden breath, the "spout" can be seen rising high, geyserlike.

How deep a whale can dive safely is uncertain. When feeding, the whale makes periodic submergences, since the food sought is found at varying levels. A harpooned whale may dive to greater depths.

In April, 1932, the cable repair ship *All America*, while investigating the cause of an interruption in the service of the submarine cable between Balboa, Canal Zone, and Esmeraldas, Ecuador, hoisted to the surface a dead 45-foot Sperm Whale from a depth of 3,240 feet off the coast of Colombia.

The cable was twisted around the lower jaw of the animal and an additional 180 feet was wrapped around one flipper, the body, and the caudal flukes.

WHALES WEEP GREASY TEARS

At such a depth the body of the whale must have been subjected to a pressure of approximately 1,400 pounds per square

inch. It is not likely that the other cetaceans, with the possible exception of the Bottlenose Beaked Whale, ever dive to such depths.

Since cetaceans spend their entire lives in the water, their bodies are blanketed with a layer of blubber to prevent rapid loss of body heat. Tear glands of whales secrete a greasy substance that guards the eyes against the irritation of sea water. Whales possess no external ears, but they can detect water-borne sounds.

A WHALE'S "COLD TABLE"

Baleen whales depend for their livelihood on "food banks," vast masses of small crustaceans, resembling shrimp, that come to the surface to feed on diatoms and plankton, which are tiny plants and minute forms of animal life that live in the sea.

Nature's plan for producing the food banks is fascinating. They are found in high latitudes in spring and summer in regions where cold polar currents mix with warmer ocean waters. This mixing produces just the right temperature, which, combined with action of the radiant energy of sunlight and nourishing salts in the water, provides a favorable environment for vast quantities of microscopic plants and animals to come into existence. They multiply in such numbers that large areas of surface waters are colored brownish or greenish.

Then immense swarms of small shrimplike creatures come to the surface to spawn and feed upon this accumulation of provender. Next come the whales, eating in their turn the crustaceans which have eaten the smaller organisms.

Migration routes of the baleen whales depend largely on the seasonal locations of these floating food supplies. The whales go north or south to cooler waters to find the food banks in summer. As the surface water grows colder, however, the food sinks to greater depths, and the whales turn back to the Tropics, where they bring forth their young during the winter months.

Most of the larger baleen whales commonly display such strong affection for their calves that whalers for centuries made a practice of harpooning the young first. The cow then became an easy prey, since she refused to leave her dead offspring.

Dolphins and porpoises are not noted for the defense of their young. Nevertheless, the females keep their calves close beside them and no doubt endeavor to protect them from the attacks of their natural predatory enemies. The young dolphin is able to keep up with the pace set by the school as soon as it is born (p. 88). Normally, female cetaceans give birth to single young.

Whales have been hunted for more than a thousand years. When they were pursued in small ships, and the killing was done with hand harpoons by a few men in a small boat propelled by oars, whaling was necessarily limited to animals that floated when dead, such as the Right Whale, Bowhead, and later the Sperm Whale.

The larger "finner" whales, including the Finback, Blue Whale, and Sei Whale, and also the Humpback, sink when killed. Moreover, these animals were too speedy and dangerous to be hunted successfully until the perfection of the harpoon gun about the middle of the 19th century. This also permitted use of a heavier harpoon line, by which the whales could be hauled to the surface to be pumped full of air so that they would float.

The ever-increasing demand for whalebone, or baleen, led to an amazing expansion of the whale fishery. Men endured constant hardships in the pursuit of whales for whalebone, but is doubtful that they were at any time much more uncomfortable than the ultimate consumer, the fashionable woman of that day, who willingly subjected herself to the discomforts of garments braced with whalebone.*

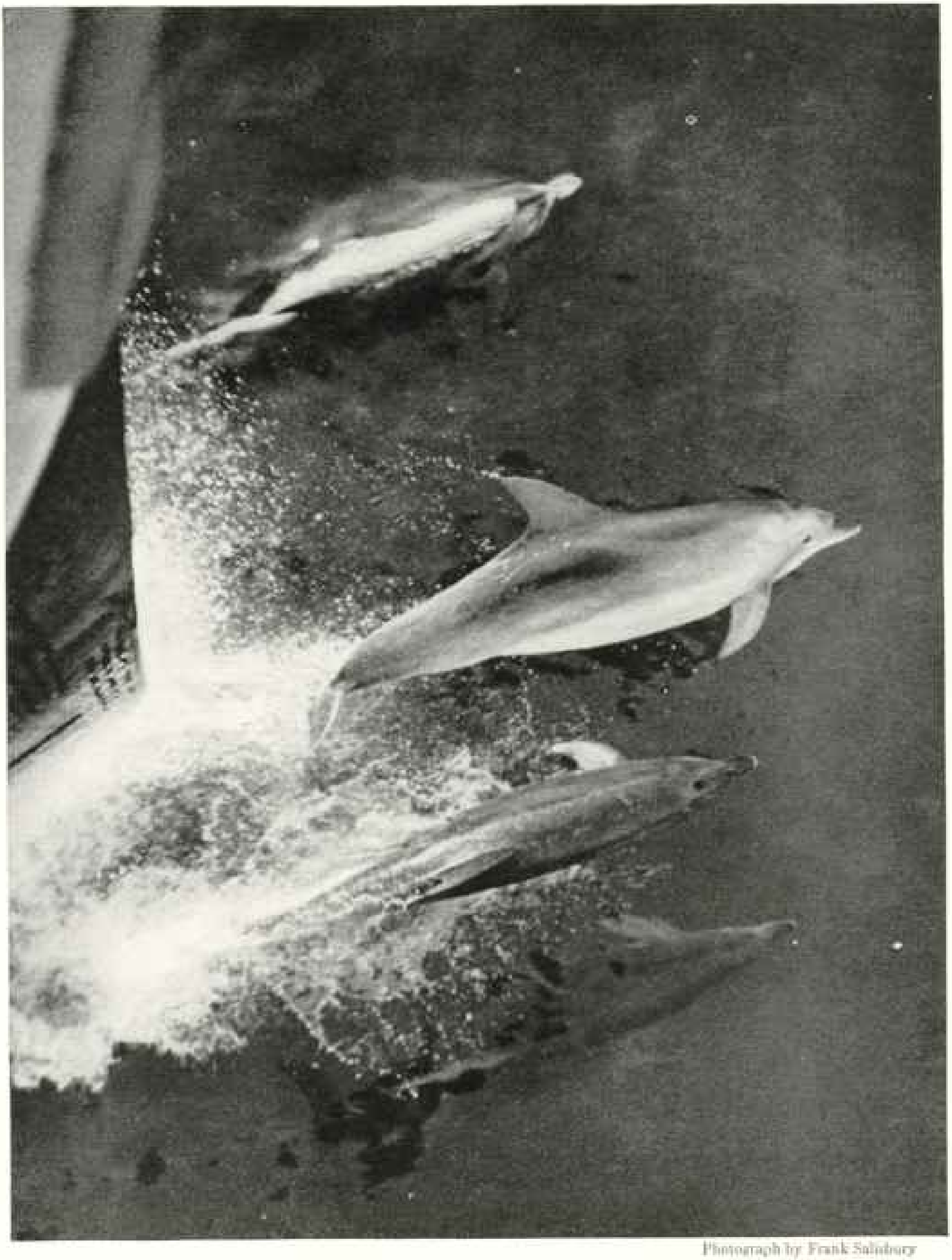
WHALEBONE AIDS TO BEAUTY

Bustles, basques, and bodices were stiffened with thin strips of whalebone; high collars and ruffs were braced with this material, and the billowy hoop skirt would have been literally a "flop" without its presence.

In the years between 1890 and 1902, whalebone sold for a top price of $5 to $7 a pound and a single Bowhead Whale would yield from 1,500 to 3,300 pounds. But when steel corset stays came to be substituted for whalebone, many holding large stores of this material went bankrupt.

Whale oil was suitable for nearly all the diversified uses for which oil was required. Soaps to preserve complexions and to wash clothes were made of it. Homes were lighted with lamps filled with whale oil or with candles made of spermaceti. In 1819

* "Whalebone" refers only to the horny material taken from the mouth of the baleen whale. The huge bones of the whale's skeleton are ground up for use as fertilizer.



Photograph by Frank Salisbury

LEAPING HIGH OUT OF WATER, DOLPHINS ESCORT AN AUSTRALIAN VESSEL

In similar fashion, a dolphin known as "Pelorus Jack" swam ahead of ships entering and leaving Pelorus Sound, New Zealand, for about 32 years (page 85). These animals are Dusky Dolphins (*Lagenorhynchus obscurus*) and were photographed from a ship between Sydney and Brisbane. They frequently are seen along the coasts of Australia and New Zealand. Among the smaller cetaceans, those with beaks are called dolphins, and those without are porpoises.

the streets in several English towns were lighted by a gas made from whale oil.

Manufacturers used the oil in making varnishes and paints, in finishing leather and coarse woolen cloths, in cordage manufacture, screw cutting, and steel tempering.

The perfection of the kerosene lamp, the gas mantle, the electric light, and the change in women's fashions allowed the whale a respite for some years. But with the World War came an enormous demand for glycerine, obtainable from whale oil, to be used in manufacture of munitions. Whaling operations were suspended in the North Atlantic because of the war and large-scale hunting of Antarctic herds followed.

Since then, the Antarctic production of whale oil has increased year by year, with 3,340,330 barrels reported in 1937-38. The war in Europe again has increased the demand for whale oil, for making glycerine and edible fats such as margarine. It is used to a less extent for currying leather, fiber dressing, face creams, and ointments. A whale of average size also yields about four tons of meat and fertilizer.

PERFUMES FROM SICK MAMMALS

The most valuable of all whale products, however, is ambergris, a grayish, spongy substance which is found only in the intestines of sick whales. It commands high prices in making quality perfumes.

Year after year, whaling has taken a toll in excess of the natural rate of reproduction, and one region after another has been depleted. Operations are shifted from exhausted grounds to promising new fields, and here the process is repeated. Overfishing probably will bring to an end the present operations in the Antarctic areas before many years pass.

The present-day harpoon, which is fired from a maneuverable cannon at the bow of a small "catcher" boat, has strong barbs on its sides that open after it has entered the whale's flesh, and contains a bomb that either kills or fatally wounds the victim. The *Terje Viken*, largest whaling factory ship now in use, is 633 feet long and is rated at 30,000 dead-weight tons. Ten whale-catcher boats are needed to kill sufficient whales to keep this factory ship operating 24 hours a day.

The rapidity with which whales have been killed since 1900 is appalling. More than 46,000 whales, including 14,923 Blue, 28,009 Finbacks, 2,079 Humpbacks, 161 Sei, and 867 Sperm Whales were killed in 1937-38 in the Antarctic alone. During the season 1938-39 no fewer than 2 shore stations, 34 floating factories, 281 whale-catcher boats, and at least 12,705 men were engaged in whaling in the Antarctic.

Warnings have been repeatedly given that the scale of operations and the methods employed in the modern whaling industry constitute a menace to the maintenance of the stocks of whales. By an international agreement that came into force in 1935, full protection was given to all kinds of Right Whales; the killing of calves, immature whales, and females accompanied by calves was prohibited, and fullest possible use of all whale carcasses was required.

Later agreements bar factory ships from tropical calving grounds of whales; increase the minimum length of whales that can be legally killed; prohibit killing Humpback Whales in the Antarctic, Gray Whales in the North Pacific, and establish an Antarctic whale sanctuary between the Ross Sea and Cape Horn.

In spite of these agreements there has been no marked reduction in the total number killed. If the exploitation of the whale stock continues on the present scale, the time will come in the very near future when whales will become much less numerous on the "grounds," the price of whale oil will rise, and consequently whaling operations will be intensified. Overfishing and the resultant scarcity of whales will automatically make it economically impossible to operate floating factories.

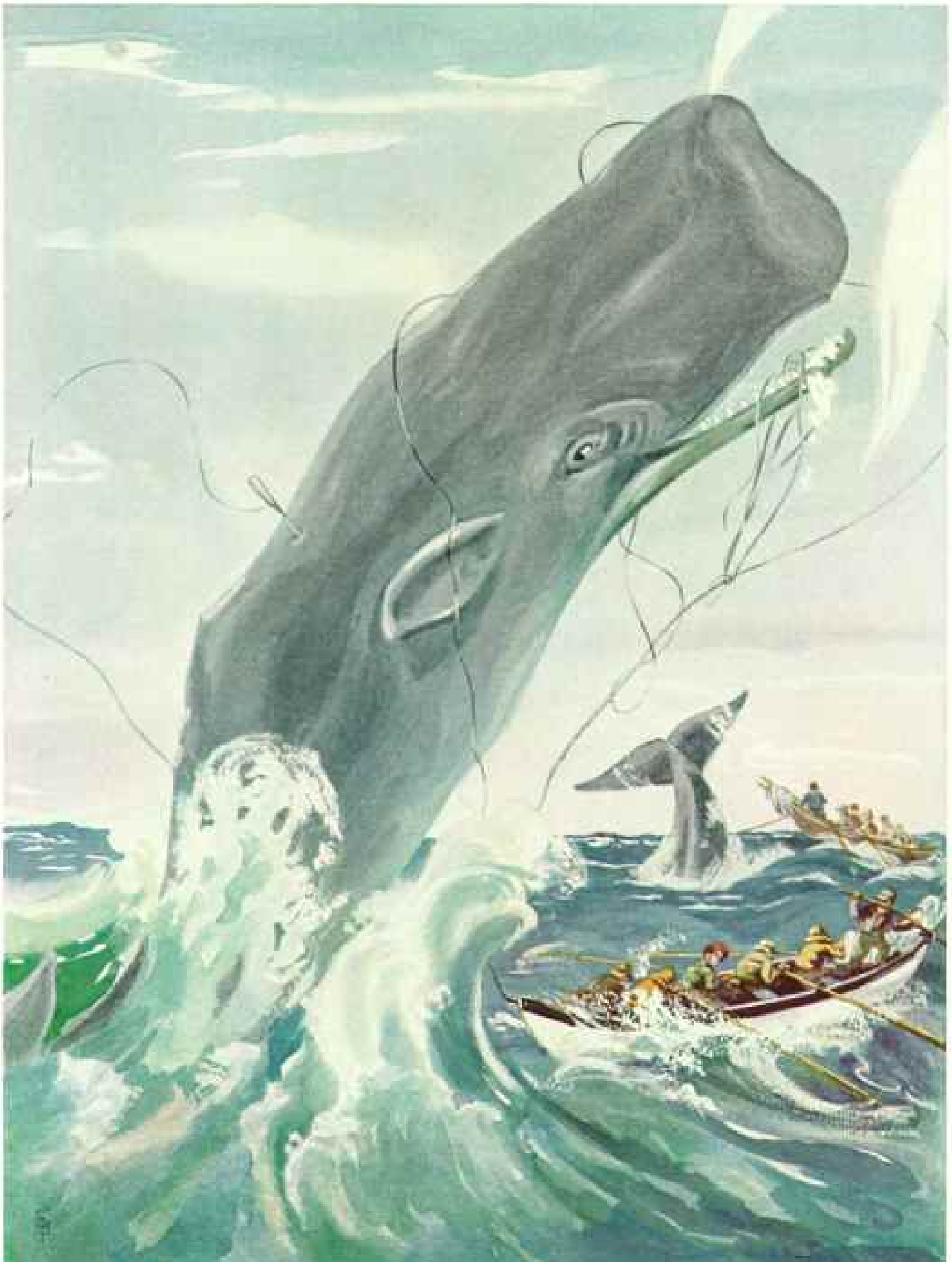
Sperm Whale

(Physeter catodon)

Of all the living toothed whales, the Sperm Whale, or Cachalot, is the largest and probably most widely distributed (Plate I). Females and calves are found the year round in tropical waters, but old males in summer travel to or beyond the latitude of the South Shetland Islands of Antarctica on the south and Iceland and the Bering Sea on the north.

Before 1800, American whalers were going to the Pacific Ocean on sperm whaling voyages lasting two to three years. Spermaceti, a whitish, oily substance found in an enormous reservoir in the Sperm Whale's head, was valued for making clear-burning candles.

Male Sperm Whales grow considerably larger than females, the greatest known length being 65 feet. They are a uniform gray or dark bluish gray, with several shallow ridges on back and flanks. The relatively narrow, slender



 Painting by Else Bostelmann

MADDENED BY THE HARPOON, SPERM WHALES OFTEN SMASHED PURSUING BOATS

It is appropriate that the most colorful and pugnacious of all whales should head this series of paintings, which represents the first attempt to gather pictures of all the better-known whales, dolphins, and porpoises in a single group. "Moby Dick," made famous in Herman Melville's book, was a **Sperm Whale,** and could easily have bitten off a man's leg as the story relates. The sperm was widely hunted by the old New England whaling fleets. Once common in the Atlantic and Pacific, it now is found chiefly off Japan, Chile, and Natal.

Painting by Else Bostelmann

LARGEST MAMMAL THAT EVER LIVED ON LAND OR SEA IS THE BLUE WHALE, SOMETIMES 100 FEET LONG

Rising to expel its breath in a spout of air and vapor, this **Blue Whale** is about to fall victim to the deadly harpoon gun of one of the "whale-catcher" boats in Antarctic waters. Near by swim several **Little Piked Whales,** a type too small to make their capture worth while.

Painting by Else Bostelmann

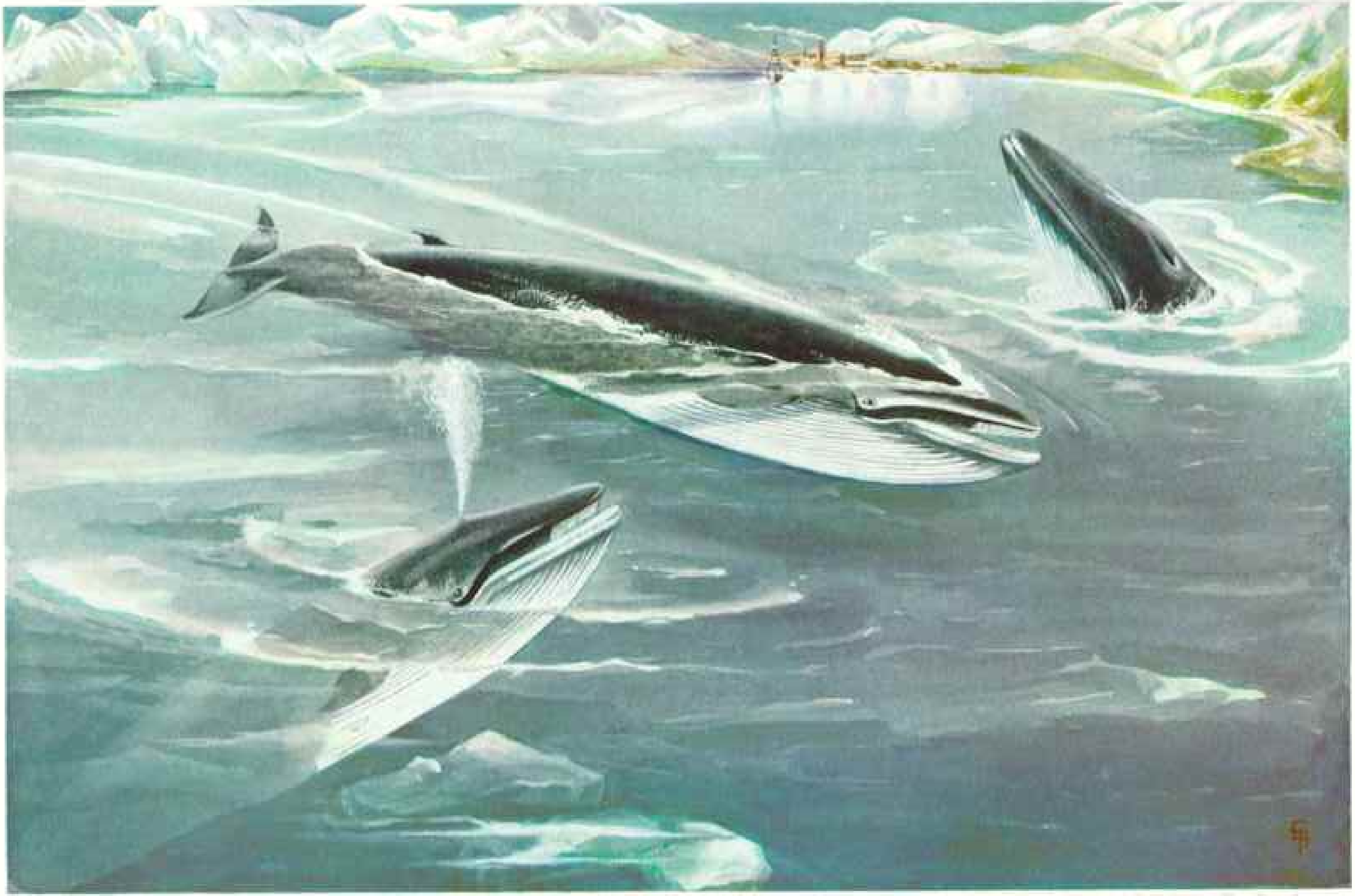
A RIGHT WHALE CALF SNUGGLES CLOSE TO ITS MOTHER'S SIDE AS THE TWO COME UP FOR AIR

In the mother's mouth are seen the strips of baleen, or whalebone, which strain bushels of tiny creatures like shrimp from the water as the animal swims. **Right Whales,** natives of the North Atlantic, have small throats and no teeth, so cannot eat large fish. A rare **Pygmy Right Whale** rises below.

Painting by Else Bostelmann

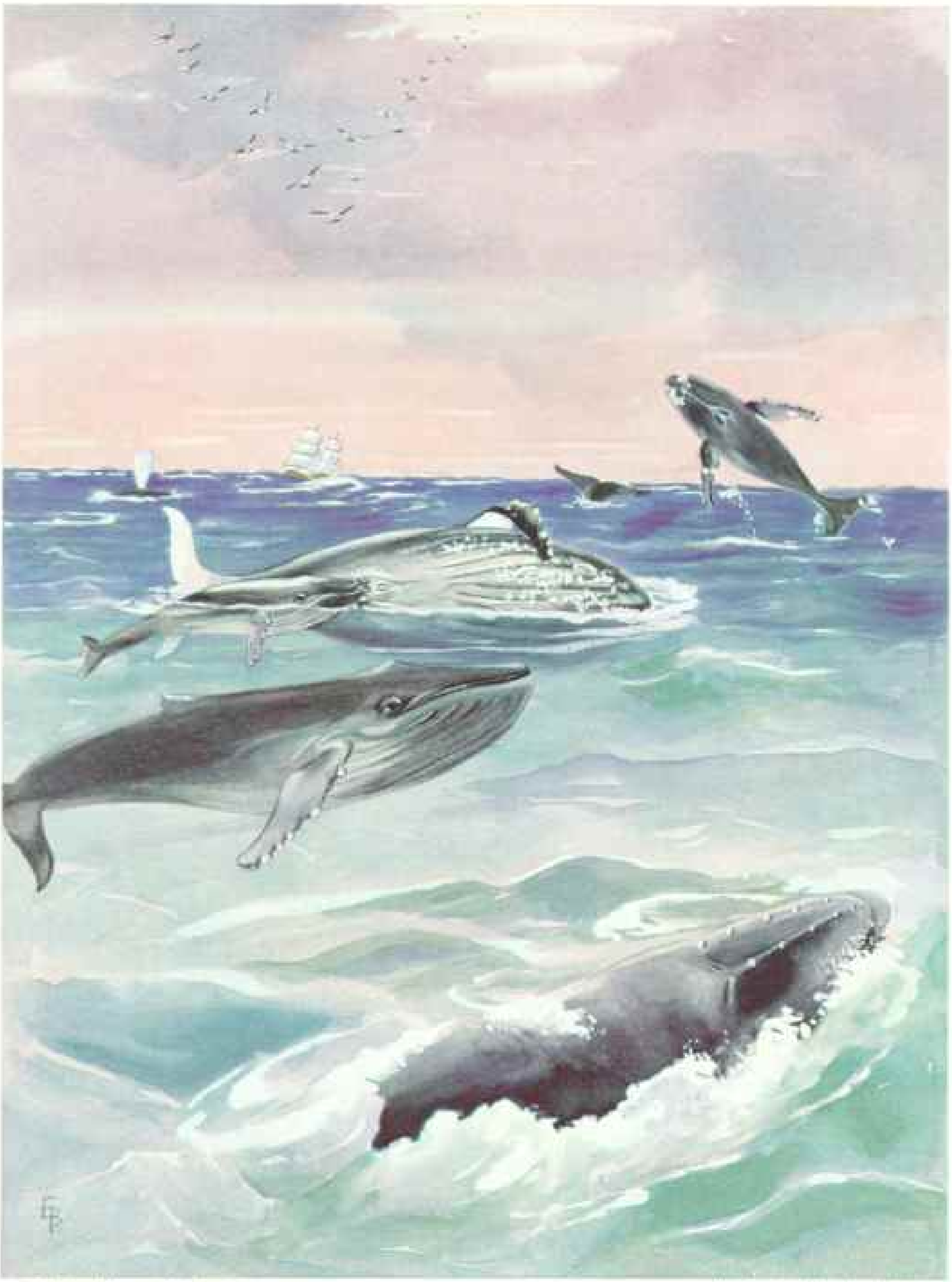
ITS NEVER-ENDING SEARCH FOR FOOD CARRIES THE SEI WHALE ALMOST FROM POLE TO POLE

These grayish giants cruise from Iceland and the Bering Sea as far south as Antarctic seas. Smaller than some of their cousins, and yielding less oil, the **Sei Whales** are not hunted so relentlessly. This group is spouting off the South African coast.



Painting by Else Bostelmann

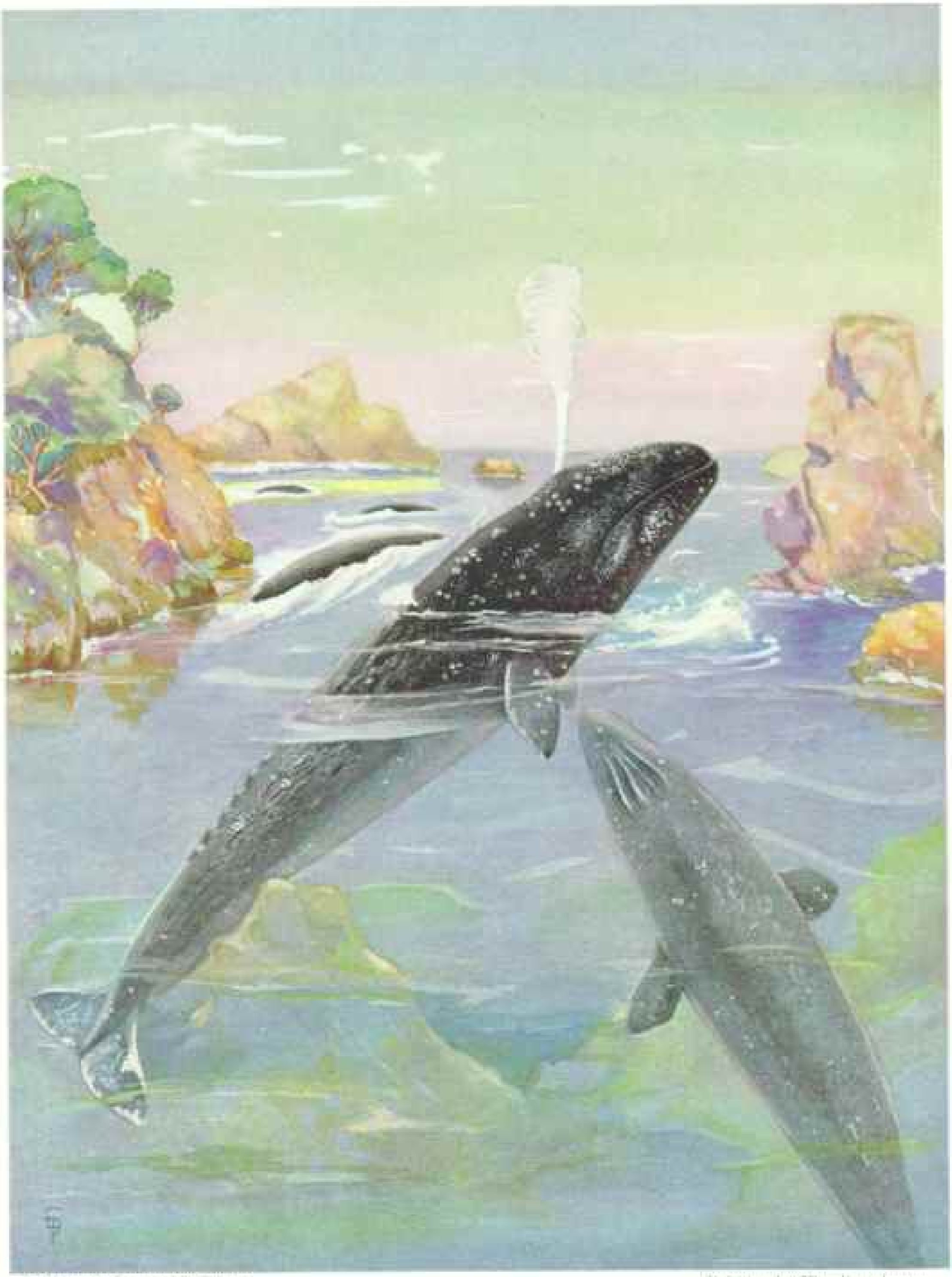
FASTEST SWIMMER AMONG WHALES, THE STREAMLINED FINBACK GULPS DOWN HERRING BY THE BARREL AND CODFISH BY THE HUNDRED When feeding it turns on its side, and water spurts out between the strips of baleen as its jaws close on a mouthful of fish or shrimp. **Finbacks** are found in all oceans, but this school is off South Georgia, British island in the South Atlantic.



 Painting by Else Bostelmann

TURNED ON HER SIDE, A MOTHER HUMPBACK WHALE NURSES HER CALF

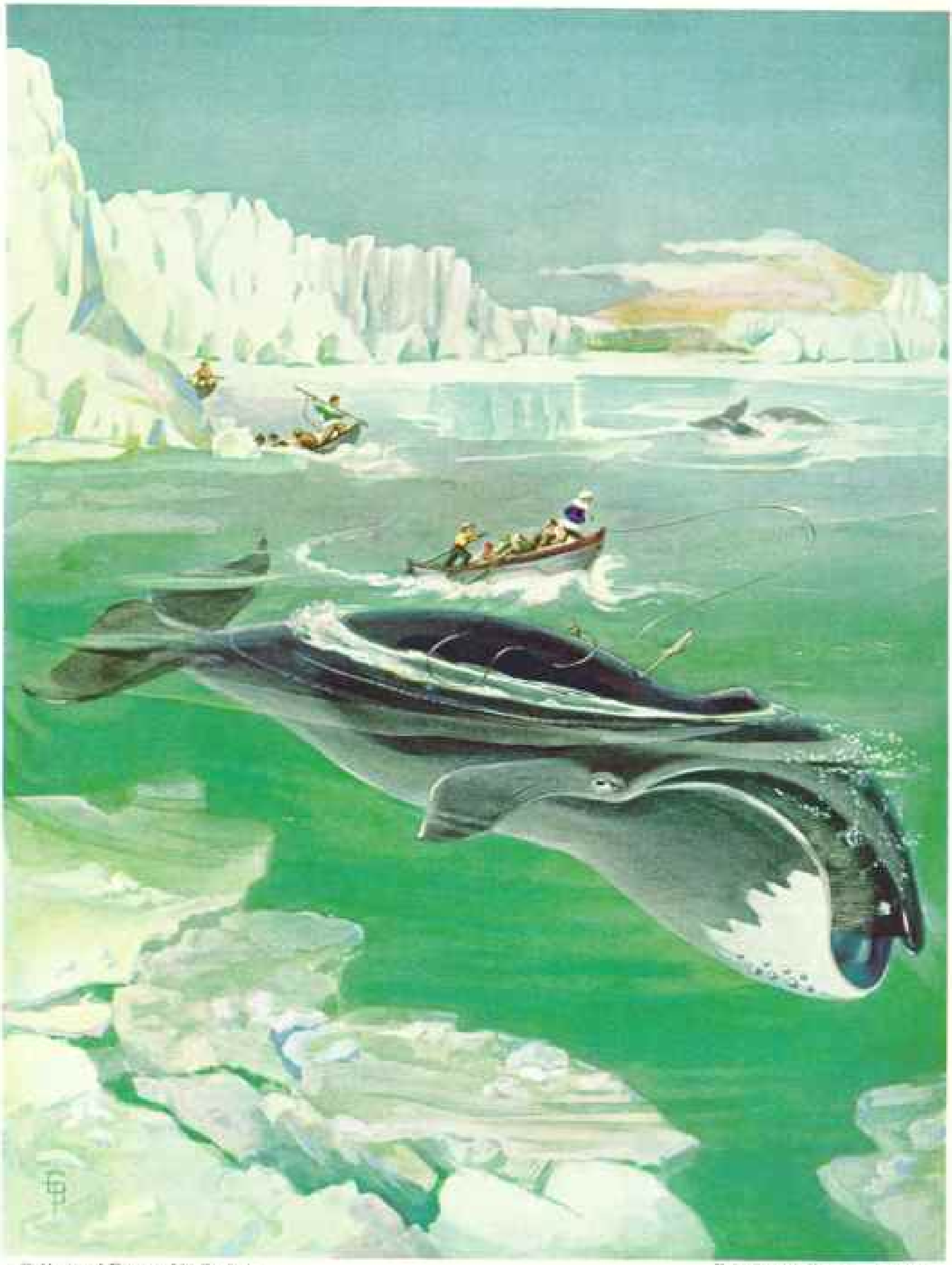
This position brings the teats above the surface. Later the baby will be able to nurse under water. Whale milk is yellowish and oily. The **Humpback** in the foreground is seen from above, showing the two slitlike blowholes, or nostrils, and the fleshy knobs on the snout. In the background a Humpback leaps clear of the water, one of the most spectacular maneuvers performed by any whale. This animal is widely distributed in the oceans of the world.



 Painting by Else Bostelmann

GRAY WHALES, ATTACKING HARPOONERS, EARNED THE NAME OF "DEVIL-FISH"

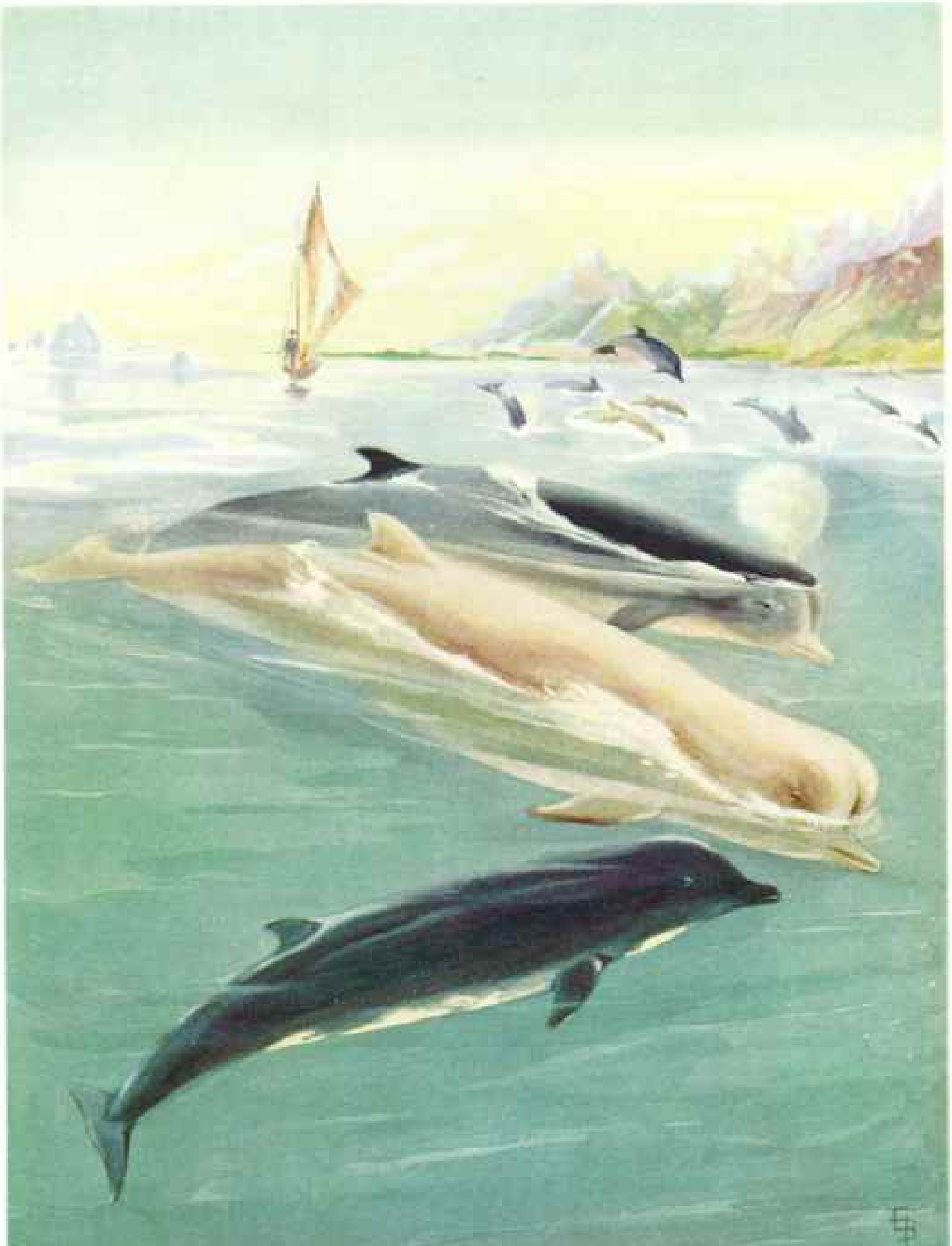
Their frenzied rushes after being wounded often upset or stove in the small boats of old-time whalers. Female **Gray Whales** battle fiercely to defend their calves. This animal lives only in the North Pacific Ocean, and seems to prefer to stay close to shore, as do these individuals off the coast of southern California. Often they swim into shoal water and apparently enjoy rolling ponderously in the surf, without fear of becoming stranded.



© National Geographic Society Painting by Else Bostelmann

ALMOST ONE-THIRD MOUTH IS THE BULKY BOWHEAD WHALE OF THE ARCTIC

The gigantic lips enclose a boat-shaped space large enough to hold several men. Whalebone from its mouth brought four dollars a pound in the "gay nineties," when it was used in corsets, but the advent of steel stays as a substitute ruined the industry. These **Bowhead Whales,** swimming among Arctic icebergs, are being attacked with hand harpoons by men in small boats, a method now little used.



 Painting by Else Bostelmann

SUDDEN DIVES OF THE BOTTLENOSE HAVE DRAGGED MANY A WHALER TO DEATH

A denizen of North Atlantic waters, this whale still is hunted with hand harpoons. So fast is its dive that if a man is caught in a loop of the uncoiling harpoon line he will be yanked deep under water and drowned. This danger existed in hunting all whales in the days when they were pursued only in small boats, and thus Captain Ahab meets his end in the novel, *Moby Dick*. Old males of the **Bottlenose Whale** family sometimes are almost pure white.

WITH ONLY TWO TEETH, TRUE'S BEAKED WHALE STILL EATS WELL

Only eight specimens have been seen by naturalists, all in the Atlantic. Apparently **True's Beaked Whale** lives far from the haunts of man. It eats squid and other fish.

 Paintings by Else Bostelmann

SCARS OF BATTLE DISFIGURE THE HIDE OF THIS CUVIER'S BEAKED WHALE

The pairs of scratches were made by the two teeth in the lower jaws of a pugnacious rival during the mating season. **Cuvier's Beaked Whale,** sometimes called "goose-beaked," is found the world over. Some females are brown beneath, with a central spotted area.

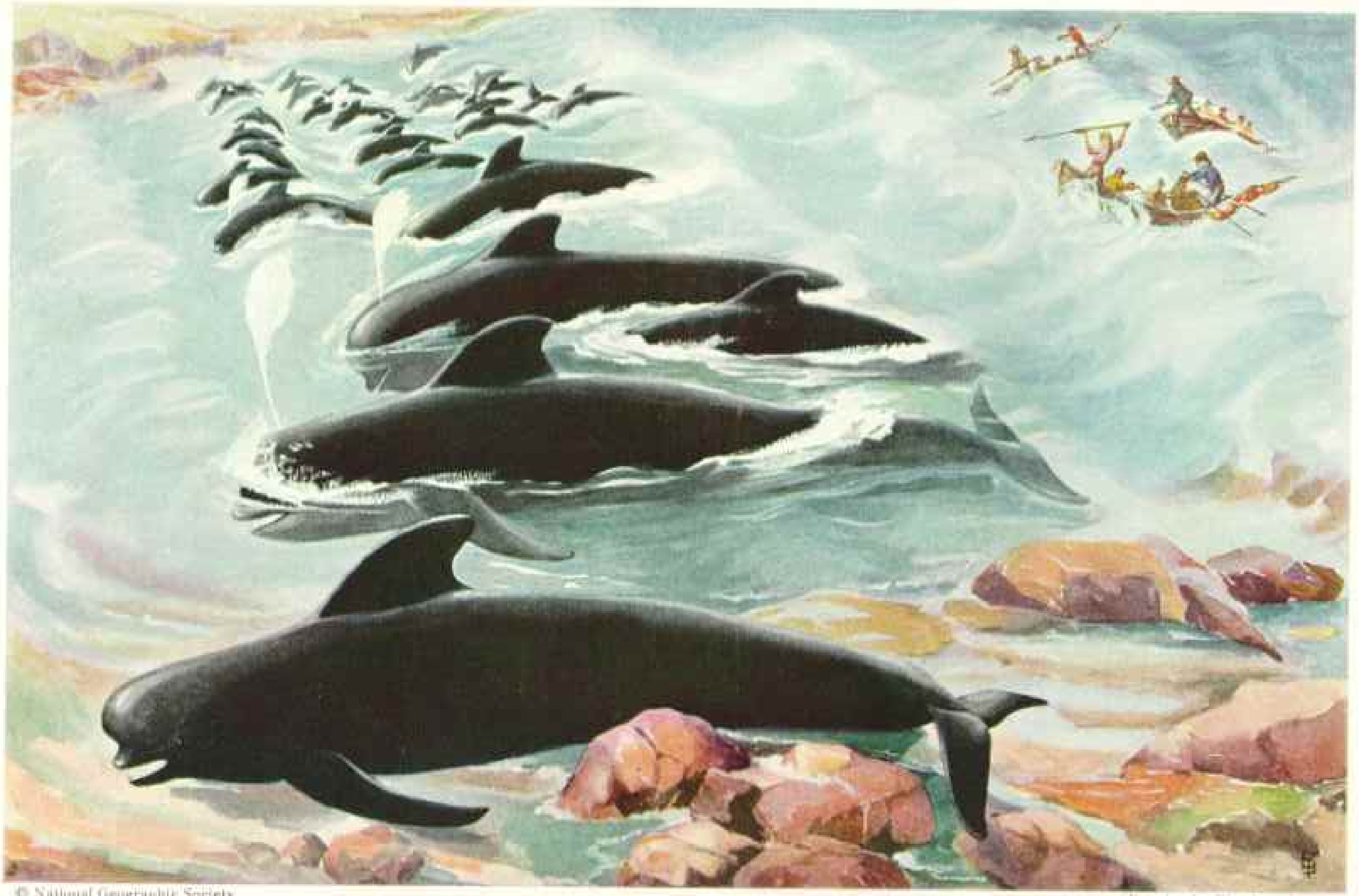
MYSTERY STILL PARTLY CLOAKS THE RARELY SEEN ROUGH-TOOTHED DOLPHIN

Few naturalists ever have observed one in the flesh. The crowns of its teeth are roughened by fine vertical ridges. The **Rough-toothed Dolphin** has been seen by sailors in most of the oceans.

 Paintings by Else Bostelmann

POCKET EDITION OF MOBY DICK IS THE PYGMY SPERM WHALE

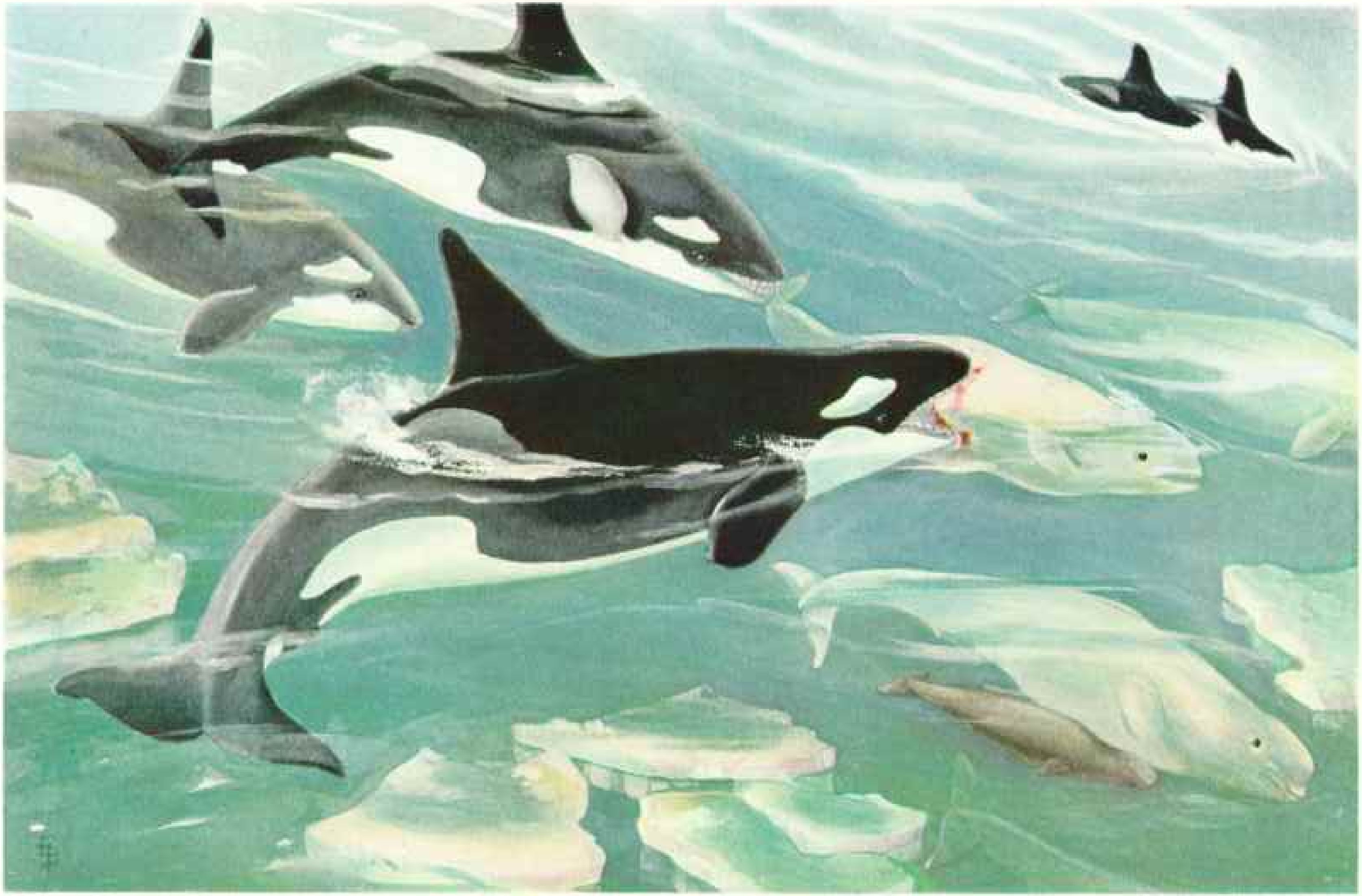
Like its giant relative (Plate I), it has sharp, backward-curving teeth in the lower jaw only, a reservoir of spermaceti in its head, and lives largely on cuttlefish. The **Pygmy Sperm** is believed to inhabit both the Atlantic and Pacific Oceans.



Painting by Else Bostelmann

THEIR HABIT OF "FOLLOW THE LEADER" IS DISASTROUS WHEN A SCHOOL OF BLACKFISH, OR PILOT WHALES, IS DRIVEN ASHORE

Fishermen take advantage of the animals' instinct to follow the largest member of the school and force them into shallow water, where they are easily killed. About 20 feet long, the **Blackfish** is found in the Atlantic and Pacific Oceans. Members of a school rise and dive in rows, like well-drilled soldiers.



Painting by Else Bostelmann

SAVAGE KILLER WHALES, WHICH CAN SWALLOW A SEAL OR EVEN A MAN, ATTACK A HERD OF SMALLER WHITE WHALES

Armed with sharp teeth in both upper and lower jaws, the **Killer Whale** fears no living thing. Males reach a length of 30 feet. Killers capture seals or penguins on ice floes by smashing or upsetting the floes from beneath. The timid **White Whale** frequents waters of the Arctic coasts and rivers.

SCHOOLS OF DALL'S PORPOISE RACE BOATS IN ALASKA'S INSIDE PASSAGE

A group of two dozen regularly met and escorted a Government boat on its daily trip for two months near Wrangell, Alaska. **Dall's Porpoises,** about six feet long, are seen mostly in the waters of the Inside Passage and near Kodiak and the Aleutian Islands.

Paintings by Else Bostelmann

THE HANDSOME RIGHT WHALE DOLPHIN SEEMS TO BE WEARING A TUXEDO

Like its larger namesake (Plate III), it has no dorsal fin. The **Right Whale Dolphin** lives far offshore in the North Pacific Ocean, and has relatives in waters off Japan and in the South Pacific.

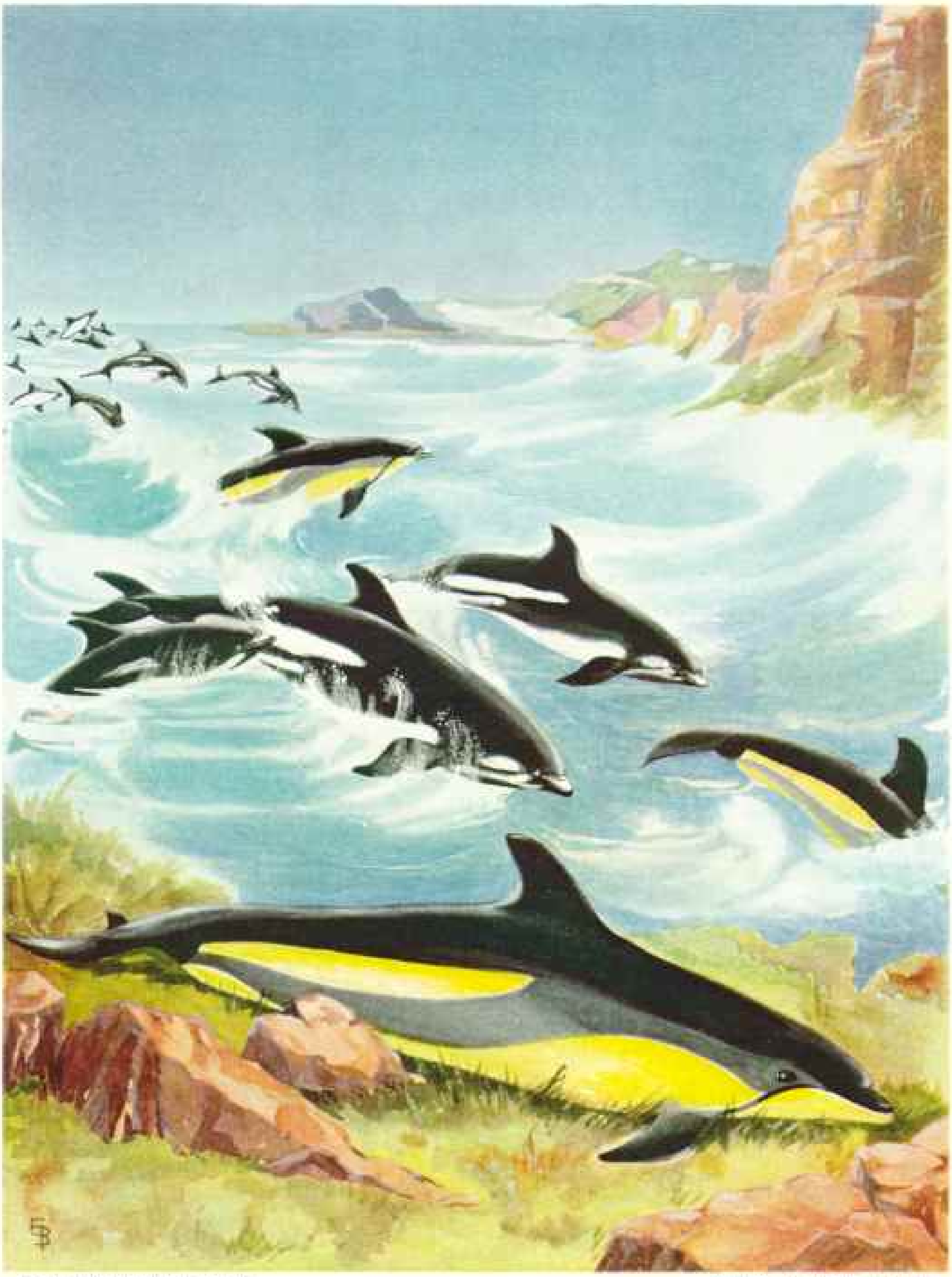
LONG TEETH IN THE LA PLATA DOLPHIN'S BEAK ARE BAD NEWS FOR FISH

It inhabits river estuaries and parts of the coasts of Argentina and Brazil. A brown baby swims close to its mother. Curiosity, or carelessness, often brings the **La Plata Dolphin** alongside fishing boats, where it is easily captured.

Paintings by Else Bostelmann

THROUGH EAR-FLUNG JUNGLE STREAMS SWIMS THE AMAZON RIVER DOLPHIN

Sometimes called the Bouto, it lives in the great system of waterways centering around the stream for which it is named. The **Amazon River Dolphin** is eight to nine feet long.



 Painting by Else Bostelmann

WHITE-BEAKED AND WHITE-SIDED DOLPHINS OFTEN LEAP HIGH OUT OF WATER

Frequently they are washed on shore. Despite its name, the male **White-sided Dolphin** is chiefly conspicuous because of the yellow stripes on its flanks. The **White-beaked Dolphin** (center and background) is similar in appearance except for its coloring. These animals live in the North Atlantic Ocean, from Norway to Cape Cod, Massachusetts. Both types sometimes travel in schools of 1,000 or more individuals. They grow to a length of nine or ten feet, with very short beaks.

lower jaws are furnished with 20 to 30 heavy teeth (page 63).

The Sperm Whale calf, which measures 13 to 14 feet at birth, is suckled by the mother at least 6 months and is weaned after attaining a length of 21 or 22 feet. The female, when suckling her calf, floats on her side, while the calf, which is thus enabled to breathe normally at the surface, takes the protruded nipple in the corner of its mouth.

Sperm Whales live 8 or 9 years. Requiring a ton of food a day, they feed principally on squids and octopuses, as indicated by circular scars on the head and jaws left by the suckers and claws of these cuttlefish.

In "sounding," or diving, the Sperm Whale lifts its caudal flukes high in the air and goes down almost vertically. On coming to the surface after a dive of from 20 to 30 minutes, the instant the end of the snout breaks the water the low, bushy spout bursts forth, directed diagonally forward. Following a prolonged submergence, the Sperm Whale makes about 40 shallow dives. It swims at about four knots, but when frightened can triple this speed.

Blue Whale

(Sibbaldus musculus)

The summer haunts of Blue Whales are near the polar pack ice of both hemispheres, and they seem to avoid the Tropics (Plate II). They depend on small crustaceans for food and their wanderings appear to be correlated with the periodic abundance of these organisms.

The Blue Whale is the largest mammal that has ever lived either on land or in the water (page 35). Three females 100 feet in length have been taken in the Antarctic in one season. A Blue Whale 89 feet long and 45 feet in maximum circumference weighed more than 119 tons; it yielded 166 barrels of oil.

Although this whale's body has a decidedly bluish cast, the shoulders, back, and sides generally have a diffused paler mottling of small grayish patches, and the belly, including the area of the throat folds, is unevenly mottled with scattered silver-gray and white spots of irregular shape. A yellowish or sulphur-colored film of diatoms may form on the animal's under surface, giving rise to the name "sulphur-bottom" used by American whalers. The blades of whalebone are black-blue or coal-black, and from 23 to 41 inches long.

A Blue Whale calf, 23 to 26 feet long at birth, is nursed by the mother for about seven months and is weaned when it has attained an average length of 52 feet. The life span apparently does not exceed 20 years. The Blue Whale feeds on small crustaceans called "krill." The mass of such shrimplike animals in the stomach of one large Blue Whale weighed more than a ton.

The Blue Whale generally makes a dozen or more shallow dives of 12 to 15 seconds after coming up from a deep dive. The columnar vaporized spout, which may rise 20 feet, is delivered when the vertex of the head first appears at the surface. At the beginning of a deep dive that may last 10 to 20 minutes, the great caudal flukes rise clear of the water.

Pursuing whale-catcher boats have found that the normal speed of a Blue Whale when traveling is 10 or 12 knots, but a frightened animal may exceed 14 knots.

Little Piked Whale

(Balaenoptera acutorostrata)

The Little Piked Whale seems to be partial to inshore coastal waters (Plate II and page 36). Strictly speaking, the name *Balaenoptera acutorostrata* applies only to the North Atlantic Little Piked Whale, since the Antarctic form has been named *Balaenoptera huttoni*, and the one that occurs in the North Pacific has been called *Balaenoptera davidsoni*. Since their external features are much the same, all will be treated here as one species. On this basis, the Little Piked Whale has a world-wide distribution, ranging northward to Spitsbergen, Iceland, Baffin Bay, and Bering Sea, and on the south penetrating Ross, Weddell, and other Antarctic seas. Because of its small size, it has little commercial value.

Not only is the Little Piked Whale the smallest of all the furrow-throated whales, but it is readily recognized by the broad white band crossing the upper side of the fore flipper and by the entirely white or yellowish-white whalebone. Its length seldom exceeds 33 feet. Throat folds, from 50 to 70, extend from the chin backwards onto the chest.

The bluish-gray, brownish-gray, or grayish-black coloration of the head, lower jaws, and back becomes lighter on the flanks. Ordinarily the entire throat, chest, and remainder of underparts, with the exception of four or five outer folds, are ivory white. Scottish fishermen gave this whale the name "Little Piked" on account of its high and pointed dorsal fin.

Probably this whale feeds more on fish than do its larger relatives. It is seen in the colder waters of the Northern and Southern Hemispheres during the respective summer seasons, but rarely remains there during the winter.

Right Whale

(Eubalaena glacialis)

For at least 700 years (1100 to 1800) the Right Whale was successively hunted in the Bay of Biscay, along the northwestern coast of Norway, around Iceland, in the Gulf of St. Lawrence near Newfoundland, and along the coasts of New England (Plate III).

Its abundance, slow speed, buoyancy of its carcass, and great yield of oil and whalebone made it an attractive quarry. For these reasons it was called the "right" whale.

Photograph by Merl La Voy

A WHALE'S "OVERCOAT" OF BLUBBER MAY BE SIX OR MORE INCHES THICK

A blanketlike layer of fat is being peeled off the head of a Sperm Whale (Plate I) by a chain and donkey engine at a shore station in the Aleutian Islands. The blubber, which keeps the animal warm in cold seas, is melted down into oil. The carcass is lying on its side. The man's left foot is resting on the long, narrow lower jaw, which is small in proportion to the rest of the huge head. No other whale has a mouth and head like this.

Actually there are three recognizable kinds of Right Whales, of which one (*Eubalaena glacialis*) inhabits the North Atlantic Ocean, another (*E. australis*) the oceans in southern latitudes, and a third (*E. sieboldii*) the North Pacific Ocean.

The Right Whale is related to the Bowhead, or Greenland Whale (Plate VIII), and like the latter is characterized by the absence of external throat furrows, lack of a dorsal fin, presence of long, narrow blades of black whalebone, and enormous fleshy lower lips on the outward-bowed lower jaws.

Adult Right Whales generally average from 45 to 50 feet long. The short and chunky body is often entirely black, although about one out of five individuals is white-bellied. Near the end of the muzzle of adults and young is a horny excrescence of irregular shape known as the "bonnet," commonly infested with parasitic worms, whale lice, and barnacles. The row of black whalebone suspended from each upper jaw consists of at least 250 flexible blades, of which the central ones are the longest, averaging from six to seven feet. The female has a single young which she suckles and keeps with her for at least a year.

Right Whales are fond of floating on the surface, and at times are playful, springing nearly clear of the water. Usually a series of five or six shallow submergences is succeeded by a deep dive of 15 to 20 minutes' duration. The V-shaped spout is double, the forcibly ejected breath from each blowhole being directed forward and upward some 15 feet.

Pygmy Right Whale

(Neobalaena marginata)

Pygmy Right Whales are either few in number or their habits are such that they are rarely seen by whalers (Plate III). Stranded specimens have been found on the eastern coasts of the Great Australian Bight, most frequently in the spring at the time of heavy gales, and in various New Zealand waters.

Probably less is known about their habits than of any other cetacean. Measurements of skeletons indicate that they attain a length of 20 feet. The throat is smooth. The blades of whalebone are ivory white or yellowish white, with a blackish outer margin.

One of the most remarkable features of the Pygmy Right Whale's body is the presence of 17 pairs of peculiarly widened ribs, a greater number than is found in any other cetacean. Some zoologists believe that these ribs provide

Photograph by Merl La Voy

GIANT WHALE JAWBONES SERVE AS AN ALASKAN CEMETERY FENCE

In a land where wood is scarce, this burying ground at Point Hope, Alaska, is surrounded instead with the lower jawbones of Right and Bowhead Whales, which formerly were plentiful in Arctic waters. Some of these bones reach a length of 21 feet. In prehistoric times such bones were used by the Alaskan Eskimos as roof beams for their semisubterranean houses.

additional protection to the internal organs and may be related to deep diving habits.

Sei Whale

(Balaenoptera borealis)

Sei Whales migrate in search of food during the warmer season to the colder waters some distance from the pack ice and when winter sets in they return to tropical or subtropical waters for breeding and calving (Plate IV). They range northward to Spitsbergen, Iceland, and the Bering Sea, and southward to the northern limit of drift ice in the Antarctic seas. Except near Japan, Korea (Chosen), and the west coast of Norway, they are of no great importance on any of the whaling grounds, for their oil yield is low.

This whale rarely exceeds 56 feet in length. The upper parts are nearly always gray, often dark steel gray or a gray with a bluish cast. On the flanks and sides of the tail the color is generally light bluish gray, but occasionally with small irregular spots of the color of galvanized iron. Oblong white scars left by parasitic copepods are usually scattered over the body. The mid-portion of the underparts from the chin backwards is white, the remainder, including the lower jaws, being the same color as the upper parts.

Sei Whale calves at birth are from 15 to 16 feet in length, are suckled for at least five months, and are weaned when they have attained a length of 26 to 30 feet. Old age is reached at 15 years. They are plankton feeders.

Norwegian fishermen call this animal the Sei Whale (*Seihval*), since it arrives on their coasts simultaneously with the *sei*, or coalfish. The English equivalent is "pollack whale."

This whale generally comes to the surface obliquely, so that the observer sees in succession the snout, the top of the head, and then the delivery of the spout, which is accompanied by a metallic whistling sound. The moisture-charged breath forms a cone-shaped column that rises from 10 to 14 feet.

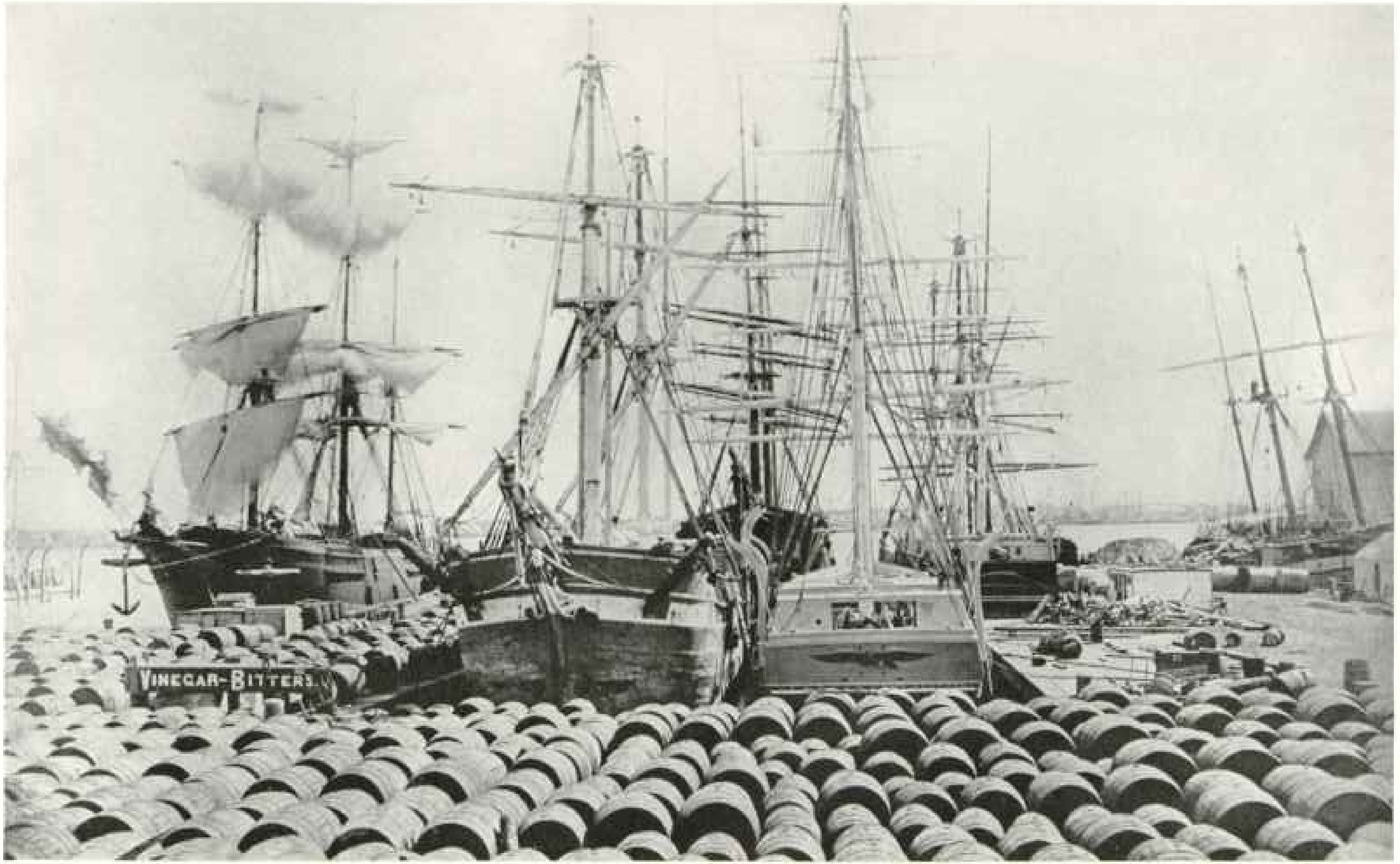
Bryde's Whale, which somewhat resembles the Sei Whale in outward appearance, is common on the coast of Cape Colony.

Finback Whale

(Balaenoptera physalus)

Finback Whales are found in all large oceans, assembling in schools of a few to two or three hundred in areas where food is plentiful (Plate V). About 250,000 Finbacks have been killed since 1900.

Few whales can compete with the Finback in speed. A long tapering body, elongate wedge-



Photograph from Captain George T. Fluman

WHALE SHIPS AND CASKS OF WHALE OIL CONGESTED THE WHARVES AT NEW BEDFORD, MASSACHUSETTS, 80 YEARS AGO

This was a typical scene along the water front when the city was the world center of the whaling industry. American vessels engaged in the "fishery" far outnumbered all others. Ships like these sometimes went on voyages lasting two or three years and added greatly to geographic knowledge of remote parts of the world.

Photograph from Captain George T. Thompson

WHAT THE GOLD RUSH OF 1849 DID TO THE AMERICAN WHALING FLEET! DOZENS OF DESERTED SHIPS WERE TIED UP AT SAN FRANCISCO
Yerba Buena Island, background, is now a stepping stone for the 8¼-mile Bay Bridge connecting San Francisco with Oakland, California.

© Morris D. Miller

FEW WHALES CAN ESCAPE MODERN FAST "KILLER BOATS" WHICH SUPPLY THE "FLOATING FACTORIES"
This fleet killed more than 900 whales in three months for processing on the American whaling ship *Frango* off western Australia in 1958 (page 37).

HARPOONED BY A GUN FROM THE BOAT, A HUMPBACK WHALE BREACHES AFTER A DIVE

Knobs on the snout are characteristic of the Humpback (Plate VI and page 65). The New Zealander in the bow of the boat is hauling in the slack line.

Photographs courtesy The Auckland Weekly News

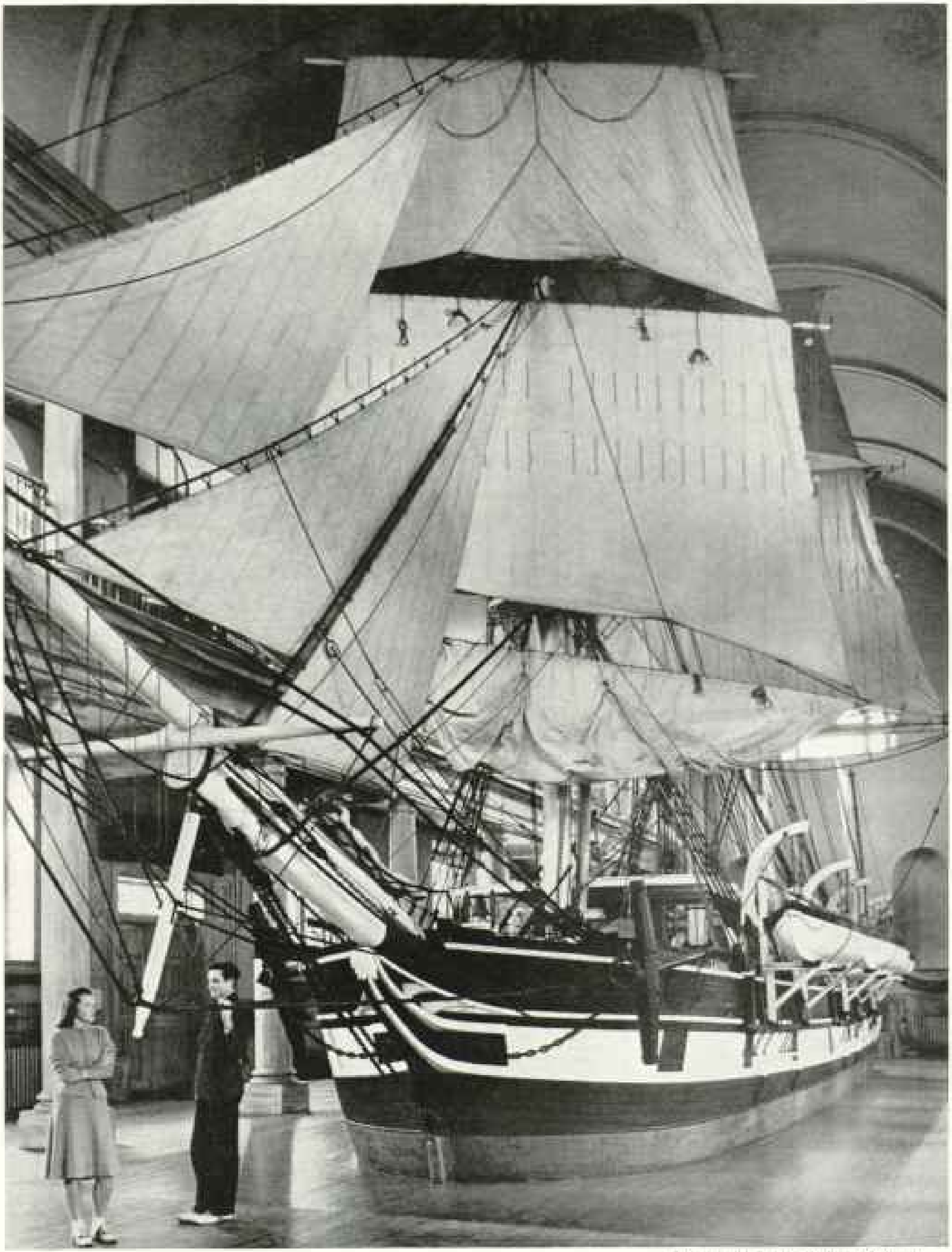
FLUKES LASHING THE AIR, A WOUNDED HUMPBACK DIVES IN ITS DEATH THROES

A grenade on the harpoon first stuns the whale, and then it is killed by explosion of a bomb attached to a lance. Finally the carcass is inflated with air so that it will float.

Photograph from International Press Photo Service

TWO HUGE SPERM WHALES, RELATIVES OF THE FICTIONAL "MOBY DICK," PROVIDE A SPECTACLE FOR ROTTERDAM CROWDS

These adult males were cast ashore February 24, 1937, in the southern part of the Netherlands. The animals measured 59 and 52½ feet, and weighed 52 and 39 tons, respectively. The whale in the foreground is on its side, showing clearly the shape of the long, narrow lower jaw, small by comparison with the rest of the head (Plate 1).



Photograph by B. Anthony Stewart

THE WHALER "LAGODA" ONCE WAS GONE FROM NEW BEDFORD ALMOST FOUR YEARS

During the voyage, she captured whales valued at more than $300,000. This model is 59 feet long. It is housed in the Bourne Whaling Museum, connected with the Museum of the Old Dartmouth Historical Society, at New Bedford, Massachusetts. This town and Nantucket Island, near by, were the two leading American whaling ports of the 19th century. At the cry of "Thar she blows!" from the masthead, the boats (right) would be lowered from the davits and rowed or sailed in pursuit of the whale (page 82).

shaped head, high curved dorsal fin, and tapering fore flippers all contribute to its graceful lines. Old adults reach a length of approximately 82 feet. The back is sharply ridged toward the tail, and the throat furrowed.

Finbacks are normally dark gray above and snow white beneath. Curiously, the right side of the head is more whitish than the left. The longest blades of whalebone measure 20 to 36 inches. The long bristles hanging from the inner edge of each blade are whitish or yellowish.

Calves measure 21 or 22 feet at birth and are nursed for at least six months. Finbacks may reach the ripe old age of 20 years.

The animal expels its vaporous breath to a height of 15 or 20 feet at the instant the blowholes on the vertex of the head break the surface of the water. The spout rises vertically as a narrow column at first and then expands into an elongated ellipse before it is dissolved.

Humpback Whale

(Megaptera novaeangliae)

Humpbacks are generally distributed in the oceans of the world according to season and feeding conditions (Plate VI). These whales migrate along well-defined courses at definite seasons, pass the winter in tropical or subtropical waters, and return to the polar seas in the spring (pages 37 and 62).

A thickset body and long fore flippers give the Humpback an ungraceful appearance. The obtusely rounded snout of the flattened head and the rows of rounded knobs on the snout and lower jaws have convinced more than one inexperienced ocean traveler that he has seen some strange sea serpent. Humpbacks are normally black except for the white throat and breast. The whalebone blades are grayish black, with bristles four to six inches long.

At nursing time the calf demonstrates its playful affection by leaping and splashing around its mother until sharply called to the business at hand by several slaps from her long flippers.

The calves, which measure 15 to 16 feet and weigh more than 3,000 pounds at birth, are nursed for about a year. The average length of old adults is around 48 feet.

Favorite food of the Humpback seems to be small shrimplike crustaceans. Along the coasts of Norway and Labrador, Humpbacks follow large schools of capelin, a small smeltlike fish.

Humpbacks are noted for their playful antics, such as "lob-tailing," when the partially submerged whale is seemingly standing on its head, thrashing the surface water into foam by powerful strokes of its flukes. More remarkable is its habit of "breaching," or jumping clear of the water in a vertical direction and then falling on its side with a great splash.

Gray Whale

(Rhachianectes glaucus)

The shore-loving Gray Whale is found only in the North Pacific Ocean (Plate VII). Along the western coast of North America it migrates in winter as far south as the latitude of the State of Jalisco, Mexico, returning to the Arctic Ocean in the spring. Other herds of Gray Whales that pass the summer in Okhotsk Sea, along the Kamchatka coast and the Arctic Ocean, appear off southeastern Korea (Chosen) toward the end of November on their southward migration.

The Gray Whale has only two to four short throat furrows, a slight hump but no distinct dorsal fin. It attains a maximum length of about 50 feet and, like other baleen whales, the females average larger than the males. Although the general coloration is black or very dark slate, the whole body from head to caudal flukes is usually marred by many white or light-gray circular scars, presumably left by parasitic cirripeds such as barnacles. The largest blades of whalebone in its mouth are from 14 to 18 inches long. These blades are thick and heavy, yellowish white or light yellow.

Gray Whale calves 16 to 18 feet in length are born usually in the last half of January, and are weaned 6 to 8 months later when they have grown to 25 feet.

In the Bering Sea, Gray Whales feed on several kinds of amphipods resembling sand fleas. When traveling along the shore, they submerge for 8 to 10 minutes at a time. The spout rises vertically to 10 or 11 feet.

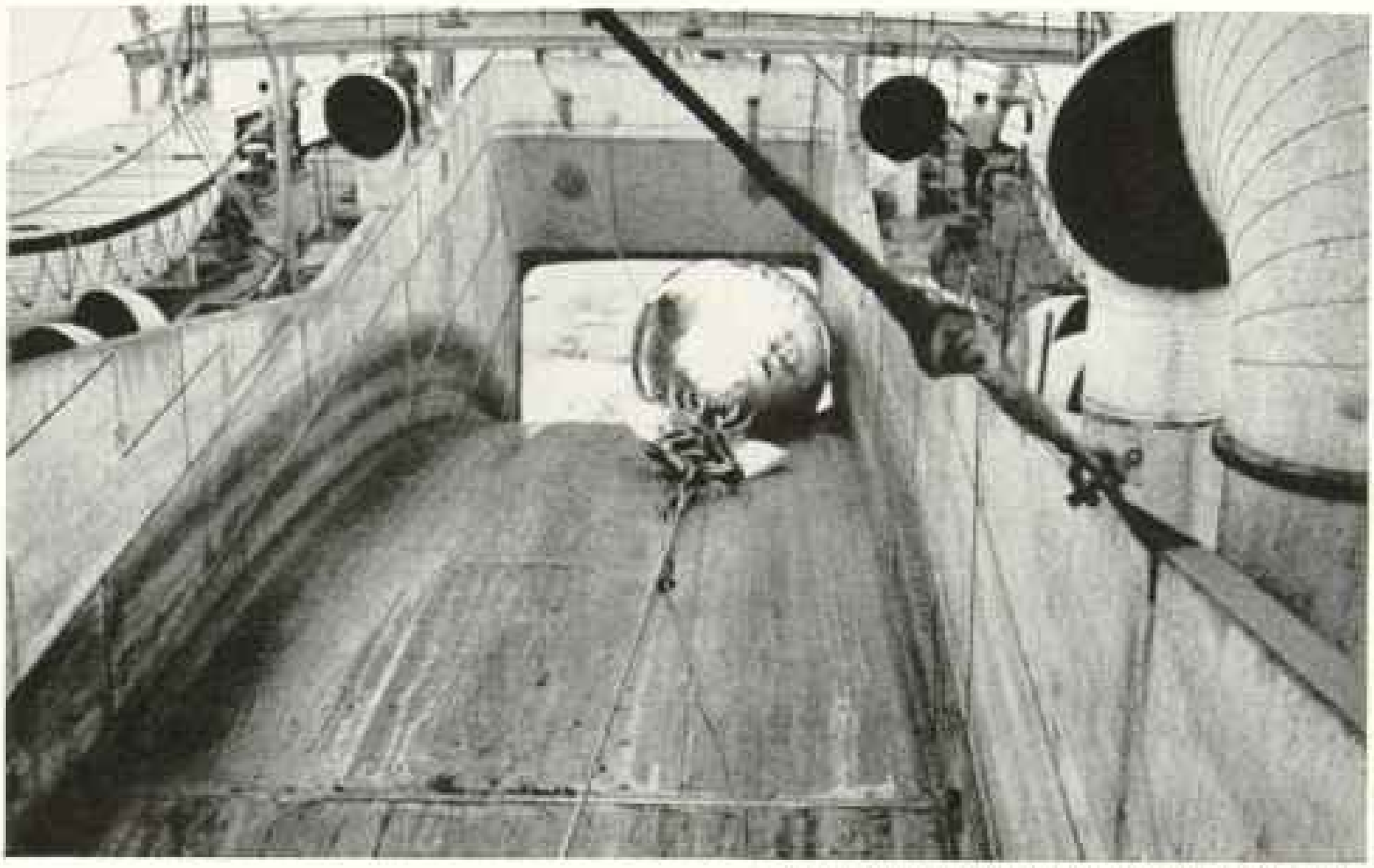
Bowhead Whale

(Balaena mysticetus)

Bowhead Whales formerly ranged from Spitsbergen westward to eastern Siberia, approaching the pack ice around the North Pole in summer, and moving southward again in the fall (Plate VIII). Today the few remaining Bowheads appear in Bering Strait in June and proceed eastward to the mouth of the Mackenzie River, and Baillie and Banks Islands.

From September to November, depending on ice conditions, they pass Point Barrow, Alaska, and spend the winter months in drifting field ice about the Aleutians and the Kurile Islands north of Japan.

Bowheads were hunted almost to extinction in the North Atlantic between 1612 and 1887, but meanwhile a new fishery was opened up in Bering Sea and the neighboring Arctic regions in 1848. Notwithstanding many setbacks, including the burning of whaling vessels in Bering Sea during the Civil War by the Confederate privateer *Shenandoah*, and the destruction by pack ice of the entire Arctic fleet in 1871 and 1877, whaling was continued on a rapidly diminishing scale in these waters for many years thereafter.



Photograph by Lieut. Q. R. Walsh, U. S. Coast Guard

HAULING A WHALE ABOARD SHIP WOULD HAVE ASTONISHED OLD-TIMERS

A Humpback is being pulled directly out of the ocean up the slipway at the stern of the factory ship *Tyrfjord*. Then it will be cut up and processed into oil and other by-products. A two-ton steel claw clamps on to the whale's tail, making it possible to haul carcasses on board the ship with a steam winch. Prior to its use, in bad weather or when the ship was rolling, whalers were sometimes drowned when they attempted to loop wire cables around the tail flukes.

© Morris D. Miller

WHALES, LIKE SHIPS, GET BARNACLES ON THEIR BOTTOMS!

This close-up shows parasites an inch or more in diameter on a Humpback Whale. They attach themselves "just for the ride," and pick up tiny organisms for food as the whale swims along. Barnacles are colored delicate shades of pink, blue, and lavender. Whales sometimes come into shallow water in an apparent effort to rub them off. The pointer indicates one of the "lice" or parasitic copepods which infest whales. They are reddish, spiderlike creatures as large as a thumbnail.

In 1897 the prices quoted at San Francisco, California, were $4 a pound for whalebone and 30 cents a gallon for whale oil. The average yield of a Bowhead was from 1,500 to 1,700 pounds of whalebone and from 70 to 90 barrels of oil, worth in all about $8,000.

This smooth-throated whale measures from 50 to 65 feet in length. Adults are velvety black, except for the small ash-colored area at the tip of the lower jaws, the cream-colored chin and throat, and, occasionally, white or piebald underparts. Immature individuals are bluish black and the calves are bluish gray.

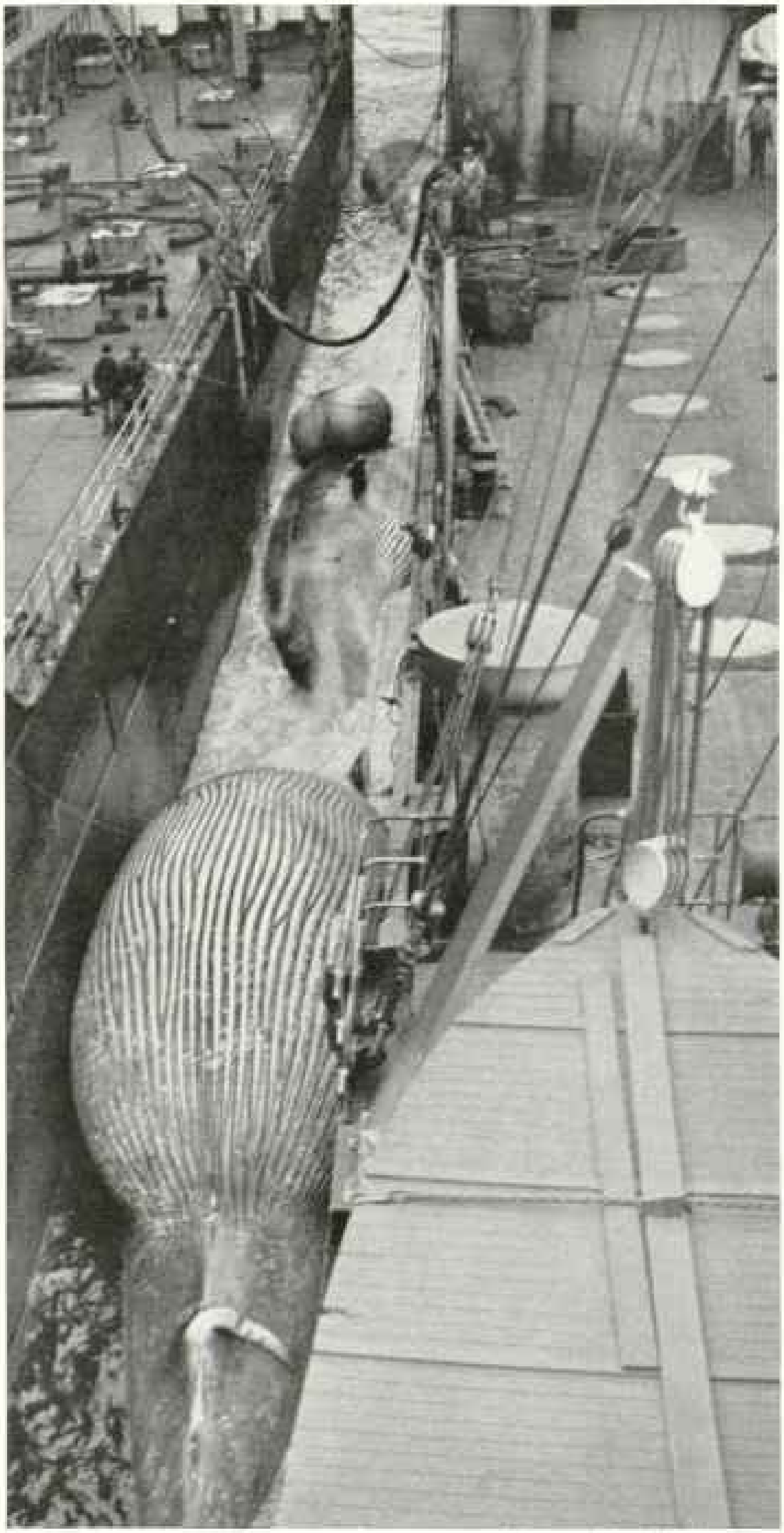
The gigantic mouth is provided on each side with a row of about 360 long, narrow, closely spaced blades of whalebone, attached at one end to the gum of the upper jaw. The blades near the middle of each row are the longest, sometimes nearly 12 feet, but decrease gradually toward each end of the row down to a few inches.

The newborn calf is rarely longer than 14 or 15 feet, and is nursed for about a year.

Bottlenose Whale
(Hyperoodon ampullatus)

During the summer, Bottlenose Whales frequent the northern seas from Novaya Zemlya and Spitsbergen to the east and west coasts of Greenland, and in winter they sometimes go as far south as the Mediterranean Sea (Plate IX).

It is generally conceded that the harpooners and crews who pursue Bottlenose Whales in small boats are en-



Photograph by R. P. Randall

WHALES SERVE AS FENDERS BETWEEN TWO SHIPS

The American floating factory *Ulysses* (right) discharges whale oil through a hose (top of picture) to the tanker *California* in Antarctic waters 1,800 miles south-southeast of the Cape of Good Hope, for shipment to the United States. Floating upside down between the vessels, the carcasses show the bottom grooves of Finbacks and Blue Whales.

Photograph by Paul Feyor

ONLY THREE YEARS OLD, BUT 74 FEET "TALL"

The jaws of the skeleton of this young Blue Whale seem almost large enough to swallow the whole group of school children who are examining it. The huge shoulder blade, just behind the head, is three feet across. The Blue Whale is the largest mammal that ever lived on land or sea. This skeleton is mounted in the United States National Museum, Washington, D. C.

gaged in the most hazardous occupation of all whalemen. Because of the suddenness and unbelievable speed of the dive of one of these whales when harpooned, an accidentally entangled line may result in the capsizing of the boat or in the drowning of any seaman who is caught by a loop in the line and carried downward in the icy water.

The fore part of the head of the male Bottlenose rises abruptly from the short rostrum, or beak. A tolerably deep ∧-shaped groove is present on the throat. Old males have a single tooth, usually more or less worn, at the extremity of each lower jaw, while some young males have two teeth, barely visible.

Full-grown and aged males attain at least 30 feet. The color changes with age. Calves are black or grayish black with a leaden-gray tinge. As the animals approach maturity, yellowish-white or whitish spots appear on their flanks and underparts.

The confluence of these spots in aged females usually produces a marbled effect and sometimes an almost uniform yellowish-white coloration, or occasionally a white band around the neck. Old males are readily recognized by an irregular whitish patch on the forehead and a white dorsal fin. Very old and large males may become almost yellowish white.

It is believed that Bottlenose Whales must dive to great depths to find squids, their principal food. Occasionally they capture herring and other fish, and at times they rummage around on the bottom taking whatever happens to be available.

Usually these whales remain submerged only 10 to 20 minutes, but harpooned animals have been known to stay under water from one to two hours. When they come to the surface after a prolonged dive, the forcibly discharged breath can be heard in still or foggy weather a mile away.

Another species (*H. planifrons*), believed to be closely related to the North Atlantic Bottlenose, frequents the Antarctic waters chilled by pack ice and at times wanders northward along the south and west coasts of Australia.

True's Beaked Whale

(Mesoplodon mirus)

One or more kinds of Beaked Whales belonging to the genus *Mesoplodon* inhabit the oceans

of both hemispheres, but little is known of them (Plate X). They apparently spend their lives far from shores frequented by man. These whales feed principally on squids, other cuttlefish, and occasionally fish.

Beaked Whales of this genus seldom exceed 20 feet. All have two anteriorly converging grooves that form a /\ on the throat, not more than one visible tooth in each lower jaw, and a dorsal fin placed considerably behind the middle of the animal's length. Ten kinds of Beaked Whales have been recognized.

One of the rarer species is True's Beaked Whale. It is seldom more than 17 feet long, and there is a single tooth at the very tip of each lower jaw, a character this species shares with the New Zealand Beaked Whale (*M. hectori*) and Longman's Beaked Whale (*M. pacificus*). The body is usually slaty black above and lighter beneath.

Close of kin to True's Beaked Whale are four rare types: Baird's (*Berardius bairdii*); Sowerby's (*Mesoplodon bidens*); Gervais' (*Mesoplodon europaeus*); and Blainville's (*Mesoplodon densirostris*).

Cuvier's Beaked Whale

(Ziphius cavirostris)

Few whales are such wanderers as the Goose-beaked, or Cuvier's Beaked Whale, as it is more often called, and yet it rarely has been seen alive by naturalists (Plate X). It has been recorded on both sides of the Atlantic Ocean, off Sweden and Rhode Island, south in the Mediterranean Sea, and off South Africa and Argentina. In the Pacific Ocean it ranges from the Commander Islands and Alaska south to New Zealand and Tasmania, and also on the coast of India.

Goose-beaked Whales attain a length of at least 28 feet. Males have a single tooth at the end of each lower jaw, which projects an inch or more beyond the gum. The thickset body has a strongly marked medial keel extending from dorsal fin to tail; the caudal flukes are not separated by a distinct notch.

The color pattern of this whale is especially variable. An 18-foot male from Ireland and a 19-foot female from New Zealand had the head, the neck, and the back in front of the dorsal fin colored a creamy white, the remainder of the body being black. Other females were purplish black above, spotted or brown on the sides, and white below.

At the mating season the males apparently not only fight among themselves but attack the females and half-grown young. Cuvier's Beaked Whale depends to a considerable extent on cuttlefish for food. Schools of 30 to 40 travel in rather close formation, swimming and diving more or less in unison. After remaining at or near the surface for about 10 minutes spouting, the school dives as if by command and remains below searching for food for intervals up to half an hour or more.

Rough-toothed Dolphin

(Steno rostratus)

Few naturalists ever have had the opportunity of examining the Rough-toothed Dolphin in the flesh, and information is based largely on skeletons (Plate XI). It is found in the Mediterranean and Caribbean Seas and the Gulf of Mexico, and it ranges in the Atlantic Ocean from the North Sea to South Africa.

In the Pacific Ocean this whale has been recorded from places as far apart as Japan, Hawaii, and New Zealand. It has been identified also at Java in the Indian Ocean, the Nicobar Islands in the Bay of Bengal, and in the Red Sea.

The Rough-toothed Dolphin is readily recognized by its slender beak, which is compressed from side to side and not flattened above. The beak is not distinctly marked off by a cross groove from the receding forehead. Unlike other dolphins, the crowns of the 20 to 27 teeth on each side in each jaw are not smooth, but are roughened by fine vertical wrinkles. So far as known, this dolphin never exceeds seven or eight feet in length.

Pygmy Sperm Whale

(Kogia breviceps)

Strange in structure, with its habits practically unknown, the Pygmy Sperm Whale seemingly shuns the usual haunts of the larger whales (Plate XI). No naturalist has yet observed one at sea. They range as far south as Tasmania, Peru, and South Africa, and north to Japan, Baja California, and in the Atlantic to Nova Scotia and the Netherlands.

This diminutive relative of the huge Sperm Whale (Plate I) grows to a length of only 9 to 13 feet. The Pygmy is black above and light gray or grayish white beneath. It has a bluntly pointed snout, which projects beyond the lower jaw, a spermaceti organ, and a small, narrow, pinkish mouth. There are 14 or 15 slender, curved, and acutely pointed teeth in each lower jaw.

Like their larger relatives, Pygmy Sperm Whales live considerably on cuttlefish.

Blackfish, or Pilot Whale

(Globicephala ventricosa)

Blackfish migrate about in large schools from southern Greenland, the Faeroe Islands, and the coast of Norway to the Cape of Good Hope and the Kerguelen Islands, and in the Pacific Ocean from Japan south to New Zealand and Tasmania and east to Peru (Plate XII). Schools appear at irregular intervals along the Atlantic coast of the United States.

Among fisherfolk this animal is generally called "Blackfish" because of its black color.

Photograph by Captain C. T. Pedersen

BLUBBER FORMERLY WAS "PEELED" FROM A WHALE

Carcasses were cut up alongside the ship before the advent of the floating factory. As one might peel an apple, the blubber is being taken off in one continuous strip called the "blanket piece," which is hoisted aboard. The carcass rolls over and over as the blubber is "unwound." The men on the cutting stage at the left are using long-handled sharp-edged spades to loosen the blubber and cut the strip to the right width.

A longitudinal stripe, which expands into a heart-shaped figure on the throat, is usually present, however, on the under surface. The name "Pilot Whale" alludes to its queer habit of following the "leader," usually the largest male in the school. When one grounds in shallow water, the others follow, even though it means death for most of them. At such times the breathing of Blackfish is said to make a bellowing noise, and this seems to be the basis for the name "Caa'ing," or Calling Whale.

In the Faeroe Islands, lookouts on hills above the bays employ smoke signals to notify the village that Blackfish have been sighted. Rushing to their boats, the villagers endeavor to drive the school into shallow water.

Keeping the boats in a line, the pursuers fire guns, beat on pans, throw rocks, and shout to frighten the school shoreward. When the Blackfish run aground, men armed with lances and knives jump into the water and cut their throats. The expected average yield from each Blackfish is about 40 gallons of blubber oil and two to two-and-a-half gallons of head and jaw oil.

Blackfish have an almost globular head, remarkably swollen in front above the very short beak, and very long but narrow flippers. Adults vary from 14 to 28 feet in length.

Many hundreds of males, females, and young are sometimes seen in a school, though the schools that come into inshore waters are generally much smaller. They travel at a fairly rapid pace, the individuals in each row rising and diving side by side, with the spouts rising perhaps five feet. Blackfish feed chiefly on squids, but eat many kinds of fish. Calves measure at birth from five to six feet in length and are suckled for several months.

Killer Whale

(Grampus orca)

Killer Whales are found in all oceans and seas, tropical and polar alike, from Novaya

Zemlya, Baffin Bay, and Bering Strait to beyond the Antarctic Circle in the Southern Hemisphere (Plate XIII).

The most striking and unforgettable feature of the Killer when swimming at the surface is its erect black dorsal fin, rising like a pole every time the back comes up. The flippers and caudal flukes of young and old males are exceptionally large. Males grow to a length of 30 feet, but most females do not exceed half that size.

Killer Whales may be recognized by the bluntly rounded snout, which merges imperceptibly with the forehead, the white patch just behind and above the eye, and the striking contrast of the jet-black color of the head and back with the snowy-white underparts. They have 10 to 14 large conical teeth on each side in each of the powerful jaws which interlock when the mouth is closed.

Endowed with powerfully built bodies and ravenous appetites, Killer Whales hunt in packs of 5 to 40 individuals and habitually prey on other warm-blooded marine animals, including their own kind. The members of these schools often travel at a rapid rate in close formation, side by side, rising and diving at the same time, or cruise along at a uniform pace with their dorsal fins and part of their backs exposed.

Photograph by B. Anthony Stewart

LIKE A DOG TAUGHT TO STAND UP AND BEG, A DOLPHIN RISES FOR FISH

With its tail lashing beneath the surface, this tame Bottlenose Dolphin (Plate XVII) in a large tank at Marineland, near St. Augustine, Florida, stands half out of water to take mullet from the attendant's hand. A bell is rung to call the dolphins to "meals" (page 86). The umbrellalike canvas is a sunshade for penguins that live in the pool.

The Killer Whale has a mouth and throat large enough to swallow seals and porpoises entire. Narwhals, White Whales, and hair seals will leave open water and frantically rush toward the beach or narrow leads in the ice on the approach of a pack of Killers. Gray Whales either become paralyzed with fright and float belly up, or head toward the beach and slide into water so shallow that they roll in the wash. A pack of Killers, encircling a large whale, will harass and leap at it from all sides, biting at the fleshy lower lips, the flippers, and the sides until the animal either runs ashore, if near the coast, or, becoming exhausted, is literally torn to pieces.

Killers hunt for seals and penguins along the edge of pack ice and around large floes. At times when seals are basking or have taken refuge near the edge of thin ice, a school of Killers will suddenly come up beneath and endeavor to dislodge them by breaking the ice with their backs.

In the fall at the time fur seal pups are learning to swim, packs of Killer Whales cruise back and forth in the coastal waters of the Pribilof Islands, devouring hundreds of the babies. They swallow young walruses whole. Fish of all sizes also form part of their food.

White Whale

(Delphinapterus leucas)

White Whales are most numerous during the summer months in Arctic seas and adjacent waters as far south as Okhotsk Sea, Kodiak Island, St. Lawrence River, and Great Britain (Plate XIII). Shallow coastal waters and bays are their favorite haunts, but they also ascend rivers. White Whales have been seen in the Yukon River 600 miles from salt water and they travel up the St. Lawrence River as far as Quebec.

Near Greenland, fishermen have used motorboats to surround and drive schools of White Whales into shallow water. On the Greenland coast they are caught in large-meshed nets supported by floats and laid outward from the shore. Leather shoestrings are manufactured from their hides and oil from the blubber.

Adult White Whales are readily distinguishable from all other cetaceans by being entirely white and by having the dorsal fin reduced to a mere ridge. They are generally 12 to 14 feet long. Ten teeth are typically present in each upper jaw and eight in each lower jaw.

Newborn calves are gray and subsequently assume shades of slate, brownish gray, or hair brown. Calves eight feet in length are generally mottled with chocolate brown. As the calves approach maturity, they assume a yellowish color before acquiring the adult milk-white skin.

The White Whale is a fast swimmer, attaining a speed of at least six miles an hour, and readily outdistances the Narwhal. It is usually very shy and sensitive to movements or sounds in or on the water, but is said to disregard those emanating from the land.

White Whales consume large quantities of fish, squids, and prawns. When salmon are running in Okhotsk Sea during July and August, the whales are especially abundant off the mouths of rivers.

Dall's Porpoise

(Phocoenoides dalli)

One of the creatures most frequently noticed by passengers on steamships following the Inside Passage from Seattle, Washington, to Juneau, Alaska, is this black and white porpoise (Plate XIV). Less frequently it is seen around Kodiak Island and among the Aleutians. During June it has been sighted as far south as the Santa Barbara Channel off southern California.

A first cousin (*P. truei*) of this species frequents the waters around northern Japan. It differs from Dall's Porpoise in having the white area on the sides extending forward beyond the flippers. Both types are restricted to the North Pacific Ocean.

When Dall's Porpoise breaks the water at the surface, the white lateral area contrasting sharply with the jet-black body and the low triangular dorsal fin serve as instant recognition marks. There is a strong dorsal longitudinal ridge in front of the tail flukes. Dall's Porpoise measures, when fully grown, as much as 6 feet 2 inches and weighs about 200 pounds. Its food consists almost entirely of squids; but occasionally small fish, such as the saddled blenny, are eaten. The presence of this fish in the stomach contents suggests that this porpoise, when feeding, may nose around submerged rocks along the shore.

Right Whale Dolphin

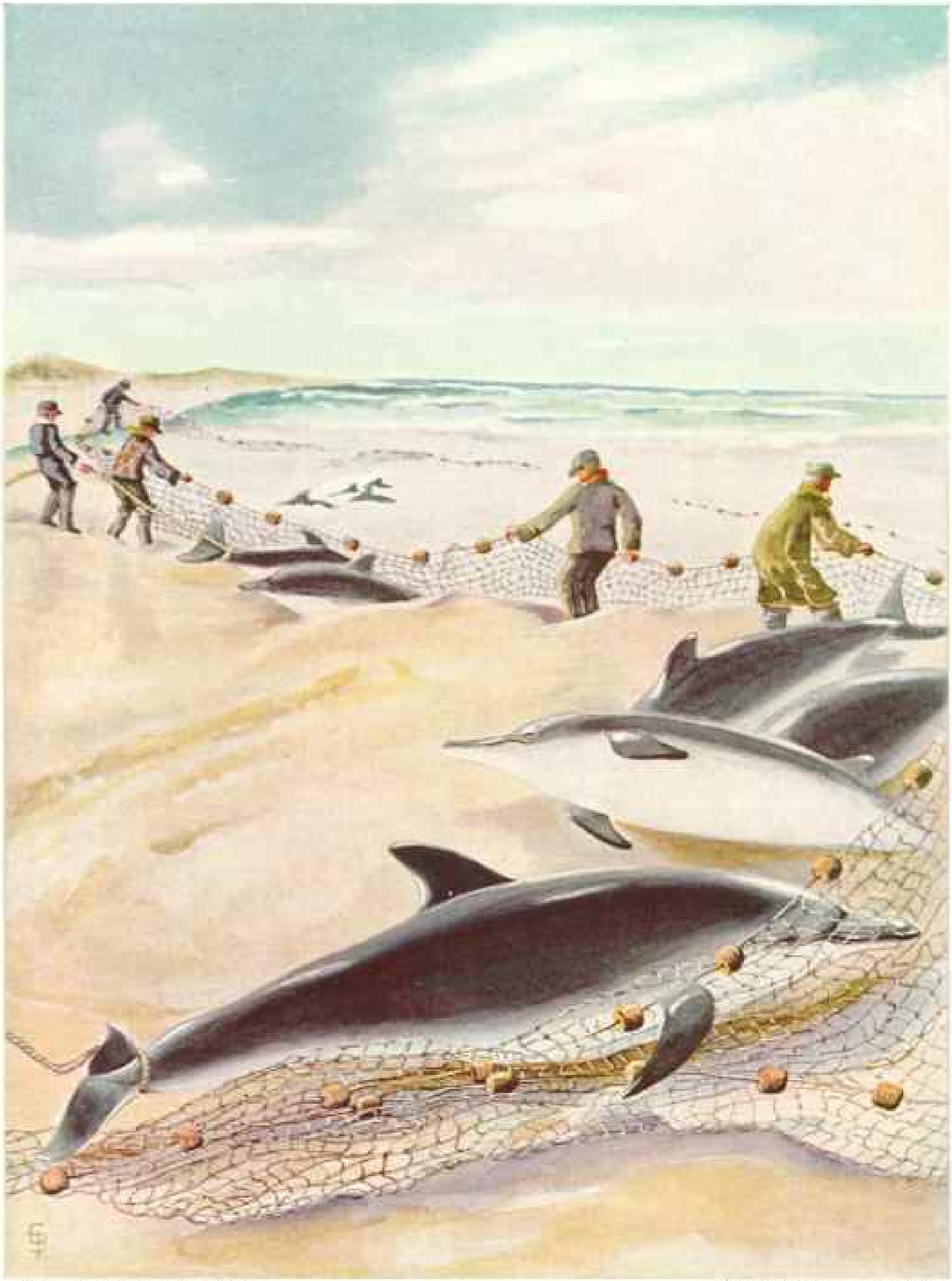
(Lissodelphis borealis)

Small schools of these dolphins wander about in the vast depths of the North Pacific Ocean, generally far offshore, from the latitude of San Diego, California, to Bering Sea (Plate XIV). On the other side of the Pacific they are found off the coasts of Japan. Right Whale Dolphins are so called because of the absence of a dorsal fin, a character they share with the larger Right Whale (Plate III).

Rather slender in proportion to its length and having a short but distinct beak, this dolphin attains a length of at least eight feet. It is perhaps the sleekest and handsomest of all the dolphins, the velvet-black color of the upper parts, the flippers, and the tail flukes contrasting with the white areas on the underparts.

Our knowledge of this dolphin's actions when swimming rests solely on the observations of Titian R. Peale, who accompanied the United States Exploring Expedition of 1838-42 commanded by Charles Wilkes, U. S. N. He reported them to be remarkably quick and active and said they frequently leap out of water. They feed largely on cuttlefish and fish.

Péron's Dolphin (*L. peronii*), a related species, inhabits the southern seas from the longitude of Chile to New Zealand and Tasmania. Its beak, as far as the eye, is silky white, and so are the sides, the flippers, the tail flukes, and the entire underparts; the top of the head and the back are black or bluish black. It is somewhat smaller than its northern relative, measuring about six feet in length.



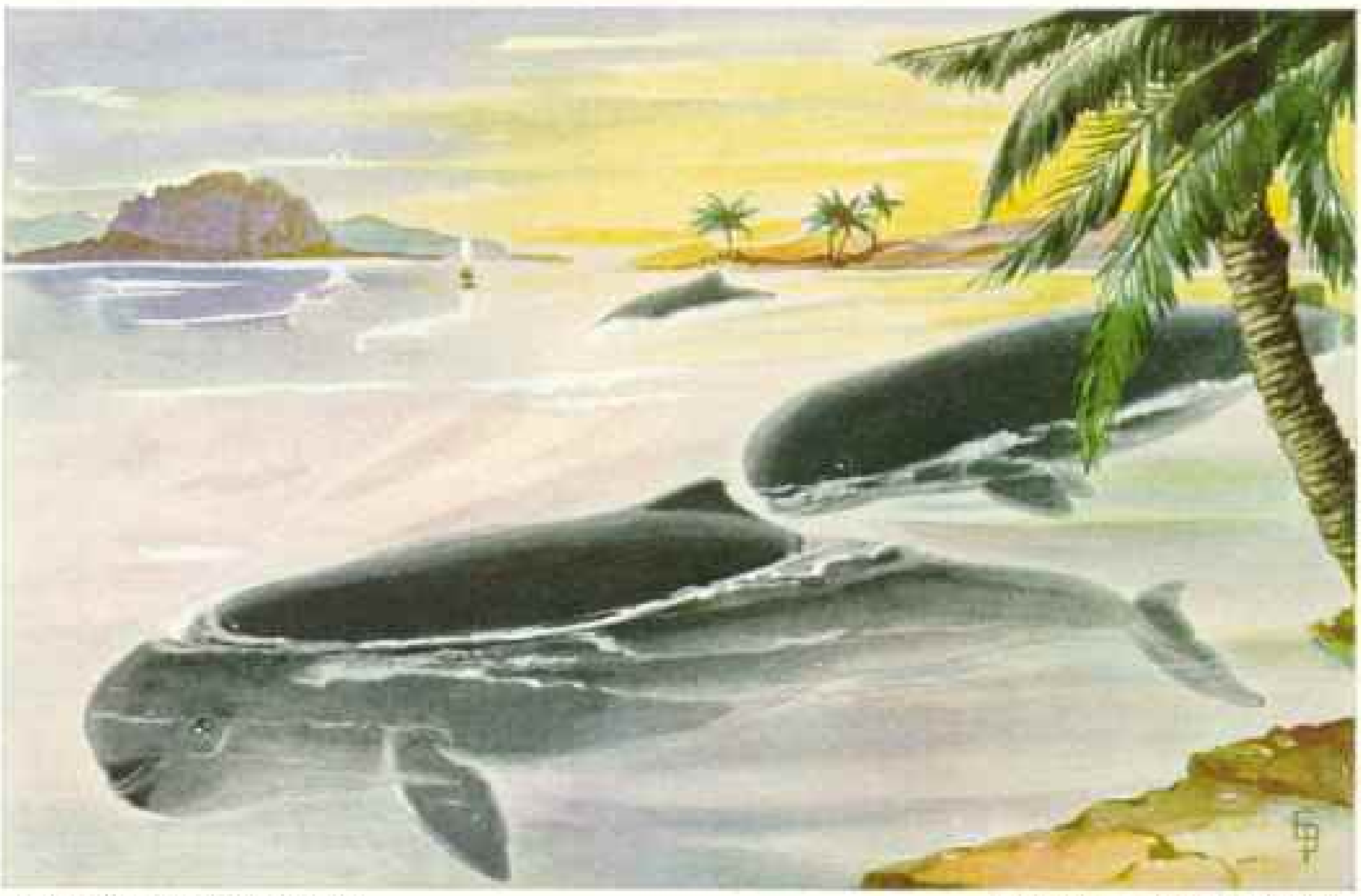
 Painting by Else Bostelmann

BOTTLENOSE DOLPHINS ARE CAUGHT IN NETS ON HATTERAS ISLAND, NORTH CAROLINA

The school first was encircled by the "out net," shown in the distance, which may be half a mile long, and then pulled ashore in the "sweep net." A school was last taken there in 1929. Oil from sacs in the forehead and behind the lower jaw is used in chronometers. The beak of the **Bottlenose Dolphin** is supposed to resemble the top of an old-fashioned gin bottle.

ALMOST BLIND, THE GANGES DOLPHIN PROBES FOR FOOD WITH ITS SNOUT

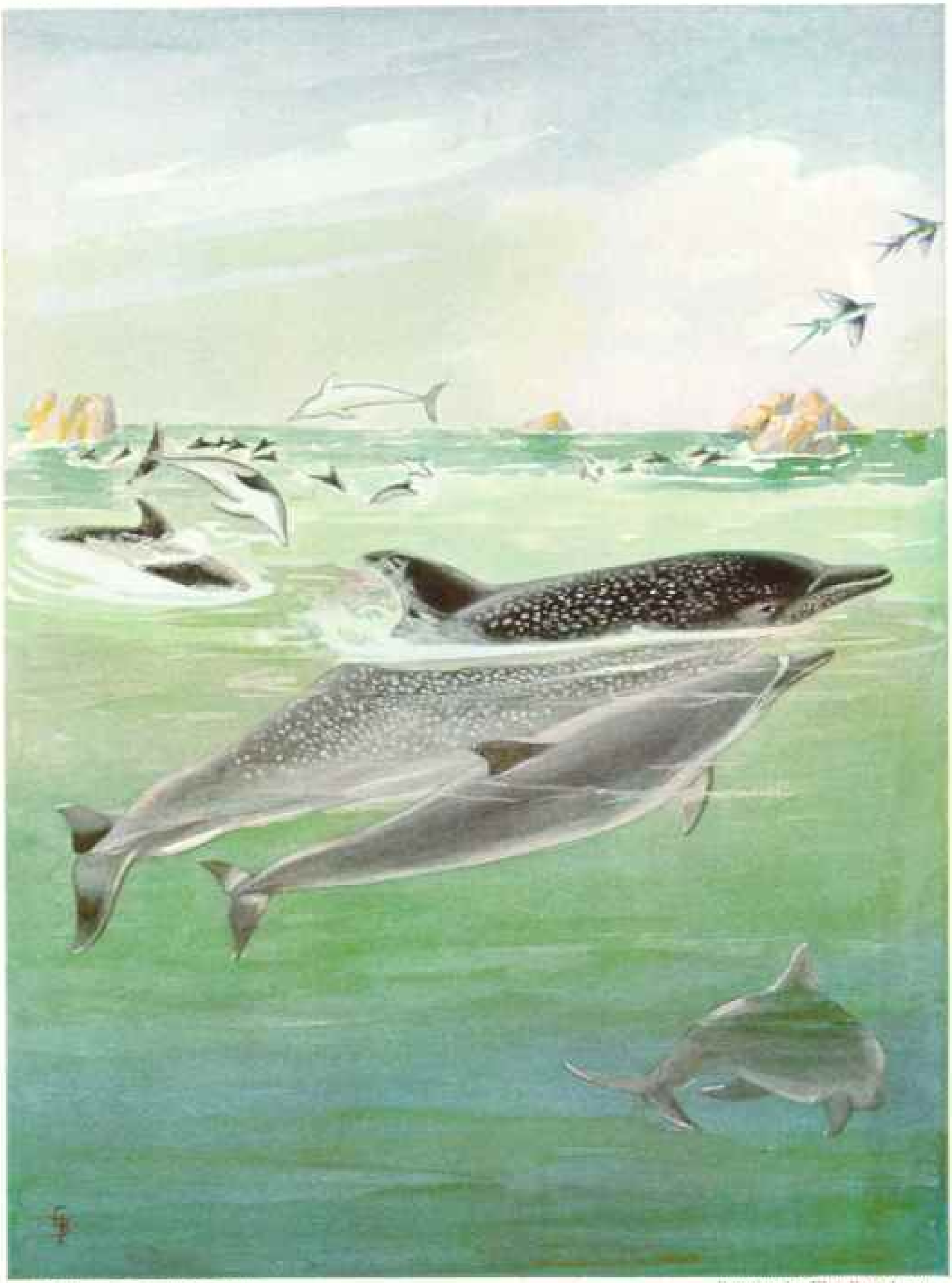
Sharp teeth line the beak, used to dig out fish in the bottom mud. The **Ganges River Dolphin** never goes to sea, but stays the year round in the rivers of northern India.



 Paintings by Else Bostelmann

THE IRRAWADDY PORPOISE TRAVELS 900 MILES UP ITS NAMESAKE STREAM

It is native to the southern Asiatic coast. The **Irrawaddy River Porpoise** has the strange habit of squirting water from its mouth, and likes to roll over and over on sand bars in shallow water.



Painting by Else Bostelmann

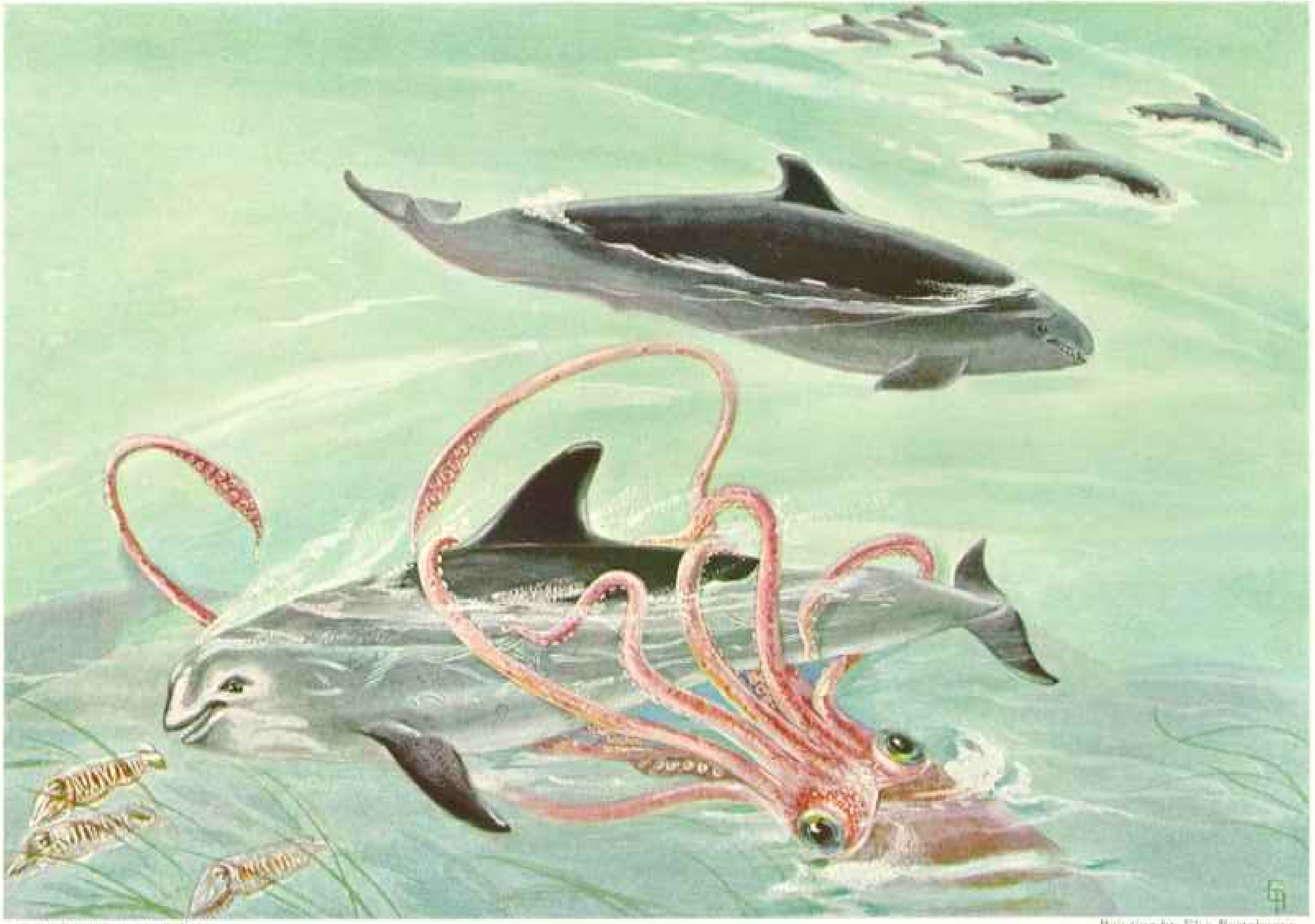
SWIMMING AHEAD OF SHIPS IS SPORT FOR THE LONG-SNOUTED DOLPHIN

Stationing themselves just in front of a vessel, **Long-snouted Dolphins** seem to ride the bow wave as if they were guiding the ship on its course. The calf, a uniform gray color, swims close to its white-spotted mother. These dolphins can swim at a speed of 12 to 15 knots. They play about ships for long periods, easily keeping up with them on the surface, rolling and jumping out of water. In the distance **Bottlenose Dolphins** are leaping (Plate XVII).

Painting by Else Bostelmann

GRACEFUL COMMON DOLPHINS, OMENS OF GOOD LUCK TO SAILORS, SHARE A SEAFOOD MEAL WITH A HARBOR PORPOISE

Passengers on ocean liners often see schools of the **Common Dolphin** sporting in the sea. This animal is so fast that it can capture flying fish. The **Harbor Porpoise,** lower right, stays close to shore. It is found in the North Atlantic Ocean, Baltic and Black Seas.



Painting by Else Bostelmann

A GIANT SQUID FIGHTS A BATTLE-SCARRED RISSO'S DOLPHIN, WHILE A SCHOOL OF FALSE KILLER WHALES SWIMS PAST

ASIATIC COASTAL WATERS ARE THE HAUNTS OF A FINLESS PORPOISE

A low ridge replaces the dorsal fin. Some Asiatic religious sects, forbidden to eat meat, class the **Black Finless Porpoise** as a "fish" and thus get a change of diet.

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COMMERSON'S DOLPHINS FROLIC IN THE STORMY STRAIT OF MAGELLAN

Hundreds of the animals often play about ships passing through these waters, the white areas of their bodies flashing like mirrors in the sun. The coloring of **Commerson's Dolphins** probably helps them escape killer whales prowling among ice floes (Plate XIII).

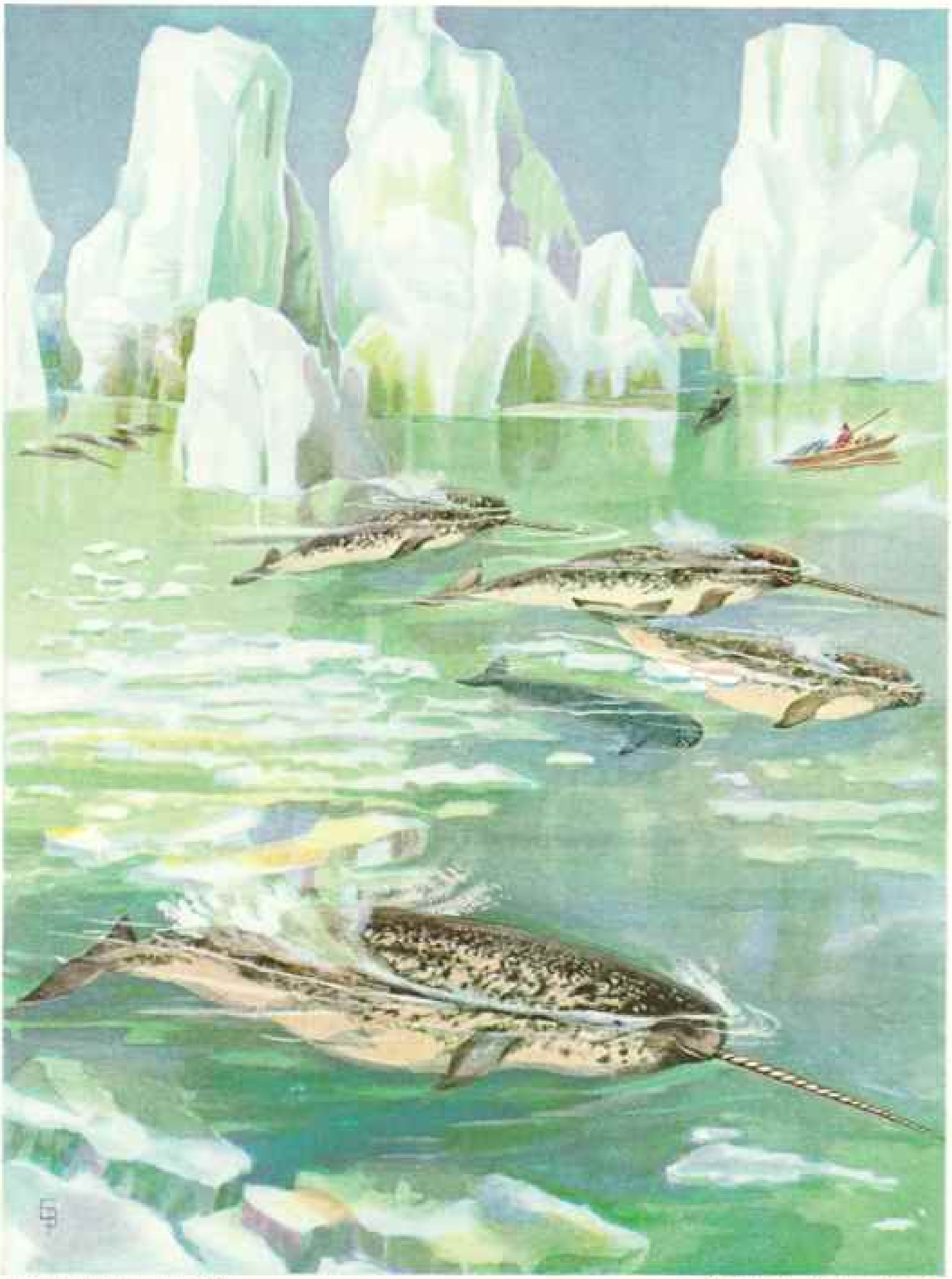
WHITE FLAG DOLPHINS ARE FOUND ONLY IN TUNG TING LAKE, CHINA

This body of water, about 600 miles up the Yangtze River, is their sole habitat. The dorsal fin of the **White Flag Dolphin** is supposed to resemble a flag when seen above the water.

 Paintings by Else Bostelmann

EQUALLY AT HOME IN SALT OR FRESH WATER IS THE GUIANA RIVER DOLPHIN

It lives off the coasts of Surinam, British and French Guiana, and travels up the streams of these three colonies. Relatives of the **Guiana River Dolphin** have been seen swimming in flooded forests more than 1,000 river miles from the sea. Crocodiles submerge when they appear.



© National Geographic Society Painting by Else Bostelmann.

NARWHAL TUSKS ONCE WERE TRADED AS HORNS OF THE MYTHICAL UNICORN

As such, they were highly prized in medieval times for supposed medicinal qualities. The tusk of the **Narwhal,** which may reach a length of nine feet, is hollow and too brittle to use as a weapon. It grows only on males, and is spiraled clockwise. This school, accompanied by a grayish calf, is being hunted by Eskimos in kayaks among Arctic icebergs.

La Plata Dolphin

(Stenodelphis blainvilli)

Among the lesser-known kinds of dolphins that are found solely in the Southern Hemisphere, the La Plata Dolphin is recognized as being the most specialized, not only in its skeletal construction but in its outward form (Plate XV). It seems to prefer the estuaries of fresh-water rivers, but appears occasionally in coastal waters on the Atlantic side of South America.

The record length and weight for a female are respectively 68 inches and 88 pounds; full-grown males are at least 6 inches shorter and weigh approximately 70 pounds. Their dull coloration, small size, and unobtrusive habits tend to render them quite inconspicuous and protect them from the attacks of some of their more cannibalistic relatives. They travel, feed, and breed in small schools. The newborn young are surprisingly small, measuring about 18 inches in length and weighing 15 pounds.

La Plata Dolphins delight in coming alongside fishing boats and thus are readily captured by fishermen. They rarely are seen in the Plata estuary during the winter. Perhaps at this season most of the schools migrate northward along the Brazilian coast or frequent the high seas in approximately the same latitude.

Their teeth, quite long, slender as toothpicks, and sharply pointed, are marvelously adapted for catching and holding soft-bodied prey. The food of this dolphin consists chiefly of the silvery mullet which swim in shoals and certain croakerlike fish which are noted for their ability to make a drumming noise.

Amazon River Dolphin, or Bouto

(Inia geoffrensis)

Geological ages ago, as shown by fossils, the family Iniidae, to which this river-dwelling dolphin belongs, was widely distributed in the waters of the world, but today there are only two survivors, the White Flag Dolphin in Tung Ting Lake, China (Plate XXIII), and the Bouto in South America (Plate XV).

All reports indicate that these dolphins are numerous in the Amazon River, from the long reach where the Tocantins empties into it, to and including most of its principal tributaries. The Boutos travel upstream at least to Nauta, Peru, on the Marañón, and follow some of the latter's smaller tributaries to lakes at the foot of the Cordilleras.

In Bolivia they inhabit the rivers that drain the immense Plains of Mojos and empty into the Guaporé and Mamoré Rivers, several hundred miles upstream from the falls on the Madeira. They ascend the Purús at least as far as Hyutanahan, penetrate far upstream in the Negro and the Branco, and enter some of the smaller tributaries of these rivers.

They have been seen in the Tacutú River, which forms part of the boundary between British Guiana and Brazil. On the Venezuela border, the Casiquiare River connects the Negro with the Orinoco, and through this channel the Bouto makes its way from the Amazon to the Orinoco.

The Boutos in the large rivers generally have pale-bluish, bluish-gray, or even flesh-colored upper parts, but those that wander into the larger lakes during the season of heavy rains are often blackish. The underparts are paler, usually whitish but sometimes pinkish.

Full-grown males attain a length in excess of nine feet. The slender and almost cylindrical beak is curved slightly downward. The Bouto comes to the surface to breathe more frequently than the oceanic dolphins. It feeds on fresh-water fish, including those that are habitually found on river bottoms.

White-beaked Dolphin

(Lagenorhynchus albirostris)

One of the most abundant of all the North Atlantic toothed whales is the White-beaked Dolphin, which seems to prefer the colder northern waters from southern Greenland as far north as Sukkertoppen, on Davis Strait, and the Tromsö coast of Norway (Plate XVI). Schools are present in the North Sea throughout the year. On the American side of the Atlantic they are rarely seen south of Labrador.

The White-beaked Dolphin may be recognized at once by its white beak, about two inches long, separated from the sloping forehead by the usual cross groove. The dark color of the upper parts usually extends downward to the base of the blackish upper surface of the rather broad flippers. Old adults rarely exceed 10 feet in length.

This dolphin is protected from the cold of the northern waters by a thick coating of blubber. Vast schools of as many as 1,500 or more are often seen. Stomachs of these animals have been found packed with the undigested bones of whiting, claws of hermit crabs, and horny parts of the common whelk, a mollusk used in dyeing purple. They also feed on capelin, cod, squids, and crustaceans.

White-sided Dolphin

(Lagenorhynchus acutus)

Both summer and winter, schools of White-sided Dolphins roam about in the North Atlantic Ocean, from southern Greenland and the North Sea as far north as the Arctic Circle on the coast of Norway, and south to the British Isles, the Netherlands, and Cape Cod, Massachusetts (Plate XVI).

This dolphin is readily recognized by the lighter area on each side of the body below the dorsal fin, and by the conspicuous elongated yellowish-brown and grayish lateral streaks above the white underparts. Its beak is about

Photograph by B. Anthony Stewart

HIS SLOGAN—"A DEAD WHALE OR A STOVE BOAT"

Portraying the spirit of the whalers of a century ago, this monument at New Bedford, Massachusetts, shows the harpooner about to plunge his iron into a whale. The line is passed through a slot in the bow, ready to pay out when the quarry dives after being struck. A stove boat was a not-infrequent occurrence, for the small craft sometimes was crushed in the jaws of a maddened Sperm or smashed by its lashing flukes (page 64, and Plate I).

two inches long, always black, and separated from the sloping forehead by a cross groove. This dolphin grows to nine feet, the males being slightly larger than the females. Schools numbering more than a thousand have been observed in the North Sea.

Close of kin to these North Atlantic types are half a dozen or so kinds of short-beaked dolphins that frequent the southern and circumpolar seas. The North Pacific striped dolphin *(L. obliquidens)* has been known to visit Monterey Bay and Puget Sound, but seems to be most numerous along the coasts of Japan.

Bottlenose Dolphin

(Tursiops truncatus)

Despite the similarity in names, the Bottlenose Dolphin is unlike the Bottlenose Beaked Whale either in general appearance or in size (Plate XVII). These dolphins are common in the North Atlantic and are found in the North and Baltic Seas, the Bay of Biscay, the Mediterranean and Black Seas.

They are the most numerous of all dolphins along the Atlantic coast of the United States, ranging according to season from Maine to Florida and Barbados, and along the Gulf coast.

Other species closely allied to this dolphin live in the North Pacific Ocean, the Australian seas, where they are known as "Cowfish," the Indian Ocean, the Red Sea, the coastal waters of South Africa, and along the coasts of Argentina and Brazil.

Stranded Bottlenose Dolphins may be recognized by the purplish lead-gray upper parts, the short beak, seldom more than three inches long, the lower jaw slightly longer than the upper, and 20 to 26 teeth on each side in each jaw. Adults attain a length of 11 or 12 feet.

Large schools numbering several hundreds, scattered over the ocean for half a mile or so, have been seen near the Galápagos Islands. Spectacular leaps are often made by members of a school as it passes near a ship. On coming to the surface, the dolphin cuts the water cleanly and may rise twice its own length above the surface before plunging nose first or falling on its back or side.

Fishermen say that the very young calf swims a little ahead of its mother and that it is pushed to the surface each time she rises to breathe. Along the Hatteras coast, Bottlenose Dolphins feed on squeteague, or weakfish, and elsewhere on various shoal fish.

Ganges River Dolphin, or Susu

(Platanista gangetica)

The distinguishing features of this dolphin are the long, slender, compressed beak with its formidable array of teeth, wedge-shaped forehead, small, degenerate, lenseless eyes, longitudinal slitlike blowhole, distinctly constricted neck, low, ridgelike dorsal fin, and broad flippers cut off squarely at their ends (Plate XVIII).

The inoffensive Susu may remain at the bottom of a river probing about in the mud for two minutes. Being almost blind, it must be guided to its food by the sense of touch in its long snout.

Irrawaddy River Porpoise

(Orcella brevirostris)

This beakless porpoise is an inhabitant of the warmer Asiatic coastal waters (Plate XVIII). Its geographic range extends from the mouths of the Ganges through the Strait of Malacca to Borneo on the China Sea and northward into the Gulf of Siam. Schools travel up the Irrawaddy River more than 900 miles from salt water.

In India the oil from the blubber is rubbed on externally as a remedy for rheumatism. Burmese fishermen along the Irrawaddy River believe that this porpoise purposely leads fish into their nets.

The Irrawaddy Porpoise is slate blue above and lighter below. Males reach a length of at least 7½ feet. There is a rounded forehead that curves regularly from the upper lip to the blowhole, moderately long and broad triangular flippers, and the dorsal fin is located behind the middle of the animal's length, with a low dorsal ridge back of it.

This porpoise rises to breathe at intervals varying from 70 to 150 seconds, emitting each time a short blowing noise. It has a habit of squirting water from its mouth, generally straight ahead, but sometimes upward.

Long-snouted Dolphin

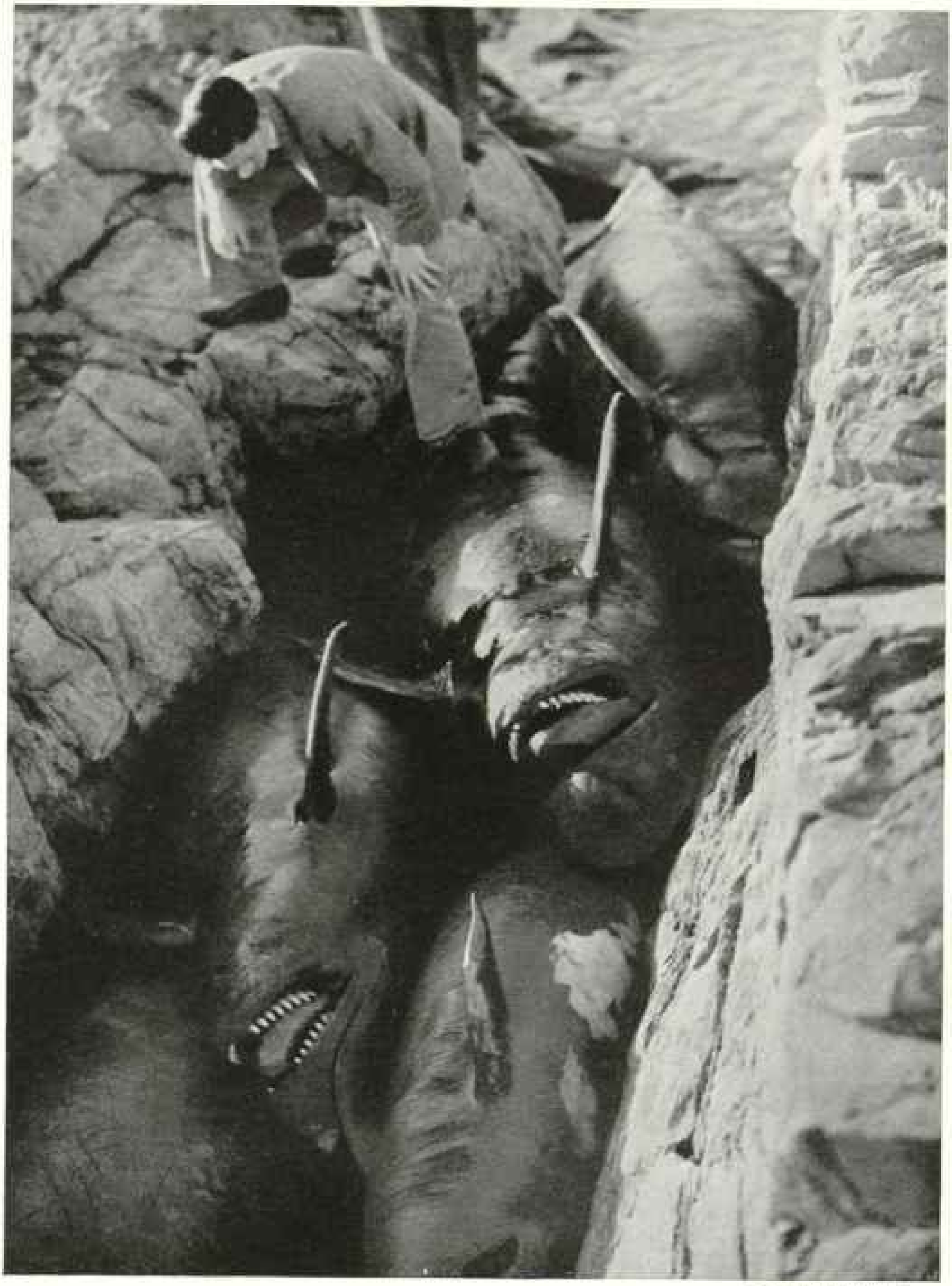
(Stenella plagiodon)

Schools of Long-snouted Dolphins are often seen by passengers on the coastwise steamships that pass within sight of the Diamond Shoal Lightship near Hatteras, North Carolina (Plate XIX). From a distance these dolphins appear very dark, almost black, above and paler beneath. At closer range the white spots on the purplish-gray upper parts are conspicuous, and as the dolphin rolls at the surface the

Photograph by Maynard Owen Williams

HORN OF THE "SEA UNICORN"

This tusk is about eight feet long and was taken from a Narwhal killed by Eskimos in a fjord near Godthaab, Greenland (Plate XXIV).



© Leon Daniel from Fix

TRAPPED BY FALLING TIDE, A HERD OF WHALES MEETS DEATH ASHORE

Part of a school of more than 200, these False Killer Whales (Plate XXI) were cut off from the sea by sandy shoals when the tide went out near Mamre, South Africa, on November 19, 1935. Stranded on their backs in rocky crevices, they could not breathe through their blowholes, and died of suffocation and exhaustion from their struggles. They are smaller relatives of the true Killer Whale (Plate XIII). Sharp teeth line both upper and lower jaws.

lighter flanks speckled with white or gray spots may be clearly seen. This dolphin and all of its close kin have a relatively long beak.

Long-snouted Dolphins do not grow much longer than 7 feet and weigh around 280 pounds. The small gray calf swims alongside its mother invariably between the fore flipper and the caudal flukes, both rising and sinking in unison. A sucking fish, the remora, adhering to the fore flipper or to the side of the tail of one of the dolphins, at times has been mistaken for the calf. This has given rise to the erroneous belief that the calf grasps the fore flipper or the caudal flukes of the mother and thus is towed along.

Like most of its relatives, this dolphin feeds on fish. It swims with so little apparent effort and at such speed that the human eye can barely follow the animal's beak as it snaps up its prey. Great schools of another related spotted dolphin (*Stenella graffmani*) are frequently seen in the Pacific Ocean in coastal waters northward at least to Acapulco, Guerrero, Mexico, and southward to Gorgona Island, off Colombia.

Common Dolphin

(Delphinus delphis)

This handsome ring-eyed dolphin frequents the high seas, but is found in much larger numbers in warm or temperate than in colder waters (Plate XX). Nevertheless, it follows the Gulf Stream as far north as the bleak coasts of Finnmark, Norway. Common Dolphins are especially abundant in the waters about Gibraltar, the Mediterranean, and Black Sea. A similar type is found in the Pacific and Indian Oceans.

Since the days of the Phoenician mariners, the appearance of dolphins alongside a ship has been regarded by sailors as an omen of good fortune, fair weather, and steady winds.

The Common Dolphin grows to a length of 8 feet 6 inches, and has a tapering beak about 6 inches long which is sharply marked off by a deep V-shaped groove from the low sloping forehead. It may be recognized by the saddlelike expansion of the dark upper parts about midway to the flukes. After the dolphins have overtaken a ship and are racing alongside toward the bows, the distinctive arrangement of the colored stripes on the flanks can be seen at the time they make curving leaps clear of the surface and enter the water headfirst with hardly a splash.

The Common Dolphin usually travels in schools and is in the habit of accompanying ships for considerable distances, hovering alongside and executing intricate maneuvers. It can pass ships traveling at 15 or 18 knots (pages 39 and 87).

The teeth of both jaws interlock perfectly, and, being sharply pointed and curved backward, are very effective for catching and holding slippery fish. These dolphins take their food whole and swallow it head first.

Harbor Porpoise

(Phocaena phocoena)

Harbor, or Common Porpoises, as they are often called, are found in the North Atlantic Ocean as far north as Iceland and Davis Strait and in the White Sea (Plate XX). They are abundant in the Baltic Sea, around the British Isles, and range south to the Strait of Gibraltar and Cape May, New Jersey.

Similarly, a related porpoise (*P. vomerina*) ranges along the Pacific coast of North America from the Pribilof Islands in Bering Sea southward to Banderas Bay, Mexico. Several kinds of porpoises, probably not all distinct, have been described from the coastal waters of Argentina, Chile, and South Africa.

Four to six feet is the usual length of the Harbor Porpoise. It has a blunt, rounded snout, but no distinct beak, and is readily distinguished from all other small cetaceans by having teeth with peculiar spadelike crowns.

Harbor Porpoises usually travel along the coasts in schools numbering from a few to 50 or even 100, and rarely are seen very far offshore. This porpoise usually swims just below the surface and rises to breathe about four times a minute. The breath is expelled from the lungs with a low puffing or hissing noise as the snout and top of the head break the surface.

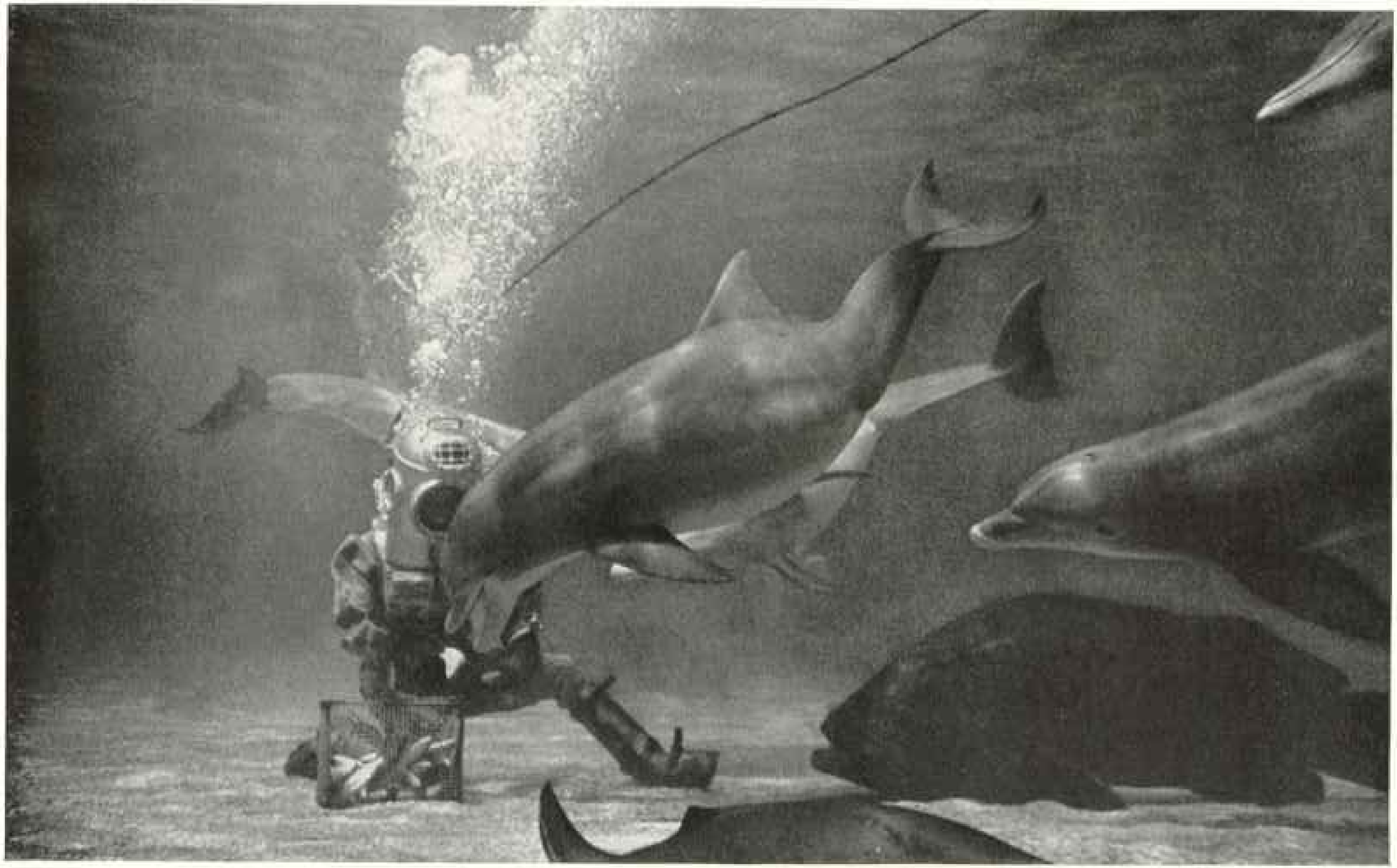
The calf at birth measures from 30 to 34 inches, and is suckled by the mother while she floats or swims slowly partly on her side. The Harbor Porpoise feeds according to season on herring, pilchard, mackerel, whiting, rock cod, small salmon, and eels, as well as on squids and occasionally crustaceans.

Risso's Dolphin

(Grampidelphis griseus)

Risso's Dolphin is widely distributed (Plate XXI). It has been seen near the Cape of Good Hope, New Zealand, South Australia, the Netherlands Indies, in the China Sea, along the coast of Japan, and at Monterey, California. It is numerous in the Mediterranean as far east as the Adriatic, and ranges from the Azores northward along the coasts of Europe to the Shetland Islands in the North Sea and the Swedish coast in the Baltic Sea. A few have been taken at Cape Cod, Massachusetts, and on the coast of New Jersey.

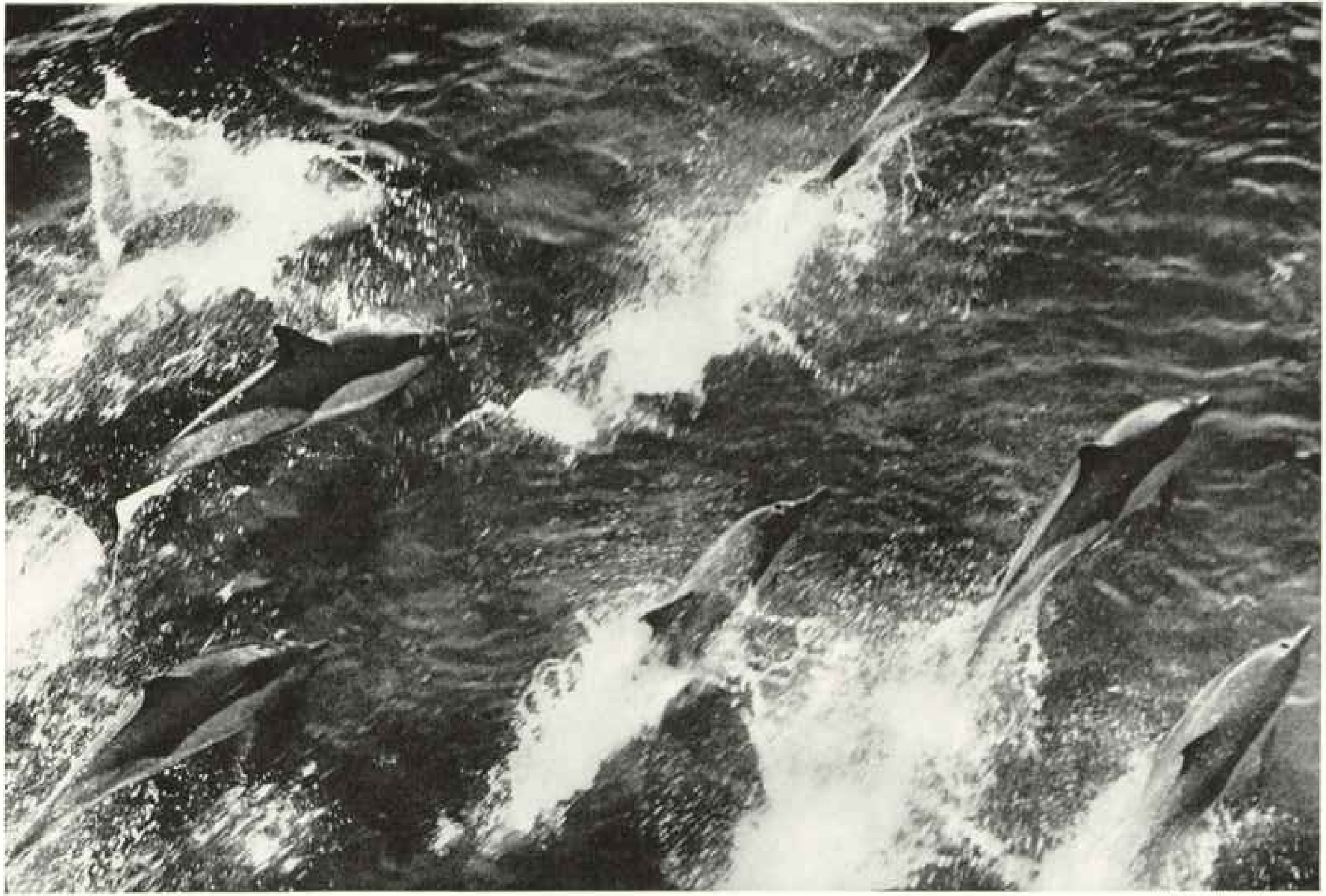
One of these dolphins, "Pelorus Jack," became so well known from its habit of playing about the bows of passing vessels at the entrance to Pelorus Sound in New Zealand that it was given protection for its natural life by an Order-in-Council. This dolphin accompanied vessels for about 32 years and was last seen in 1912. Risso's Dolphin is frequently called "grampus," owing to a confusion of



Photograph by B. Anthony Stewart

FRIENDLY BOTTLENOSE DOLPHINS "EAT OUT OF THE HAND" OF A DIVER IN THE TANK AT MARINELAND, FLORIDA

The animals snap up and swallow mullet which are given to them from the basket (Plate XVII and pages 71 and 90). The diver keeps one eye on the dangerous sting ray just visible in the foreground. The big jewfish on the bottom at right is blind and must be fed by hand.



Photograph by Acme

LEAPING IN UNISON LIKE WELL-DRILLED TROOPS, COMMON DOLPHINS FROLIC BEFORE A LINER IN THE INDIAN OCEAN

© C. Anders & Co.

DIVING AND LEAPING TOGETHER, A DOLPHIN "FAMILY" PLAYS ABOUT A SHIP

Their sleek bodies strongly arched, the quartet begins a shallow dive with tails lifted and heads almost entirely submerged. The dolphin on the left is half grown, and the second one is a calf still young enough to nurse, yet able to keep up with the adults. There was an old belief that the souls of dead sailors entered dolphins, and that the bodies of drowned men were carried ashore on their backs.

names in the early part of the past century.

It differs from all other dolphins in that the few teeth it possesses are, as a rule, restricted to the front end of the lower jaws. Two to seven pairs of teeth, often worn down to the gums, may be present. It has a bluntly rounded head, and moderately long and narrow flippers. The maximum length of adults is 12 or 13 feet.

When this dolphin is breathing at the surface, the slender recurved dorsal fin at once betrays its identity. Males are mainly bluish white with dark-brown patches and females a uniform brown.

The whitish streaks and blotches often seen on the bodies of these dolphins probably are scars made by the circular suckers, armed with claws, on the arms of the giant squid.

False Killer Whale

(Pseudorca crassidens)

With the possible exception of the polar seas, False Killer Whales wander in all oceans, in schools of hundreds of individuals (Plate XXI). The sporadic appearance in inshore waters during the past 30 years of large schools of False Killer Whales, a species that hitherto had been regarded as rare, is perhaps the most extraordinary happening in the entire history of cetology. It is believed that some of these invasions have coincided with the flooding shoreward of warm ocean currents, which influenced the distribution of fish and other sea life on which the whales feed. Hundreds of individuals have been stranded when schools of False Killers invaded shoal water and were trapped by the falling tide (page 84).

The False Killer may be distinguished by its flattened head, bluntly rounded snout, and absence of any vestige of a beak. It has slender, tapering flippers, 8 to 12 rather strong teeth on each side in each jaw, and a low recurved dorsal fin. Occasionally the uniform black color of the body is broken up by a number of light-colored, star-shaped scars. The largest individuals rarely exceed 18 feet in length, and weigh 1½ tons.

Black Finless Porpoise

(Neomeris phocaenoides)

This porpoise is a native of Asiatic coastal waters from western India to Sarawak, Borneo, southern Japan and Korea (Chosen). It prefers warmer inshore waters but ascends freshwater rivers, and travels up the Yangtze for at least 1,000 miles to the Ichang Gorge in Hupeh Province (Plate XXII).

Full-grown males are a little over five feet long. The color of this pink-eyed porpoise in life is leaden black on the upper parts and lighter beneath. Pale-gray areas, and sometimes even purplish-red patches, are present on the throat and lips. Unlike all of its close relatives, this porpoise lacks the usual type of dorsal fin, which is replaced on the third quarter of the body length by a fairly prominent compressed dorsal ridge. The forehead rises abruptly from the tip of the upper jaw.

When feeding in coastal waters, the Black Finless Porpoise lives chiefly on prawns, cuttlefish, and squids.

Commerson's Dolphin

(Cephalorhynchus commersonii)

This dolphin was discovered off the coast of Tierra del Fuego and in the Strait of Magellan, and its range extends in the South Atlantic Ocean from the latitude of Bahia Blanca, Argentina, to the boisterous seas beyond the latitude of Cape Horn (Plate XXII). There are a number of dolphins close of kin but markedly different in color pattern in the southern seas.

Aside from its distinctive color pattern, this dolphin is distinguished from its first cousins by the short beak which is not sharply marked off from the receding forehead, 29 to 30 teeth on each side in each jaw, the low rounded dorsal fin, and the more or less rounded ends of the flippers. It rarely exceeds 4 feet 6 inches in length.

The food of this dolphin consists mainly of squids supplemented by the small shrimplike crustaceans that swarm at the surface of southern oceans during the summer months.

White Flag Dolphin

(Lipotes vexillifer)

Although a member of the once widely distributed family that includes the Amazon River Dolphin, or Bouto (Plate XV), the Chinese White Flag Dolphin today is restricted to the fresh-water Tung Ting Lake in Hunan Province, China, some 600 miles up the Yangtze River (Plate XXIII).

Fishermen seem reluctant to capture this dolphin, chiefly because of their belief that it is a descendant of a princess who flung herself into the lake. If one of the animals is accidentally killed, however, the Chinese will utilize it. They use the blubber to treat colds and other ailments, both externally and internally.

The White Flag Dolphin grows to 7 feet 6 inches and weighs about 300 pounds. It is gray or bluish gray on the upper parts and white on the underparts. The beak is curved upward and is fully a foot in length.

The animal feeds on fish which it finds in the mud on the bottom of the lake. But for its beak, peculiarly adapted for probing about in the mud, the creature might experience some difficulty in finding food, since it is blind or nearly so.

Guiana River Dolphin

(Sotalia guianensis)

This dolphin inhabits the coastal waters as well as the streams of Surinam, British and

Photograph by Willard R. Culver

AN EXUBERANT DOLPHIN SEEMS TO JUMP FOR JOY

This Bottlenose is sporting near a ship off the Rhode Island shore. The animals may leap as much as twice their own length above the surface, and in captivity have been known to turn somersaults. This dolphin is one of the types frequently seen along the Atlantic coast (Plate XVII).

French Guiana (Plate XXIII). About a dozen species of *Sotalia* inhabit the tropical coastal waters or rivers of South America, Africa, India, and the lands bordering the China Sea.

Two of the three species native to the Amazon often are found in its smaller tributaries, 1,500 or more miles upstream from the sea. When the German scientist, Alexander von Humboldt, was traveling by boat along the Rio Temi to Yavita on the Venezuela-Colombia frontier, his Indian boatmen usually followed open leads through the inundated forest. In the thickest part of the forest where the depth of the water was not more than half a fathom, Humboldt was astonished to see a school of these fresh-water dolphins suddenly appear around his boat.

The Guiana River Dolphin differs from others in having a slimmish body, a relatively large dorsal fin, and a peculiarly shaped slender beak. It is usually about five feet long. The dull lead-colored or brownish upper parts blend on the lower third of the sides with the pinkish or violet-gray underparts.

Narwhal

(Monodon monoceros)

Narwhals are inhabitants of Arctic seas and under favorable open-water conditions wander along the Arctic coasts of the Old and New Worlds (Plate XXIV).

The male Narwhal differs from all other whales and porpoises in having the left upper jaw armed with a clockwise spirally twisted tusk, which occasionally measures more than nine feet (page 83). The Narwhal never has been known to use its tusk as a weapon. The tusks were first taken to Europe as articles of trade by Norsemen from Iceland and Greenland.

Narwhals generally migrate in large herds. In the spring when the ice is rotten and cracked, they frequent the openings, apparently to escape being attacked by Killer Whales.

The calves, which are gray, and five feet in length at birth, remain with the mother for a long time. The shrill whistle made by the Narwhal just as it bobs up out of the water may result from forcing the respiratory blast through the water. The deep roar or short low-pitched blast sometimes heard may be made by the nostrils of a mother calling to her calf.

Cuttlefish, skate, turbot, rock cod, salmon trout, sea scorpions, and shrimps have been found in Narwhal stomachs, and small halibut and flounders are among their favorite foods. Fish are crushed between the jaws and swallowed without mastication, since there are no functional teeth.

SOUTHAMPTON—GATEWAY TO LONDON

The Port of Double Tides Where the "Mayflower" Moored is Rich in Sea History and Lore of Early England

By Stanley Toogood

TWO millions of travelers Southampton—my home since I was a year old—is merely a place where boat trains meet the liners. Every time I come back to it by sea, I realize why transients feel that this city is only a gateway to London.

Cranes, dock sheds, customhouses, freight boats, tugs, lighters, and a thicket of spars and funnels monopolize one's first impressions. Tall buildings distract attention from the seafaring interest of New York, but Southampton's skyline appears dedicated to shipping, with ocean liners as its skyscrapers (page 97).

In peacetime, when a big vessel approached the port diminutive tugs raced for it like a brood of hungry ducklings; optimistically they pushed and pulled the massive hulk, none apparently caring what the others were doing; yet in an incredibly short time their giant charge was securely berthed.

MINES AND HUGE NET GUARD HARBOR

Today, in wartime, the festive air is missing. When a liner nears port, two pilots come aboard. One is the customary harbor pilot, the other a naval officer. Together they zigzag the ship through an extensive mine field, gradually working their way to a huge, submerged net which protects the harbor entrance from marauding submarines. Two tugs swing open the gateway of the net, and close it again as soon as the ship has passed through.

Convoys of merchant ships now assemble here before crossing the Atlantic, and other fleets of freighters arrive from overseas under armed escort. Naval vessels hover near, antiaircraft batteries are ever on the alert, and planes soar overhead, all closely guarding this great ocean terminal, to which come supplies from all corners of the earth to furnish England with the sinews of war.

From a towering boat deck one sees a medley of flags, but only by strolling through the docks can one get the cosmopolitan effect. Brazil Road and Java Road lead to wharves where bananas, millions of them, bring the ripe atmosphere of the West Indies; farther along, the smells of oranges and olive oil and onions unite in an aroma that could only be Spanish. Within the boundary of dockland, the United States, Australia, New Zealand, South Africa, India, and continental European ports meet around mighty consignments of citrus fruits, wool, meat, grain, butter, hides, tomatoes, and wines.

Southampton's commercial traffic dates far back, the early trade having been chiefly in wool and wine. During the fourteenth century a tax of a penny a pound was payable on all woolen goods passing through the port. These were weighed at the Wool House, which stands alongside the Old Quay. During the Napoleonic Wars, when the wool trade diminished, prisoners of war were confined in this building, and some of their carved names still remain on the old beams. This venerable relic is now being used as a warehouse.

Guided by a fluttering blue peter, I went over to watch a twentieth-century *Mayflower* straining impatiently at her hawsers. Simultaneously with a striking clock, her siren bellowed a thrilling farewell and powerful propellers churned the muddy water to a dazzling white.

"NO HANGING ABOUT FOR TIDES"

"She's punctual today," I remarked to a seafaring onlooker.

"Yes, there's never no hanging about for tides here," he said, with the characteristic double negative. "You have heard of the double tides, haven't you? The Isle of Wight* cuts the flood tide coming up the English Channel so that one part reaches us through the Solent and the other from Spithead. The Spithead tide takes about two hours longer to get around the island, and this makes the second high water."

This phenomenon, together with the position midway along England's southern shore and directly opposite the mouth of

* See "England's Sun Trap Isle of Wight," National Geographic Magazine, January, 1935.

SOUTHAMPTON—LONDON'S SHORT CUT TO THE SEVEN SEAS

Midway along the coast of the English Channel, but protected from its choppy waves by the Isle of Wight, lies this nerve center of British shipping, at the head of Southampton Water. Ocean liners reach its miles of docks and quays from two channels, the Solent on the west and Spithead on the east. The great harbor is the terminal for most transatlantic passenger ships and hundreds of freighters, because it is only 79 miles from London by rail but 248 miles by water.

France's important river, the Seine, has much to do with Southampton's prosperity.

In A. D. 43 Romans realized the possibilities of the locality and built a fortress, called Clausentum, to defend their capital, Venta Belgarum, which lay about twelve miles up the River Itchen. At the fall of the Roman Empire the original British peoples regained their lands, but were soon driven out by the Saxons, who settled in Venta Belgarum (now Winchester),* with Clausentum, or, as they renamed it, Hamtune (later South-ham-tune), as their serving port.

These two towns ultimately became the center of the great Kingdom of Wessex, which had considerable influence over the early prosperity of England.

Since then, Southampton's progress has been governed by many whims of fortune and war. In 938, for instance, the town was of sufficient importance to possess a royal mint. A few years later, King Canute took up permanent residence here, a fact which gives foundation to the tradition that it was on the shores of Southampton Water he rebuked the advancing tide to prove to his courtiers that he did not possess miraculous powers.†

In 1338 a combined French, Spanish, and Genoese army, arriving in a fleet of 50 galleys, sacked the town and burned the palace, but were driven out the next day by a rallied force of Southampton citizens, who thereupon strengthened the city wall. Remains of some of these galleys are still brought up by dredgers.

HERE THE "MAYFLOWER" MOORED

Only when I walked to the end of the docks did I realize their amazing size (page 109). The actual quaysides are nearly six miles long, and because these are lined with some 45 miles of railway sidings, a multitude of cranes, storage sheds of every description, and seven dry docks, the effect is remarkable.

As I watched big pipes sucking mountains of grain from a ship's hold and in a few seconds transferring them to imposing flour mills standing on land which, a few years ago, was a muddy waste, I endeavored to picture the ancient town quay against which the little *Mayflower* and *Speedwell* moored at the beginning of the Pilgrims' New World adventure.

It will be remembered, no doubt, that the little band originally started from Holland, but put into Southampton before striking across the Atlantic. They stayed in the port for about a fortnight, until, on August 15, 1620, a favorable breeze fanned them down Southampton Water.

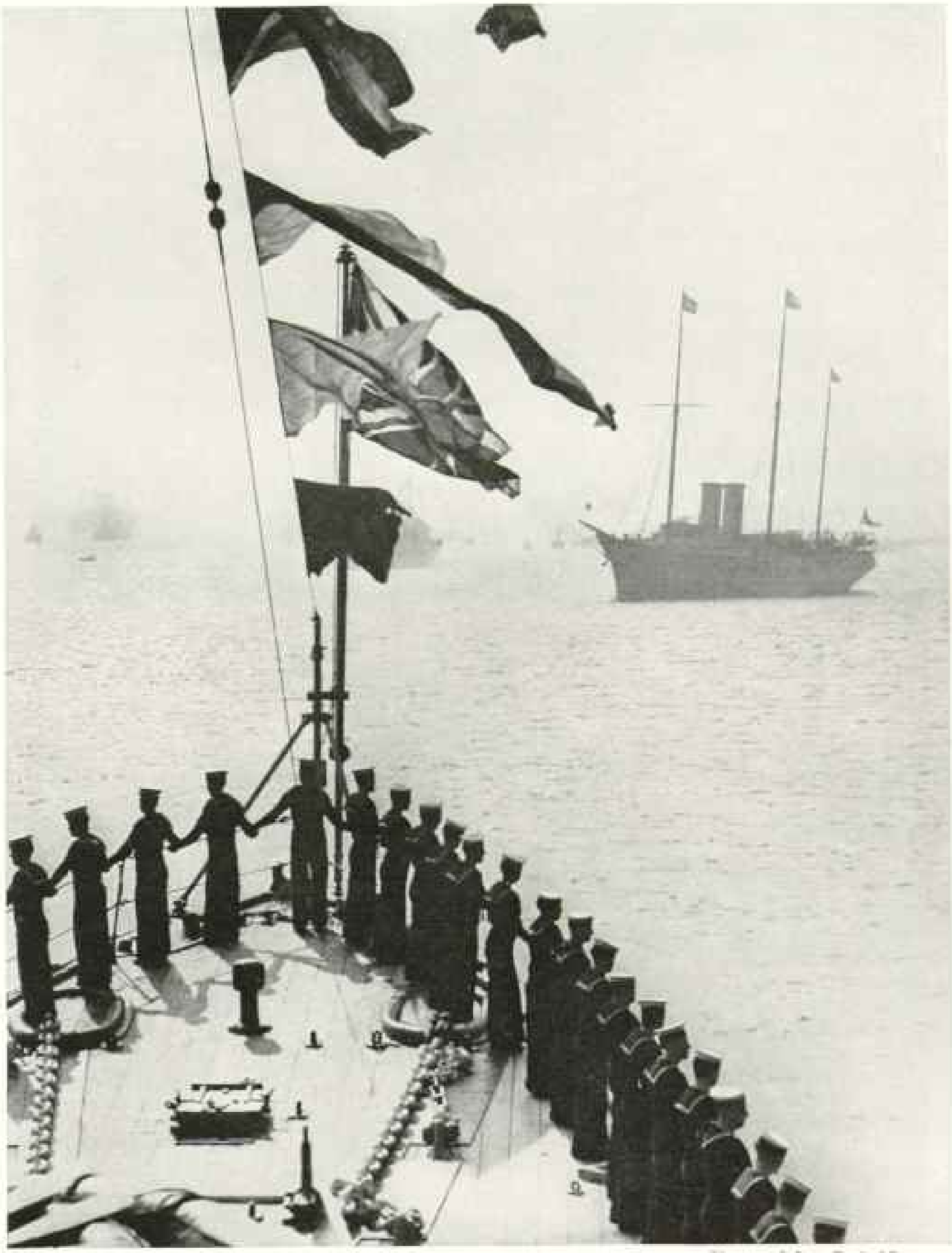
Before they left the English Channel, however, it was decided that the *Speedwell* was unfit for so long a voyage, so she was left at Plymouth and the *Mayflower* sailed alone.‡ A memorial commemorating their association with Southampton stands on the exact site of embarkation (page 95).

I walked more than half a mile around the 20-foot-thick lip of King George V graving dock without reaching my start-

* See "Cathedrals of England," 16 dry-point engravings by Norman Wilkinson, NATIONAL GEOGRAPHIC MAGAZINE, December, 1939.

† Bosham is also the reputed scene of Canute's encounter with the waves. Although both Bosham and Southampton maintain that the incident occurred at their water fronts, available facts cannot prove either to be the place. This rivalry in claiming historic locations is frequent in the British Isles, as elsewhere.

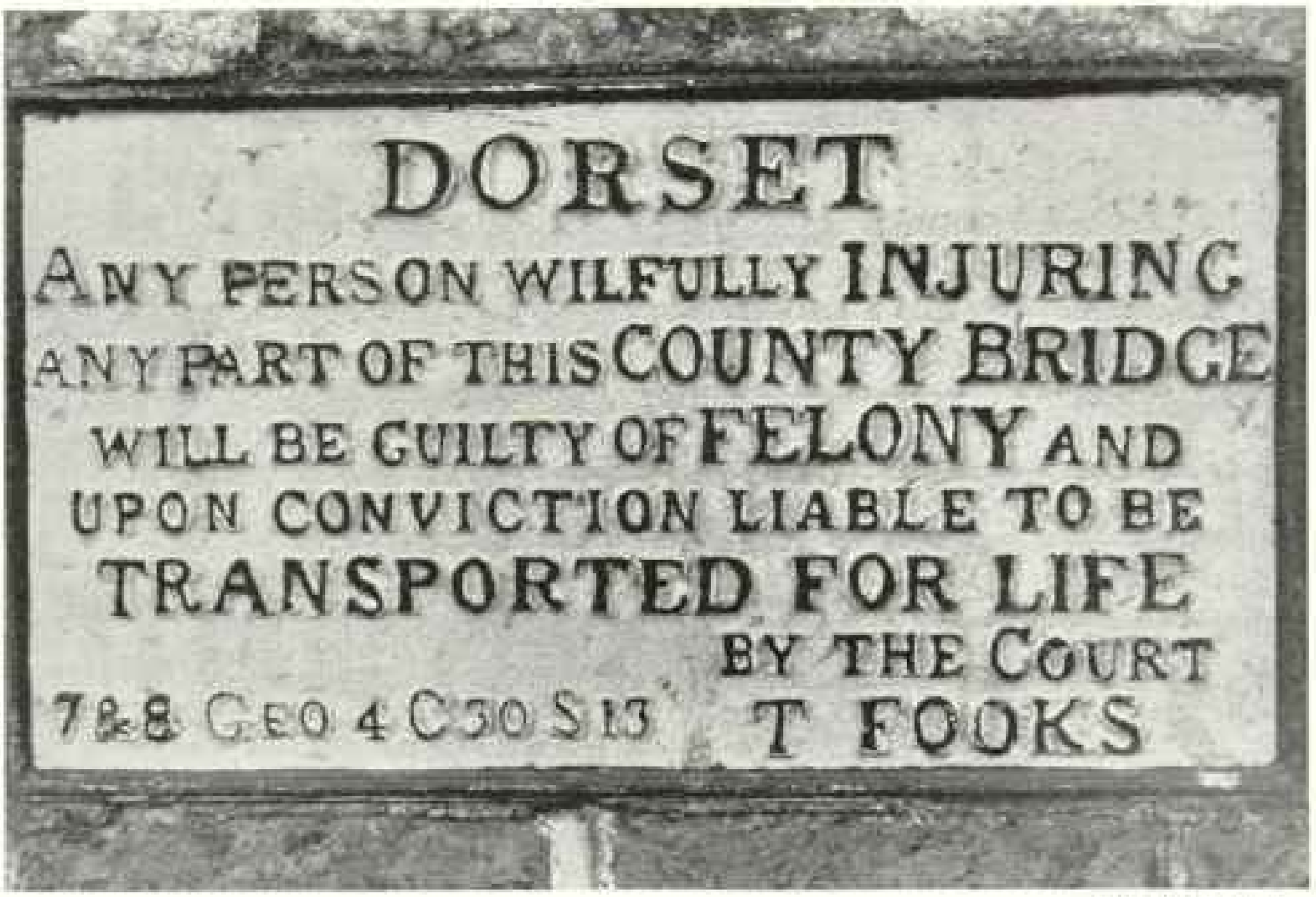
‡ "Pilgrims Still Stop at Plymouth," by Maynard Owen Williams, NATIONAL GEOGRAPHIC MAGAZINE, July, 1938.



Photograph from Topical Press

KING GEORGE VI, ABOARD THE ROYAL YACHT, REVIEWS HIS MIGHTY FLEET

Bluejackets man the rail of the cruiser *Cairo* as the royal yacht, *Victoria and Albert*, bearing His Majesty, passes by in Spithead. Manning the rail, while a salute is fired, is the highest honor a ship can bestow upon a passing vessel. Scene of many historic naval pageants, Spithead forms the eastern entrance to Southampton Water. The ships which participated here in the coronation review of 1937 now are blockading Germany, convoying merchant and troop vessels, and searching for Nazi submarines.



© Stanley Tourist

EVEN IN PEACETIME, SABOTAGE ONCE BROUGHT THREAT OF BANISHMENT

To be "transported for life" meant exile to a penal colony. The medieval warning signs still are preserved on old bridges in Dorset and Hampshire.

ing point. A pumping engineer was sitting on the edge of his canyon eating sandwiches.

"How long," I asked, "does it take to pump the dock dry?"

"Four hours," he replied. "Of course, when a liner is in we can do it a bit quicker, because there's less water to pump away."

"You must handle those pumps pretty smartly to do it in that time," I said, by way of encouragement. "That's about 15 million gallons an hour, isn't it?"

"Something like that," he answered. "But as all the pumps are controlled from one switchboard, with colored lights indicating what motors are running, there's nothing much to it. I wonder," he went on, meditatively, "if we'll ever have ships too big even for this dock."

"What about the *Queen Mary* and the *Normandie*?"

"Oh, they're nothing!" he said, tossing a crust to a scavenging sea gull sixty feet below. "A 75,000-tonner leaves us ample space. Nothing under 100,000 tons would worry us."

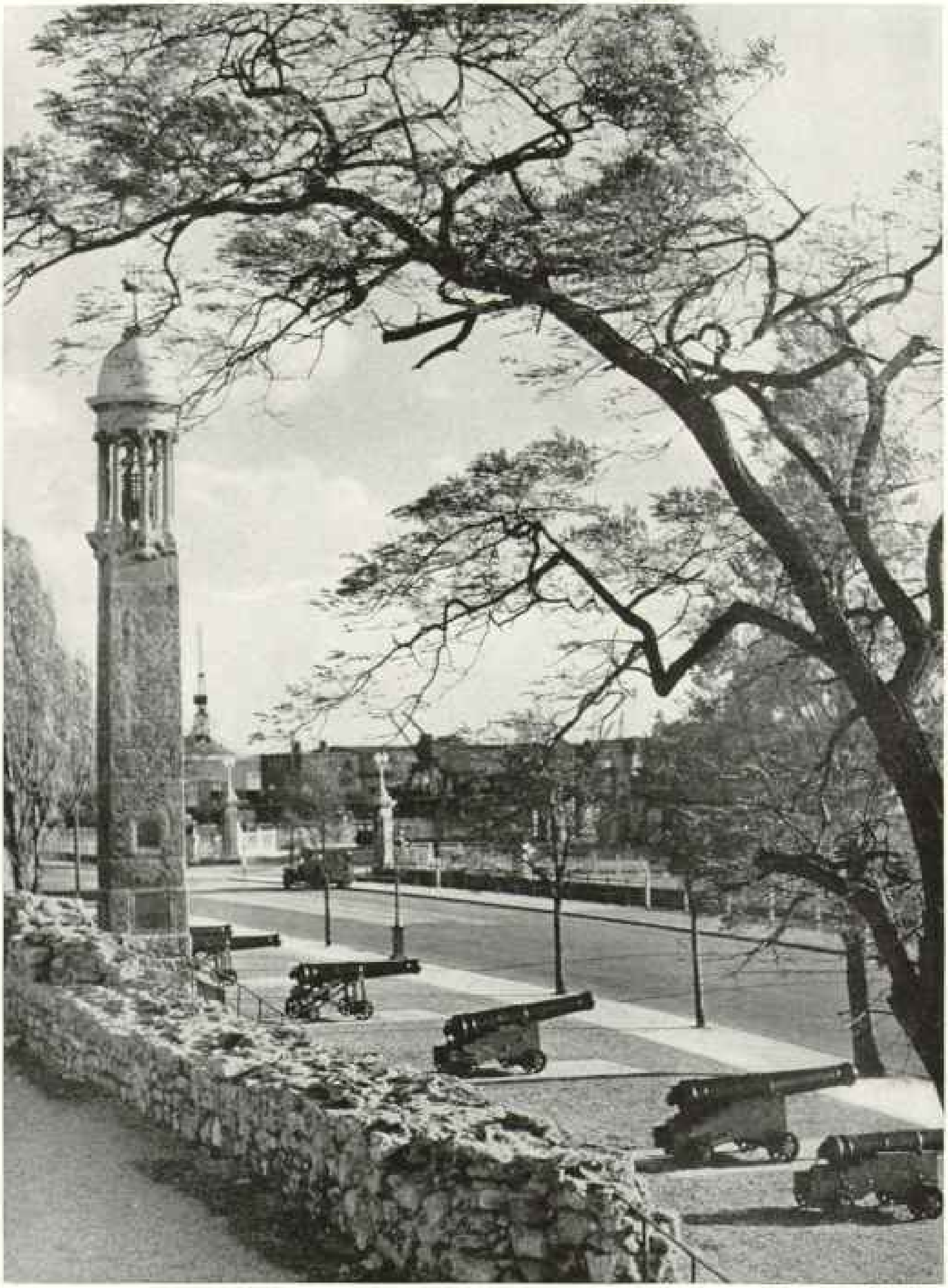
Although the biggest liners dock six or seven miles from the open sea, they have ample depth of water even at the lowest tide. Tenders, therefore, are used only with vessels such as the *Normandie* or the *Europa*, which in peacetime pause briefly for passengers and mail out in the Solent, but otherwise have no connection with Southampton.

CITY IS THE CHILD OF STEAM

Only in recent times has Britain's travel interest been focused on Southampton. Strangely, the rise of England's foreign trade during the Elizabethan period tended to bring decline to the city. The major centers of shipping then were Bristol and London, while "Westward Ho!" adventurers departed from Cornish ports.

Southampton's real prosperity dates from the time sail began to make way for steam, when the first dock was opened. In 1858 the North German Lloyd Company started regular steamship services between Southampton and America, after which, in 1890, the Empress Dock was opened especially for use of Atlantic traffic.

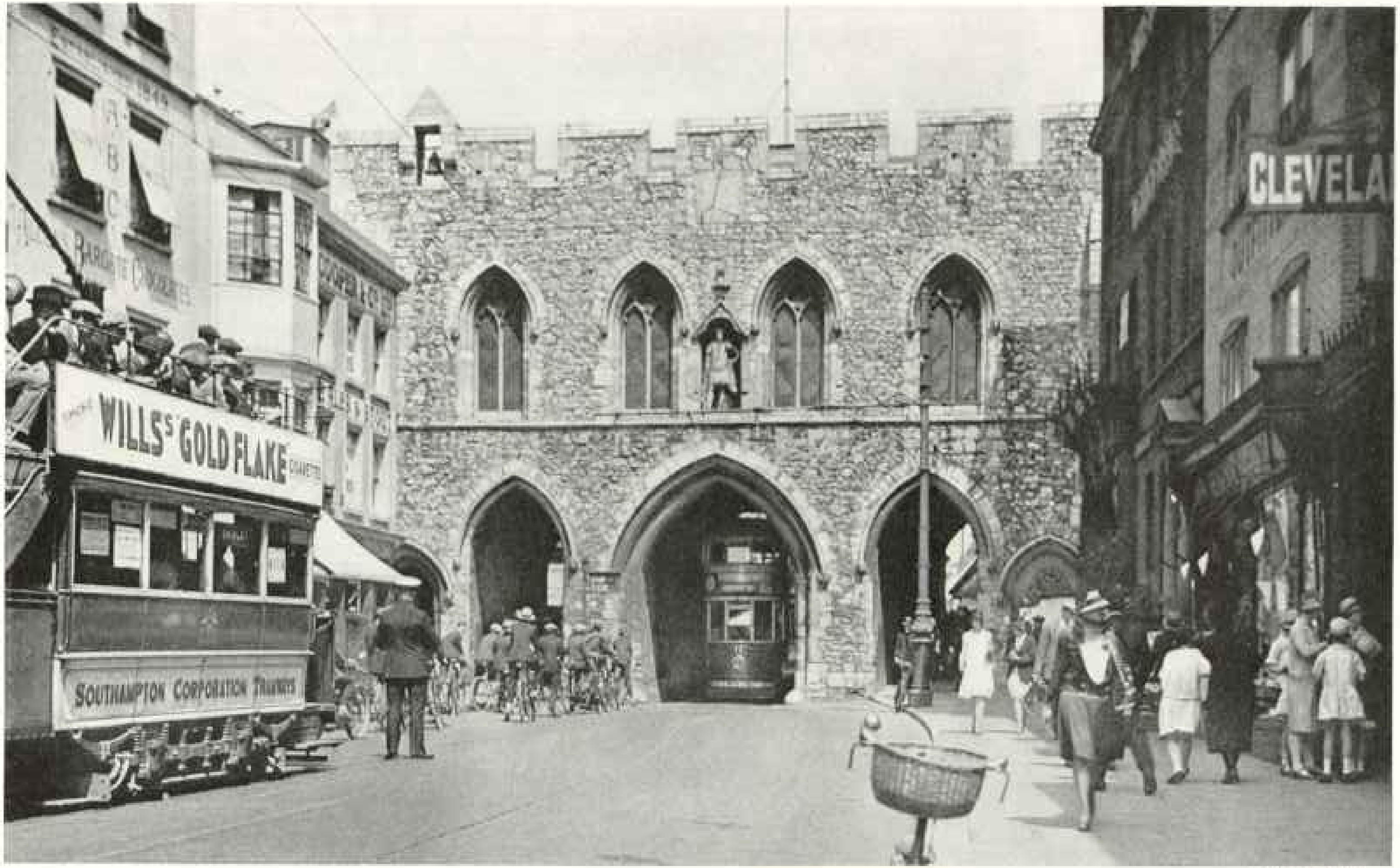
In normal times 30 shipping companies connect the port with every part of the world, and maintain regular communication



© Stanley Toogood

A SIMPLE SHAFT OF GRANITE MARKS THE SAILING OF THE PILGRIMS

Inscriptions on Southampton's monument tell the story: "On the 15th August, 1620, from the West Quay, near this spot, the famous *Mayflower* began her voyage, carrying the small company of Pilgrim Fathers who were destined to be the founders of the New England States of America. On the 15th August, 1913, this monument to their memory was unveiled by His Excellency, Dr. Walter Hines Page, Ambassador from the United States of America to the Court of St. James's" (page 92).



© Herbert Felton

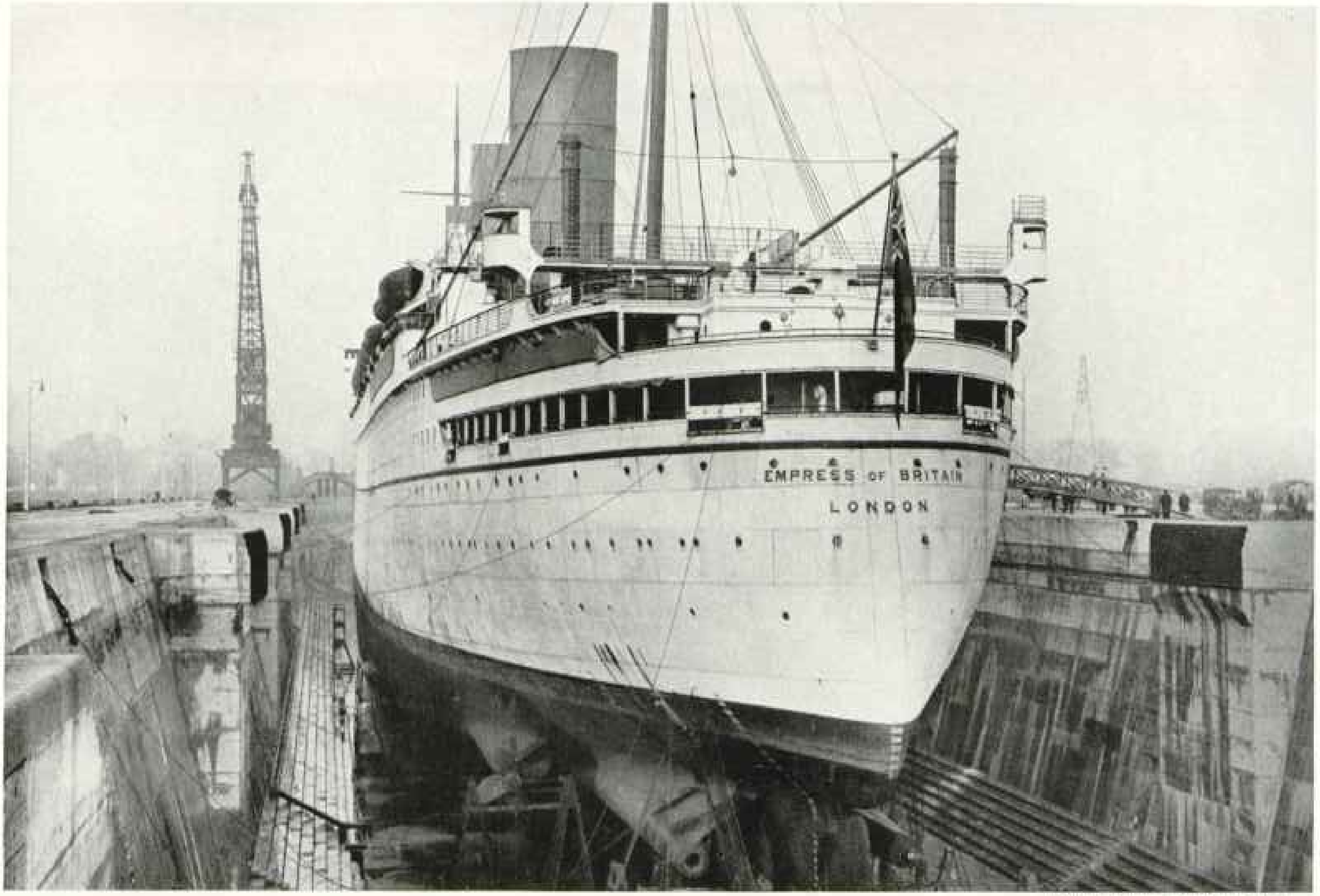
LOW BRIDGE! UPPER-DECK TRAM RIDERS INSTINCTIVELY DUCK WHILE PASSING THROUGH BAR GATE

When double-decked streetcars first came to Southampton, the authorities decided to remove the famous Norman gate, once the northern entrance to the old town, but now in the heart of the city (page 103). Protest resulted in a compromise to lower the street just enough for headroom beneath the center arch.

Photograph by Popper from European Picture Service

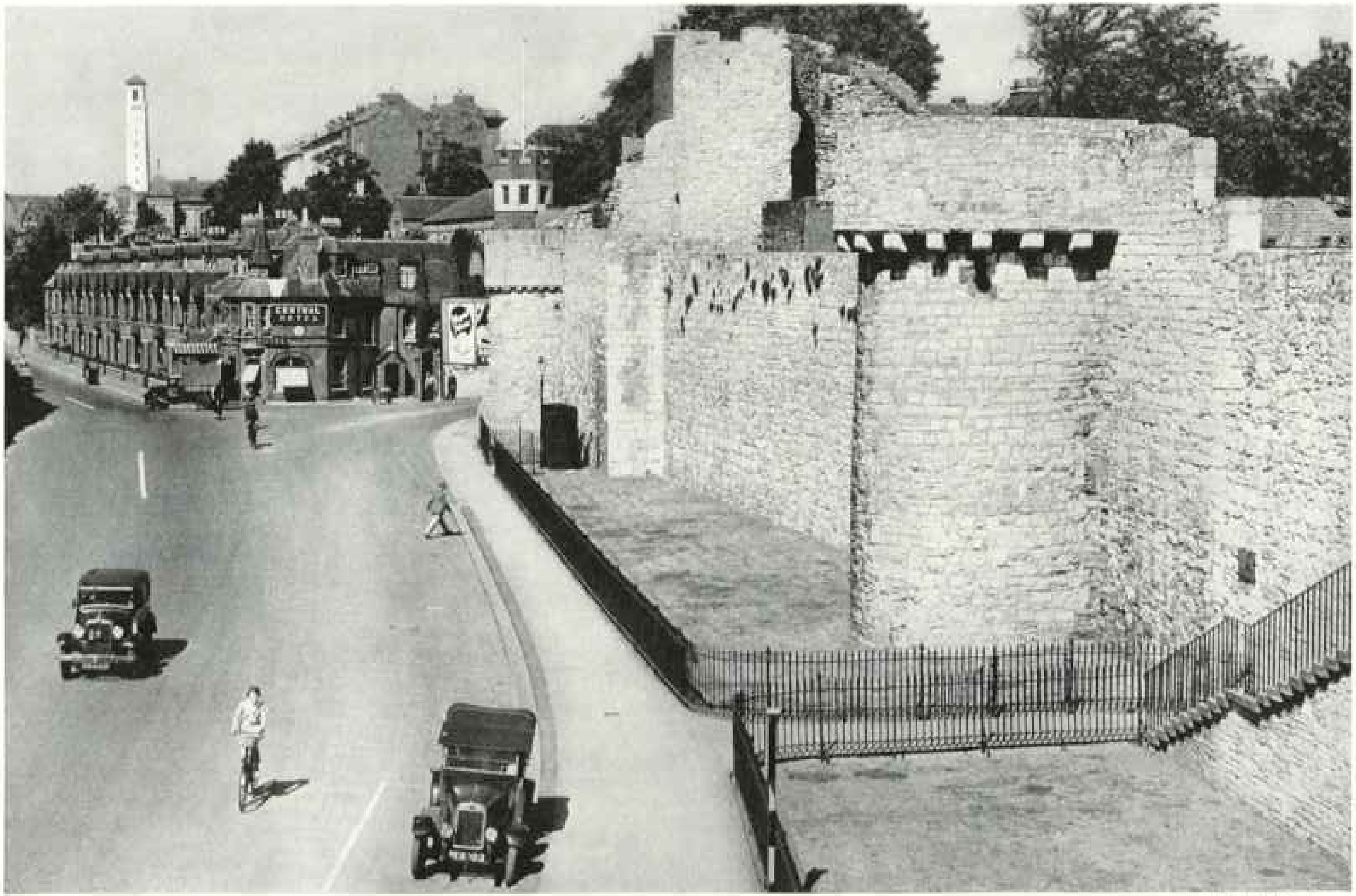
WORLD SEA AND AIR TRAFFIC CONVERGES ON SOUTHAMPTON

Imperial Airways' seaplanes which link the Empire berth in the shadow of giant ocean liners. Before the war the port was the main European base of the Clippers, Pan American Airways' transatlantic flying boats. The ship in the center background is being raised in a floating dry dock.



Photograph courtesy Southern Railway

IF THE 42,350-TON "EMPRESS" WERE TWICE AS BIG, SHE WOULD NOT TAX THE KING GEORGE V GRAVING DOCK, WORLD'S LARGEST



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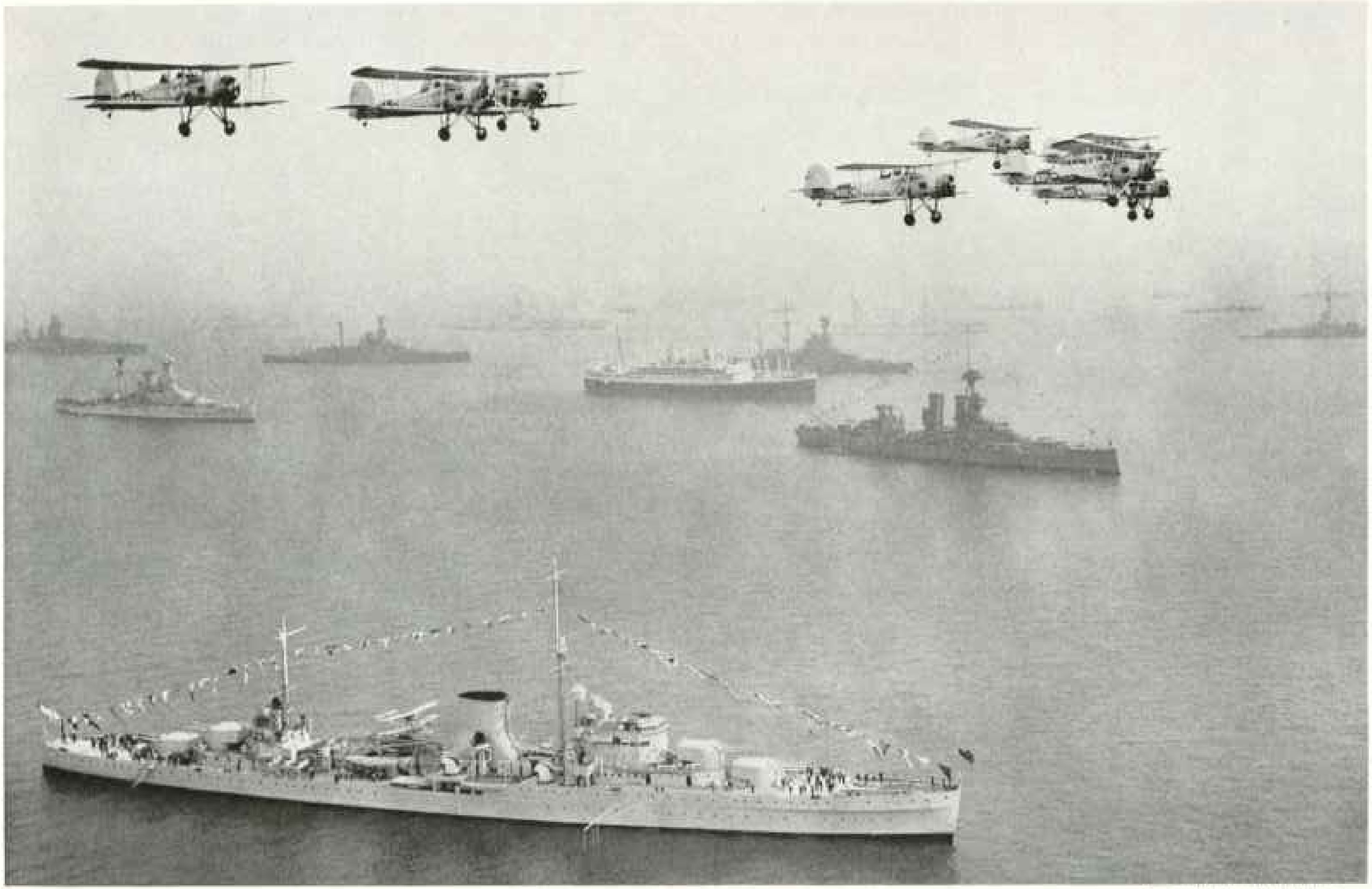
SHIVERING NORMAN WARRIORS CALLED THESE NORTHWEST TOWERS "WINDWHISTLE" AND "CATCHCOLD"

Once the sea washed the walls here, but lightermen brought stones from the Isle of Wight and reinforced the foundations to prevent undermining (page 102).



Photograph from Topical Press

AIR ARM SALUTES THE KING! AIRCRAFT OF THE BRITISH NAVY FLY IN FORMATION ABOVE THE CORONATION REVIEW IN SPITHEAD

H.M.S. *Iron Duke*, right center, gunnery training ship, was bombed by German planes in a raid at Scapa Flow on October 17, 1939. H.M.S. *Leander* (New Zealand), is in the foreground, and H.M.S. *Revenge* in left center.

"STEAM MUST GIVE WAY TO SAIL," SAY THE "RULES OF THE ROAD," BUT SOUTHAMPTON YACHTS GIVE LINERS A WIDE BERTH

with more than 160 world ports. Travelers disembarking here reach London a day sooner than if they had gone directly by boat, and 21 million people live within 135 miles of the dock gates. Thus Southampton gets the reputation of being "Britain's premier passenger port."

Many of the world's fastest destroyers have been built at the Messrs. Thornycroft's yards at Woolston, a suburb across the river. During the World War a fully equipped Thornycroft destroyer, H.M.S. *Teazer*, was capable of more than 40 knots, a speed which remained a record for many years. Thornycroft's are also official repairers to many big liners, and, of course, this firm's marine engines are well known to yachtsmen.

HOME OF HIGH-SPEED VICKERS PLANES

For facts about speed, however, Southampton's aircraft factory, Vickers Supermarine Aviation, holds prime interest. Here the famous Schneider Trophy seaplanes were built, one of which set a world's speed record of 407 miles per hour, a mark since surpassed by Italy. The first non-stop transatlantic flight in 1919 was in a Southampton-built Vickers-Vimy plane, as was also the plane piloted by Sir Ross Smith in his pioneer flight to Australia.*

Speed, however, is not confined to industries. Sometimes a liner is delayed by fog or gales, and in order not to interfere with sailing dates the lost time has to be made up by rapid port service. During my sojourn in the district I saw a Cunarder dock at 9:30 p. m. and pull out for New York by 11 o'clock the next morning. A thousand passengers, 1,000 tons of cargo, 160,000 pieces of linen, 6,000 bags of mail, 7,000 tons of oil fuel, and a million gallons of fresh water were handled in the thirteen and a half hours!

"What do you think the most interesting thing in your city?" I asked a taxi driver, after we had passed through police-guarded dock gates into a city where ancient walls, two-story office buildings, American-type department stores, and spacious parks correct the conception of Southampton as only a maze of quaysides.

"Come to think of it," he said, at length, "I don't think there's much to beat our old Bar Gate. You know, I've lived here since I was a nipper, yet I never get fed up looking at it. Funny, don't you think? And they say it's been standing like that for eight hundred years."

STRANGERS BOW TO HISTORY

Strangers to Southampton duck their heads when going through the Bar Gate on the double-decked streetcars (page 96). Once this was the northern entrance to the ancient walled city, but recent development makes it appear central, with the main thoroughfare extending in either direction. Modern traffic must negotiate the 60-foot gateway as cautiously as former invaders.

Typically English streets, or roads as they are more often called, interweave in a manner so confusing that many taxi drivers carry street plans. The postman's greatest worry is that too many villas named "Chez Nous" or "Hill Side" may appear on the same street.

In contrast to New York's Empire State Building, the new Civic Center of Southampton is striking because of its low, spacious architecture (opposite page). The tower, which would perhaps reach to the twelfth floor of the Manhattan skyscraper, appears to stretch dizzily toward the clouds. In this tower are bells which frequently play the hymn, "O God, Our Help in Ages Past," in memory of the author, Dr. Isaac Watts, who was born in the city.

Foremost among Southampton's civil activities is the Ordnance Survey Office. Here are made famous maps which are universally praised for their accuracy and wealth of information (page 105). One feature which appealed to me was a massive camera, so big that the photographer steps inside to focus it! The lens of 70-inch focal length weighs 45 pounds.

CATCHCOLD TOWER MADE STRONG MEN SHIVER

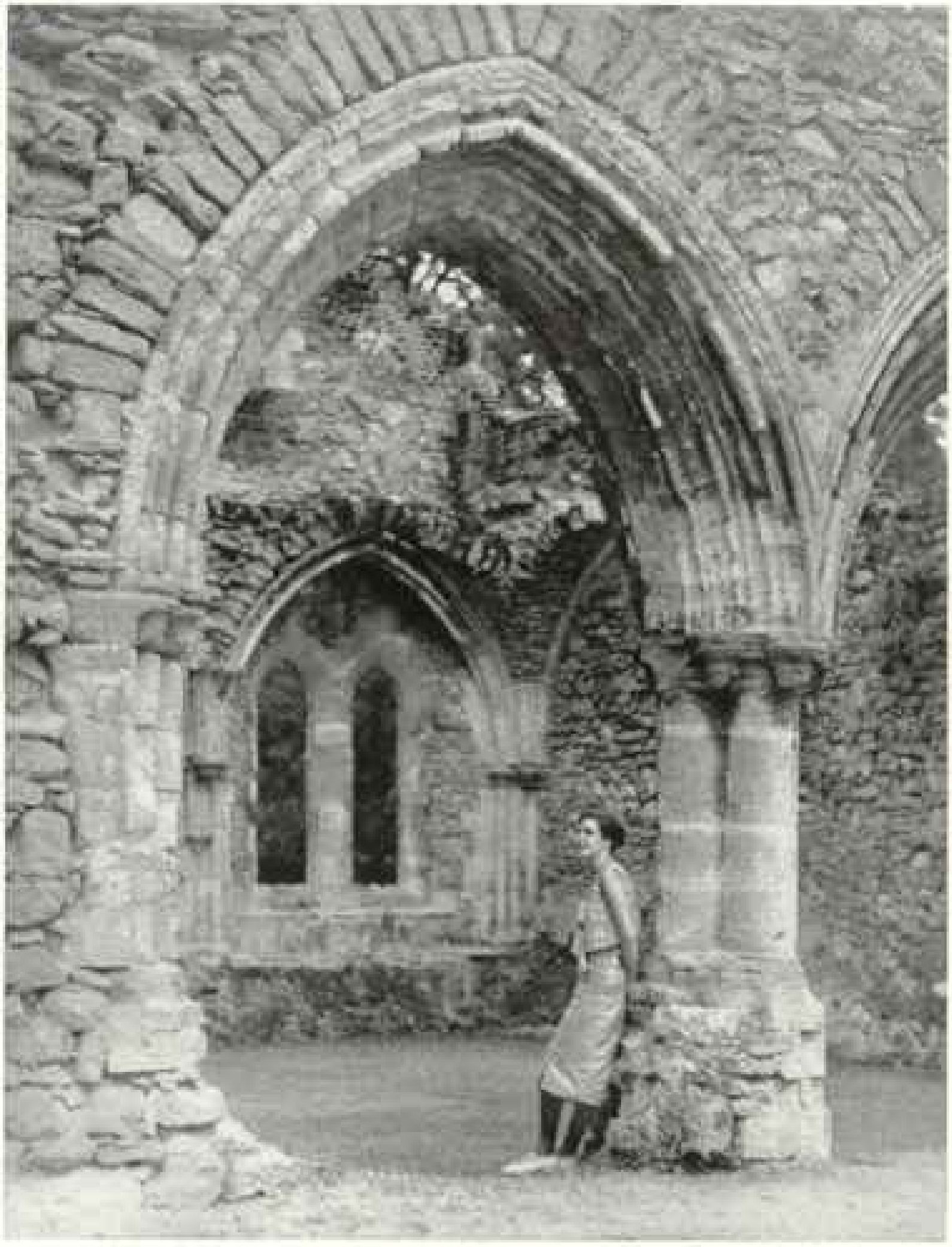
I endeavored to trace the 1¼-mile length of the ancient moated wall, a task which led me to most of Southampton's historical relics. Enough of this wall remains to give one an idea of its former strength; standing close to the formidable mass, one can hardly believe that troops armed only with bows and arrows could have actually forced the city. The Normans and Saxons planned the wall so that a small garrison within could hold its own against an outnumbering enemy. Small towers were built at intervals, each projecting, bay-window

* See "From London to Australia by Aëroplane," by Sir Ross Smith, NATIONAL GEOGRAPHIC MAGAZINE, March, 1921.

© Stanley Tregood

SOUTHAMPTON'S ONLY SKYSCRAPER IS A MODERN CIVIC CENTER

Bells in the tower frequently play the famous hymn, "O God, Our Help in Ages Past," in memory of its author, Dr. Isaac Watts, who was born here (opposite page). The spacious new building houses a library, art gallery, municipal offices, and law courts.



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"PROVIDENCE" KEPT NETLEY ABBEY FROM BEING DESTROYED

Villagers tell the story of an eighteenth-century builder who bought the old Cistercian abbey to tear it down. According to the tale, he ignored a dream forewarning him of the risk he ran. While wrecking it he was killed. From that day the ruins of the abbey have been preserved.

fashion, so that no part was out of range of the defenders.

Several of these towers are well preserved. Two of the best are Windwhistle and Catchcold Towers, their names indicating that even the stalwart warriors of old felt the effects of the English climate! (Page 99.)

A HOUSE WITH A SECRET PASSAGE

Southward is a remarkable series of shallow Norman arches, or "arcades," with large holes at the tops, through which molten lead or boiling water could be poured upon a too-persistent enemy. These arcades were added after the attack in 1338.

Close by is a building with meager windows and rough-hewn rafters, believed to be the oldest Norman house existing in England. Adjoining this is Tudor House (page 107) where Henry VIII is reputed to have stayed with Anne Boleyn.

In spite of its banqueting hall and minstrel gallery, I could not imagine Henry VIII in Tudor House. The Old World garden, the homey rooms with cosy paneling and big fireplaces (behind one is a secret passage), the twisting stairway and rambling landings, all seem most friendly and informal — just the setting for a Christmas party with yule logs, roasted chestnuts, and a crinolined maiden playing a lullaby on the harpsichord.

Farther along is West Gate, standing exactly as when the solemn little band of Pilgrim Fathers walked through on the way to the Old Quay after being wished bon voyage by the citizens of Southampton (page 111). The Old Quay has almost entirely disappeared now, but a wide pier has since been built for the use of local pleasure steamers and as a rendezvous for evening amusements and sprightly dances.

Apparently this part of the city has long been gay, for records show that in the "Long Rooms" on the West Quay popular

A SINGING KETTLE IS THE MUSIC OF A FORESTER'S COTTAGE

In some old chimneys around Southampton are secret recesses built to store contraband liquor.

Photographs © Stanley Toogood

A MAP OF BRITAIN'S BOURNEMOUTH RESORT AREA ACQUIRES A LINEN BACK

The map is sheet No. 141 of the one-inch-to-the-mile popular edition, printed by the British Ordnance Survey in Southampton. Stacks of each section of the map are placed in the individual compartments. Then the linen back, to which glue has been applied, is put on top of the stacks and the press brought down upon it. The top section in each stack adheres to the linen, thus mounting the map (page 102).

© Stanley Toogood

MYRIAD MASTS AND TIMBERS FOR BRITAIN'S "WOODEN WALLS" CAME FROM NEW FOREST

William the Conqueror ordered the first planting of the vast stretch of 92,000 acres southwest of Southampton. Through its long history, the tract has been a reservoir of timber for shipyards, a cache for early smugglers' contraband, a haven for gypsies, and, more recently, a camp site for city folk. Four of Lord Nelson's Trafalgar ships were made of New Forest oaks (page 108).

balls were held at seven o'clock every Tuesday night throughout the summer season. At these balls, said the rules, no gentleman was to appear with swords, or in boots, nor any lady in an apron, mittens, or black gloves!

GOD'S HOUSE TOWER AND "BARBARY COAST"

I succeeded in tracing the wall right around, and I concluded after visiting God's House Tower that prisoners of war in early days probably had a different name for it!

Canal Walk, Southampton's "Barbary Coast," was, in its way, more interesting. This lane, paralleling the eastern side of the wall, is lined with gypsy fortunetellers (once patronized by royalty), music shops gay with fo'c'sle ragtime, junk stalls sad with forgotten keepsakes, and barrooms, missions, and sailor haunts, all reminding one, almost for the first time since leaving dockland, that a great port is near by.

For me, however, much of Southampton's appeal lies in the life that surrounds it. So, on a sunny morning, I packed my camera into an automobile and made for the open country.

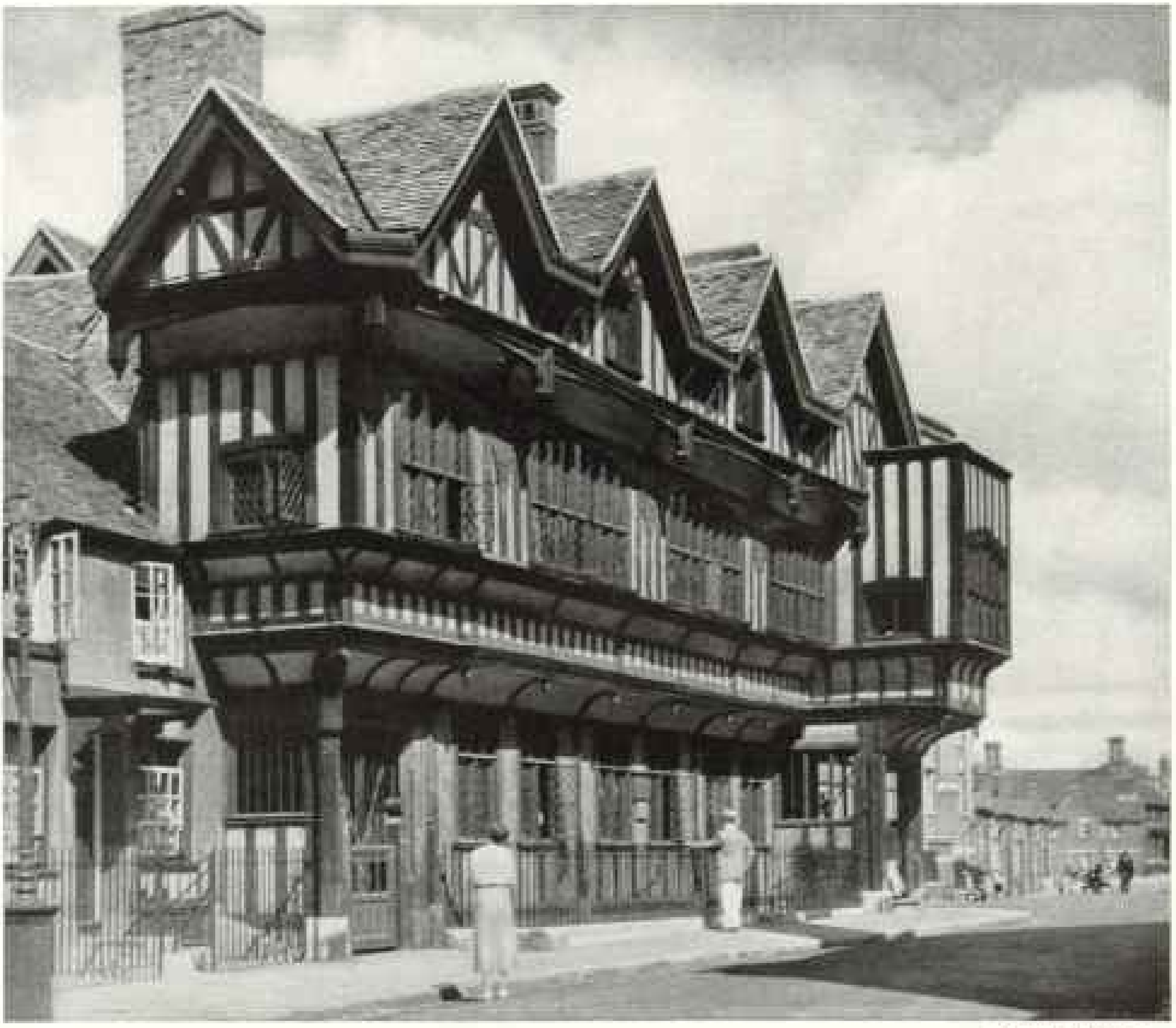
"Can you tell me where Beauworth is?" I asked a farmhand driving cows along a road northeast of Southampton.

"Where?"

"Beauworth."

"Beauworth? No. Never heard tell of it."

"But it should be right here," I insisted. "Look: the map shows it as being on this very hill. There: B-e-a-u-w-o-r-t-h."



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FRENCH PRISONERS IN OLD TUDOR HOUSE MADE SHIP MODELS FROM BEEF AND MUTTON BONES

One example of their eighteenth-century craftsmanship still remains in the half-timbered mansion, now a museum. It is a model of the famous *Téméraire*, French warship captured by the British at the Battle of the Nile in 1798. She fought next to Lord Nelson's *Victory* at Trafalgar, against the French and Spanish fleets. Henry VIII and Anne Boleyn once lived here, according to legend. When Southampton restored the old landmark in 1912, three ceilings were removed from the banqueting hall before workmen reached the original paneling (page 104).

"Oh, *Beau'orth!* Yes sir! Right t'other side of yonder trees!"

I went into the Fox and Hounds and had bread, cheese, and beer, to the accompaniment of a running commentary on a game of shove-ha'penny.

When "Time, gentlemen," was announced at 2 p. m., the landlord showed me his massive, one-manpower waterwheel (page 114), and told me of a skeleton he found several years back while digging in a near-by field. Guided by a jar of food which had been buried with the body, archeologists judged it to date from the year 50 A. C.

Beauworth is favored by finds, for a hundred years ago a shepherd unearthed a battered leaden box in which were 6,000 silver pennies minted in the time of William the Conqueror and William Rufus.

YOU WALK 3 MILES TO TELEPHONE

Beauworth, with its few inhabitants, is as truly rural as any English village I know of. The nearest telephone is three miles away, and the landlord of the inn is the local undertaker, blacksmith, carpenter, churchwarden, and wheelwright; his father made his own coffin and proudly exhibited it in the bar until he was buried in it.

East of Southampton is Hambledon, where cricket was first played during the eighteenth century. In those days two short stumps were placed two feet apart with a fairly deep hole between, and into this the

wicketkeeper had to drop the ball to stump a running batsman.

Before the rules governing the game were standardized, many liberties were taken; once a player brought a bat which had a face so wide that it entirely hid the wicket! The third stump was added when the ball was repeatedly bowled through the wide stumps.

Not far from here, parchment is made by the same methods employed centuries ago, although vellum (for drumheads) has largely taken the place of actual writing parchment (pages 112, 113). As I stood in this south Hampshire yard and watched the clever way the vellum maker shaved the sheepskin to a thickness of two cigarette papers, I tried to imagine the finished vellum rhythmically resounding in a Broadway dance band.

THE WAYFARER'S DOLE

A hobo introduced me to Winchester. His bearded face, bowler hat, and merry disposition had appealed sufficiently for me to give him a lift.

"I'll be in time to get the free beer," he said, when I stopped near the huddled cathedral city.

"Let me into the secret!" I said, following him through a towering gateway near which aged, black-gowned brethren were standing.

"I want the wayfarer's dole!" my hobo said, stopping at an arched door. Immediately a horn of beer and a large slice of bread were handed out.

"How did you manage that?" I queried.

"You ask!" he replied.

My request was satisfactorily rewarded. What the beer lacked in alcoholic strength was made up in historic associations, for I learned that the wayfarer's dole has been handed out from St. Cross Hospital for eight centuries, each day's supply being two gallons of beer and two loaves of bread, sufficient for about 30 persons (with no second helpings!). This is one of the remaining examples of old-time charity which made provision for all comers.

A ROMAN-PLANNED BROADWAY

Going into the city, I parked my car on Broadway and sauntered through Roman-planned streets until I reached Winchester Cathedral, dating from the eleventh century—William the Conqueror himself could have admired, in construction, the same features that attract the present-day visitor.

One of the many treasures in the building is the Norman font, remarkable for its black marble carvings. On one side, for example, is depicted how St. Nicholas became the patron saint of small boys.

A pork butcher, being short of sausage meat, chopped off the heads of three small boys; no sooner had he packed their bodies in the brine than St. Nicholas knocked at the door, saying that he wanted to sup on the three boys who were in the brine tub. Conscience-stricken, the butcher recognized his visitor and made a full confession, whereupon the saint restored the boys to life and became their patron saint.

I did not want to leave Winchester. The clear River Itchen, beside which Benjamin Franklin wrote part of his *Autobiography;* the famous Winchester College, oldest of the leading public schools in England, and possessor of a Latin motto translating into "Learn, leave, or be licked"; St. Catherine's hill, on the top of which is a curious mizmaze; and West Gate, another magnet of history, hold one in the city better than the strongest wall. Nevertheless, at sunset, with the curfew bell tolling as it did here at Winchester in the days of William the Conqueror, I regained the Southampton arterial road.

North of Southampton is a little village called Abbotts Ann, where lingers a strange funeral custom. If a chaste maiden dies in the village, her companions accompany her to the grave carrying a "virginal crown" and a pair of big white gloves. After the burial these emblems are hung in the church. At the time of my visit I counted more than forty.

TRAIL OF A SMUGGLING BAND

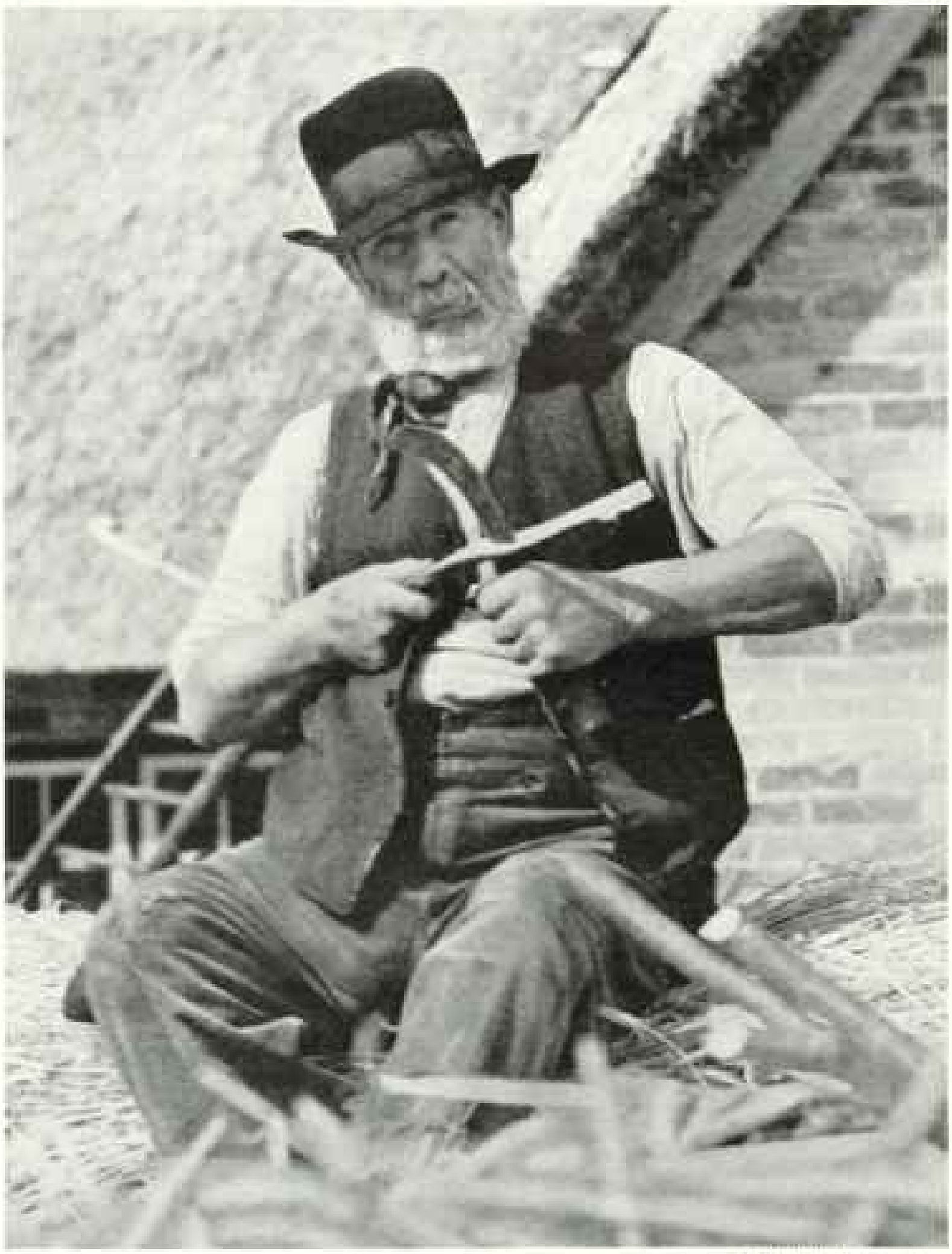
I was told that the best seasons to visit the New Forest are spring, summer, autumn and winter, so I joined a party of friends and went camping, our aim being to dawdle, Romany fashion, through the more unfrequented parts.

For me there is always a certain romance and thrill of adventure connected with the old-time smuggler, trundling along in the dead of night with a donkey cart overloaded with brandy casks, tobacco bales, and fine silks, bound for a secret hiding place. We followed the trail of a smuggling band which, about a hundred years ago, had its own secret road, its own code of danger signals, and its own special

Photograph courtesy Southern Railway

GIANT LINERS TIE UP IN A ROW AT SOUTHAMPTON'S MAMMOTH "NEW DOCKS"

A deep-water channel 600 feet wide, with minimum depth of 35 feet, affords access to the jetties, with their lines of warehouses. This addition to the port facilities was dedicated in 1933. Here the largest liners arrived and departed on regular transatlantic service before the start of the present war. Three years before the outbreak of the World War, the Ocean Dock was completed. During the World War more than 7,000,000 officers and men were embarked and disembarked at Southampton and more than 5,750,000 tons of stores were handled. Sometimes between 25 and 30 convoyed ships departed in a single night. Such scenes are being re-enacted today (page 91).



© Stanley Toogood

A VETERAN HAMPSHIRE THATCHER COMES INTO HIS OWN AGAIN

Handed down from father to son, the craft had been considered obsolete in the vicinity of Southampton. Now, after many years, thatched roofs are becoming popular, as cottagers once more prefer them to slate.

cache away up in the wilds of the forest.

We began from Burley, for near here is a hill on which an old woman used to give the go-ahead signal by standing on the skyline dressed in a red coat and bonnet. Following the trail to Ridley Wood, we came to the tree in which a light used to be hung when the smugglers were working by night; adjoining this tree is reputed to be a hollow spot in the ground wherein are hidden several casks of brandy, a surmise which caused us considerable delay, but left us, I regret, unable to confirm this supposition.

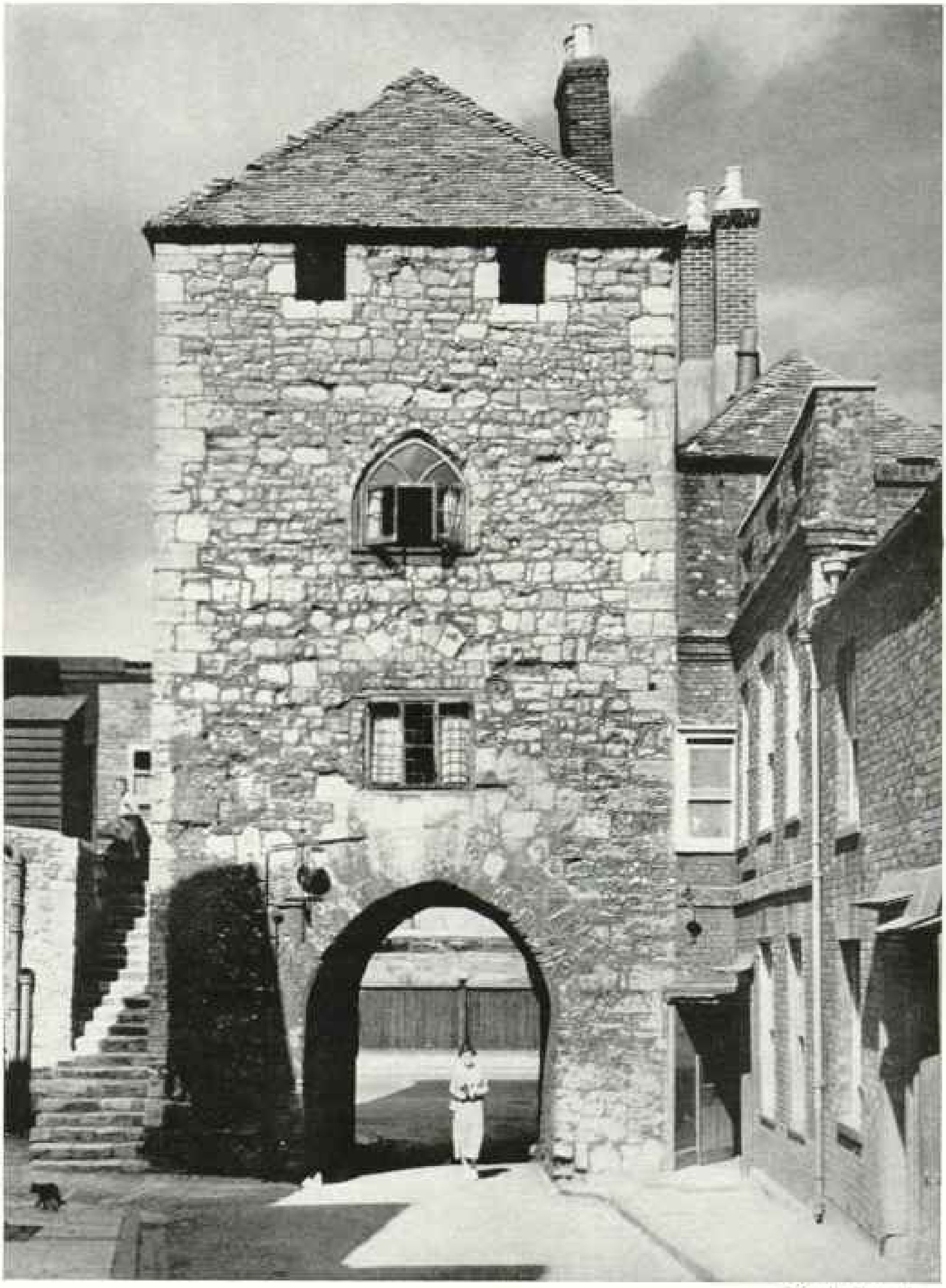
Continuing through glades, streams, marshes, and "lawns" (open spaces in which grass grows as though regularly cut by a mower), and seeing many forest ponies and several deer, we reached Rufus Stone, a monument marking the spot where King William Rufus was killed by an arrow while hunting. Tradition says Walter Tyrrell, one of the men accused of shooting the king, fled immediately to a village now known as Tyrrell's Ford, where he had the shoes of his horse reversed, and, fording the river, confused his pursuers.

At Rufus Stone we lost the smugglers' trail, our interest being diverted by several ice-cream peddlers, similar to those who cover practically the whole of summertime Britain.

Later, however, I came across many locations where contraband goods were hidden. An old house, for instance, was being demolished, and behind a chimney was found a secret recess containing a number of liquor kegs, which the workmen said were empty. At Kinson Church, a little beyond the borders of the forest, the ancient tower still bears rope-marks made when smuggled goods were hauled up and, so the story runs, concealed in coffins!

AN ECHO OF WOODEN SHIPS

While exploring a forest byway after a heavy gale, I came across several fallen trees and large branches on which were tacked



FOR THE PILGRIM FATHERS WEST GATE OPENED THE WAY TO A NEW WORLD

On an August morning more than three centuries ago, the little group passed through the stone portal on its way to Southampton's West Quay, now called Old Quay. There they embarked on the *Mayflower* and the *Speedwell*. The small ships remained in port two weeks until a fair breeze enabled them to set sail. At Plymouth, England, the *Speedwell* was abandoned and the journey to America continued in the *Mayflower* (pages 92, 95, and 104).

© Stanley Troutman

LIFE FOR THE PARCHMENT MAKER IS ONE SCRAPE AFTER ANOTHER

Literature of the centuries has been preserved on durable parchment, made by the same process this Hampshire worker is employing. Skins of sheep, goats, and calves are first washed, limed, dehaired, and given a preliminary scraping. After a second washing, they are placed on the stretchers and scraped again to the desired thickness. Rough spots are removed, the skins are dusted, and finally they are rubbed with pumice. Vellum is made from more delicate skins, of kids, lambs, and newborn calves.

labels lettered "bought," a custom which, I learned from a patrolling keeper, is connected with laws which protect the forest. Cottagers are at liberty to take away as much fallen wood as they can personally carry to their homes, but large logs may not be removed until they have been sold to the highest bidder.

This law is one of many that came into force when England's fighting fleet was wooden, and important shipbuilding yards were located in near-by estuaries. Stout New Forest oaks were responsible for four of Nelson's Trafalgar ships (page 106).

Nowadays, locally grown wood is used only for industries consuming small quantities; that of making "New Forest toys" is of special interest. A local artist carves true-to-life toys depicting customers' horses, dogs, automobiles—even their personal portraits! Recently, an orchestral trio placed an order for carvings to be made showing them playing their instruments.

I had vaguely connected herbalists with witches, black cats, stuffed owls, and musty bunches of withered plants, but these ideas were shattered when I visited the New Forest Herbarium, at Sway.

In a picturesque mansion standing in spacious, well-kept grounds, I was taken into efficient laboratories where the fresh herbs are converted into fragrant teas, aromatic tinctures, and soothing ointments. I was told that an infusion of sage and raspberry leaves makes an excellent gargle for sore throats, that burdock and clover tops make a blood-purifying medicine, and that wood betony has conquered many cases of chronic rheumatism.

Apart from the plants cultivated in the grounds of the mansion, the neighboring forest supplies many medicinal herbs,

among which are attractive-sounding things such as old-man's-beard, horsetail, colts-foot, mouse-ear, pellitory, and pennyroyal.

THE LEGEND OF CHRISTCHURCH

The name of Christchurch, a small town southwest of the forest, is associated with a unique legend.

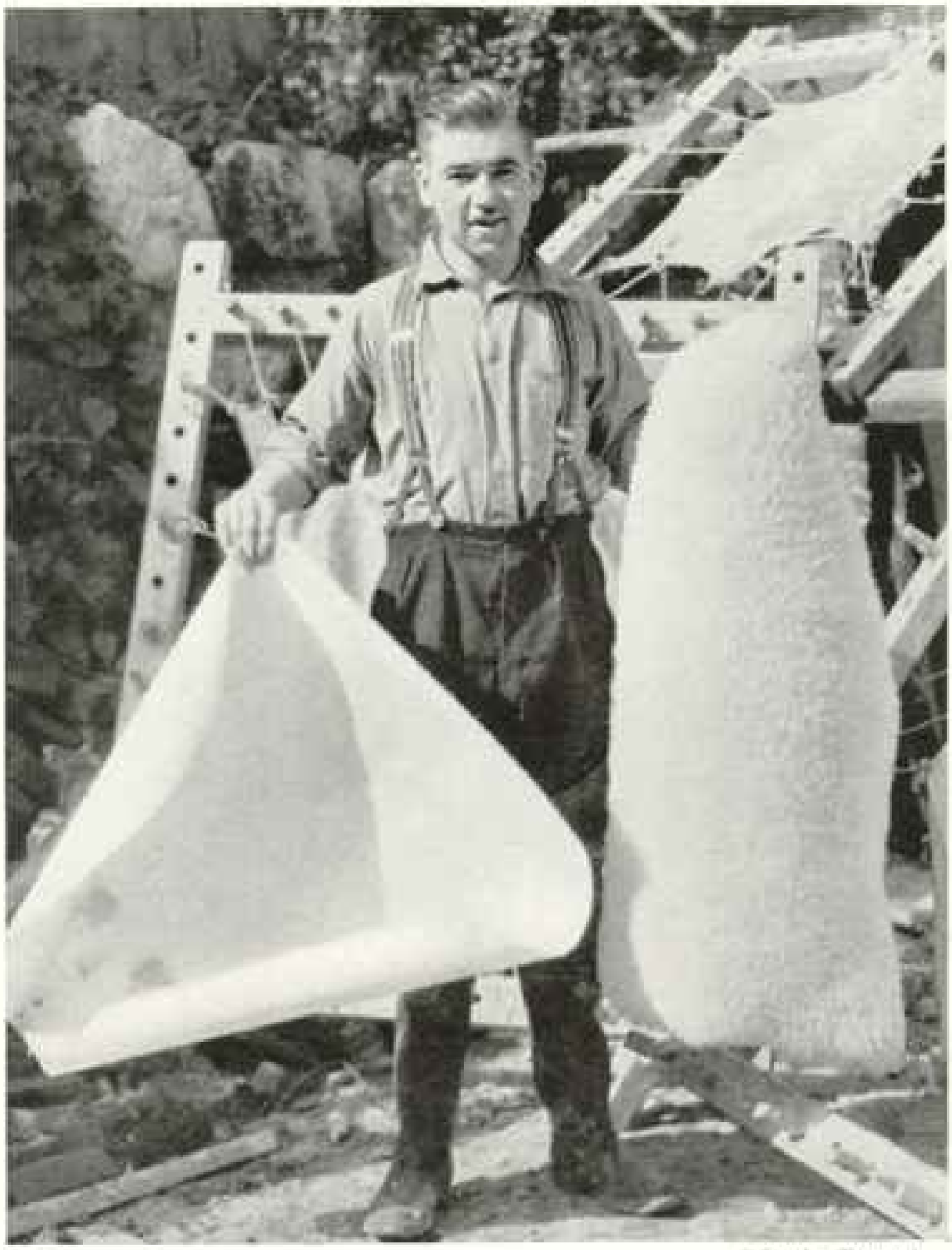
Workmen commenced building a priory at the top of a hill about a mile and a half away, but every night the previous day's work was mysteriously removed to a spot near the river. The builders finally abandoned their site for the one so strangely appointed. As the work progressed, they noticed that a stranger labored with them, yet he did not speak or receive payment; neither was he seen to eat.

Once a valuable beam was cut too short, but the stranger brought it to the necessary length at the touch of his hand. This act convinced the builders that they had none other than the "carpenter's son" of Nazareth assisting them; thus from that day the church was called "Christchurch." The beam may still be seen.

A GYPSY "WADING WEDDING"

New Forest would not be complete without its Romany encampments, with their gaudy caravans and motley-fabricated tents. Before various regulations restricted the wanderings of the Romanies, they used to have many strange customs, among which the marriage ceremony particularly appealed to me.

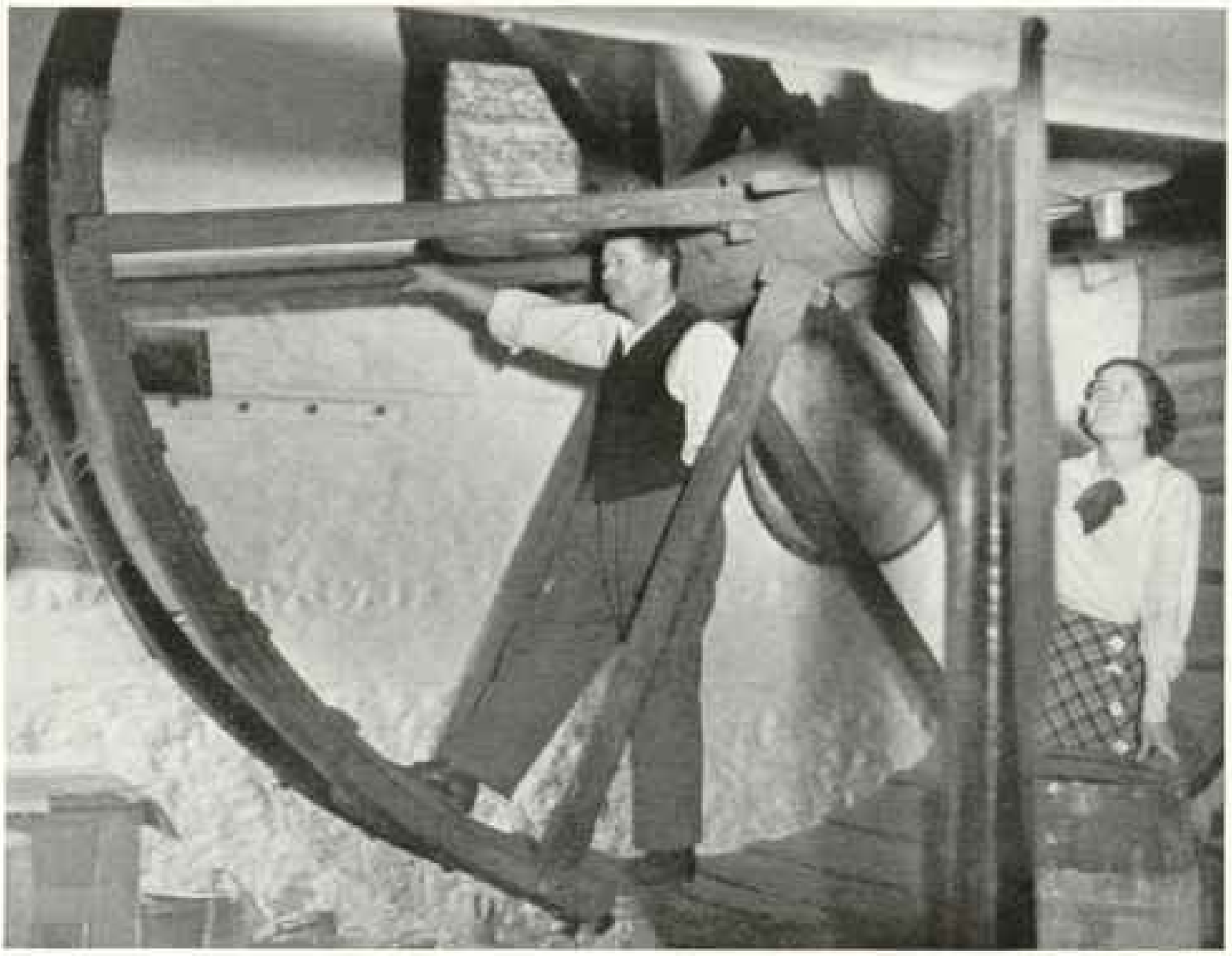
For such an occasion, camp would be pitched at a spot where two streams met. The ceremony began with the bride's entering the smaller stream and the bridegroom's wading into the larger; the couple then proceeded in the direction of the flow. Thus at the joining of the waters the bride met



© Stanley Townsend

HIS SHEEPSKIN MAY RESOUND IN A NEW YORK NIGHT CLUB

Several popular United States bands use drumheads and banjo vellums which have been made in this Hampshire workshop. In his left hand the worker holds his raw material—a fleece-covered sheepskin. In his right is the finished parchment. For an average drumhead, he must scrape the skin to a thickness of one thirty-second of an inch, and he makes it even thinner for fine snare drums. Gauging by touch alone, he can shave a skin to the thickness of two cigarette papers.



TO GET SHAVING WATER, THIS HUMAN SQUIRREL WALKS A QUARTER MILE IN HIS OWN KITCHEN!

When the landlord of the Fox and Hounds (page 107) revolves the wheel, 12 feet in diameter, by walking within it, a large bucket full of pure water is drawn up from a well 300 feet deep. It never has been known to go dry.

her lover. He placed his arm protectively around her shoulders. By that time the rest of the camp were in the water, cheering the event.

When due solemnity was regained, the bridegroom placed a ring upon his bride's third finger and kissed her hand, after which he touched her earrings with both hands in obscure symbolism.

From then on there was great merry-making. A fiddle was brought out, the camp fire was stirred to a blaze, and characteristic dances proceeded well into the night to the joyous celebration of two souls that were merged as surely as the waters merged and flowed into the sea.

I understand that this ceremony is still carried out by some of the Romany tribes, but the occurrence recorded here happened during a previous sojourn in England, and none of my enquiries as to the possibilities of seeing one during my present stay met with success.

Once more back on the transatlantic ship, I listened to a fellow passenger describing his trip.

"I stopped off at Southampton," he said. "But there's nothing there worth seeing."

INDEX FOR JULY-DECEMBER, 1939, VOLUME READY

Index for Volume LXXVI (July-December, 1939) of the NATIONAL GEOGRAPHIC MAGAZINE will be mailed upon request to members who bind their copies as works of reference.

SOUTH FLORIDA'S AMAZING EVERGLADES

Encircled by Populous Places Is a Seldom-visited Area of Rare Birds, Prairies, Cowboys, and Teeming Wild Life of Big Cypress Swamp

By John O'Reilly

REACHING southward into the sunshine between the Atlantic Ocean and the Gulf of Mexico lies south Florida, a curious subtropic land unlike any other part of the United States.

It is a land where everybody goes, but one that almost nobody knows. Part of the region is populous, and becomes host to thousands of health-hunters and play-seekers each winter.

The other part is a vast area, rich in natural beauty and wild life, which lies beyond the eye of the visitor or winter resident—lies there in the hot sunshine almost unchanged since four centuries ago when Juan Ponce de León penetrated its somber forests as a likely place to find the Fountain of Youth.

South Florida visitors follow a route skirting either coast, where they see streamlined cities and towns of white buildings, bright gardens, and streets ornamented with orderly rows of man-planted palm trees.

Throughout each year thousands speed along the Tamiami Trail, the only highway built across the wide stretch of wilderness between the two coasts, but seldom does one of the travelers wander more than a hundred feet north or south of the highway (map, page 118, and page 122).

HAUNT OF BEARS, BIRDS, ALLIGATORS

Barred from the road by junglelike growth are vast cypress swamps, where wild orchids decorate the aisles of trees, and exotic water birds rear their young in huge rookeries; islands where pines and palms grow side by side, where panthers, bears, and wild turkeys are still found, and alligators dig caves in the soft soil (p. 138).

Spreading out for mile upon mile are the Florida Everglades. To the south they extend all the way to Cape Sable and the mangrove islands at the spearlike tip of the peninsula. Beyond eye range of the visitor are vast areas strewn with the white skeletons of trees, torn and twisted by the power of the winds, and thousands of islands and wide prairies seeming more like a part of the South American pampas than a section of the United States.

To the north the Everglades stretch all the way to the Kissimmee Prairie and Lake Okeechobee, Florida's inland sea. The prairies are low, sandy, grassy, and comparatively treeless tracts, subject to occasional inundation in rainy seasons.

The human inhabitants of the interior of south Florida blend with its untamed atmosphere, for the Seminoles are the only American Indians who have never, since the end of hostilities, signed a formal treaty with the United States Government.

They constitute an independent remnant of a tribe which fought the United States Army in two of the most furiously contested wars ever waged by Indians (1816-18 and 1835-42).

SEMINOLES SECEDED FROM GEORGIA TRIBE

Originally the Seminoles were a group of Creeks who left the main Georgia tribe about 1750 to make their home in the wild country of the Florida Peninsula. "Seminole" means "seceder" or "runaway."

By treaties in 1832 and 1833, some of the tribal leaders ceded their lands to the Government and agreed to be moved out to the Indian Territory in the West. This caused a split in the Seminoles; part of the tribe refused to be moved west and sought sanctuary deep in the swamps (page 130).

Efforts to force them to move brought on renewed warfare, which began in 1835, lasted for seven years, and cost the lives of nearly 1,500 American soldiers and millions of dollars.

More than 4,000 Seminoles and runaway negroes who had become their slaves were transported to the West in small groups during those seven years, but a small number held out to the last, protected by their knowledge of the swamps and their ability to live in them. The war ended in 1842 without a treaty. Today about 650 Seminoles still make their homes in the Everglades and the cypress swamps.

Reservations have been provided for

Photograph by Lois Marden

TO SPEAR GARFISH, SEMINOLE TRIBESMEN STAND BY THE HOUR LIKE STATUES

One young fisherman is pulling in a prize. Along the Tamiami Trail, Indians are commonly seen watching intently for the garfish, which they consider a delicacy.

them, but for many years their only contacts with the white man were when they silently appeared to sell and trade the hides of the animals they trapped in the swamp.

In recent years they have been forced into closer relations because of the draining of part of the Everglades and the growing scarcity of game.

To obtain a livelihood the tribesmen have built villages of palm-thatched huts along the Tamiami Trail. There they exhibit alligators, wildcats, raccoons, snakes, and other animals in cages and charge visitors a small sum for inspecting the village.

For the most part, though, the traveler finds that the Seminoles are still uncommunicative individuals. They accept coins at the village gates but usually refuse to talk with strangers.

When not in villages, they roam the Everglades and the cypress swamps, where they still hunt alligators for their hides, wandering about in country still almost inaccessible to the white man, where even the old Spaniards did not penetrate frequently.

Pánfilo de Narváez, who followed Ponce de León in 1527, and those who came after him, founded settlements along the coasts of Florida but rarely attempted inland excursions in the swampy south.

THE LURE OF THE SWAMP

Such has been the history of the Everglades since. Cities have grown on either coast, but until the building of the Tamiami Trail (page 122) the swamps were little known. Besides the Seminoles, there are still few who really know them.

To see this strange inland wilderness I went to south Florida. I wanted to view at first hand the curious and beautiful birds about which I had read or which I had seen

Photograph by S. A. Grimes

YOUNG SNOWY EGRETS HUDDLE UNDER THE PARENTAL WING

Once decimated to supply the long, lacy plumes, which were fashionable as hat decorations, the snowy egret is now again becoming numerous in many of its old haunts. Protective legislation and sentiment against the use of aigrettes for ornament have helped the recovery of the species. This nest in the Everglades displays the typical crude construction of dead twigs (page 154).

as lonely specimens in zoos—the roseate spoonbill, the snowy egret, the wood ibis, and many others. I wanted to go far into the big swamps, for swamps have always fascinated me as places where Nature puts on her most abundant show. It was to be a wilderness trip. The cities were to be merely starting points.

My guides were wardens of the National Association of Audubon Societies. Their duties are to protect the bird population of the region and they must know the country they patrol.

The plan was to start in the vicinity of Lake Okeechobee and gradually work southward to the Everglades; then, finally, to invade the great cypress swamps.

As I alighted from the train at Okeechobee City, two men in the olive uniform of the Audubon warden service approached me. One was Alexander Sprunt, Jr., director of southern sanctuaries for the Association. The other was Warden Marvin Chandler. Their enthusiasm was evident.

There was still enough daylight for me to get a first impression of the Kissimmee Prairie. We piled into Chandler's car, which looked as if it had been climbing trees, and headed out of town.

A TRAILER FOR THE HORSE

As we rode, it developed that the car was used for almost everything. Chandler, of lean and wiry build, is a native of the prairie country. His face is tanned the color of dead palmetto. He is stingy with words, but his mouth is bordered by grin wrinkles. He patrols a wide area and knows it as a housewife knows her kitchen floor.

The warden keeps vulnerable parts of his

Drawn by Newman Bumstead and Ralph E. McAfee

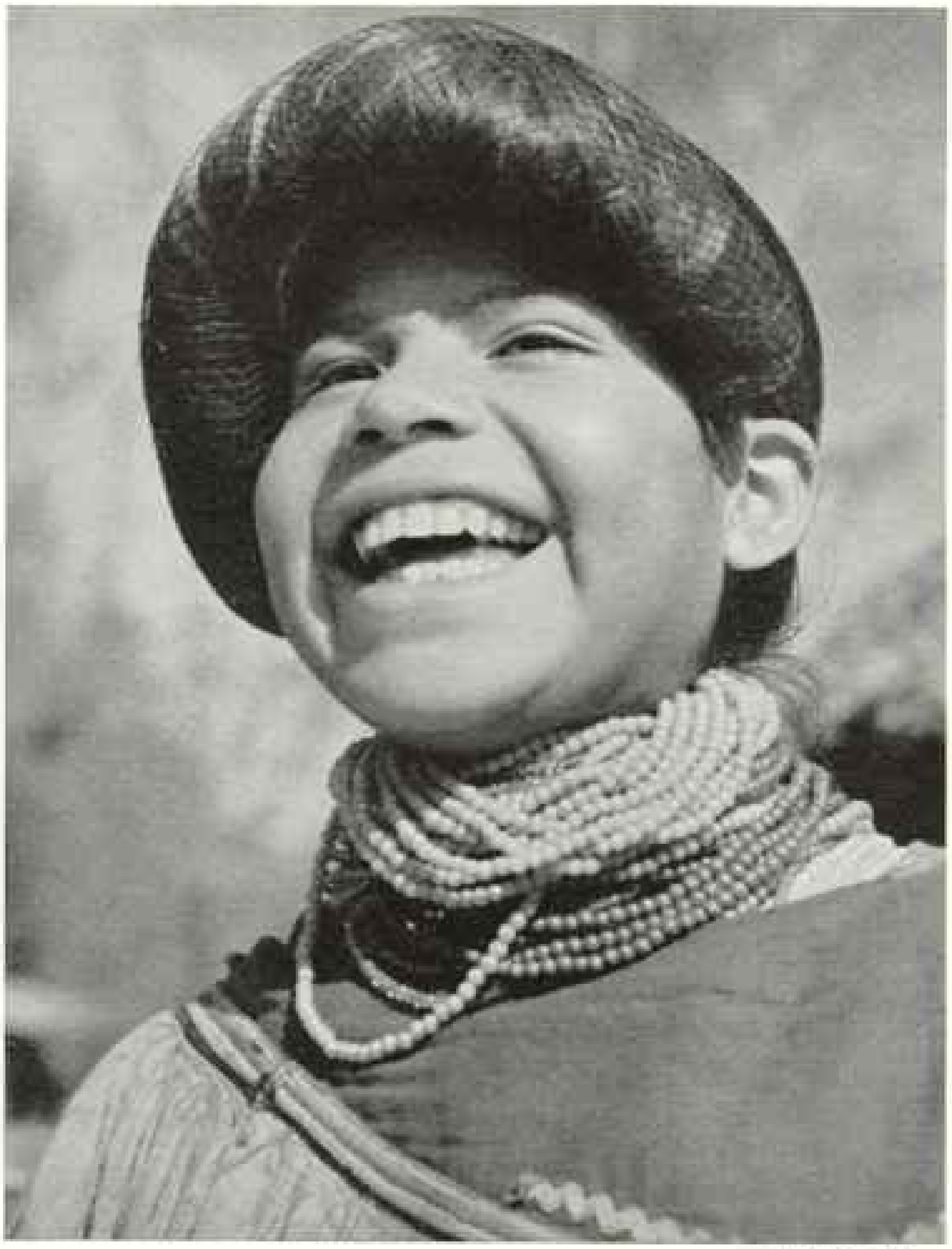
SOUTH FLORIDA BLENDS INDIAN VILLAGES AND LUXURIOUS BEACH RESORTS, BIRD-RICH SWAMPS, AND MODERN CATTLE RANCHES

Remote marshes, prairies, and forests of the water-soaked inland are edged, on the Atlantic and Gulf of Mexico shores, with cultivated strips studded with groves, villages, and streamlined cities such as Miami, West Palm Beach, St. Petersburg, and Tampa. The Everglades National Park Association has worked for many years to set aside as a park a large area in the southern part of the State. By Act of Congress in 1934, some 2,000 square miles, outlined by dashes on the map, were allotted for the proposed park. It is planned to preserve in their natural state the wild life, jungles, interlocking waterways, and keys of this tropical region. Between Seminole Indian reservations and Kissimmee Prairie lies Lake Okeechobee.

car so coated with grease that it can almost travel under water. The machine is used where there are no roads or over sandy ruts worse than no road at all.

Usually Chandler hauls a horse in a trailer behind his car. When the going gets too rough, he saddles up the horse and rides on to look after his birds. He says the horse now likes to ride better than he likes to be ridden (page 130).

At intervals during the first several miles, the warden pointed to straight sidewalks stretching out across the prairie, leading nowhere. They were veined with grass-grown cracks and bordered by palmetto. Those sidewalks were concrete reminders of the Florida land boom, marking places where dream cities were to have stood. Now they were being reclaimed by Nature.



© Kurt Severin

LAUGHTER LIGHTS THE FACE OF A SEMINOLE "GIBSON GIRL"

Characteristic of the Indian women of the south Florida "out back" is the carefully molded and net-bound "hair-do." With such an overhanging roll, this ten-year-old girl needs no broad-brimmed hat for protection from the sun.

After a few miles the car swung off the paved road onto a tortuous trail through the sand, lunging over it with the grace of a jitterbug. Chandler rocked easily at the wheel, keeping his seat like an accomplished horseback rider. His passengers achieved no such synchronization.

OWLS THAT DIG TUNNELS

Suddenly the world became strangely still. My bones settled back into their sockets and my head cleared. Chandler had stopped the car. Ahead and near the road a small brown owl stood stiffly erect on a mound of white sand. It stared at our vehicle.

It was one of the strangest of avian curiosities, the Florida burrowing owl (*Spectyto cunicularia floridana*), a bird that makes its home beneath the ground like a woodchuck. The owls dig a tunnel four feet or more long and at the end of it hollow out a room for the nest (page 121). They feed almost entirely upon insects. When the young are old enough to leave the nest they sit in a family group on the mound beside the burrow while the old birds forage for them.

Photograph from Wide World

THEY TAKE THE SUN ON THE PORCH OF A HOME ON STILTS

If the sea rises too high, they can free their house and float away. Independent residents of Chokoloskee Island, in the Gulf of Mexico off Florida's southwest coast, live over large shell beds left by ancient occupants.

Chandler was engaged in making a census of the nesting pairs of burrowing owls in his territory. He had located 64 pairs since the beginning of the nesting season. It is estimated that there are not more than 500 pairs in the Kissimmee Prairie.

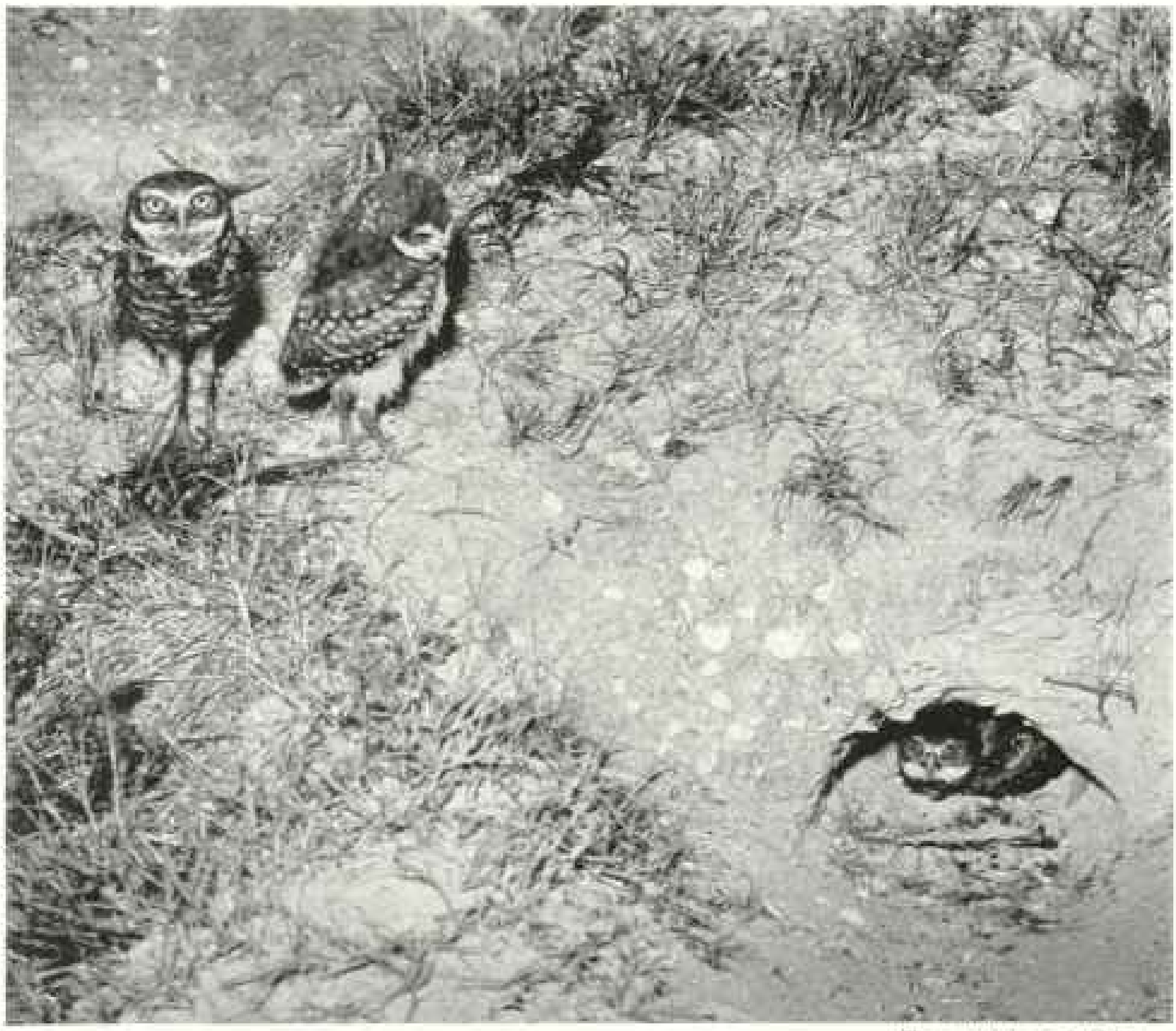
As we got out of the car, the bird flew from the mound beside its burrow, coming to rest some 30 feet away. There it stood contemplating the intruders with an indignant air. Suddenly it bowed quickly from the hips, a brisk bow of intimidation rather than a gesture of courtesy.

While we inspected its burrow, the bird remained near by, bowing at intervals but never taking its eyes from the group at its doorstep. It showed no inclination to fly away and was still watching us as we climbed into the car and jolted on our way.

In time the vast sweep of the Kissimmee Prairie spread out around us. The flat plain with its brownish-green covering of grass and palmetto swept away to the horizon. Here and there were clumps of thickly set cabbage palms and at times a single one stood like a lonely sentinel. Now and then narrow belts of slash pine were in sight, but for the most part the view was unobstructed.

To me the Kissimmee Prairie had been merely a name on a map. Here was a great stretch of inland Florida, roughly 80 miles long and 40 broad, which most visitors to the State glimpse from train windows as they speed toward coastal resorts. Those who do traverse its few roads by automobile are surprised to find what appears to be a bit of the western cattle country brought east (page 139).

The Kissimmee Prairie is a ranching sec-



Photograph by S. A. Grimes

THE FLASH BULB SURPRISES BURROWING OWLS AT THEIR DOORSTEP

Beside one owlet stands a solemn, wide-eyed parent bird (extreme left). Another young one rests in the entrance to the burrow. Sandy soil held together with grasses forms the favored situation for the home. The birds dig a tunnel four to eight feet long. At the end is the nest, lined with grass roots, pieces of dry cow dung, and bunches of hair. Prairies of central and southern Florida are the burrowing owl's chosen haunts in this State (page 119).

tion. Florida cattle graze singly or in small groups far out on the plain.

Cowboys in boots and big hats drive herds along the roads to shipping points, and disputes arise over grazing rights just as cattle wars were started in the free range days of the old West.

LAST OFFICIALLY RECORDED CAROLINA PARAKEETS

Before the sun had dropped below the straight-line horizon Chandler stopped the car at Taylor Creek Hammock. This grove of live oaks, willows, and other trees along the creek is a spot deeply revered among ornithologists. From here came the last official record of the Carolina parakeet (*Conuropsis carolinensis carolinensis*), now feared extinct. Dr. Frank M. Chapman, Curator of Birds at the American Museum of Natural History, saw two flocks totaling 13 birds there in 1904. About a dozen are believed to have been seen in 1915 and another 30 in 1920. Since that time there have been only vague reports of them.*

Once these typical parrots flourished in the Eastern States from Florida to Virginia and in summer flocks wandered as far north as Pennsylvania and New York.

We strolled for a time under the live oaks, and I found myself scanning the tops of the

* See "Parrots, Kingfishers, and Flycatchers," by Alexander Wetmore, in the NATIONAL GEOGRAPHIC MAGAZINE for June, 1936; also the National Geographic Society's *Book of Birds*, Volume II. Virtually all species mentioned in this article are pictured and described in that two-volume work, a new edition of which is now available ($3 the set, postage prepaid in U. S. and Possessions).

Photograph by G. W. Rosner

TO BUILD THE TAMIAMI TRAIL, THE ROADBED (RIGHT) WAS CLEARED OF MUD AND THEN FILLED WITH ROCK BLASTED FROM A PARALLEL DITCH

Photograph by Luis Marden

WESTWARD FROM MIAMI, THE TAMIAMI TRAIL RUNS FOR MORE THAN 35 MILES WITHOUT A BEND

Cutting across the wild Everglades in southern Florida, the famous highway was named for Tampa and Miami, the two cities which it joins (map, page 118).

Photograph by Richard B. Holt

TWO CAUSEWAYS AND CHAINS OF VERDANT ISLANDS CONNECT MIAMI BEACH (FOREGROUND) WITH MIAMI AT THE EVERGLADES' EDGE

Photograph by Aero Graphic Corporation

FLEETS OF ISLETS CROWD MANY OF THE LAKES IN THE EVERGLADES' VAST AREA OF WATER, FOREST, SWAMP, AND PLAIN

From the air, many smooth spots show up as safe landing places for planes, but often these "fields" are actually growths of matted vegetation floating on water.

Photograph by Aero-Graphic Corporation

WHITISH BLOTCHES SHOW WHERE POOLS HAVE BEEN DRAINED TO OPEN FERTILE SECTIONS OF THE EVERGLADES TO AGRICULTURE

A new road zigzags into the "frontier" region in the upper right corner. Draining the vast swamp areas of central and southern Florida has raised serious problems. Many marsh birds and other water-loving creatures are deprived of breeding grounds, and in dry seasons the parched land is swept by fierce fires (page 158).

Photograph by G. W. Kenner

A HUGE DREDGE EATS ITS WAY THROUGH THE SWAMP

Water hyacinths cover the surface so thickly that the floating construction giant seems to stand on solid ground. At the right, another derrick rests on dry land. The operation was photographed near South Bay on Lake Okeechobee.

trees in the hope that I might catch a glimpse of the bird that had been long since erased from the south Florida wild-life picture. Chandler recalled how he had seen flocks of the parakeets in that vicinity when he used to go there as a boy.

Since none of the birds came back to us out of the past, we returned to the car and headed back toward Okeechobee City.

There followed days of wandering over the wide prairie. Most of the time the car forsook the sandy roads to follow its own course across the plain.

WONDERS OF THE FLORIDA PRAIRIE

Once, far out on the prairie, Chandler stopped the car near a low clump of palmettos. It seemed no different from thousands of other such clumps, but the warden pushed his way through the foliage and pointed to the nest of a turkey vulture. It was only a shallow depression in the ground, adorned with a few dead leaves and containing a pair of creamy-white eggs, mottled with brown and lavender.

Later the same day we came upon a tall pine tree standing alone. In its top was the nest of a pair of bald eagles, a massive structure evidently inhabited by the birds for years. Some of the sticks used in its construction were like small logs. On its edge perched a single young eagle, peering down at its visitors. As we inspected the nest, the old birds circled us but kept their distance.

That night brought us a thrilling sight, a flock of Florida cranes (*Grus canadensis pratensis*) arriving at their roost (page 136). This bird, larger than a goose, is a close relative of the sandhill crane and is

now rare except here. The roost we visited is the largest in the State, but the breeding season had started and most of the birds had paired off to build their nests in marshy spots.

After winding across the prairie for hours, the car pulled up in the late afternoon behind a stand of tall palmettos. Several marsh rabbits had emerged from hiding. As we took our places behind the palmettos to wait for the cranes to come in, a cottontail sprang from beneath the leaves at our feet.

From our vantage point we kept watch to the northwest because Chandler said the cranes would soon be returning from their feeding grounds along the shores of Lake Istokpoga. By peering over the top of our screening palmettos we could see the shallow pond, along the shores of which the great birds stand during the night.

THE COMING OF THE CRANES

It was getting dusk when Chandler made a motion for silence. From the direction of the lake came the buglelike notes of a Florida crane. Soon a pair of the huge birds approached us, flying low and silhouetted against the sunset. Arriving over the bushes which surrounded the pond, they set their wings, lowered their long, awkward legs, and glided to a landing at the water's edge.

Another lone bird appeared. Soon others began arriving in groups ranging up to seven. When several came to the roost at a time, those already on the ground greeted the new arrivals with a raucous chorus.

Through our binoculars we could see them stalking along the edge of the water, evidently selecting some comfortable spot to stand and sleep. It was just about dark before the last bird arrived. Ninety-three of them had come to the pond. Before the breeding season started, Mr. Sprunt had visited the roost and counted 768.

Leaving the crane dormitory, the car wound back across the prairie through the darkness, the headlights making the landscape even stranger than it had been in the daytime. Chandler found his way about in the dark as well as he did when the sun was shining.

That night the expedition members were guests at the home of W. S. Pearce, patriarch cattleman of the Kissimmee Prairie. Mr. Pearce retired recently and now the ranch, with its thousands of cattle, is operated by his daughters. Their ranch house is in a grove of ancient live oak trees on the bank of the winding Kissimmee River.

Members of the family and cowboys were amused when their visitors insisted on arising at dawn to hike along the river bank and listen to the yelling cries of the limpkins (*Aramus pictus pictus*) in the marshes. The limpkin is a gangling brownish bird with a long, slender bill. It has a cry like that of no other thing that flies—a startled yell. It also startles the listener who has never heard it before.*

At dawn the limpkins were standing like sentries in the edge of the marsh grass and yelling their heads off. Sharing their riverbank habitat were a few snowy egrets, little blue herons, Ward's herons, and a young bald eagle. A barred owl greeted the dawn with hoots from the woods beyond the marsh.

Before leaving the area of Chandler's patrol we decided to inspect the marshes bordering Lake Okeechobee, which provide a home for countless flocks of water birds. As usual, Chandler felt that dawn was the time to start.

Driving to the mouth of the Kissimmee River, we embarked in an outboard motorboat and headed southwest. Looking to the left was like gazing out over an ocean, for no shoreline was visible. Lake Okeechobee is more than 30 miles across. On our right the marsh grass formed a border for the lake, an expanse of green which varied from one to four miles in width.

In this undisturbed haven of grass and water the birds had found sanctuary. Their squawking, chattering voices came mysteriously from the depths of the marsh to be heard above the whir of the motor. From time to time they rose in flocks above the forest of reeds only to settle back out of sight, white ibises, little blue herons, snowy egrets, and many others.

OCEAN FISHING RULES APPLY TO BIG LAKE OKEECHOBEE

The only human beings encountered on the lake were fishermen setting out long nets for catfish. So large is this fresh-water lake that it is classed legally as salt water and comes under the same fishing regulations as the ocean.

As the boat passed the mouths of little bays, flocks of coots, widgeon, and other waterfowl appeared. An osprey flew overhead, a fish clutched in its claws.

* See "Hunting with a Microphone the Voices of Vanishing Birds," by Arthur A. Allen, in the NATIONAL GEOGRAPHIC MAGAZINE for JUNE, 1957; also The Society's *Book of Birds*, Volume I.

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LONG-LEGGED, LONG-BILLED WOOD IBISES LOOK AS IF THEY WERE A PART OF THEIR ROOSTING TREE

The two at the left seem to be romancing, but actually they are separated by several feet. On the upper part of one of the tallest limbs are three snakebirds. Shoulders and head of a cormorant are barely distinguishable (bottom center). The group was photographed at Cuthbert Lake Rookery, near Cape Sable (page 142).

Photograph by S. A. Grimes

EXTINCTION THREATENS THE EVERGLADE KITE

Some ornithologists believe there are not more than 30 individuals of this species left in Florida. Once it abounded in watery areas where it found large numbers of the fresh-water snail (*Pomacea*), its only food. Drainage and other encroachments of man have seriously restricted its range (page 134).

Photograph by George Shiras, 3d

FAVORITE PERCHES FOR CORMORANTS ARE CANAL MARKERS

One sits on the post as if to referee the race. Florida cormorants in large flocks frequent bays and lagoons along both coasts of the State, as well as the larger rivers and lakes. In pursuit of fish, they dive expertly and can remain under water for long periods, swimming rapidly.

Photograph by Luis Marden

A WARDEN'S HORSE RIDES TO WORK

Audubon Warden Marvin Chandler, who keeps a check on the avian population of a wide area in central Florida, uses a trailer to carry his horse as far as an automobile can travel. Then he mounts it and continues his patrol (page 117).

Photograph from W. M. Burtline

DEEP IN THE FOREST, THE SEMINOLE DEER HUNTER SETS UP CAMP

Gun in hand and dog at heel, the tribesman returns from the hunt with a deer slung over his back. Skins of other prizes dry on a pole. The Seminoles have built palm-thatched villages along the Tamiami Trail. The Indians are permitted to kill game on their reservations (page 141).

Occasionally a white pelican came sailing along, gliding low over the water like a fat-bodied amphibian airplane.

After several hours of watching the shifting panorama of bird life, Chandler steered the boat toward the mouth of the Indian Prairie Canal.

Overgrown with water plants, the mouth of the canal, the shallow bay there, and the marshes reaching out on either side, all combine to form an ideal feeding ground for birds. They kept us busy with the binoculars, Mr. Sprunt and the warden calling out the name of each additional species sighted.

High overhead, seven white pelicans soared in formation. Standing on a pile of coral rock thrown up in the digging of the canal were Caspian terns, laughing gulls, and herring gulls. Ducks of various species fed on aquatic vegetation. Flocks of white and glossy ibises rose from the marsh. Black-necked stilts waded daintily in the shallows. A bald eagle flapped in the distance and from a thick stand of reeds beside the mouth of the canal some 200 red-winged blackbirds kept up a ceaseless chorus.

It seemed that Chandler was poling the boat into a strange world, the only inhabitants of which were birds. Each few feet the boat moved brought additional species into view. In not more than 20 minutes, 34 species were seen. Permitting the boat to float motionless, we sat watching the teeming bird life about us. Never had I seen so many species of wild birds in one spot.

Photograph by S. A. Grimes

A ROSEATE SPOONBILL PERFORMS A BALANCING ACT

Head down and wings upraised, it steps gingerly along a shaky branch on an island in Alligator Lake, on Cape Sable. This striking adult spoonbill has a yellowish-green head, white neck, back, and breast, and rose-pink body and wings. Its tail coverts and shoulders are splotched with carmine. Among the Ten Thousand Islands the author saw two flocks totaling 50 individuals, estimated as half the remaining spoonbill population in Florida (page 142).

ONE OF 30 EVERGLADE KITES

But there was to be a spectacular climax even to this impressive assemblage. The warden was poling the boat back out of the shallow bay when Mr. Sprunt half rose to his feet, rocking the craft and staring toward the mouth of the canal.

AP Photograph from Pictures, Inc.

IN SKILLFULLY FASHIONED DUGOUT, A SEMINOLE POLES HIS WIFE, CHILD, AND HOUSEHOLD GOODS TO A NEW HOME

In sharp contrast to the well-made boat is the crudely rigged sail. With the Indian's love of color, the tribesman wears a brightly figured shirt. About 650 Seminoles still live in southern Florida, where they hunt and fish, and trade in hides and souvenirs along the few roads which skirt their inaccessible haunts.

Photograph by Aero-Graphic Corporation

BOLDLY SWEEPING OVER THE WAVES, THE OVERSEAS HIGHWAY IS A CONCRETE THREAD STRUNG WITH BEADLIKE ISLES

A ramp leads down to buildings on palm-studded Pigeon Key, which gives a dry-land foothold to the viaduct. The tiny black specks beyond the drawbridge are automobiles. Protective railings edge the paving, which links Key West with mainland Florida.

"Just look over there," he called out excitedly.

Flying low over the water was an Everglade kite, one of the rarest birds in the United States (page 129). We watched as the bird, hawklike in appearance, flew to the shallows. Descending, it lowered its feet into the water, flapped hurriedly, and rose again with a large snail held in its claws. Flying to a small stump on the shore, it proceeded to make a meal of its catch. We sat perfectly still, watching the bird as it finished its repast, rose into the air again, and disappeared over the marsh.

This graceful bird was once common in Florida. Its diet consists mainly of the large fresh-water snail (*Pomacea*). Drainage and the inroads of agriculture reduced the areas where the snails were to be found, and the Everglade kite dwindled in numbers accordingly. Only eight nesting pairs have been located in the vicinity of Lake Okeechobee and some ornithologists believe there are not more than 30 of the birds left in the entire State.*

MARSH LANDS ARE ROOKERY SITES

Discussing our good fortune at having seen such a rare species, we moved through the calm water and pointed the boat back toward our starting place.

Taking leave of Warden Chandler, I departed for an inspection of the great marshes of the upper St. Johns River. This stream is one of the broadest south-to-north-flowing rivers in the United States. Its upper reaches meander through a wide belt of marsh land which provides rookery sites for thousands of birds.

When we were there, the flocks were augmented by others which had migrated northward in search of places to establish nesting colonies. They had been driven out by the drought conditions which we were to find later to the south.

Host on this part of the trip was Warden Arthur Eifler. He and Mrs. Eifler live on an ancient Indian mound on the shores of Lake Washington, their house nestling in a grove of cabbage palms. The mound, called Cabbage Mound, is surrounded by swamp. While showing me about his home, the warden took a small stick and scratched in the earth of his dooryard. After a few minutes he uncovered a fragment of Indian pottery. Evidently the mound contains many Indian relics, and Eifler would like to turn archeologist and excavate it, but he hates to dig his home out from under him.

The warden's job is to guard the Lake Washington rookery, one of the oldest and largest nesting places for water birds in the State. He promised us a sight we would not forget; that afternoon he kept his promise.

Leaving the dock in his motorboat, we cruised along the edge of the rookery. The birds could not have selected a better site to attend to their domestic duties. Stretching for a mile along the east shore of the lake, the rookery was a huge floating island.

Sweet myrtle, willows, cattails, saw grass, bulrushes, and other plants formed a tangle impenetrable to human beings. Any attempt a man might make to walk there would result in a disappearance through the heavy muck to the ooze beneath.

THE EGRET WITH THE LACY FEATHERS

Eifler anchored the boat out in the lake and we waited for the birds, which had been feeding as far away as 20 miles, to come home for the night. There was only a suggestion of a breeze and the boat floated on a glassy surface. From the rookery could be heard the gurgling call that the snowy egret makes during the mating season. Evidently they were the first occupants of the rookery to start nesting.

Like its larger cousin, the American egret,

* A list of the birds seen in that one spot at the mouth of the Indian Prairie Canal follows: Everglade kite (*Rostrhamus sociabilis plumbeus*), turkey vulture (*Cathartes aura septentrionalis*), white pelican (*Pelecanus erythrorhynchos*), baldpate (*Mareca americana*), blue-winged teal (*Querquedula discors*), coot (*Fulica americana americana*), greater yellow-legs (*Totanus melanoleucus*), Caspian tern (*Hydroprogne caspia imperator*), laughing gull (*Larus atricilla*), herring gull (*Larus argentatus smithsonianus*), dowitcher (*Limnodromus griseus*), red-winged blackbird (*Agelaius phoeniceus*), yellow-throat (*Geothlypis trichas*), Louisiana heron (*Hydranassa tricolor ruficollis*), little blue heron (*Florida caerulea caerulea*), American egret (*Casmerodius albus egretta*), snowy egret (*Egretta thula thula*), white ibis (*Guara alba*), eastern glossy ibis (*Plegadis falcinellus falcinellus*), Florida cormorant (*Phalacrocorax auritus floridanus*), limpkin (*Aramus pictus pictus*), Ward's heron (*Ardea herodias wardi*), anhinga or water turkey (*Anhinga anhinga*), black-necked stilt (*Himantopus mexicanus*), southern bald eagle (*Haliaeetus leucocephalus leucocephalus*), palm warbler (*Dendroica palmarum*), shoveller duck (*Spatula clypeata*), boat-tailed grackle (*Cassidix mexicanus major*), ring-billed gull (*Larus delawarensis*), Forster's tern (*Sterna forsteri*), black skimmer (*Rynchops nigra nigra*), lesser scaup (*Nyroca affinis*), ring-necked duck (*Nyroca collaris*), duck hawk (*Falco peregrinus anatum*).

the snowy egret was once on the verge of extermination by plume hunters (page 117). Federal laws were passed making even the possession of their lacy feathers a serious offense. The birds began to increase and continued until now they are again numbered in tens of thousands. Once more the American egret wanders as far north as New York State and even Canada in the summer, causing numerous inquiries and astonished reports from persons who have seen "a big, snow-white crane."

Photograph by Lida Marden

"OKAY, YOUNG FELLOWS, THAT'S ALL TODAY!"

An Audubon warden has stopped two boys on their homeward way from a rural school near Lakeport on Lake Okeechobee to question them about a poacher seen in the vicinity. Residents of the area give much help to the officers in tracking down law-breaking hunters, and inform them about the movements of birds and animals.

As if moving in accordance with some avian timetable, flocks of little blue herons and Louisiana herons appeared from the westward, flying low over the lake to the rookery. White ibises, large birds with curved pink bills and white plumage except for black wing-tips, began to arrive at 6:10 p. m. During the next hour, as we sat there in the boat, approximately 45,000 birds flew to the rookery; 35,000 of them were white ibises.

They crossed above the lake in long files, the birds following a leader and keeping themselves evenly spaced in line. Some of the files contained several hundred ibises. In general they kept pace with each other, all the birds in line flapping and gliding in unison. In some of the shorter files the timing was so perfect that it seemed as if some invisible coxswain were calling out the beats for his feathered crew.

Most spectacular was the manner in which the lines of birds rose and dipped as they crossed the lake. So closely did they follow their leaders that they seemed to be moving over unseen hills and valleys rather than traveling in mid-air.

As more and more birds arrived, the chorus from the rookery rose to a raucous din. It subsided again as the great bird city settled down for the night. As in the case of the Florida cranes, it was almost dark when the last files winged their way across the lake.

Photograph by Ernest G. Holt

READY TO JUMP AT THE DROP OF A HAT

A wary young Florida crane "faces off" with Audubon Warden Marvin Chandler on the Kissimmee Prairie, one of the bird's principal breeding grounds. A close relative of the sandhill crane, this species is now comparatively scarce. Only about 3,000 of them are left (page 126).

The warden made careful estimates as the birds came in.*

From Lake Washington I made a quick drive to Miami, jumping-off place for the next part of the trip (page 123). Arriving in the morning, we found the city enveloped in a thick pall of smoke. There had been a prolonged drought and large areas of the Everglades were on fire. A wind from the west was bringing the smoke for miles, carrying it into east-coast cities and on out to sea.

Waiting until a shift in the wind had driven back the smoke and increased visibility, we took off in a U. S. Coast Guard seaplane with Commander C. C. von Paulsen at the controls. Before flying over the Everglades, the plane followed the Florida Keys, that long chain of low islands which curves from the southeastern tip of the Florida Peninsula far into the Gulf of Mexico.

* A compilation of the populations of the Lake Washington rookery follows: white ibis, 35,000; Louisiana heron, 3,000; little blue heron, 3,500; glossy ibis, 150; snowy egret, 2,000; American egret, 300; Ward's heron, 24; anhinga, 100; Florida cormorant, 50; Florida duck (*Anas fulvigula fulvigula*), 8; Florida gallinule (*Gallinula chloropus cachinnans*), 24; purple gallinule (*Ionornis martinica*), 8; black-crowned night heron (*Nycticorax nycticorax hoactli*), 75; yellow-crowned night heron (*Nyctanassa violacea violacea*), 23.

THE STAY-NEAR-HOME BIRD

The Florida Keys constitute the home of the great white heron (*Ardea occidentalis*), grandest of American herons and a bird which probably has a smaller range than any species in the United States. Four years ago there were only about 160 of these spectacular birds left alive.

After several years of protection by Audubon wardens a census last spring showed they had increased to about 600 individuals. In October, 1938, President Roosevelt issued an executive order creating the Federal Great White Heron Refuge on the western end of the Florida Keys. Since then, Audubon wardens and wardens of the United States Biological Survey have co-operated in protecting them.

Beneath us the keys extended like irregular beads held together by the recently built Overseas Highway running all the way to Key West (page 133). It was hard to believe that the water about them could be so many shades of blue and green. For long stretches it was clear and shallow, every

Photograph by Allan D. Cruickshank

A BLACK-TIPPED WHITE IBIS GIVES A LESSON IN SOARING

Legs stiffly trailing and neck outthrust, the bird glides across the sky. In a single hour the author watched 35,000 ibises fly in long files across Lake Washington, on the upper St. Johns River, to their rookery (pages 134-5).

detail of the bottom visible as we passed over it. The sand showed gray or brown, shelving off to the white of the beaches surrounding the islets. As the water deepened, it graduated to darker shades of blue. Here and there were inky patches marking spots of considerable depth, surrounded by belts of aquamarine.

AN OSTRICH OF SALT WATER

A Florida cormorant floating on the surface appeared as if suspended in mid-air (page 129). Frightened by the roar of the plane, it turned its head to look at us and then dived beneath the surface. It seemed a foolish way to escape, for we could see the bird under water almost as clearly as when it was on top. Looking back, I watched it come up again amid a ring of ripples, evidently satisfied that it had played a neat trick on the noisy monster above.

Large sharks moved along the bottom, singly and in groups. At one point, seven of them swam in a school. A few miles farther, the occupants of a pleasure cruiser turned their faces skyward to watch the passing of the plane. They did not know that while they watched us a pair of sharks of no mean size swam almost underneath their boat.

Besides sharks, we saw an occasional sea turtle basking at the surface and giant rays stirred up clouds of marl as they flapped their "wings" against the bottom.

As the plane zigzagged over the low islands, Commander von Paulsen and I counted the great white herons on each key. The white bodies stood out unmistakably against the foliage. After counting the birds on one half of an island, the commander would swing the plane around sharply to the other side.

A BIRD CENSUS BY SEAPLANE

Passing over the city of Key West, the plane continued to the Marquesas Keys, 20 miles beyond (map, page 118). Here was a coral atoll, a circle of coral islets enclosing a wide lagoon. The plane swung around so the herons could be counted and then the commander set a course direct for Cape Sable.

For a time no land was visible. Then, directly ahead of us, we saw the low-lying coastline of the cape, appearing as it did when Ponce de León approached it on his historic search, a long line of green formed

Photograph by George Shiras, 3d

WATCHFUL EYE AND SPINE-RIBBED BACK REVEAL A BASKING ALLIGATOR

In dry seasons in the Everglades, gators seek out pools and marshy hollows. They excavate tunnels, or enlarge natural caves, to a length of as much as 15 or 20 feet, and in the underground dens they "hole up" for considerable periods. Alligator hunters, mostly Indians, are said to draw the big reptiles out of their pits by grunting in such a way that the creatures come to the surface to exchange greetings. Rods also are used to poke them from their lairs (page 141).

by the trees and beneath it the white sand of the beach.

Nearer at hand a tangle of dead trees, uprooted and tossed about by the hurricane of 1935, formed an impenetrable jungle. Behind the cape was Whitewater Bay with its many mangrove islands. On our left was Ponce de Leon Bay. The plane headed toward it and then swung inland to follow the winding course of the Shark River, a stream which forms in the Everglades and flows southwest through forest which has never heard the whine of the sawmill.

When the river had become a mere twisting creek, Commander von Paulsen touched my shoulder and indicated the view ahead with a wide sweep of his arm. Before us lay the Everglades, one of the strangest of American landscapes.

Flat as a table and seemingly endless, the sun-baked land spread out beneath us. It was like a greenish-brown carpet, pock-marked with blackish holes, dry beds of shallow ponds. Normally, the Everglades would have been covered with several inches of water and the ponds would have been full, but the prolonged drought had left them sere and lifeless (pages 124–5).

Thousands of water birds had deserted the region for the well-watered country to the north. I had seen some of those wandering flocks at Lake Okeechobee and the marshes of the St. Johns River. Now the Everglades were waiting for the summer rainy season to bring them verdure and the returning wild life.

A MILLION-ACRE FIRE

The commander pointed to the north. Ahead rose towering columns of smoke. Bright fingers of flame which had been creeping across the Everglades for weeks slowly ate their way through the dry saw grass and palmetto. These were the fires which had been sending their smoke clouds eastward to harass the cities along the coast.

Photograph by Luis Marden

WHEN THE CALF GETS UP HE'LL HAVE A "TRADE-MARK"

Cowboys brand cattle with an identifying mark on a south Florida ranch. Branding is usually done at weaning time, when the animals are eight or nine months old. The Kissimmee Prairie, north of Lake Okeechobee, is an important cattle-raising area (page 120).

Gaining altitude, the plane passed through the wall of smoke and flew over a scene of utter devastation. The burning and blackened land stretched away as far as the eye could see in any direction. Here and there small geysers of smoke marked spots where pockets of the dried peatlike soil continued to smolder after the flames had passed on. The only living things visible were turkey vultures wheeling low over the blackened ground in search of the carcasses of animals which had been trapped by the fires.

For the remainder of the flight the commander cruised a wandering course so the area swept by the fires could be traced on the map. Later a conservative estimate showed that more than a million acres of the Everglades had been burned over.

Not until we were within a few miles of Miami did the fires come to an end. As we passed over the last of them, farmers were plowing firebreaks to protect their crops.

Next morning I left Miami again by automobile, this time to see the Everglades and the Big Cypress country from the ground.

My companion on this part of the trip was Warden Ray Barnes, who knows the swamps, the prairies, and the rivers as well as a Seminole.

Rolling along the Tamiami Trail, we again passed through the burning area. Smoke clouds grew so thick over the trail that motorists were prevented from taking that route for a time, lest, blinded by the smoke, they run their cars into the canal which parallels the highway.

After mile upon mile of prairie, the Everglades finally merged into the Big Cypress Swamp. The eastern part of it is a belt of scrub cypress 18 to 20 miles wide. Farther west lie the great, untouched swamps with their virgin forests of giant cypress, blackjack oak, maple, and various species of palms. In one section we found royal palms towering 110 feet in the air.

During the day we passed through part of the proposed Everglades National Park, a large area extending from north of the

Photograph by Eric Fleet

A FIRM GRIP, A TOSS OF THE HEAD—AND THE FISH IS STOWED

The brown pelican nets its food in the capacious pouch under the bill. Fish are stored in the stomach.

Tamiami Trail all the way to Cape Sable. Some day Florida's visitors may drive through this subtropic land or take regular boat trips up the coastal rivers.

That afternoon we were joined by another companion and changed vehicles for a trip into the swamp country. The new member of the expedition was Wilson Dykes, State Game Warden, and the new vehicle was a "Glades buggy."

A "MOTORIZED BULLFROG"

The Glades buggy is a sort of motorized bullfrog, an adaptation of the machine age to the jungle (page 141).

A favorite way of making a Glades buggy is to select a light automobile, tear out the rear end, and replace it with that of a truck. Four or even six wheels are attached to the rear axle for traction over the soft ground. Sometimes the tires are inflated, but often they are left flat and held on with heavy chains.

The vehicle is stripped to the essentials. Traveling in one is like riding on a pump handle. It makes three to five miles an hour when the going is rough, and as it bumps over logs, cypress knees, and gullies, its movements in a vertical plane exceed its forward progress.

As our Glades buggy pursued its agonizing course, I recalled with pleasure the rides on the Kissimmee Prairie. In comparison they seemed like trips on an express highway.

Our first destination was the Fakahatchee Swamp, largest of the swamps in the Big Cypress area. It is 22 miles long and three to five miles wide. On either side of it, fingers of smaller cypress trees extend out from the main body of the swamp. Between these fingers, or sloughs, are islands where tall slash pines mingle with cabbage palms, or small prairies where the grass grows waist-high. One of them was circular, and Barnes called it "Dollar Prairie."

A few hundred feet from the Tamiami Trail all signs of civilization disappeared. As our buggy bumped along, an occasional raccoon dashed for cover or deer which had been feeding in the open bounded into the woods. Several times we stopped and, with Barnes in the lead, sneaked through the grass to see wild turkeys. Once Barnes led us close without disturbing the birds and we watched a big gobbler strut and vocalize for the admiration of two hens.

The Big Cypress is one of the few places left where the true wild turkeys still exist. In most sections tame turkeys have escaped from farms and crossed with the wild stock.

That night our camp was made on a pine

Photograph by Luis Marden

"THE GLADES BUGGY IS A SORT OF MOTORIZED BULLFROG"

Wilson Dykes, State Game Warden, demonstrates the toughness of his remodeled automobile. The carburetor is on top of the motor, permitting the engine to run even when the vehicle is almost submerged. Four rear wheels equipped with heavy chains give traction on slippery ground (page 140).

island deep in the swamp. After dinner, as we sat around a campfire, a pair of barred owls perched in the trees over our heads. For almost an hour they hooted, clucked, snapped their beaks, and otherwise demonstrated their disapproval of the invaders. They were still keeping up a lively comment when we crawled into our sleeping bags.

After Barnes had demonstrated his uncanny ability at waking up at the first pale glint of dawn, we had breakfast and set out into the swamp on foot. In a mile and a half of walking, we saw eleven deer. We also came upon a spot where the bleached bones of deer were strewn on the ground, marking an old camp of meat hunters.

These poachers kill the deer and strip the flesh from the bones. Then they carry the meat through the swamp on their backs to the Tamiami Trail, where it is transferred to automobiles. The meat from one deer brings about $12. Warden Dykes sometimes spends weeks on the trail of meat hunters before apprehending them in their hideouts in the swamp.

Back in camp, we again boarded the Glades buggy to follow a faint trail which Barnes called a road. We made numerous stops. One was at a "cypress head," a large clump of cypress trees and other vegetation marking a low spot away from the sloughs and runs of the main swamp. Pushing our way through the tall grass to the center of it, we came upon an alligator cave.

In the dry season large alligators seek out low places where they dig caves in the soft earth to get down to the water level. These caves form small pools which become congregating places for many animals.

THE GRUNT THAT FAILED

Alligator hunters have several methods of getting the gators out of their caves. One is to "grunt 'em up." The hunter sits near the mouth of the cave and grunts in a manner calculated to be appealing to the alligator. It is asserted that the alligator, hearing the grunts, will come to the surface of his pool to exchange grunted greetings. When he does so he is shot. If this method fails, iron rods are used to poke and drag the reptile from its aquatic lair (p. 138).

About the pool formed by the cave were the tracks of wildcats, raccoons, otter, and other animals. The thick vegetation surrounding it included custard apple, maple, willow, and cypress. Wild orchids hung on the mossy limbs of the trees.

The three of us sat on a log, remaining quiet in hopes that the alligator would come to the surface. Even I tried grunting a few times. Barnes studied the muddy ground about the pool and assured us that the resident of the cave was still inside. The alligator failed to accord us any recognition, but, as we sat on our log, cottonmouth water moccasins came crawling to the pool from several directions. One of them passed within a few feet of my legs.

"Just sit still and they won't bother you," whispered Barnes. I might as well have been a statue.

From the Fakahatchee Swamp we journeyed northward to the Corkscrew Swamp, which lies to the south of Lake Trafford. This swamp is the site of an ancient rookery which contained 30,000 nesting wood ibises (*Mycteria americana*). The wood ibis, the only true stork inhabiting the United States, is a tall, solemn bird with a bare, wrinkled head and a huge beak. Lacking fancy plumes and not being palatable, it is one of few Florida birds which have been unmolested (page 128).

Crawling over fallen logs and cypress knees, we made our way on foot to the slough along which the birds were nesting. For almost a mile along its shore the cypress trees were decorated with the nests. We counted 16 nests in a single large tree. The young birds stood on the twiggy structures with comical solemnity, waiting for their parents to bring them food.

For a while we sat on a big log at the edge of an oval lagoon. Bird life was abundant in this unspoiled setting. About the lagoon the straight shafts of the cypress trees rose sheer to the leafy tops where the wood ibises stood on their nests.

Moss hung in streamers from the limbs and on the water floated the green rosettes of water lettuce. A snakebird perched on a stump, holding out its wings to dry. An American egret stood in the shallow water. Little blue herons sailed over the lagoon and young wood ibises which had left their nests made awkward attempts to support themselves on the floating vegetation.

A SCORPION GOES TO THE FAIR

For four days we wandered through the swamp country and at last emerged again onto the Tamiami Trail. A brief side trip was made to Marco Island where I captured a whip-tailed scorpion which I had promised to get for Dr. Raymond L. Ditmars, of the New York Zoological Park, who wanted it for his exhibit at the New York World's Fair.

Barnes had saved one of the most beautiful sights in all Florida wild life for the last. In a small motorboat we cruised down among the Ten Thousand Islands on the chance of seeing a flock of roseate spoonbills (*Ajaia ajaja*). Repeated counts by Audubon wardens had failed to show that there were more than 100 of these large pink birds with the paddle-shaped bills left in Florida (page 131). After the nesting season the spoonbills spread out in flocks to feed among the hundreds of mangrove islands along the southwest coast. There we hoped to find them.

As the boat wound among the myriad islands with their tangles of mangrove roots, an occasional brown pelican dived for fish. An osprey circled overhead and various species of herons perched along the shore. In a shallow cove Barnes suddenly pointed, shouting, "Look! There they are!"

A RAINBOW OF BIRDS

From behind a dense mangrove thicket a flock of thirty roseate spoonbills rose with rapid flapping and began to circle over the boat. Their bodies were rich pink and on each wing was a bar of deeper pink, almost carmine. As they circled, their plumage stood out in sharp contrast against the deep blue sky and the fleecy white clouds.

They rose higher and higher, as if climbing a winding stair. A second flock rose to join them in the air, making about fifty birds. They represented half of the roseate spoonbills believed to be alive in Florida today. Stretched out on my back in the bottom of the boat, I watched them until they became mere dots of pink wheeling against the blue. Slowly Barnes began poling the boat back to deeper water. As he did, the birds descended their stairway from the sky to drop once more into their feeding grounds among the mangroves.

The next morning Barnes helped me pack for the journey back north. He laughed as we stowed away my souvenirs of the trip. They included some wild orchid plants we had collected in the swamp, a set of deer antlers we had found at the camp of the meat hunters, some wild oranges, and the whip-tailed scorpion. But the greatest souvenir of my visit was a lasting impression of the wilderness area of south Florida, a region which has no counterpart anywhere in the United States.

NATIONAL GEOGRAPHIC SOCIETY

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To carry out the purposes for which it was founded fifty-one years ago, the National Geographic Society publishes this Magazine monthly. All receipts are invested in The Magazine itself or expended directly to promote geographic knowledge.

Articles and photographs are desired. For material which The Magazine can use, generous remuneration is made.

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In Mexico, The Society and the Smithsonian Institution, January 16, 1939, discovered the oldest work of man in the Americas for which we have a date. This slab of stone is engraved in Mayan characters with a date which means November 4, 291 B. C. It antedates by 200 years anything heretofore dated in America, and reveals a great center of early American culture, previously unknown.

On November 11, 1935, in a flight sponsored jointly by the National Geographic Society and the U. S. Army Air Corps, the world's largest balloon, *Explorer II*, ascended to the world altitude record of 72,395 feet. Capt. Albert W. Stevens and Capt. Orvil A. Anderson took aloft in the gondola nearly a ton of scientific instruments, and obtained results of extraordinary value.

The National Geographic Society-U. S. Navy Expedition camped on desert Canton Island in mid-Pacific and successfully photographed and observed the solar eclipse of 1937. The Society has taken part in many projects to increase knowledge of the sun.

The Society cooperated with Dr. William Beebe in deep-sea explorations off Bermuda, during which a world record depth of 3,028 feet was attained.

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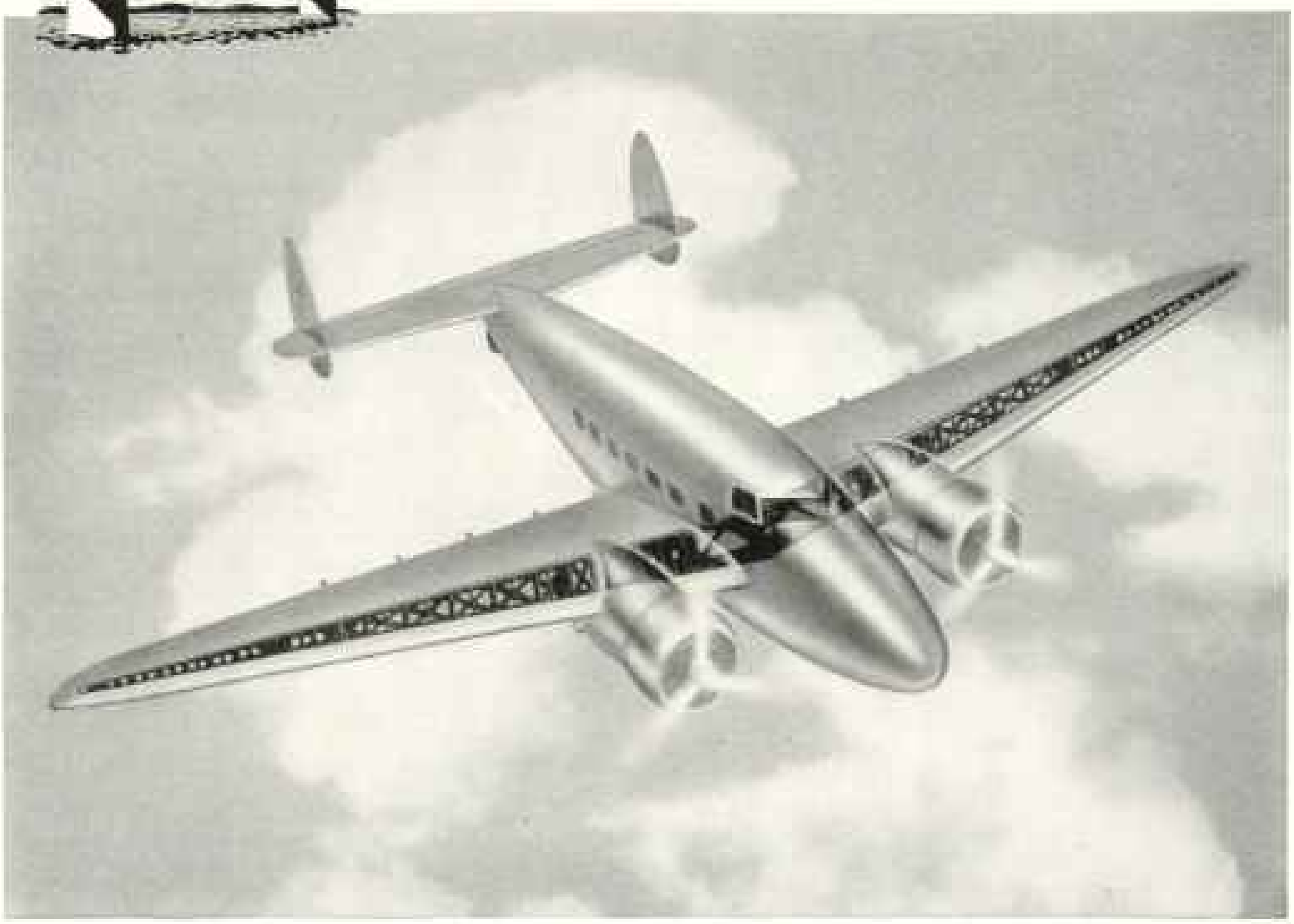

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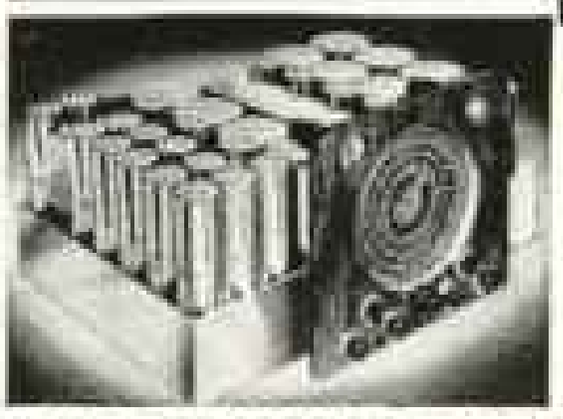

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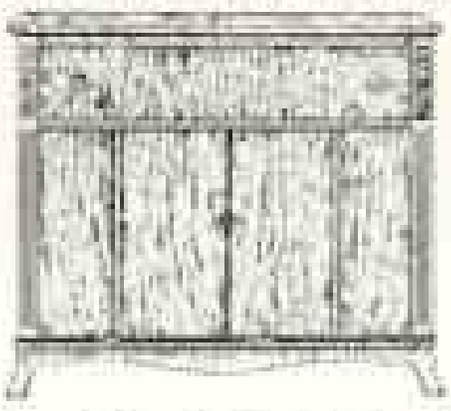

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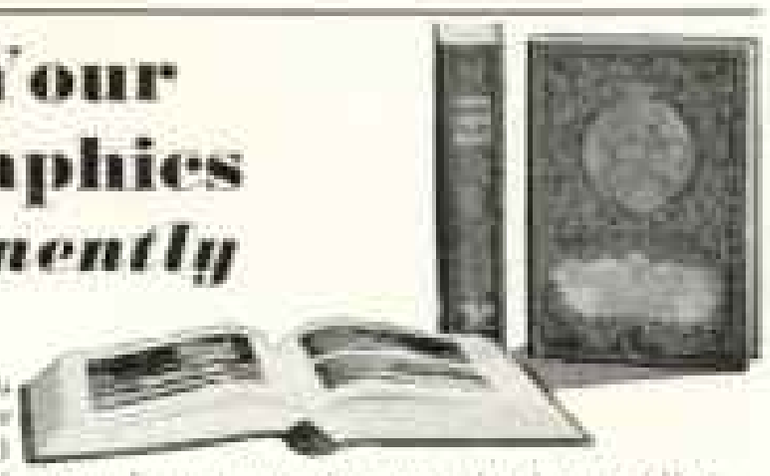

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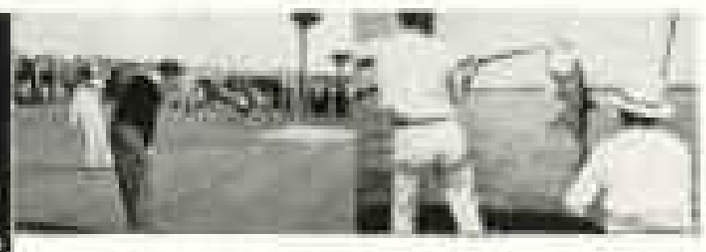

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Jacksonville's beaches are especially recommended for sufferers from allergic ailments.

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Please tell me how to make my vacation dollars buy more real vacation pleasure.

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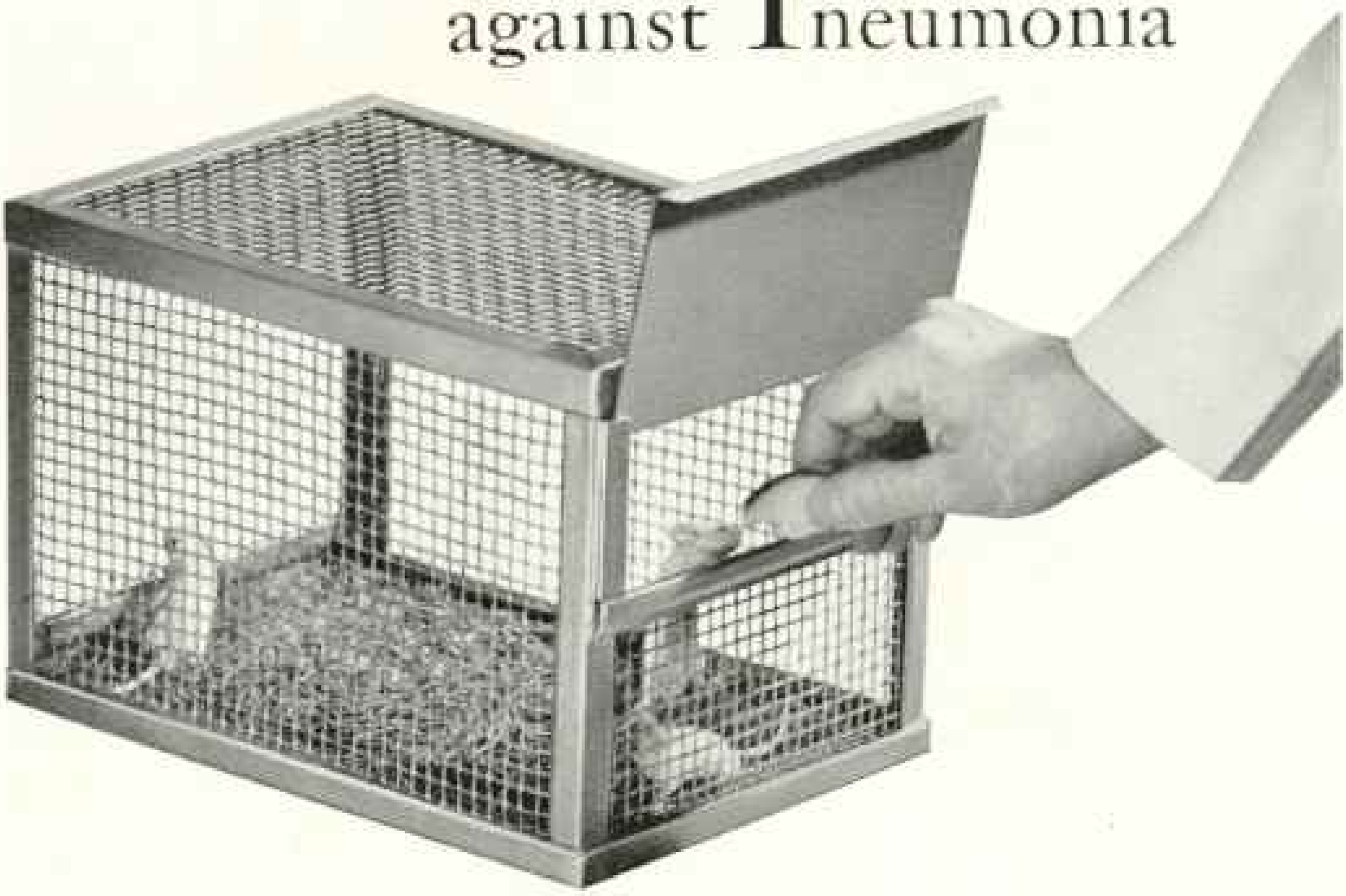
Mice and Men against Pneumonia



FOR MEDICAL RESEARCH PURPOSES, the white mice you see above are almost miniature human beings.

Their reaction to the pneumonia germ and to certain methods of diagnosing and treating pneumonia have been of invaluable help in the dramatic struggle waged by men and their little laboratory-helpers, mice, against death from this disease.

▶ Perhaps you do not realize how much progress has recently been made in this struggle—that the death rate from pneumonia has dropped nearly one-*half* in the past ten years.

Diagnosis of pneumonia is now more certain, determination of the type more accurate. Serums have been developed which are highly effective in combating the disease—provided they are given in time. New chemical compounds also are playing an important role in the control of pneumonia.

That this progress offers so much hope of relief and cure gives you more reason than ever to be on the alert for pneumonia's danger signals. More reason, too, for letting your doctor know about them promptly, and thus give him the opportunity of determining as soon as possible which treatment is most appropriate for your particular case.

▶ Though pneumonia may strike without warning, the most common symptoms usually appear after a cold or grippy infection or some extreme exposure or exhaustion. These symptoms consist of:

Sudden chill. Fever. Pain in side.
Cough. Thick, rust-colored sputum.
Hurried, somewhat labored breathing.

Any one or any combination of these symptoms indicates illness which may be pneumonia. So, a doctor should be called at once. Tragic situations have resulted from delay in seeking medical treatment. Pneumonia works fast, and the physician must work faster to check the disease.

▶ Throughout winter and early spring, colds and pneumonia are most frequent. During those coming dangerous months, much can be done to keep your resistance high to these infections. Write for Metropolitan's free booklet, "Colds, Influenza, Pneumonia," which contains many practical suggestions to help you ward off trouble.

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The Nia of the trees, the earth, the air and the rivers

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To the *nia* of the air, he may offer a wreath of leaves, scattering the leaves to the wind and to gain the good will of *nia* of the earth he may enclose some dust in a leather charm.

His offering to the *nia* of the rivers is likely to be a bracelet tossed into a forest pool. And to the *nia* of the trees, a customary offering is a white, new-laid egg, buried by a virgin at the foot of a sacred tree.

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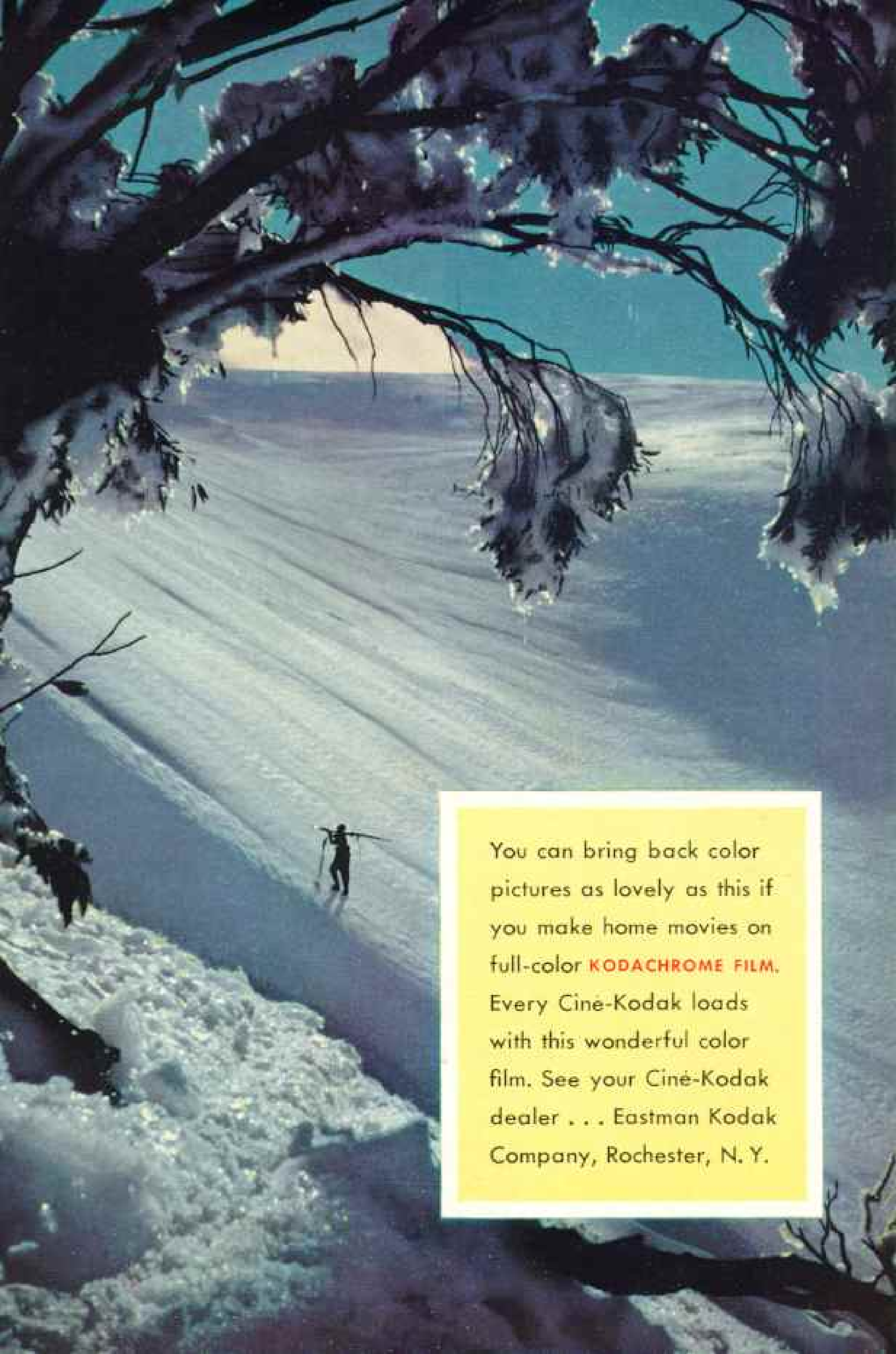

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