VOLUME LXII NUMBER SIX

THE NATIONAL GEOGRAPHIC MAGAZINE

DECEMBER, 1932

CONTENTS

Special Map Supplement of the World
Sixteen Pages of Illustrations in Full Color

The Historic City of Brotherly Love
With 49 Illustrations — JOHN OLIVER LA GORCE

Colorful Corners of the City of Homes
13 Natural Color Photographs — CLIFTON ADAMS AND EDWIN L. WISHERD

The Greatest Voyage in the Annals of the Sea
With 36 Illustrations — J. R. HILDEBRAND

A Wonderer Under Sea
With 13 Illustrations — WILLIAM BEEBE

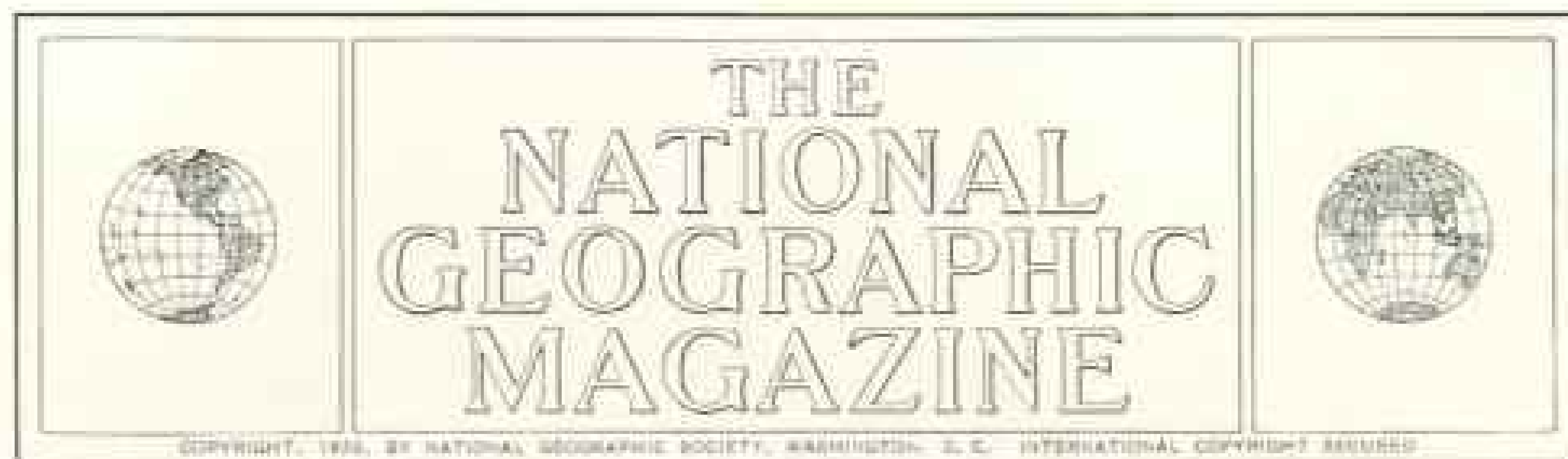
Exploring Neptune's Hidden World of Color
8 Paintings — E. BOSTELMANN

The Story of the Map
With 11 Illustrations

PUBLISHED BY THE
NATIONAL GEOGRAPHIC SOCIETY
HUBBARD MEMORIAL HALL
WASHINGTON, D.C.

$3.50 A YEAR — 50c THE COPY

VOL. LXII, No. 6 WASHINGTON DECEMBER, 1932



THE HISTORIC CITY OF BROTHERLY LOVE

Philadelphia, Born of Penn and Strengthened by Franklin, a Metropolis of Industries, Homes, and Parks

BY JOHN OLIVER LA GORCE, A. M., LITT. D.

Vice-President, National Geographic Society

IN THE quaint minutes of a meeting of the Society of Friends, at Shackamaxon, on the banks of the Delaware, for November 8, 1682, there is an entry as eloquent as it is brief. It reads:

"At this time Governor William Penn and a multitude of Friends arrived here and erected a city called Philadelphia, about half a mile from Shackamaxon."

A city so small that in 1682 its location had to be defined as a half mile from Shackamaxon, Philadelphia in two-and-a-half centuries has become one of the world's greatest urban centers, possessing a colorful history of leadership in the development of the arts and sciences and in the progress of industry.

And Shackamaxon! The direction-finder of Father Penn's day is now a tiny park on the Delaware River, between the lines of Fairmount and Girard avenues, tenderly cared for by the big city that has entirely surrounded it.

To-day this metropolis of two million souls, third in size among all American urban communities and eleventh among the municipalities of the earth, covers 80,000 acres, stretching fourteen miles between League Island and Somerton and seven miles between the Delaware River and Cobbs Creek.

Despite its spread, it continues to be the city of its founder, for William Penn established its plan, selected its name, and projected its future.

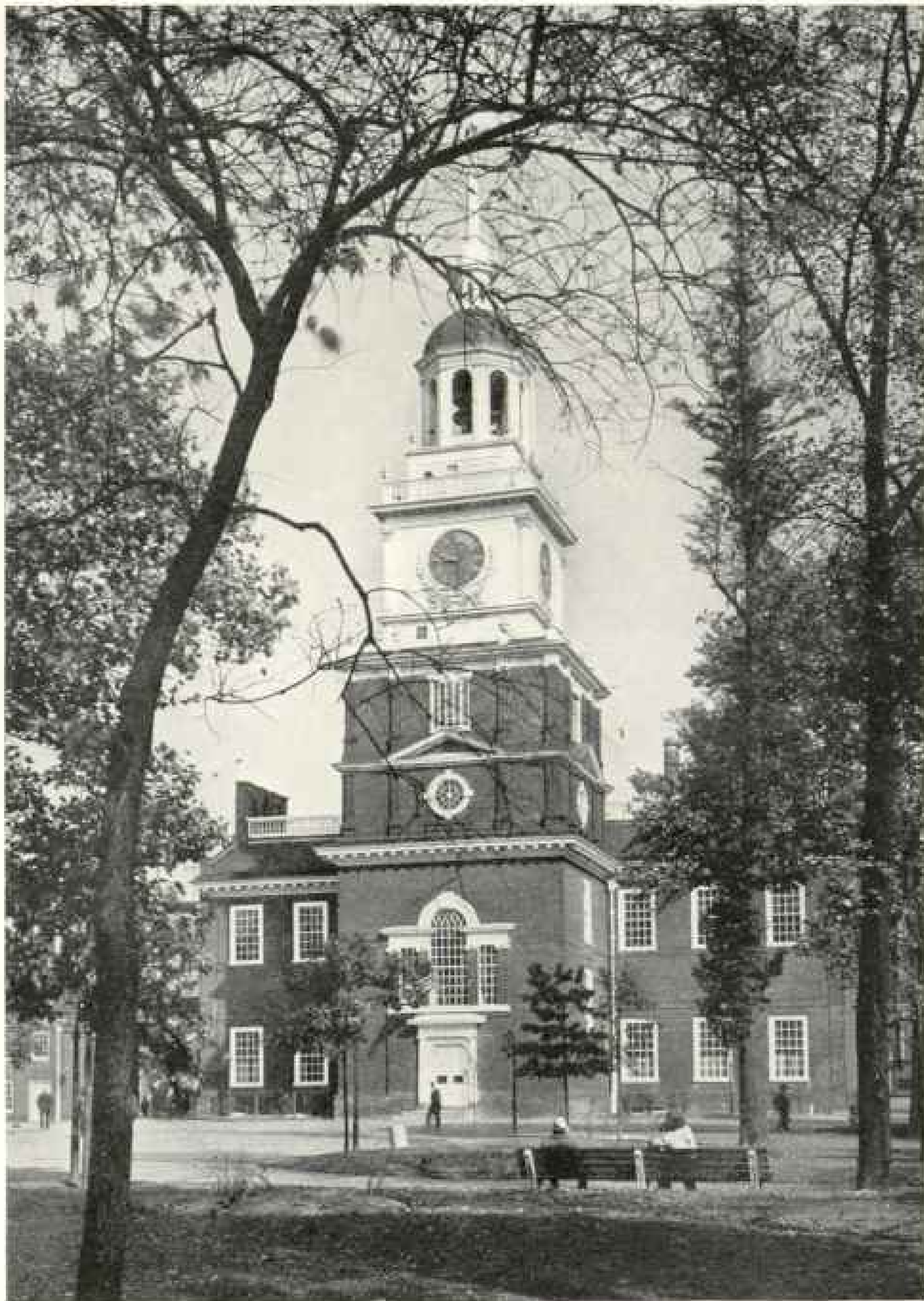
His care and forethought in laying out its central area in the urn-shaped district between the Delaware and the Schuylkill, with its central and satellite squares, have been perpetuated to this day. This area stands as a monument to his genius as a city planner, even in these times of amazing urban developments.

Marvelous changes have been wrought in the two-and-a-half centuries since the solid old Quaker landed at the Blue Anchor Inn; but neither widened streets, new-built boulevards, expanding wealth, growing population, nor waxing commerce have succeeded in erasing the elusive charm and challenging spirit that its founder gave the city.

PEERING THROUGH A TELESCOPE OF CENTURIES

The traditions and the attitudes of the long ago are maintained in this metropolis as perhaps nowhere else in America. It is no mere coincidence that Philadelphia has sixteen establishments that have been doing business consecutively from ante-Constitution days, or that the city has a number of firms that have persisted for a century.

Nor is it a matter of mere chance that Philadelphia has become known as one of



Photograph by Edwin L. Wisherd

INDEPENDENCE HALL, LIBERTY'S SHRINE OF SHRINES

The delight of architects, the joy of patriots, and the pride of Philadelphians, this stately structure is a monument as well to the good taste of the people of colonial Pennsylvania. It houses the Liberty Bell (see illustration, page 671, and text, page 674).

the world's busiest workshops; that it has right to boast of being a City of American Beginnings; that it has more individually owned dwelling houses than any other urban community in America; that it has a larger percentage of native-born people than any other municipality of its class.

For the first settlers were artisans who relied upon their industry; the broad-brimmed hat of the pietist, rather than the ruffles and plumes of the cavalier, stamped the outlook of the settlers upon life. Adventurers found small place among them. The city's foundations were laid upon the character of its people.

Perhaps we may gain our best idea of the city of the Pious Penn by going forthwith to its capitol, the City Hall, and from the parapet of its tower getting a bird's-eye view of this metropolis (page 646).

First, let us note above us the heroic statue of the founder. Massive above almost every other statue in America, it is still successful in perpetuating the benign qualities of the great man and the benediction he invoked upon the city as he sailed away in 1684, never to return: "And thou, Philadelphia, the virgin settlement of this province, named before thou wert born, what love, what care, what service, and what travail has there been to bring thee forth and preserve thee from such as would abuse and defile thee! My soul prays to God for thee, that thou mayest stand in the day of trial, that thy children may be blessed of the Lord, and thy people saved by His power."

This huge bronze statue of Penn weighs 53,348 pounds and stands 37 feet high. All of its portions are of amazing scale—the hat 9 feet in diameter, the shoes 5 feet 4 inches long, the coat cuffs 3 feet deep, and the buttons 6 inches across.

The shoulders are 11 feet broad, the arms 12½ feet long, the eyes a foot in length, the calves of the legs 8 feet and 3 inches in circumference. The hair is 4 feet long (see, also, page 650).

Look with me over the outstretched city below. A magnificent river front proclaims one of the world's great ports; a towering business district tells of a financial center of the first order; a dozen industrial areas speak of manufacturing operations; parks, parkways, a canalized river, museums, stately art galleries, and fine libraries write the superscription of culture over the city; suburbs of rare beauty environ it and make such areas along the Main Line and the Reading Route resplendent jewels in the city's crown; railroad facilities of latest electrified type extend the city into the country and bring country into town.

THE CITY OF PARKS FULFILLS PENN'S DREAM

It was always the dream of William Penn that his city should ever remain "a greene country towne." Through these two-and-a-half centuries the citizens steadily kept faith with his purpose, and to-day we find one acre out of every thirteen within its confines devoted to parks and squares.

The beauty spot of the whole city is Fairmount Park, one of the largest in the world. With 43 miles of drives and 44 miles of paths winding through its 3,600 acres of scenic beauty and romantic history, one who has a day to spend there revels in delightful prospects.

Extending on both sides of the Schuylkill River and rimmed in by its flood-plain bluffs, from the end of the Parkway and the Art Museum to the confluence of the Wissahickon, and then heading up the Wissahickon gorge past Manayunk and Roxborough, on the one side, and Germantown and Chestnut Hill, on the other, Fairmount Park is truly a realm of delight.

Here is Lemon Hill, the country home of Robert Morris, the financier of the Revolution, frequented by Washington and Jefferson, Adams and Lafayette, who sat down to break bread with the banker where the populace now may come and eat and be entertained at the concerts for which Fairmount Park is famous.

At the foot of this historic hill runs the Schuylkill, its east bank covered with the clubhouses of the "Schuylkill Navy."

Here and there giant arch bridges cross the river, some carrying the vehicular traffic of a city, others the trains of a busy metropolis.

The valley of the Wissahickon has been aptly called a miniature Alpine gorge, and it certainly possesses some of the most charming scenery in the world. Wissahickon Creek, winding in and out among precipitous hills down whose rocky ravines little streams dash in silvery cascades, is a watercourse seeming to belong more to

Photograph from Dallin Aërial Surveys

FATHER PENN SURVEYS PHILADELPHIA'S FOREST OF SKYSCRAPERS

Here, where once stood the gallows and the stocks, surrounded by open farms, beats the financial heart of a metropolis. At the lower right is the City Hall terminus of the famous $30,000,000 Fairmount Parkway (see text, page 651), and just beyond it the once imposing but now antiquated Broad Street Station.

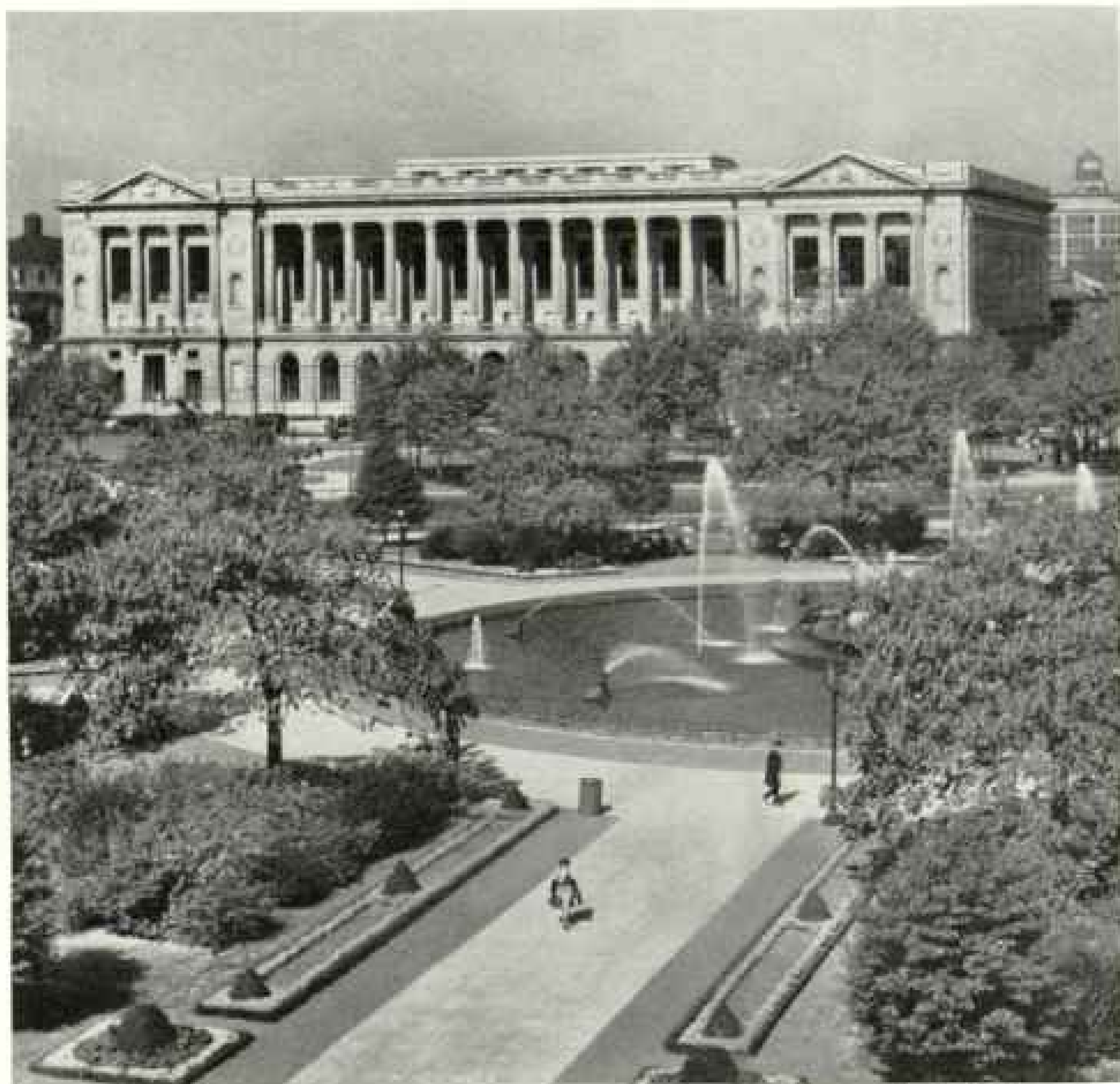
the mountains than to the plain. Nearly a quarter of a million trees flourish in their native forest on the slopes that sequester the Wissahickon (see, also, Color Plate I and illustration, page 691).

A GREAT NEED AND THE RESPONSE

For years on end Philadelphia has been conscious of a dire need for a parkway from the center of the city into Fairmount Park and the northwestern section of the city. There were no diagonals from the city's center at City Hall Square.

Then came a time when the passenger-train facilities of the nineteenth century no longer were adequate to the second quarter of the twentieth. Steam trains for suburban traffic became archaic. The old Broad Street Station of the Pennsylvania was outgrown, the old Chestnut Street Station of the Baltimore and Ohio seemed a page from an almost forgotten past; and the Reading Terminal—well, that might have been modern in Centennial times, but it was antiquated in the late twenties. Electrification had to come. Underground traffic was the only way to speed up the city's great suburban transportation.

The Pennsylvania led off. It would abandon the old Broad Street Station and build



Photograph by Harold M. Lambert

THE FREE LIBRARY, WITH LOGAN CIRCLE IN THE FOREGROUND

From the day that Benjamin Franklin began gathering books in the Leathern-Apron Club, Philadelphia has been one of America's literary centers. To-day it ranks with world cities in the quality and diversity of its libraries.

itself a suburban station underground, where all its trains into the metropolis could connect with the Quaker City's subways and its beneath-the-ground concourses.

No longer would the visitor into Philadelphia have to take his life in his hands crossing the roadways around City Hall Square.

But that was only half of the Pennsylvania's problem. Old West Philadelphia Station was a nightmare to all of the millions who used it. A great station on Thirtieth and Market streets, where the through traffic of the country could tie together with the suburban service, was the solution of the problem.

The opening up of the new monumental Pennsylvania Station and the putting into service of the Broad Street Suburban Station made possible the razing of the "Chinese Wall," as the great viaduct into the old Broad Street Station was called. In its stead there will be opened up in the not-distant future a new highway, known as Pennsylvania Boulevard, extending from City Hall Square to the imposing and classical east façade of the Pennsylvania Terminal.

With the Pennsylvania busying itself to give the people of the City of Brotherly Love and its environing suburbs the finest and most modern electrified service the

© Aëro Service Corporation

AS A BIRDMAN SEES THE CITY OF PENN

In the foreground is the Philadelphia Museum of Art (see, also, Color Plate III and page 653), with Fairmount Parkway leading via Logan Circle to City Hall Square. To the right of the Museum is the Schuylkill River, spanned at this point by the Callowhill Street Bridge. Beyond the river are the new passenger coach yards of the Pennsylvania Railroad. Beyond them is seen the stately new Pennsylvania Station, and near by it the huge concrete platform on which the new post office will blossom. The station and the post office will each be equipped with airplane landings, the runways at right angles, so the ships may always land into the wind. In the upper right hand is seen the League Island section, and across the Delaware River lies New Jersey. Contrast this view of Philadelphia with the balloon picture on the opposite page, taken nearly forty years ago.

© W. N. Jennings

PHILADELPHIA PHOTOGRAPHED FROM A FREE BALLOON IN 1893

In the center is the site of the present-day Art Museum, and in the central background the unfinished City Hall Tower (see illustration, opposite page).

Photograph by Clifton Adams and Edwin L. Wisherd

THE DELAWARE FROM PENN TREATY PARK

"As long as water flows and the sun shines and grass grows" was the substitute for "in perpetuity" in Penn's Treaty with the Indians at Shackamaxon. It has been called the only treaty never attested and never broken.

Photograph by Clifton Adams and Edwin L. Wisherd

FATHER PENN ATOP CITY HALL TOWER

Countless thousands of visitors have ascended to view the city almost eye to eye with the founder's bronze statue, designed by Alexander Calder. Note several of the visitors on the circular balcony beneath the lights. It is possible for an alpinist to climb up through William Penn's left leg, and thence through his body to the brim of his beaver (see, also, text, page 645).

railroader's art knows, the Reading kept in line and began its plans for a new terminal.

The Baltimore and Ohio felt that it must do likewise in relation to through traffic, and so Philadelphia found itself in an ideal position to set up a program of give and take that would result in the thorough modernization of the heart of its great area.

The railroad improvements are resulting in the unsightly section of the Schuylkill immediately south of Fairmount Park being canalized and boulevard-bordered and in giving the heart of Philadelphia that sort of a cleaning that delights every eye. Green will grow to-morrow where grime flourished yesterday, and the dreams of city planners will be living realizations where ugliness but lately reigned supreme.

© Ledger Photo Service

A STEEPLE JACK AT WORK ON THE STATUE OF WILLIAM PENN

This picture of the worker astride the hand of the statue and of the pedestrians on the street below was taken from the brim of Father Penn's 9-foot, instead of "10-gallon," hat.

On her part, Philadelphia plunged into a new era of urban planning of startling proportions and magnificent conception.

She would provide the diagonals to the northwest and the northeast that became so needed in the day when the automobile began to crowd every main thoroughfare.

The famous Roosevelt Boulevard, the great diagonal to the northeast, with its broad, high-speed central lane bordered on either side by parking and local-traffic lanes, took care of the northeast situation.

To the northwest, from City Hall Square to the entrance to West Fairmount Park, runs the other diagonal, Fairmount Parkway, that marvelous $30,000,000 thoroughfare which the city has opened.

It was a frank appeal for the city beautiful that created this magnificent drive from City Hall to the Art Museum, where Fairmount Park begins. A thousand buildings had to be razed and $19,000,000 had to be spent for the real estate involved in the opening up of this masterpiece of urban development (see pages 646 and 648).

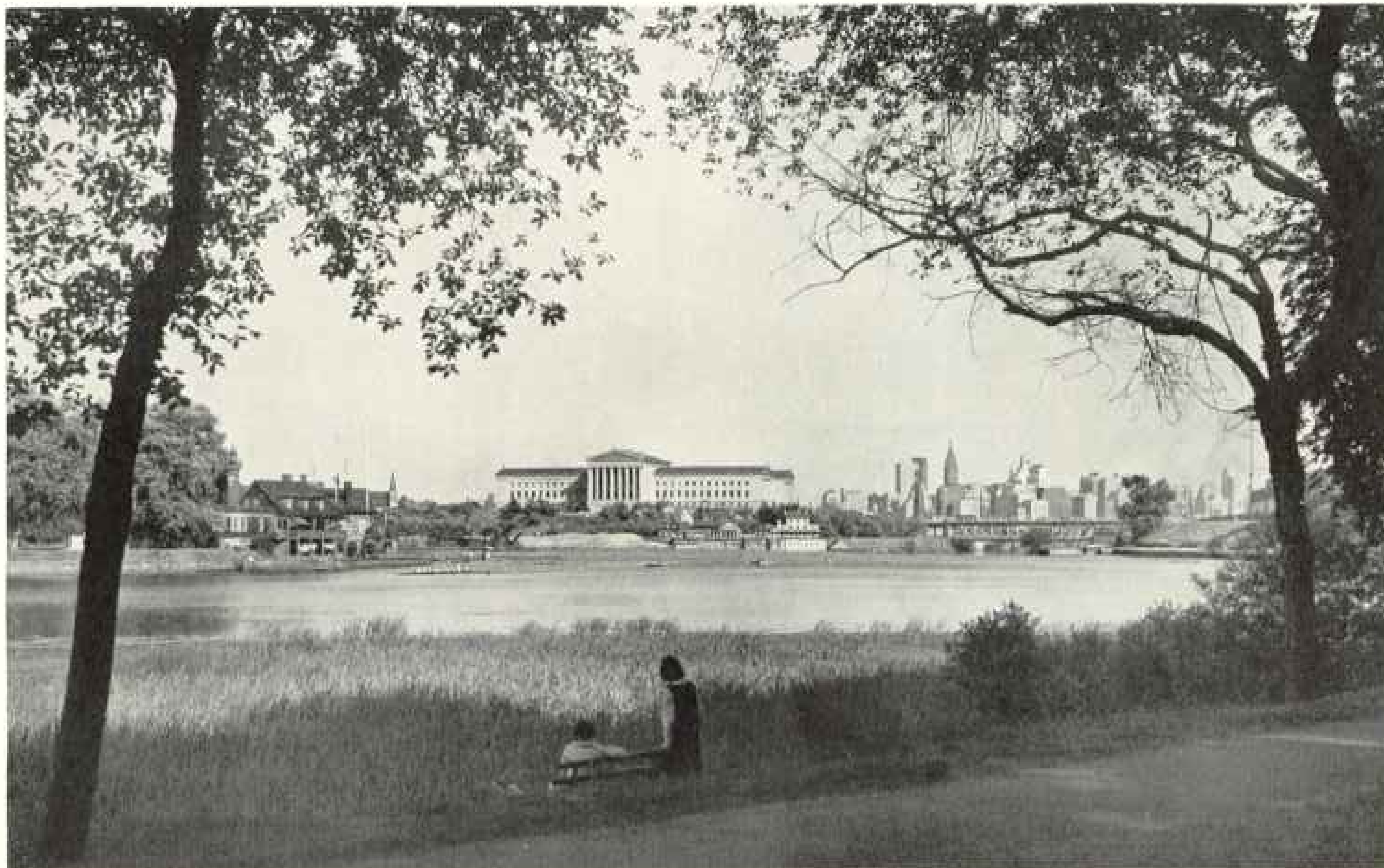
PLANS AND THEIR REALIZATION

A noted city planner has called the Parkway the beginning of the reformation, rejuvenation, and regeneration of central Philadelphia and the transcendent object lesson in city planning in America to-day.

Official photograph, U. S. Army Air Corps

PHILADELPHIA AND NEW YORK ON A SINGLE NEGATIVE AT 20,000 FEET

Climbing almost four miles into the air for this panorama, Capt. A. W. Stevens and Lieut. J. D. F. Phillips, of the Army Air Corps, recorded a part of three States. Central Philadelphia lies between its two rivers, in the foreground. Trace the course of the Delaware River up to the great bend below Trenton, discern the Jersey capital just above the elbow, and follow the northwest reach of the river to Easton, Pennsylvania. In the upper right corner can be very faintly detected the waters of Raritan Bay, and beyond them the dim outlines of Staten Island, otherwise the Borough of Richmond, New York City.



Photograph by Clifton Adams and Edwin L. Wisherd

THE SCHUYLKILL RIVER FROM WEST FAIRMOUNT PARK

Across the river at the left is the "Schuylkill Navy Row," showing several of the many boat clubs along the course of an American Henley. In the middle is the beautiful west façade of the Philadelphia Museum of Art, standing between the city's downtown and Fairmount Park (see, also, Color Plate III). The dark, tapering City Hall tower (right center) is a landmark in every skyline picture of the city.

Photograph by Clifton Adams and Edwin L. Wisherd

A PRETZEL VENDER AT THE FREE LIBRARY

Philadelphia has always loved its pretzels. Even on the thirty-million-dollar Parkway the sunny-natured old German does a steady business with his old-fashioned cart. Philadelphia eats its pretzels with mustard.

Along its shrubbed and gardened walks stand a galaxy of splendid structures, including the Cathedral of SS. Peter and Paul, the Friends' School, the Academy of Natural Sciences, the new Public Library, and numerous commercial buildings.

Even beyond the city's present-day boundaries, planning is going on that will bring a coördinated development in all the environing region, so that, whatever the decades and the centuries may bring forth, the Philadelphia of the future will be as well planned on its periphery as it is in its central section.

Under the leadership of those inspired by the example of Father Penn, the Regional Planning Federation has been set up and 260 local governments have been bound together in their joint efforts to preserve the beautiful valleys of scores of creeks, to clear all streams of pollution, to make certain that every growing neighborhood shall have park areas to take care of expanding population.

However noble the conceptions of these supercity planners, they are the first to honor the founder of Philadelphia as the New World's earliest city planner and to agree that their best thought in our day is not half as far ahead of the times as was Penn's envisioning of the future and his planning therefor.

There are drama and romance at every turn in the history of the laying of the foundations upon which modern Philadelphia has been built and in the manner in which the superstructure began to rise.

For many a year the central square of Penn's plan was remote from the center of the budding metropolis. There stood the gallows, the stocks, and the pillory, where men and women alike were led by winding paths to pay their debts to the law.

A major part of Washington Square was once a potter's field. Thousands of American soldiers were buried there in unmarked graves, and the victims of yellow-fever epidemics sleep by the thousand

Photograph by Clifton Adams and Edwin L. Wisherd

A GLIMPSE OF PHILADELPHIA'S GHETTO

Along the water front south of Market Street one finds a babel of voices, a congress of races, and an international emporium of products. William Penn and Benjamin Franklin often walked in this vicinity.

in nameless tombs beneath the sod of that busy center.

PENN, A PAINTER OF FUTURES

One is delighted with the happy and yet candid picture that Penn drew. He plainly told the prospective buyers and renters of his lands that they must not expect "immediate amendment" of their conditions, but would have "to be willing to live for two or three years without conveniences."

If Penn was frank about the difficulties and hardships, he was enthusiastic about the bounty of the land. "The Aire, heat and cold Resemble ye heart of France, ye soyle good, ye springs many and delightful, ye fruits, roots, corne, and flesh as good as I have commonly eaten in Europe," he wrote. He also told of sturgeon leaping day and night, which they could hear from their beds, and said that the people, having caught the huge fish, both roasted and pickled them.

The lover of peace and of humility had been denied the privilege of naming his Commonwealth by his king, who would not listen to his entreaties against naming it Pennsylvania. Even a bribe of twenty guineas could not induce the undersecretary to take away what Penn felt was an un-Quakerlike use of his name.

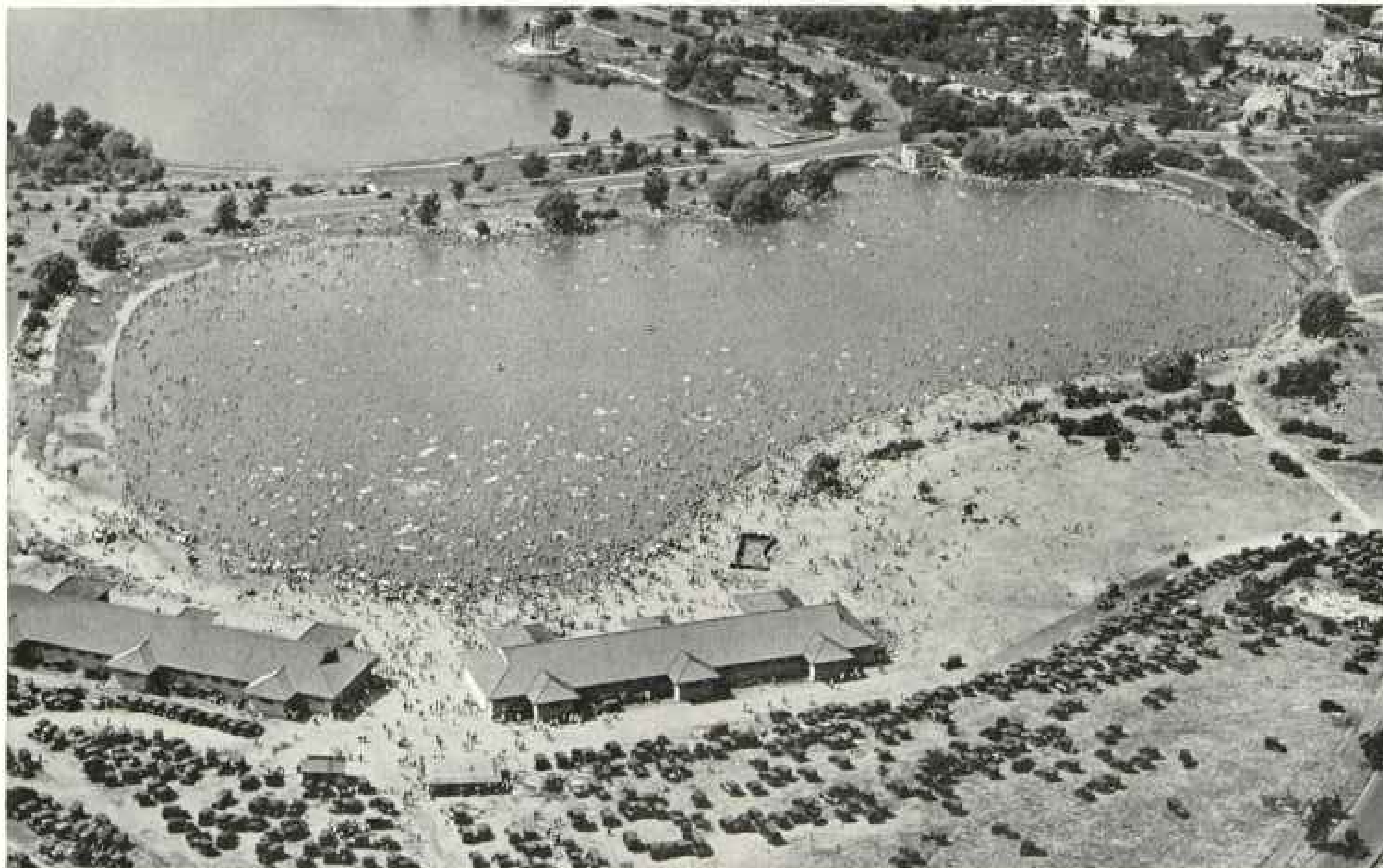
Suffering that, he did not propose to let anyone interfere with the naming of his city. Being a classical scholar, our good William turned to Greek history for his choice. The great Colonizer and man of peace certainly knew of the Philadelphia east of Smyrna, that was the seat of one of the Seven Churches of Asia referred to in the Book of Revelation, and perhaps of the one (called Amman to-day) that was the ancient capital of the Ammonite Kingdom northeast of Jerusalem. So he decided to christen his capital by that name, probably as much for its euphony as for its significance, which, as every school child learns, means "brotherly love," although, when I visited Amman recently, it was a storm center of Arab unrest, with threatened uprisings.

It is a far cry from the little caves on the banks of the Delaware, along the line

© Aëro Service Corporation

LOOKING UP THE DELAWARE RIVER, WITH PHILADELPHIA AT THE LEFT AND CAMDEN ON THE OPPOSITE SHORE

The bridge in the right background is the famous Delaware River Bridge. Most of the port works in the foreground are a heritage from World War days.



© Victor Dallin

LEAGUE ISLAND LAKE, PHILADELPHIA'S LARGEST MUNICIPAL BATHING BEACH

In summer this beach swarms with young and old investing in healthful sunshine and recreation.

Photograph Courtesy of the Philco Co.

THE CONVEYOR SYSTEM IN RADIO MANUFACTURE

Philadelphia and near-by Camden constitute one of the world's principal radio production centers. Both assembly and inspection alike are speeded up by the use of the conveyor system, and thousands of trained operatives are employed in making radio sets.

Photograph by Clifton Adams and Edwin L. Wisherd

"FLANGING" THE BRIM OF A "10-GALLON" SOMBRERO

Philadelphia hats are worn around the world. Australia has 229 dealers in these hats, South Africa 128. From Shanghai to Bombay, from Java to Cuba, from highland Peru to inland Africa, and our own West, the orders flock in.

Photograph by Wood Aërial Surveys

THE "MANHATTAN" TAKES TO HER ELEMENT

This new-born Atlantic liner of the United States Lines is the largest commercial ship launched in America. She was built in the New York Shipbuilding Company's yard in Camden and will be followed later by a sister ship, the *Washington*.

of Front Street, where those early pilgrims of a quarter millennium ago spent the winter of 1682, to the far-flung square miles of residences to-day. When one strolls along Delaware Avenue, where the busy activities of the port and the ferries create their unending din, and notes the slope from that avenue to Front Street, it is hard to realize that here most of the first settlers of Philadelphia spent their first winter in shelter no better than that which the cave man could enjoy.

CITIZENS OF A LONG YESTERDAY

Among the cliff dwellers of that early day was the famous Francis Daniel Pastorius, the learned German Mennonite. We are told that on the voyage over he and Thomas Lloyd paced the deck of the little sailing ship *America* and did all their talking in Latin. On a tablet on the garden wall of Stanfield House, at Number 502 South Front Street, is an inscription that transports the reader through two-and-a-half centuries in the twinkling of an eye.

It says: "Francis Daniel Pastorius built here in 1683, on a lot 102 feet front, a dug-out, his first American home, in which, October 25, 1683, the thirteen original settlers of Germantown drew lots for their new homes. He placed over the door this inscription, 'A little house, but a friend to the good: keep away, ye profane,' at which his guest, William Penn, laughed."

THE CITY OF ROOFTREES

Instead of those primitive caves in the bluffs of the Delaware, that answered for houses for so many of its first settlers during the early months of their American careers, Philadelphia has seen itself become the premier city of homes in America.

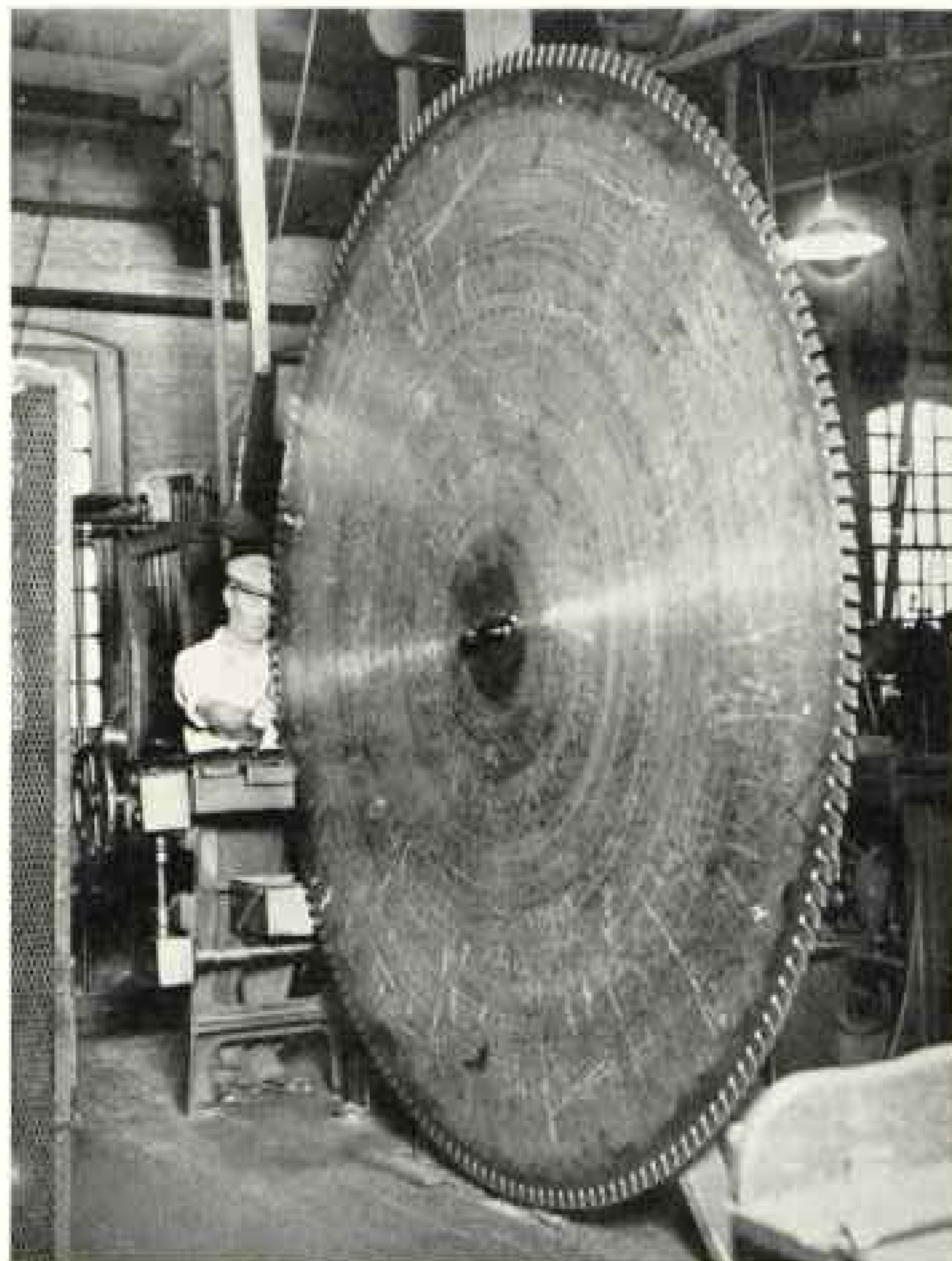
The 1930 census revealed that it had 365,000 one-family dwellings, Chicago 210,000 such habitations, and New York 294,000.

Some one has said that the roof over the average Philadelphian's head is not the floor of the domicile of some one else; that he wants a house to himself, demands his own dooryard, and requires his own

© Aëro Service Corporation

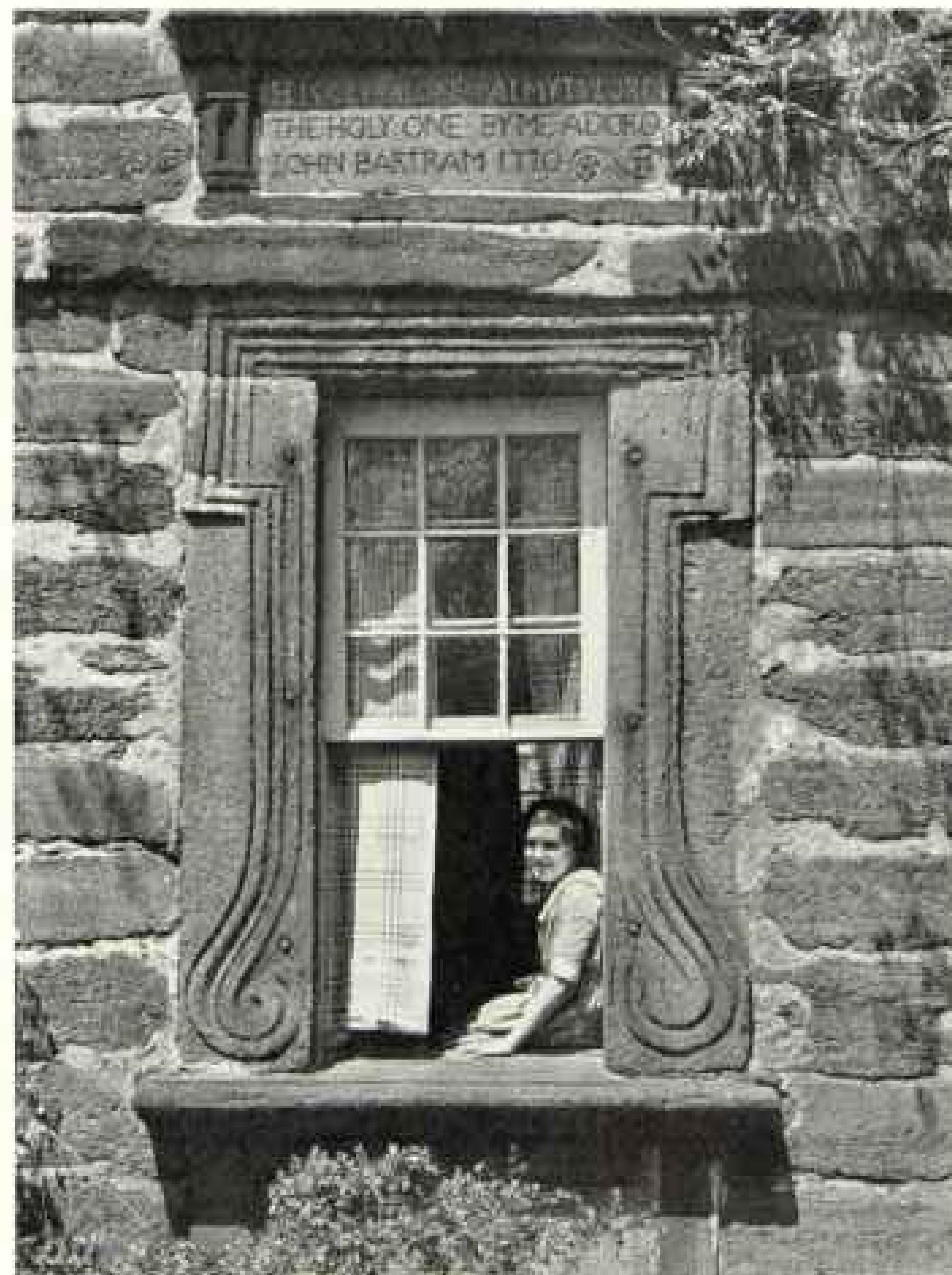
OIL REFINERIES ON THE SCHUYLKILL RIVER, IN SOUTHWEST PHILADELPHIA

Here is one of the world's greatest refining centers for both crude oil and raw sugar. Cargo ships and tankers from South and Central America and the Gulf ports bring never-ending cargoes to these giant refineries, and the finished product is then distributed to the world.



PUTTING TEETH IN A SAW

A workman fitting with a full set of teeth one of the largest circular saws ever made. The saw, 110 inches in diameter, is made of crucible electric tool steel, weighs 795 pounds, and boasts 190 teeth. The Disston saws, made in Philadelphia, are known and used all over the globe.



Photograph by Clifton Adams and Edwin L. Wisherd

A WINDOW OF JOHN BARTRAM'S HOUSE

This old stone house was built by the famous botanist with his own hands. The inscription, which he himself chiseled on the stone over the window, is one of the quaintest in Philadelphia and the house is much visited by lovers of Americana.

Photograph by Clifton Adams and Edwin L. Wisherd

THE DOORWAY TO THE POOR RICHARD CLUB, ON LOCUST STREET

This organization was named for the fictitious "philomath" of Benjamin Franklin's "Almanack" (see text, page 669). The club conducts the Charles Morris Price School of Advertising. The bust of Franklin over the doorway was illuminated through radio by Rear Admiral Byrd from Little America during his Antarctic Expedition.

upstairs and down. His thrift is revealed by the 1930 census report, which tells us that in more than half of the cases he owns his own home. Perhaps these difficult economic times have temporarily changed the figures (see, also, Color Plate I).

Wherever one may wander outside of the strictly downtown area, or from whatever vantage point one looks out over the city, there is an impelling sense of amazement at the vast number of two-story houses. Yet the reason for this outstanding difference between this city and any other major American municipality is not far to seek.

The city's industries are rooted in that remote past before the machine age reached its height and when men of high skill had to do by hand what mere machine tenders can do to-day. Such men loved their little homes and had no taste for tenements. Their sons and their sons' sons have followed.

This home-loving spirit has played an important rôle in shaping Philadelphia's problems. Those of urban transportation have never been so pressing, for the Philadelphia wage earner prefers to have his home within walking distance of the factory in which he is employed; and whether in Tacony or Manayunk, Bridesburg or Passyunk, Kensington or Southwark, you will find the average workman living near his place of employment.

The same circumstances that served to make the Philadelphia artisan a man with a distaste for tenements, but intent with an ambition to own a home, have served to make him a man with a leaning toward savings-bank accounts and building and loan investments.

APPLYING THE YARDSTICK OF INDUSTRY

A concomitant of all of these qualities is the industrious habit, through which Philadelphia has attained the distinction of having the highest percentage of skilled labor of any major city.

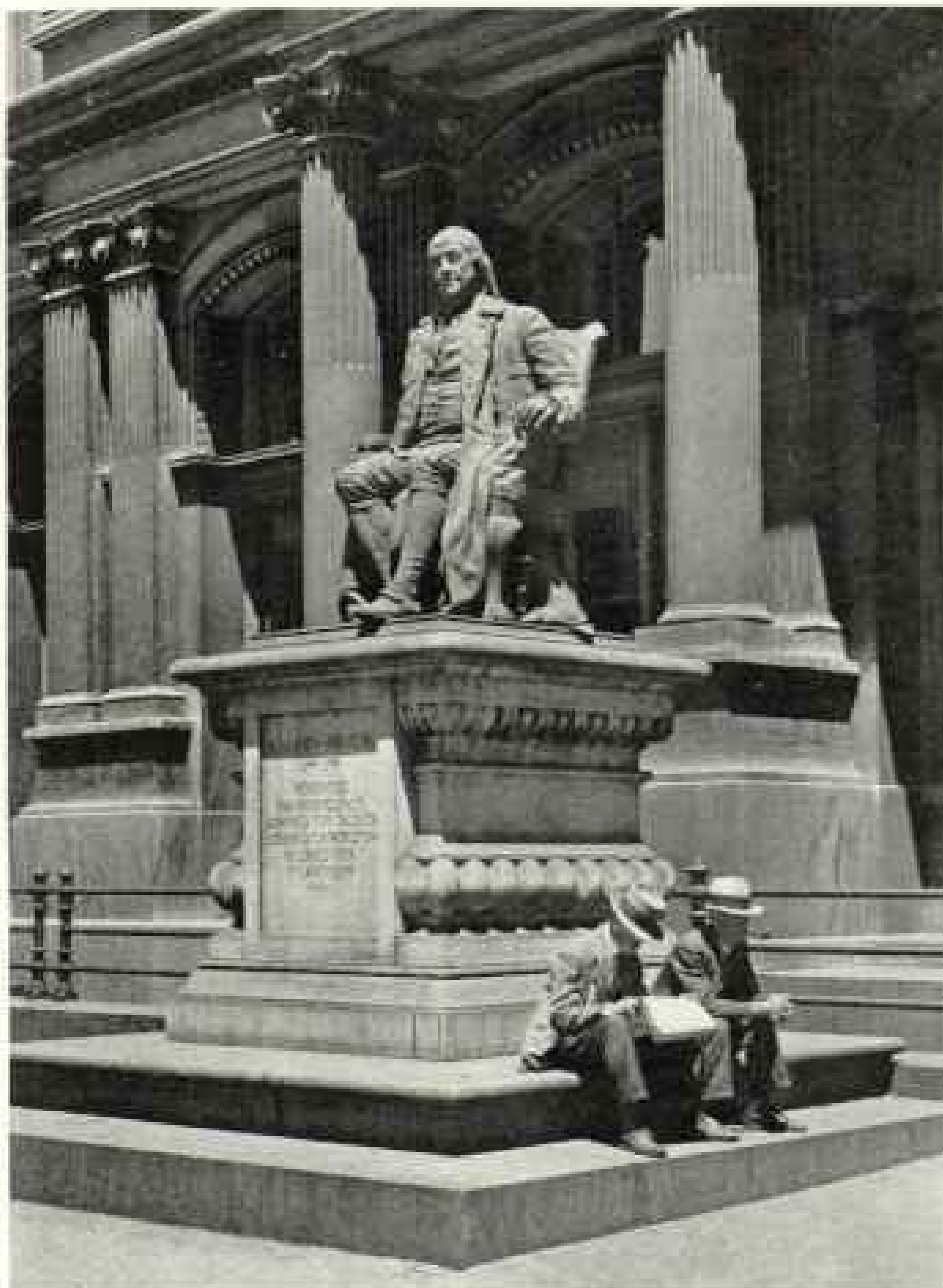
With such a fine quality of labor, it is little wonder that the national census-takers

were able to find 277 distinct lines of commodities being manufactured in the Philadelphia metropolitan area; that it ranks first in the output of hosiery and knit goods; in carpets and rugs; in cotton lace and saws, and high in the manufacture of leather, hats, fur felt, linoleum, and many other commodities.

In a normal year the great workshop of the world produces two billion dollars' worth of manufactured products, including 45,000,000 yards of carpet, 7,000,000 hats, 400,000,000 cigars, and 10,000,000 saws.

With but one-sixtieth of the Nation's population, the city of the great Penn produces about one-twenty-fifth of all its manufactures.

Travel where he will, from polar circle to polar circle, in any longitude, around the earth, the traveler will never get away from the things that Philadelphia buys, the things it makes, and the things it sells. From every land come the raw materials it needs in the fabrication of the thousand and one things it manufactures.



Photograph by Clifton Adams and Edwin L. Wisherd

FRANKLIN, BELOVED OF MANKIND, GUARDS THE CHESTNUT-STREET FRONT OF THE PHILADELPHIA POST OFFICE

The inscription on this statue embodies the tribute of George Washington. Work has been under way for some time to replace the old post office by a new square-filling structure at Thirtieth and Market streets.

Philadelphia-built locomotives draw trains to the top of the Andes, into the heart of China, through the solitudes of the Congo. Philadelphia-built steamships sail the seven seas and fly their flags in every port in the world. Philadelphia-made medicines heal the sickness of the savage in Borneo and Zululand, soothe the aches and still the pains of people from Tombouctou and Kamchatka to Nome and Rio.

Forest and field, mine and quarry, ocean bed and mountain top, jungle and desert, pampa and steppe, frozen tundra and tropic beach, alike trade with the metropolis of Penn.

THE ADVENT OF POOR RICHARD

Nearly every great city in the world pushes its way forward by a succession of new starts. Philadelphia got its first new impetus through the arrival of another man of destiny. But he did not come in state, as Penn had come, to take over a principality and to found a city.

Photograph by Clifton Adams and Edwin L. Wisherd

STROLLING ACROSS LOGAN CIRCLE TOWARD THE CITY HALL

At the left is the stately Cathedral of SS. Peter and Paul, with its graceful dome, Corinthian columns, and exquisite interior.

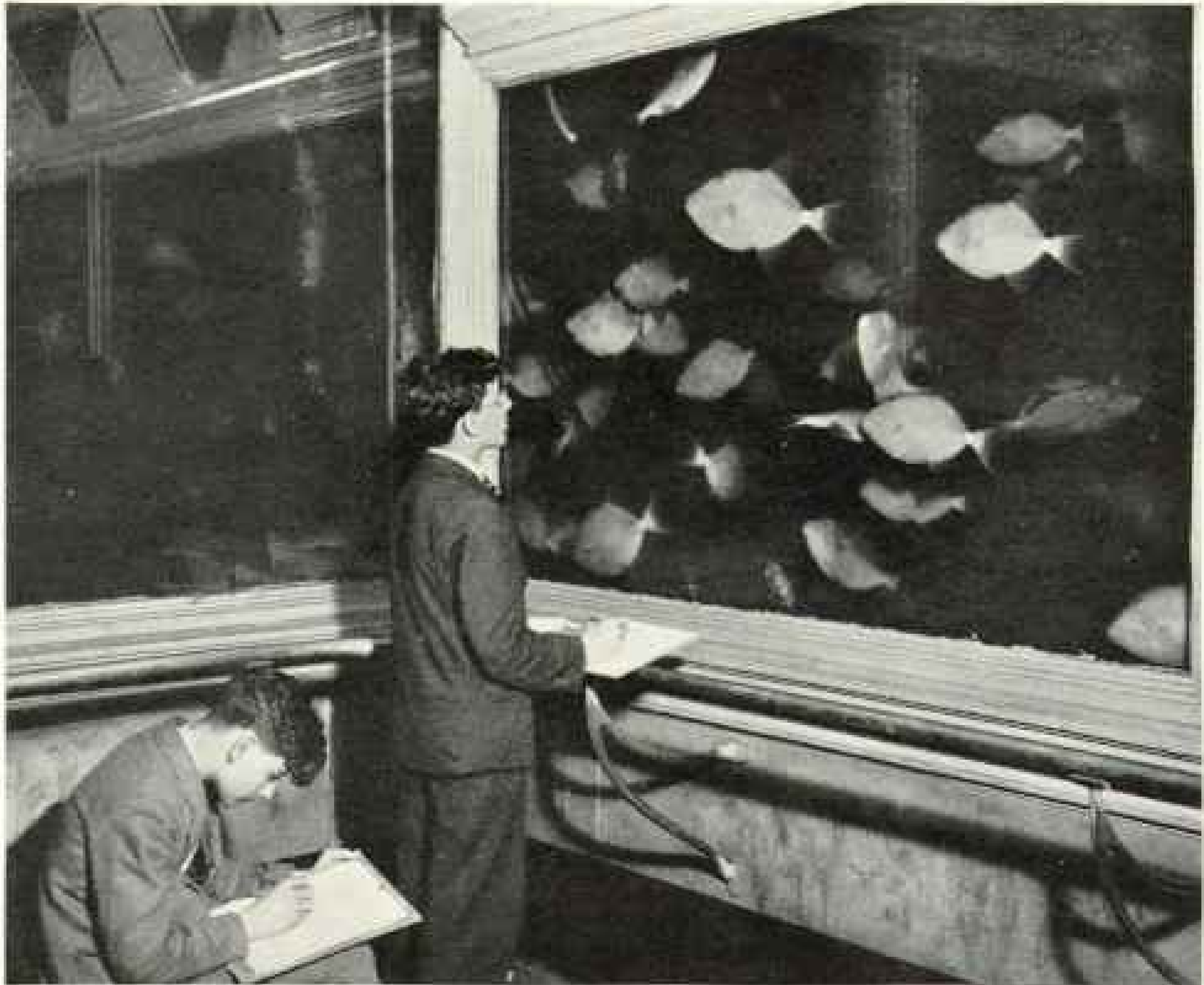
Photographs by Clifton Adams and Edwin L. Wisherd

THE BRONZE STATUE OF "THE PILGRIM"

Fairmount Park is embellished with splendid statuary, from the triumphant equestrian statue of Washington at the head of the Parkway, dedicated by the Society of the Cincinnati, to the Saint-Gaudens bronze masterpiece, The Pilgrim. The latter faces the Schuylkill and is especially remarkable for the effective drapery of the cape. It was modeled along lines similar to those of another statue in Springfield, Massachusetts.

A PATRIOT'S TOMB IN CHRIST CHURCH CEMETERY

In his early life this genius wrote his own epitaph: "The body of Benjamin Franklin Printer (Like the cover of an old book Its contents torn out and stript of its lettering and gilding) Lies here, food for worms But the work shall not be lost for it will (as he believes) appear once more In a new and more elegant edition Revised and corrected by The Author." For some reason it was not used.



Photograph by Clifton Adams and Edwin L. Wisherd

CATCHING QUEEN TRIGGER FISH WITH CAMERA AND PENCILS

Youthful artists of public and private schools frequent the Aquarium to draw and paint the finny residents from many seas. The Philadelphia Aquarium was established on a modest scale in 1911, on the banks of the Schuylkill River, west of the Philadelphia Museum of Art. It is to-day noted for the exceptional number and variety of exhibits.

Rather, he came as a poor printer and looking for work. In the grounds of the University of Pennsylvania, hard by the spot where so many of the football classics of America have been held, there is a statue of that boy, commemorating his arrival in the Quaker City, from Boston.

Chin up, shoulders back, a rustic cane in his left hand and a bundle in his right, the sculptor has depicted him as a lad who was far from being a mirror of fashion or the mold of form, but who withal had a sprightliness in his carriage and a radiance in his face that make one forget his rough clothes and endear him to the hearts of the undergraduates of old Penn.

The lad whose arrival in Philadelphia this work of R. Tait McKenzie commemorates had left Boston and had gone to New York to ply his trade. Finding no jobs in Gotham and hearing that there might be one in Philadelphia, he set out for that city.

He sailed to Amboy from Manhattan Island and then walked from Amboy to Burlington. There he undertook to earn his passage down the river by helping paddle an old flat-bottomed boat. Truly a picture of the hitch-hiker of another day!

Finally they land at the foot of Market Street and the determined youngster comes ashore, a stranger in a strange land. His pockets bulge with shirts and other articles of his scanty wardrobe; but he is hungry.

Bread; yes, he has made many a meal of dry bread; so why spend too much of his single Dutch dollar and his few small coins for more expensive food? Prices are so different in Boston and Philadelphia and the kinds of bread as markedly so.

Photograph by Clifton Adams and Edwin L. Wisherd

WHERE THE SCHUYLKILL RIVER RUNS THROUGH THE HEART OF FAIRMOUNT PARK

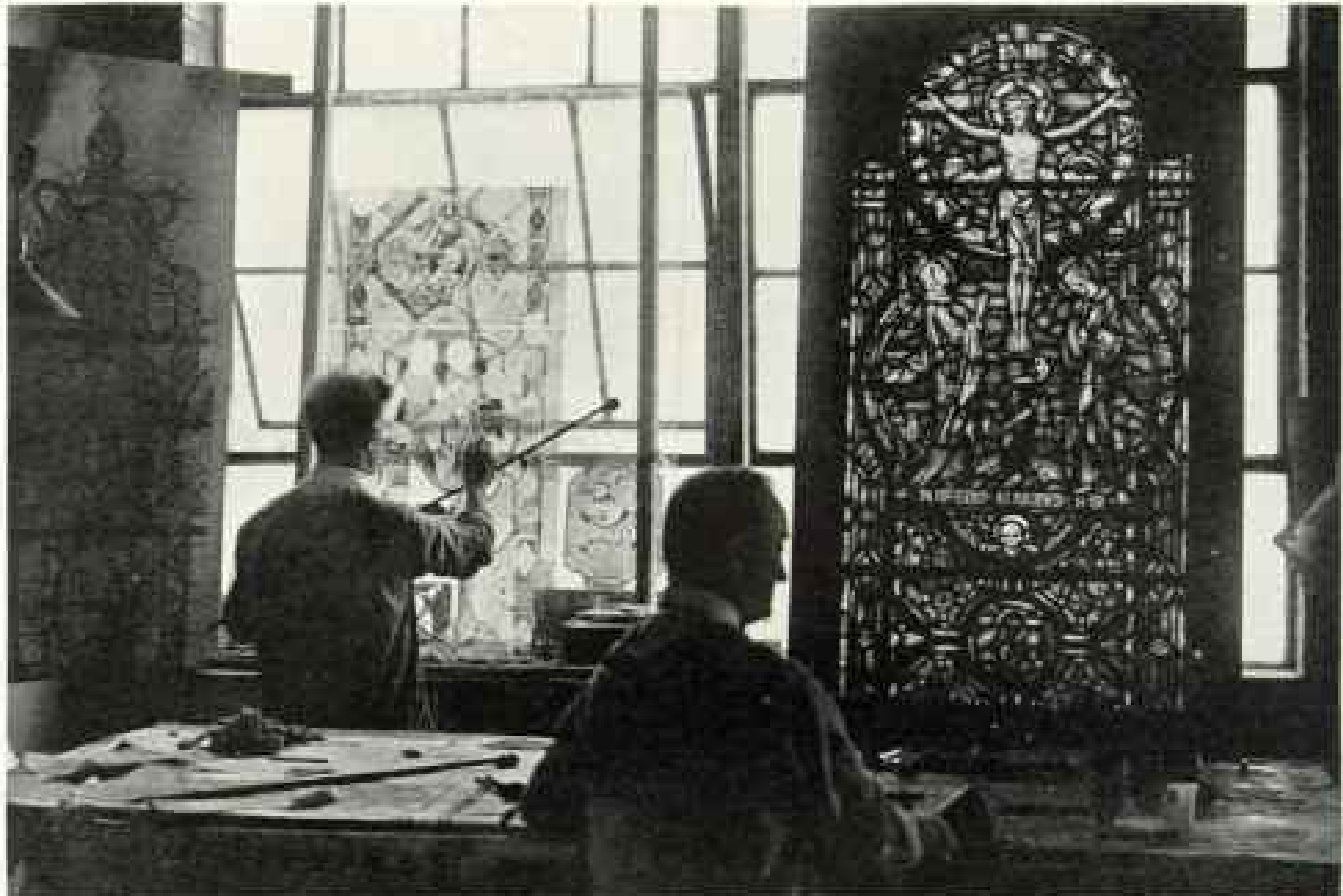
The Dauphin Street Bridge spans the river at the foot of Strawberry Hill. Railroads cross and border the park in many places, but Philadelphia has found ways to prevent their detracting from its beauty.

Consequently out of his barter with the baker he becomes possessed of three big rolls. With one under either arm and eating the third, he starts out to explore. Up Market Street he trudges, munching as he goes. When he gets to Fourth Street he turns over to Chestnut and thence to Third, to Walnut, and back to the dock again, for he bethinks himself of the poor woman and her hungry children who came down on the flatboat with him and who are going farther. He elects to share his loaf with them.

Then he starts up Market Street again, this time following a well-dressed crowd. It seems they are Quakers going to their meetinghouse, and he enters and sits. Even a hard bench is a downy couch to one so weary, and he falls off to sleep and awakens only at the prodding of the sexton, who, now that the congregation has finished its meditation and gone home, wants to close the building.

That boy was Benjamin Franklin. Little he dreamed when he arrived in Penn's village of the destiny that awaited him. It was with his rise to fame that the city of his adoption started on its road to distinction as a center of art, culture, science, and industry.

The early years of Franklin's residence in Philadelphia were years of necessarily abstemious living. He took a wife, yet tells us himself that for a long time their domestic habits were necessarily so simple that his breakfast was only bread and milk, eaten out of a twopenny porringer, with a pewter spoon! Finally, one morning he found a china bowl and a silver spoon, and a wife who defiantly explained that she had paid twenty-three shillings for the outfit, thinking that her husband deserved a



THE QUAKER CITY IS NOTED FOR ITS PRODUCTION OF STAINED-GLASS WINDOWS

Philadelphia has made windows for such famous edifices as the George Washington Memorial Chapel at Valley Forge, the Folger Shakespeare Library in Washington, and the Riverside Church on Riverside Drive, in New York, as well as for many skyscrapers, banks, and public buildings.

Photographs by Clifton Adams and Edwin L. Wisherd

OLD-TIME INSURANCE MARKERS STILL GRACE PHILADELPHIA WALLS

At the right is the Hand-in-Hand of The Contributionship; next to it the Green Tree insignia, and beyond it the emblem of the Fire Association. At the left is the marker of the Fire Insurance Company (see text, opposite page). These four were arranged for photographing.

china bowl and silver spoon as well as any of his neighbors.

It is a curious fact, as Robert Shackleton observes in his "Book of Philadelphia," that one may look in vain for the site where Franklin lived during his early years in Philadelphia. Boston, he tells us, honors the spot where he was born, London his lodging place, Paris his home during his stay at the French Court, but Philadelphia has forgotten his working place.

THE ROMANCE OF A SMILE

The girl in Fourth Street who laughed at Franklin the day he arrived in Philadelphia, as he passed her door with his bulging pockets and his loaves of bread, afterward became his wife, and we are perhaps more indebted to her mother than to anyone else for our best idea of where Franklin lived in his early Philadelphia days. Even Benjamin himself failed to describe his location in terms that have survived the years.

He tells how he "found a house for hire near the market, and took it" when he finally set up in business for himself. His books and pamphlets showed that they were published "at the new printing office near the market."

But when she was widowed, Mother-in-Law Read came to live with Benjamin and Deborah. Having been the proprietor of an ointment for the itch, she advertised it at two shillings a gallipot, and added that she had moved from the upper end of High Street to the new printing office near the market. One naturally infers that if she had moved from one street to another, rather than to a different location on the same street, she would have given her new street address.

If that inference is correct, then we are indebted to the widow for our knowledge that Benjamin Franklin in his printing days lived on what is now the north side of Market Street, a few doors from Second.

It apparently was an unsuccessful matchmaker who figured most prominently in Franklin's rise to fame. He and his partner, Hugh Meredith, took lodgers to round out their income from their printshop. These were Thomas Godfrey, the mathematician, and his wife, Mrs. Godfrey, who sought to make a match between Benjamin and one of her cousins. When she failed, the Godfreys turned their backs upon Franklin, and Godfrey became "philomath" (scholar) for Bradford.

As every printshop in those days was supposed to have a philomath, Benjamin decided to create one. It was in that way that "Poor Richard" was born, who promptly became a popular favorite and an imperishable character.

Everywhere one goes about Philadelphia one finds organizations and institutions identified with Franklin: The American Philosophical Society, the Hand-in-Hand Insurance Society, the Library Company. He had a genius for appraising the needs of a growing community and effecting the organizations capable of meeting those needs.

As early as 1735 he began to write about fire prevention, particularly protesting against the habit of carrying live coals on shovels from room to room or from story to story. He also advocated the enactment of a law against shallow hearths and wooden moldings around fireplaces.

A PRINTER WITH A BUSINESS SENSE

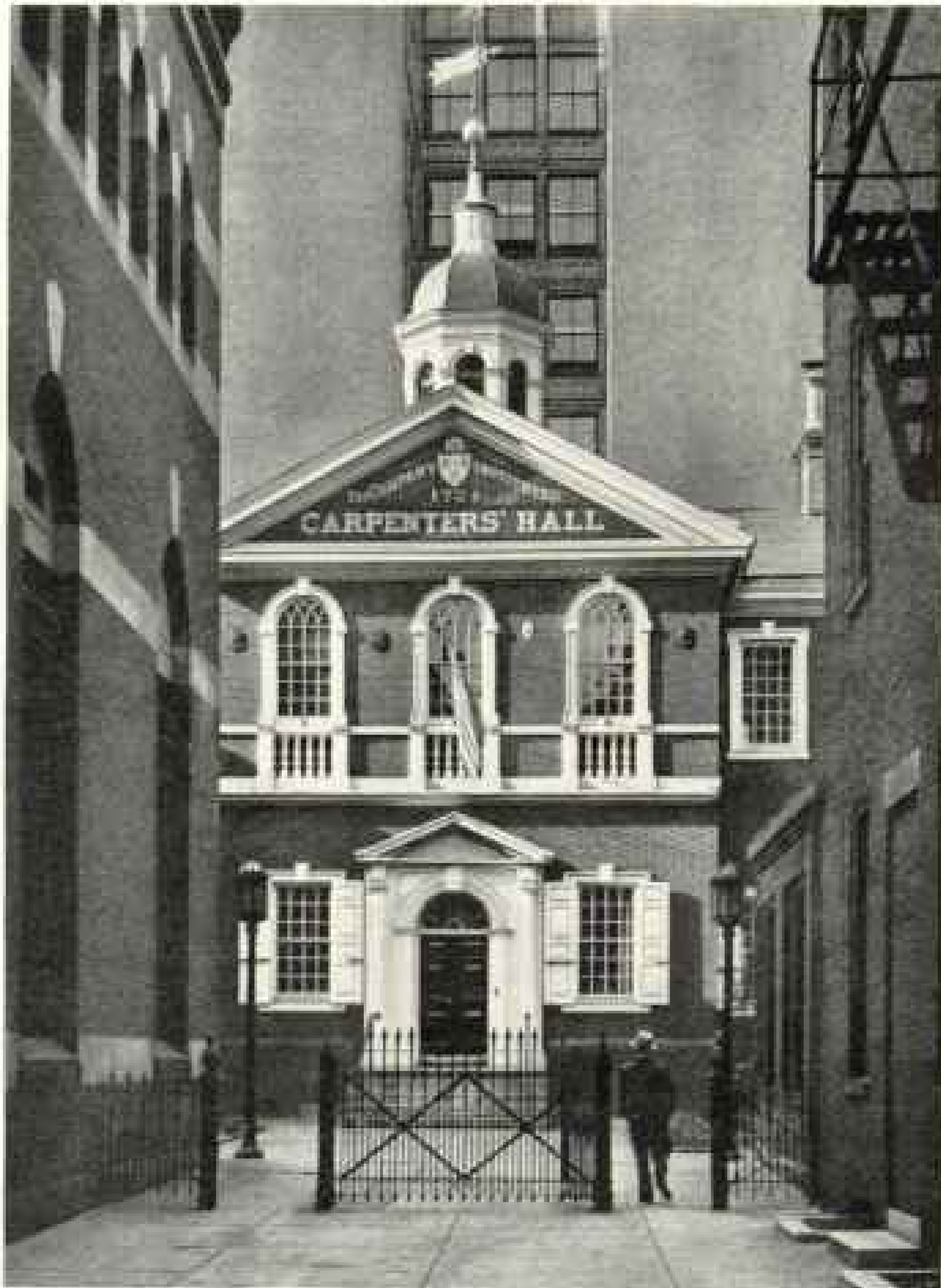
His views "took" with the staid home-owners of the city, and the following year he and four of his friends organized the Union Fire Company, whose members undertook to furnish, each at his own expense, six leather buckets and two stout linen bags, which they were to carry to every fire, the buckets to be used for water in extinguishing the fire and the bags to receive and hold endangered personal property.

Every member whose house was not on fire, when alarms were sounded, was to put lights in his window to avoid confusion.

With houses multiplying rapidly, the dangers of fire became correspondingly greater, and Franklin foresaw that the time for fire insurance had come. So he and some of his friends issued a call for a meeting, which, on April 13, 1752, convened in the Courthouse and organized "The Philadelphia Contributionship for the Insurance of Houses from Loss by Fire."

At the first meeting of the directors a seal was adopted, "being four hands united."

To this day one sees on old houses in Philadelphia cast-iron plaques with the hand-in-hand insignia denoting that it was insured in The Contributionship more



Photograph by Clifton Adams and Edwin L. Wisherd

CARPENTERS' HALL, BUILT BY THE CARPENTERS' COMPANY IN 1770

When the First Continental Congress convened in Philadelphia it had nowhere to meet until the master carpenters threw discretion to the wind and opened the doors of their hall (see text, page 674).

than a century ago (see page 668). And now and again one reads in the Philadelphia newspapers advertisements of this oldest fire insurance company in America. Only recently an advertisement recalled to present-day patrons that during the British occupation in Revolutionary times it had maintained its service of sweeping out the chimneys of its members whose houses were occupied by British officers.

FIRE RISKS DEVELOPED COMPETITIVE BUSINESS

The directorate of The Contributionship was always an extremely prudent body of men. It happened within several decades of the date of organization that several buildings burned because trees growing close to them handicapped the volunteer firemen.

With these losses in mind, its directorate ordered that no houses should thereafter be insured that were closely surrounded by trees.

Thereupon a new company was organized to provide policies upon that type of house. When it began to do a substantial business, the directorate of The Contributionship reversed its policy.

From those early days to the present hour, Philadelphia always has been a great fire-insurance center and has built upon the teachings of Franklin in the art of preventing and extinguishing fires.

With a record of first place in fire prevention among all cities of the first class for three out of the last four years and first place among all cities of all classes for two out of three years, Philadelphia feels that it stands true to the spirit that founded The Contributionship.

Another monument to Franklin in the form of a still existent organization established by him is the Library Company. The Library Company maintains the Philadelphia Library at Locust and South Juniper streets. It was organized the year before George Washington was born and came into public notice the year he was born, by importing a large number of books from London. It was popular from the start.

Its organization was preceded by the formation, under the leadership of Franklin, in 1728, of what he called the Junto, or "Leathern-Apron Club." The formation of this club marked the birth of learning in the Province, for out of this humble group sprang, directly or indirectly, most of its useful institutions.

The Leathern-Apron Club was the eighteenth-century edition of the countless modern luncheon clubs, though it met in the evenings. Members were required to declare that they respected their fellow members, loved mankind in general, believed in freedom of opinion, and loved truth for truth's sake.

The club started a small library, which soon resulted in the organization of the Library Company. Over the doorway of the library to-day is a statue of the founder draped in a toga. Some say that the idea was conceived by Franklin himself, but many think the result was a curious distortion of a simple remark made by him.

Photograph by Clifton Adams and Edwin L. Wisherd

A SHRINE OF THE NATION, THE LIBERTY BELL

This sacred relic of the birth of freedom finds its permanent home in Independence Hall (see page 644). It is mounted in such a way that it could be safely removed in five minutes, in case of fire.

A GENIUS OF MANY TRADES

Another organization still in active existence, launched by this great disciple of learning, is the American Philosophical Society. It was started as the result of a circular he published in 1743, when his later compatriot, George Washington, was only 11 years old, entitled: "A Proposal for Promoting Useful Knowledge Among the British Plantaytions in America."

A meeting was held and out of it was born the American Philosophical Society, the first scientific society in the New World.

Not satisfied with establishing the fire-insurance business in America, founding the first public library, and establishing the first scientific society, Franklin joined hands with Dr. Thomas Bond in the establishment of the Pennsylvania Hospital.

Nor was that the end of Franklin's efforts in the founding of institutions that would carry forward through the centuries those phases of human endeavor dearest to his heart. Always, preliminary to the launching of a movement of this kind, Franklin would issue a prospectus. One of these was entitled: "Proposals relating

Photograph by Edwin L. Wisherd

CONGRESS HALL, AT THE SOUTHEAST CORNER OF SIXTH AND CHESTNUT STREETS

Here Washington took the oath of office for his second term and later read his famous Farewell Address. Here, too, John Adams was inaugurated President. The House chamber was downstairs, while the Senate occupied the second floor—truly a modest beginning for our Nation's lawmakers.

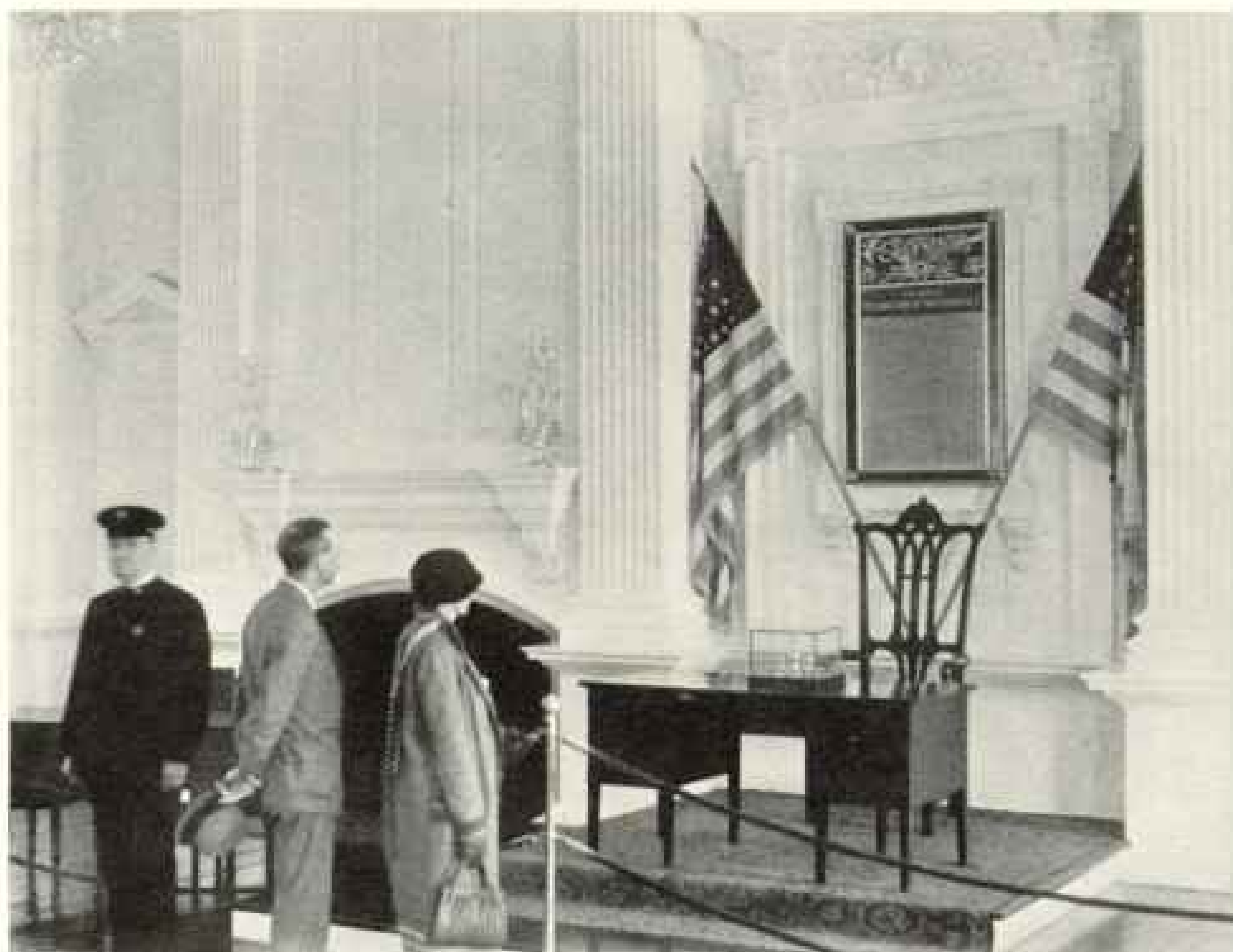
to the Education of Youth in Pennsylvania." The suggestions therein contained took root and finally resulted in the establishment of the University of Pennsylvania.

With its 48,000 living alumni and its student body recruited from every State in the United States and from many foreign nations, what was once a small charitable school has grown into one of the foremost institutions of learning in the world. With its schools of medicine, law, science, dentistry, finance and commerce, veterinary surgery, architecture, anatomy and biology, and of education, and its graduate school of medicine, the University of Pennsylvania is one of the State's rarest treasures (see, also, Color Plate II).

One loves to go over beyond the Schuylkill and visit this venerable institution. Its library is one of the most noted in America, with more than 750,000 volumes. In the Museum there are marvelous exhibits from everywhere.

PHILADELPHIA IS STILL THE CITY OF THE GREAT PRINTER

It is fitting that the city of the Great Printer should to this day have printing and publishing as one of its chief industries. Its books circulate throughout the world. Its magazines are read wherever the English tongue is known. Its engravers, prominent among them the Beck Company, who make all THE GEOGRAPHIC's half-tones and color plates, have won world admiration and are admired to the ends of civilization. Moreover, the entire profession of the art preservative of all arts doffs its hat to the distinguished publishers of *The Saturday Evening Post*, *Ladies' Home Journal*, and *Country Gentleman*, with their great plant facing on Washington and Independence squares.



Photograph by Harold M. Lambert

WHERE THE DECLARATION OF INDEPENDENCE WAS SIGNED

Simplicity creates a real elegance in this historic room in Independence Hall. The silver inkstand contained the ink with which our Charter of Freedom was signed.

Philadelphia has always been a leader in the printer's art. Here, near the Wissahickon, William Rittenhouse, a humble Mennonite preacher-immigrant, established the first paper mill and laid the foundations of an American family famous throughout the land. The site of the mill is marked to this day by a house built by the Rittenhouse family half a century before the Revolution was dreamed of.

The first almanac printed in the American colonies was issued in 1685, in Philadelphia, by William Bradford. In 1698 Francis Daniel Pastorius (see, also, text, page 659) published the first American schoolbook. In 1728 the first American weekly newspaper was established.

Christopher Saur, who was a "Tunker," or "Dunkard" preacher, was the forerunner of all American type founders, for in 1735 he cast the first type made in America. Later, in 1743, he handled the first Bible to be printed in America in a European tongue, his famous German Bible, now one of the priceless treasures of the rare-book world.

Dr. Thomas Cadwalader in 1740 published the first medical book in this country, and in the following year Andrew Bradford and Benjamin Franklin published the first two American magazines, while Saur came out in 1746 with the first religious periodical. In 1782 Robert Aitken produced the first American Bible in English. *The Pennsylvania Packet and Daily Advertiser*, the first American daily newspaper, was launched in 1784. In 1795 Adam Ramage constructed the first American printing press, and in 1804 C. E. Johnson made the first printer's ink produced in this young country.

THE CRADLE OF OUR NATION

There is no era in the history of the City of Brotherly Love more saturated with the romances of historic events than the Revolutionary period and its aftermath years. Here met the men who were called upon to

plan a Nation. Here gathered the men who were invested with the responsibility of writing the charter of human freedom that should change the attitude of the world upon the ideas of government. Here gathered the force that would defeat this rebellion against the divine right of kings. Here, liberty won, came those empowered by the people to frame the structure of the government to deliberate, and out of their deliberations to create the organic law of a Nation destined to grow under its ægis.

Take a stroll down Chestnut Street and turn aside into the narrow court between South Third and South Fourth streets, into "the hall of an ancient guild," as Shackleton describes Carpenters' Hall.

In 1724 the master carpenters in the nascent city had grown numerous and strong enough to form a guild fashioned after the pattern of the "Worshipful Company of Carpenters of London."

In 1770 the Carpenters' Company decided to build itself a permanent home, and Carpenters' Hall was the result (p. 670).

When the First Continental Congress was to meet, the Colonial Governor, fearing the effect of its deliberations upon his interests, opposed its meetings being held in the Statehouse.

Not so the carpenters with their hall. Though they knew well the danger of the confiscation of their property that a use by such a body of men might entail, they voted unanimously in the affirmative on the resolution permitting the meetings of the Congress to be held here.

That was a great procession which marched into the hall on the morning of September 5, 1774. The members of the First Continental Congress had forgathered at the City Tavern, the Bellevue-Stratford of that day, which stood at the corner of Bank Alley, on the west side of Second Street, above Walnut, and marched in a body to Carpenters' Hall. Here are George Washington, Patrick Henry, Peyton Randolph, and Richard Henry Lee, the two Adamses (John and Samuel), Thomas Mifflin, Cæsar Rodney, and Joseph Galloway. What a march and what marchers!

Aye, we watch again that first day's deliberations. The issue gathers around a place of voting. The evening comes, adjournment is taken, and the issue awaits the morrow's decision.

At last, when the morrow dawns, the debate resumes. It runs on and on. Then we hear a resonant voice crying out, under the irksome debate, and appealing to all for the obliteration of the provincial attitude, and saying, "I am not a Virginian, but an American."

It is Patrick Henry speaking. His lofty sacrifice for the general good, added to the eloquence of the Rev. Jacob Duché, brings a new order of thinking and a Congress into deadly earnest for the cause of liberty.

By the brave decision of the Master Carpenters of Philadelphia their hall takes first place in the chronology of liberty in the Quaker City, and second place only to Independence Hall in its importance as a shrine of liberty in Philadelphia.

When the Second Continental Congress met, the considerations that estopped its predecessor from meeting there had disappeared, and so it convened in what was then the Statehouse and presently was to become Independence Hall (see page 644).

A THRILL FOR EVERY LOVER OF LIBERTY

What a debt America owes to Philadelphia for its magnificent restoration of this greatest shrine of American liberty! Everything that patriotic hands and hearts could do to restore the past has been done.

"A building of serenity and symmetry, of fine amplitude, a gracious, alluring building, rich in noble memories, yet touched with a living sweetness," is the way one author describes this inspiring shrine.

What a thrill one gets as he enters that splendid east room on the first floor! Here the Second Congress met and elected John Hancock—he of the dashing clothes and bold signature—its president on May 10, 1775. Here George Washington was chosen Commander-in-chief of the Continental Army June 15, 1775. Here, too, the Resolution of Liberty was adopted on July 4, 1776. The Articles of Confederation and the Constitution itself were also adopted and signed.

Here, too, note the most historic inkstand in our country, with its quill-box and sand-shaker, used in the signing of the Declaration of Independence (see p. 673).

And in this same building is the bell that proclaimed liberty throughout the land (see page 671).

Let us recall, also, that Independence Square has another significance, for in the

BACK TO NATURE IN THE HEART OF A CITY

Wissahickon Creek cuts a canyonlike ravine of beauty through northern Philadelphia, joining the Schuylkill River and the main part of Fairmount Park at Manayunk. In the background, like an old Roman viaduct of southern France, swings the graceful arch of Walnut Lane Bridge, one of the largest concrete spans in the world.

© National Geographic Society Finlay Photographs by Clifton Adams and Edwin L. Wisherd

BEAUTIFUL SUBURBS ENCIRCLE PHILADELPHIA

From manorial estates to humble cottages and row-houses, Philadelphia is a city of homes. Forty per cent of the wage earners of the Quaker City own or are buying their own domiciles. Among Philadelphia's finest residential sections are: Chestnut Hill, Germantown, Wyncote, "The Main Line," West Chester, Haddonfield and Moorestown, the last two across the Delaware in New Jersey.

© National Geographic Society

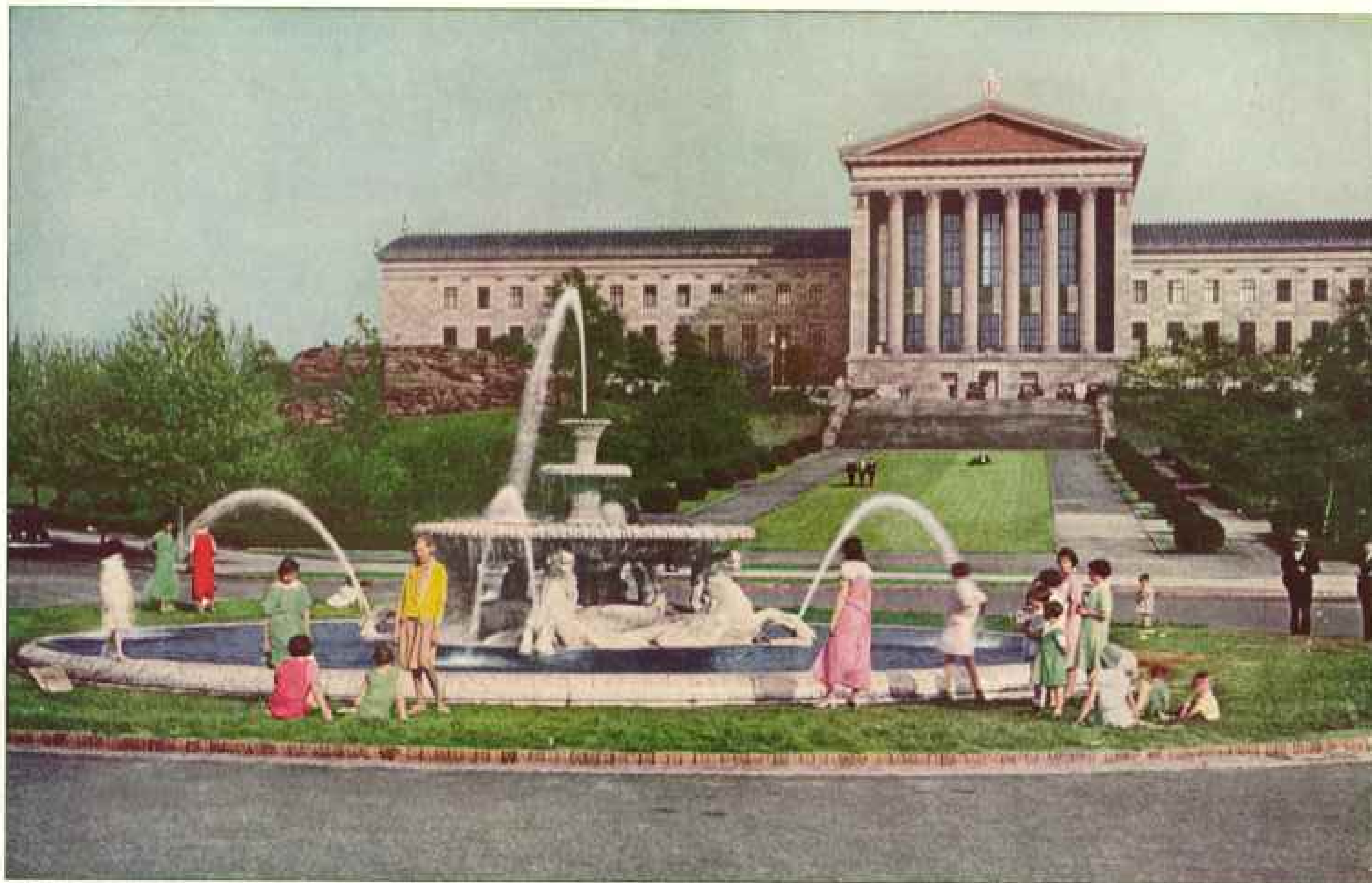
WITHIN THE "BIG TRIANGLE" AT PENN

The University of Pennsylvania is another monument to the amazing energy and versatility of that scholarly patriot to whom Philadelphia owes so much—Benjamin Franklin. Founded in 1740 as a charitable school, Penn now has an enrollment of nearly 16,000—fifth largest in the United States, and draws its students from all over the world.

Finlay Photographs by Clifton Adams and Edwin L. Wisherd

A RELIC OF THOSE WHO PRECEDED THE QUAKERS

Old Swedes' Church ("Gloria Dei"), one of the most historic buildings in Pennsylvania, was built in 1700 on the site of a blockhouse erected by the Swedes five years before the arrival of William Penn. Its ministers were sent from abroad until 1830. The baptismal font (in front of the Swedish flag) was brought from Sweden by Swedish Lutherans.

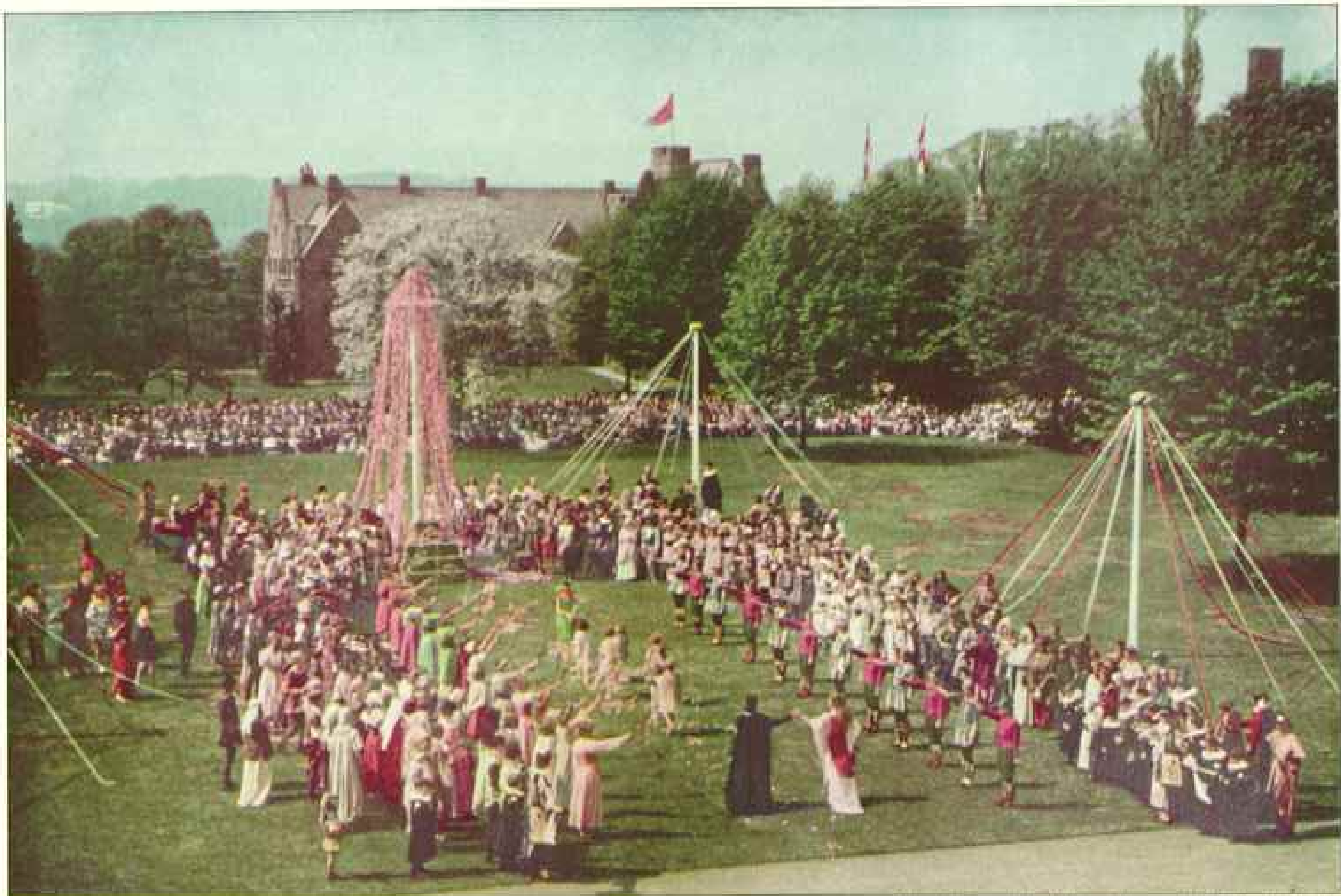


© National Geographic Society

Finlay Photograph by Clifton Adams and Edwin L. Wisherd

ON AN ACROPOLISLIKE HILL, THE PHILADELPHIA MUSEUM OF ART RISES ABOVE THE BUSY DOWNTOWN

This striking temple of light-brown Minnesota marble houses the Wilstach collection of paintings and other art treasures. The Philadelphia Museum of Art is not to be confused with the Pennsylvania Academy of Fine Arts, on North Broad Street, which is the oldest art institution in America. The Academy possesses the finest collection of portraits of early Americans in the country, including the Lansdowne portrait of George Washington.



© National Geographic Society

Finlay Photograph by Clifton Adams and Edwin L. Wisherd

ELIZABETHAN PAGEANTRY LIVES AGAIN ON THE CAMPUS OF BRYN MAWR

Once every four years the students of this famous college for women hold a May Day fête, depicting England in the time of "the good Queen Bess." Following the revels around the Maypoles, and the crowning of the May Queen, five 16th-century dramas are presented at different parts of the campus. In 1932 the students gave: "The Masque of Flowers," "A Midsummer Night's Dream," "As You Like It," "The Old Wives' Tale," and the ancient Oxfordshire mummer's play, "St. George and the Dragon."

© National Geographic Society

Finlay Photograph by Clifton Adams and Edwin L. Wisherd

ONLY ORPHANS ARE ADMITTED TO GIRARD COLLEGE

Under the terms of the unique will of Stephen Girard, venerated Philadelphia merchant who founded Girard College in 1831, fatherless boys of Philadelphia are given preference. Orphans from elsewhere in Pennsylvania, from New York City, and from New Orleans also may be entered. The main building, Founders Hall, is considered to be a perfect example of Corinthian architecture.

ARCHERY IS A FAVORITE SPORT AT SWARTHMORE

Among the noted educational institutions lending charm and culture to the Philadelphia district are: University of Pennsylvania, Haverford, Swarthmore, Bryn Mawr, Villa Nova, Drexel, Temple, and Franklin Institute. Swarthmore, founded by the Society of Friends, is the American headquarters of the Rhodes Trustees, through which Rhodes Scholars are sent to Oxford.

© National Geographic Society

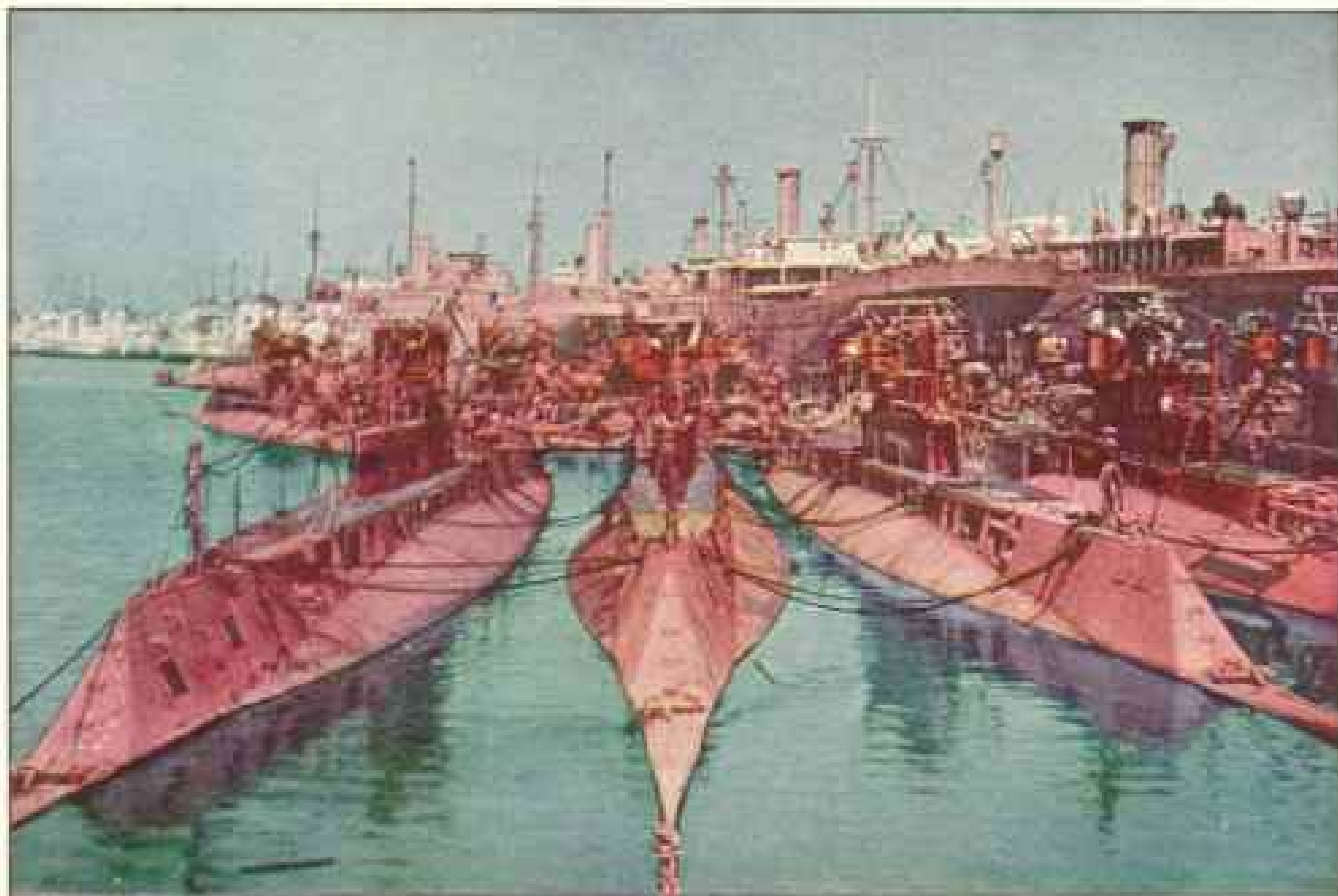
Finlay Photographs by Clifton Adams and Edwin L. Wisherd

MODERN BETSY ROSSES MAKE A PRESIDENT'S FLAG

The Philadelphia depot of the U. S. Army Quartermaster Corps manufactures many flags used by the U. S. Army, as well as quantities of uniforms, supplies and equipment. The photograph shows one of the beautiful silk and gold flags reserved for the exclusive use of the President of the United States. This ensign was adopted May 29, 1916.

RITTENHOUSE SQUARE MASQUERADES FOR CHARITY

Like New York's Gramercy Park, Rittenhouse Square is a fashionable residential section in the heart of downtown. The brilliantly painted Sicilian donkey cart takes children for rides at the annual Flower Market, given by the Garden Clubs in May. The proceeds of the fête are donated to the city's charities.



© National Geographic Society Finlay Photographs by Clifton Adams and Edwin L. Wisherd

A SNUG HARBOR FOR VETERANS OF THE FLEET

Submarines, eagle boats, and cargo ships of the Navy in the immense storage basin of the League Island Navy Yard, one of the chief naval stations of the United States. These decommissioned vessels are treated with red lead until their ultimate fate is determined. Here, too, is the Government's largest Naval Aircraft Factory.

Finlay Photograph by Clifton Adams and Edwin L. Wisherd

TRAGEDY BROODS OVER LOVELY MOUNT PLEASANT

Benedict Arnold bought this fine estate for his bride, Peggy Shippen, but the mansion was never occupied by them. When Arnold's treason became known the estate was confiscated. This is one of the nine colonial mansions in Fairmount Park under the supervision of the Associate Committees of Women of the Pennsylvania Museum of Art.

© National Geographic Society

Finlay Photograph courtesy of Mrs. Alan Reed

WHITE FANTAILS IN A WYNCOTE GARDEN

Wyncote's name recalls the part the Welsh played in the settlement of the region around Philadelphia. The first Welsh came to Pennsylvania in 1683, one year after Penn established the colony. While they, with the early Swedes, have long since been merged with those of English descent, such names as Merion, Bryn Mawr, Gwynedd Valley, Uwchland, Bala-Cynwyd, Radnor, Nantmeal Village and Tredyffrin proclaim their Welsh origin.

northwest corner of the square stands Congress Hall, where the Congress met while Philadelphia was the Capital of the Nation and where Washington's second inauguration took place. At the northeast corner of the square stands the Old City Hall, where the Supreme Court of the United States had its foundation-laying sessions between 1791 and 1800.

How different downtown Philadelphia is to-day from what it was in those stirring Revolutionary times! A grateful city, that has done as much as any other city in America to preserve its shrines of every era of its history, yet had to see vast numbers of its sacred spots identified with the birth of Liberty transformed to meet the needs of commerce.

Take, for instance, the house where Thomas Jefferson wrote the Declaration of Independence. For a long time four different houses claimed the honor of having sheltered the great statesman when he framed the immortal document.

Finally Jefferson himself was appealed to for the fact. In answer thereto he said: "At the time of writing that instrument I lodged in the house of a Mr. Gratz, a new brick house, three stories high, of which I rented the second floor, consisting of a parlor and bedroom ready furnished. In that parlor I wrote habitually, and in it wrote this paper particularly. I think . . . that his house was on the south side of Market Street, probably between Seventh and Eighth streets . . . I have some idea that it was a corner house, but no other recollections throwing any light on the question." The land records show that Gratz lived at the corner of Market and Seventh streets. A bank now occupies the site and what used to be 702 Market Street, with its building. The tablet is on the façade that includes both.

THE DIGNITY OF A BYGONE DAY

When Washington was President he lived in the Morris Mansion, which stood where the buildings at 528 and 530 Market Street stand to-day, which are occupied as clothing stores.

Never in the history of the Republic was there more formality in the presidential levees than when General Washington entertained in the Quaker City on Market Street.

That house had been occupied by General Howe during the British occupation. Later Benedict Arnold lived there, in what was called at the time "unprecedented extravagance." After Washington's retirement from the Presidency, John Adams occupied it until the removal of the seat of government to the District of Columbia, under action of the Congress, before the Government was moved from New York.

Philadelphia always felt that maybe what was planned to be the temporary capital might, after all, become the permanent one, and therefore tried to do everything in its power to make things agreeable. So it petitioned the legislature to build a presidential mansion, which the State proceeded to do. A lot was secured on the west side of Ninth Street below Market, and thereon was erected this presidential mansion. But it was not finished until Washington's second term had expired. When it was tendered to his successor, John Adams, Mr. Adams declined to accept it, saying that he was doubtful whether he was at liberty to do so without the authorization of the Congress. Thus no President ever occupied it.

FOOD NEEDS OF A GREAT CITY

Philadelphia's fame for good food is not of recent origin. Even in Revolutionary days no less of a connoisseur than John Adams praised it most eloquently, and frequently reverts to the subject in his diary.

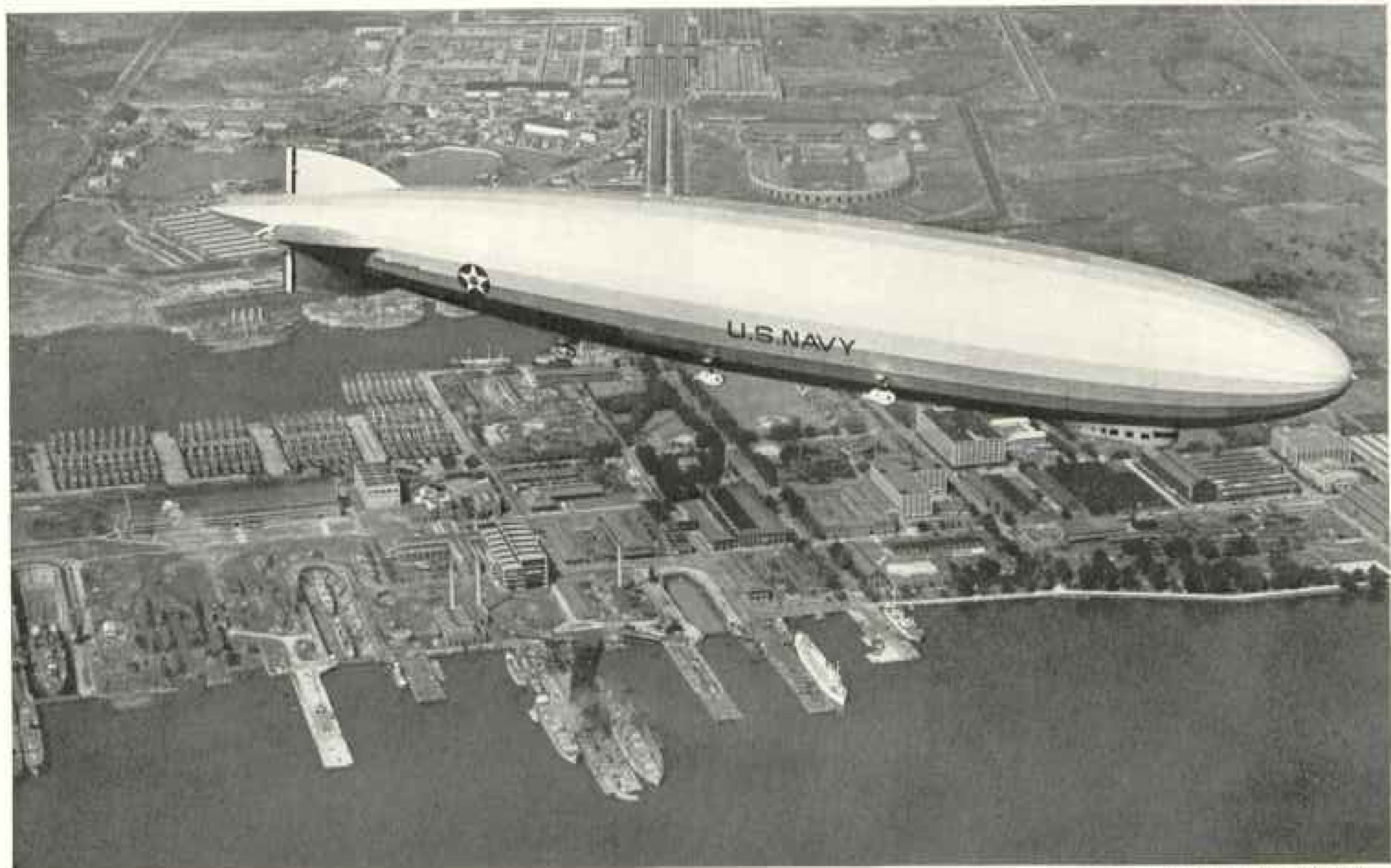
Many of America's most typical dishes originated on Philadelphia tables—Philadelphia scrapple, cream cheese, pepper pot. Even the Quakers, however plain their clothes, never had a ban on fancy food and always joined in the competition of hospitality.

Philadelphia consumes 8,000 head of cattle, 10,000 sheep, 720,000 dozens of eggs, a million pounds of butter, half a million pounds of poultry, and 163,000 pounds of cheese every week, statisticians tell us.

Every day it eats 30 carloads of potatoes, 12 carloads each of onions and cabbage, and 5 carloads of turnips, and spends $10,000,000 a year for fish.

A city with a market basket like that, as may well be imagined, has magnificent freight terminals and docks. The Delaware River has a channel to the sea in process of deepening to 40 feet; so that all but a few of the largest steamships of the world can come up to the city's docks.

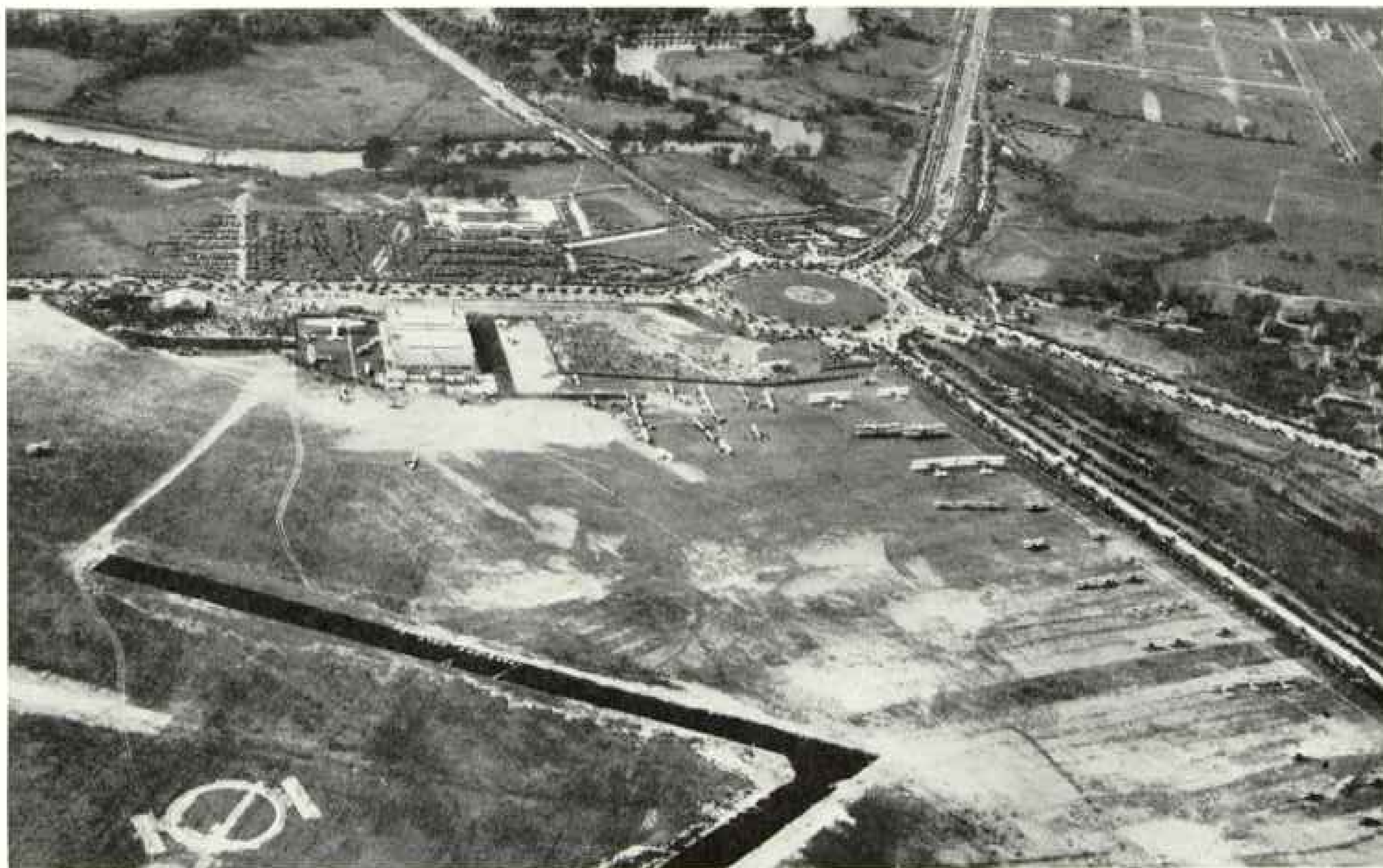
With 50 miles of water front on both sides of the Delaware and Schuylkill



© Aëro Service Corporation

A QUEEN OF THE SKY HAS A LOOK AT THE PHILADELPHIA NAVY YARD (SEE, ALSO, COLOR PLATE VII)

Immediately beyond the *Los Angeles* is the famous Philadelphia Stadium, where many athletic events of world-wide interest are held. This Titanic stadium is conveniently located less than five miles from City Hall Square (see, also, illustration, page 687).



© Aëro Service Corporation

FIFTEEN MINUTES FROM CITY HALL TO A CROSSROAD OF THE AIR

With the building of the Delaware River Bridge, Philadelphia figuratively annexed a good slice of New Jersey to its metropolitan district. The Central Airport is shown upon the day of its dedication. The direct boulevard places the giant air depot only a few minutes' distance from the heart of the city.

THE WATER WAGON ON DELAWARE AVENUE

The S. P. C. A. maintains a water service for both man and beast in the heavy trucking district along the Delaware River docks. Philadelphia's mounted police are famous for their fine horses, their splendid horsemanship, and their ability in handling traffic.

Photographs by Clifton Adams and Edwin L. Wisherd

PHILADELPHIA-MADE STREET CARS CLANG ALONG THE THOROUGHFARES OF MANY DISTANT COUNTRIES AS WELL AS OUR OWN BUSY STREETS

© Aëro Service Corporation

A GATHERING AT THE PHILADELPHIA STADIUM

This represents the largest number of people that ever assembled in one spot in Philadelphia. Three hundred thousand reverent souls gathered here a few years ago in a religious celebration. This huge stadium is a mecca for sports enthusiasts.

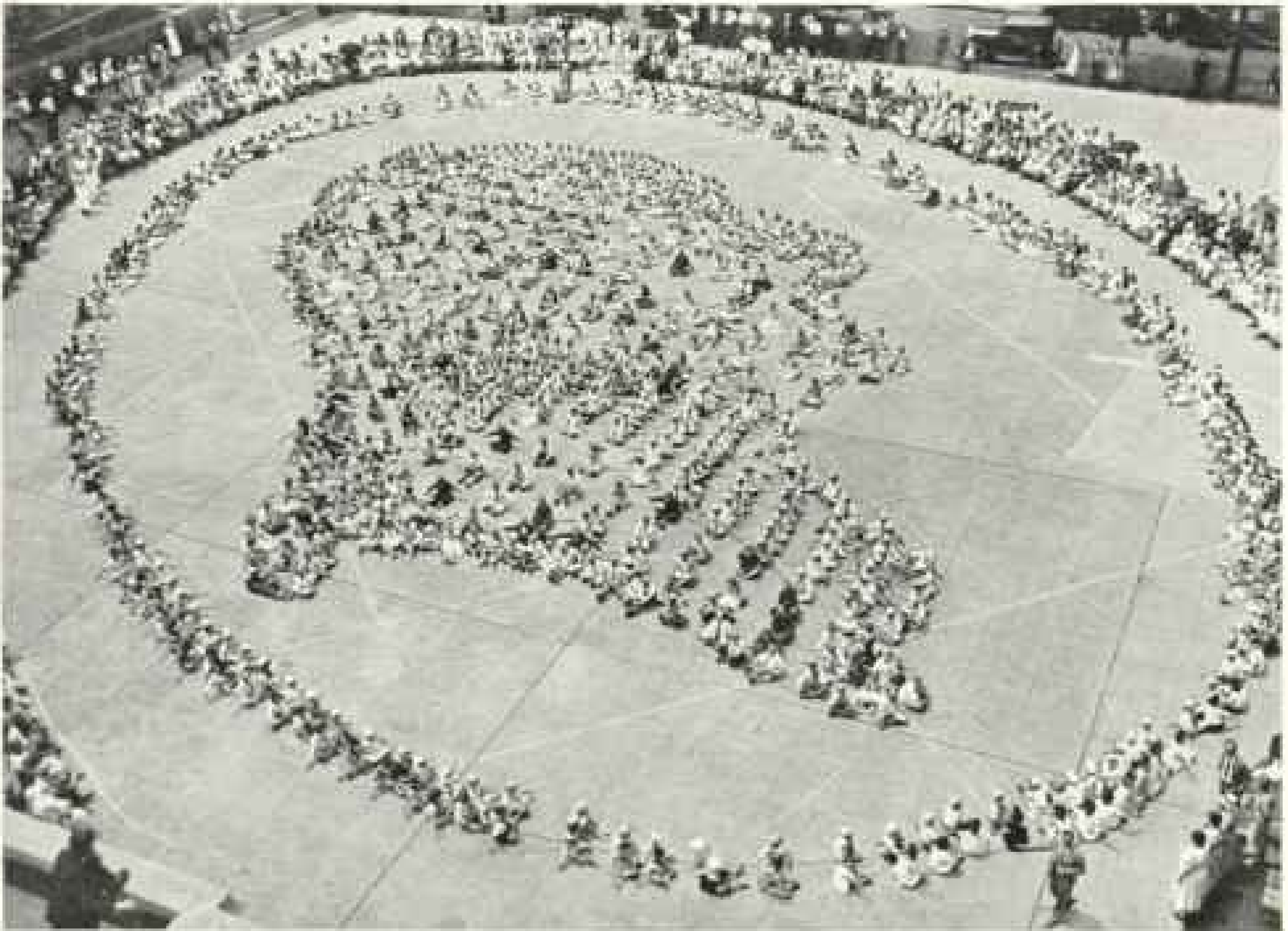
rivers, the Quaker City has developed its port facilities in splendid fashion.

One of the greatest docks in America, or in the world, for that matter, is that of the Philadelphia Tidewater Terminal, built by the United States Army as a base for the movement of war materials to our Allies in the World War. When that struggle ended, it came to be worthless from the standpoint of use, although $13,000,000 had been expended in its construction. One day a Philadelphia freight mover, Harvey C. Miller, walked through the gates and wandered through the weeds that had grown up. He believed it could be acquired and made an aid to the port expansion of the city. The presidents of the various railroads serving the city agreed with him; and so this white elephant of the Government has been transformed into a terminal in which even the Quaker City feels a pardonable pride.

LOOKING TOWARD THE BUSINESS OF TO-MORROW

Philadelphia is clearing its decks for the revival of American commerce, which it foresees as inevitable when the storms and stresses of the world collapse finally subside.

The Baltimore and Ohio and Pennsylvania railroads have been building in South



Photograph by Wide World

A LIVING MEDALLION OF THE FATHER OF HIS COUNTRY

One thousand Philadelphia school children participated in the forming of this portrait.

A TRUE PIONEER

While excavating for the Locust Street Subway, workmen unearthed an old bald cypress which geologists and paleobotanists believe to be 100,000 years old. In Ice Age days the melting glaciers made the site of Philadelphia a land of swamps.

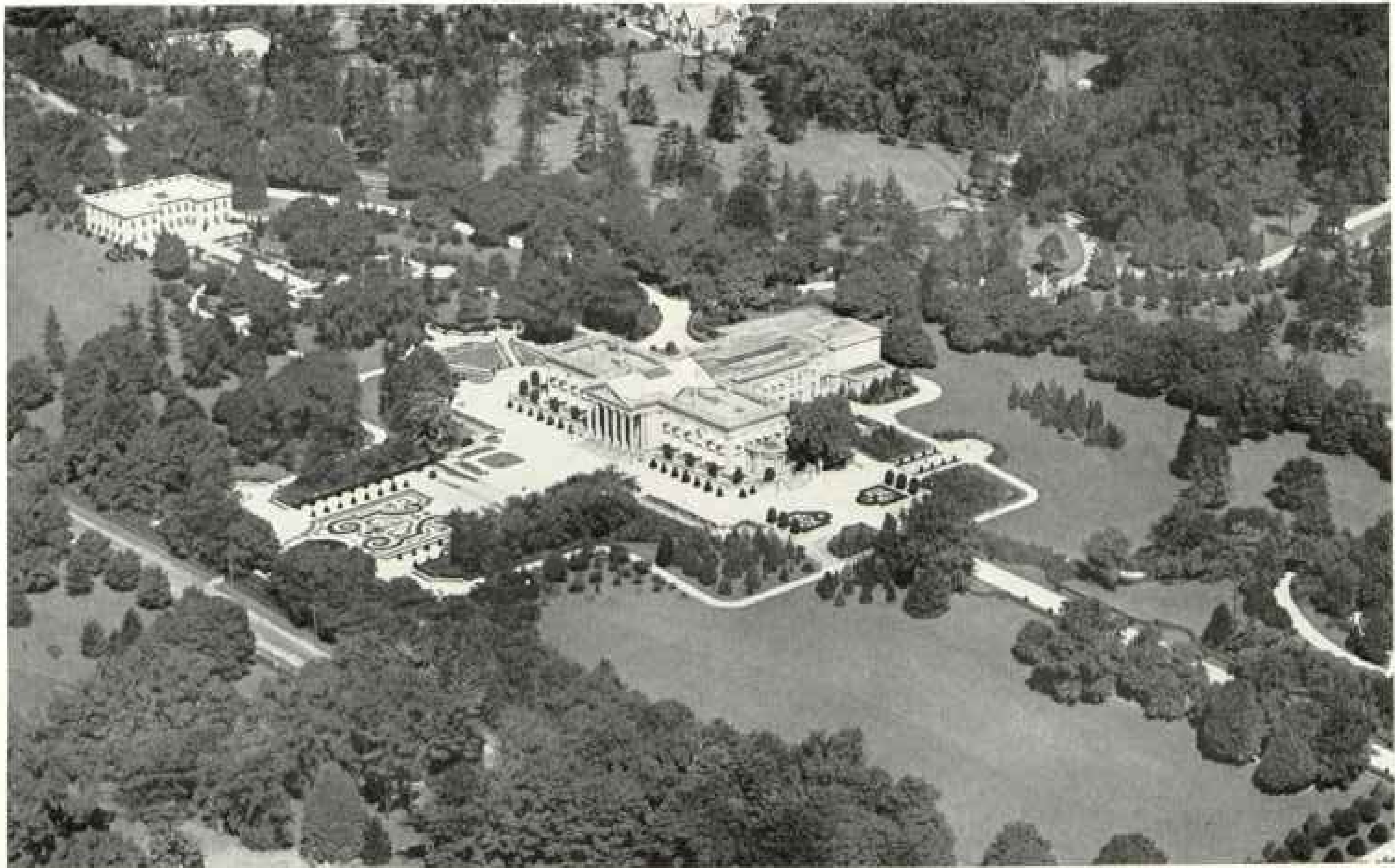
MAKING AMERICAN FLAGS

Thirteen operations now serve to convert bunting into flags (see, also, Color Plate VI).

Photographs by Clifton Adams and Edwin L. Wisherd

FEEDING TIME IN A CORNER OF THE ZOO

This zoo is one of the largest in the world and is the oldest in the United States. It occupies 28 acres in Fairmount Park, on part of the site of "Solitude," country seat of John Penn, a grandson of William Penn.



© Dallin Aërial Surveys

THE CITY OF PENN IS SURROUNDED BY COUNTRY ESTATES

At Elkins Park, a suburb, is Lynnewood Hall, residence of Mr. Joseph E. Widener. Here is enshrined one of the world's most famous privately owned art collections, including 114 paintings of the Old Masters, among them Rembrandt, Van Dyck, El Greco, Titian, and Murillo, together with leading examples of other notable schools. There also are rare tapestries, porcelain, and sculptures.

Photograph by Clifton Adams and Edwin L. Wisherd

PLEASURE-SEEKERS ON WISSAHICKON CREEK, IN UPPER FAIRMOUNT PARK

There is no more idyllic spot in any city, where urban folk may wander, than the romantic Wissahickon extension of Fairmount Park. It is fascinating to come upon Mom Rinker's Rock, surmounted by a statue of Penn; to find the natural statue of the stealthy Indian, which disappears as you approach it; to visit the old Livezey House, a sort of neutral ground of the Revolution, where British and American officers met and for a few hours forgot their enmities (see, also, text, page 645).

Photograph from Philadelphia *Public Ledger*

THE MUMMERS' PARADE ON NEW YEAR'S DAY IN BROAD STREET

The joys of celebrating the New Year have long attained their climax in Philadelphia. This year the usual city appropriations were needed for more serious demands, but the Mummers will no doubt find a way to celebrate.

Photograph by Keystone View

A MUMMER'S CLOAK MARCHES ALONG

This huge cloak, worn by a lieutenant of the Silver Crown Club, required 40 pages to support it.

Philadelphia what is said to be the largest and most modern freight terminal yard in the world.

The city itself bought the great Hog Island tract, 947 acres in extent and only twenty minutes from City Hall by motor car, paying $3,000,000 for a property that cost Uncle Sam hundreds of millions. Here it proposes to make a combination air-rail-marine trucking terminal.

Every day in the week 22,000 freight cars are moved into and out of Philadelphia over a veritable network of tracks that connect with more than two thousand industrial sidings. The South Philadelphia Terminal Yard alone can accommodate 8,500 cars.

Some one inquired recently what was the biggest industry in Philadelphia. Admiral Julian L. Latimer told the Poor Richard Club that he thought the honor belongs to the Philadelphia Navy Yard. It has a dry dock as big as any lock at Panama, a crane that is higher than an eighteen-story building and capable of setting the turret with its guns in place out of a battleship and onto the Brooklyn Bridge! Its 1,000 acres cost Uncle Sam one dollar 61 years ago; now this area is valued at $10,000,000 (see, also, Color Plate VII and illustration, page 684).

PHILADELPHIA HAS A GALLERY OF RENOWNED AMERICANS

Throughout all its quarter millennium of existence Philadelphians have been for the most part a frugal, thrifty people. The Quaker influence developed a remarkable race of business men and bankers, from Robert Morris to the Biddles and the Drexels and to Stephen Girard. Little wonder, with such men as these, that the first bank in America was established here; that the first stock exchange was here organized; that the United States Bank, both the first and the second, was set up here; that both the Revolution and the Civil wars looked to Philadelphia for their finances—to Robert Morris and Jay Cooke.

There is a peculiar pathos about the memory of Morris. He who wrought so well for the nascent Nation in jail for bankruptcy! After his mansion, in which Washington lived while President, was vacated to make way for our first President, he built himself another.

Photograph by Clifton Adams and Edwin L. Wisherd

A RITTENHOUSE CLOCK AT DREXEL INSTITUTE

David Rittenhouse's father was much pleased when his young son made a tiny clock; but he little dreamed that this bent for model-making would produce the foremost instrument-maker of the Colonies and result in astounding the astronomical world with the most accurate observation of the transit of Venus made up to that time. This master clock boasts a music-box attachment, sixteen sets of chimes, and an accurate little planetarium.

Later he bought the whole block bounded by Seventh and Eighth and Walnut and Chestnut streets, one block west of Independence Square, and therein began the erection of a mansion of the most sumptuous pattern. He poured vast sums of money into this gorgeous place, which he planned should be the grandest in Philadelphia. But he failed in business before its completion and it never was finished. It came to be known as Morris's Folly, and ultimately was razed to make way for the march of business uptown.

STEPHEN GIRARD'S PLACE IN PHILADELPHIA HISTORY

No one ever thinks of Philadelphia trade, finance, or philanthropy without thinking also of Stephen Girard. A native of France, he made many voyages to the New World. His voyage on *La Julie* in 1774 was unfortunate. He lost 25 per cent on her cargo and was afraid to return to Bordeaux lest he be imprisoned for debt.

Instead he went to New York and traded out of there for a year or so. Finally, in April, 1776, he put into Philadelphia. He liked the city and the city liked him, with all his reserve.

Great consequences grew out of his decision to seek his fortune in the City of Brotherly Love. He invested half a million dollars in the First United States Bank. When the Government refused to renew the charter, he bought the bank and its home and set it up as the Girard Bank, with a capital of $1,200,000. Such was the faith of the people in him that he was able to retain the former staff and $5,000,000 of the old bank's deposits.

When the yellow fever raged, this man, who seemed cold and austere and whose reserve was mistaken for selfishness, was one of those few brave souls who went into the alleys and poorer streets, helping to relieve the sick and bury the dead, with the kindliness and sympathy of the gentlest of knights.

The story of his meeting Mary Lum at the well in front of his store; of his falling in love with and marrying her; of the death of her baby at birth, and of her loss of mind and living death for 25 years is a tragic tale.

When finally she died, the man who had been grim and lonely before, now became doubly so, more lonely and aloof than ever. He gave generously to the hospital that sheltered his distraught wife and loaned to the Government without stint during the War of 1812.

At last, over eighty, Stephen Girard, still going about his business, was knocked down by a team and run over, and died shortly thereafter.

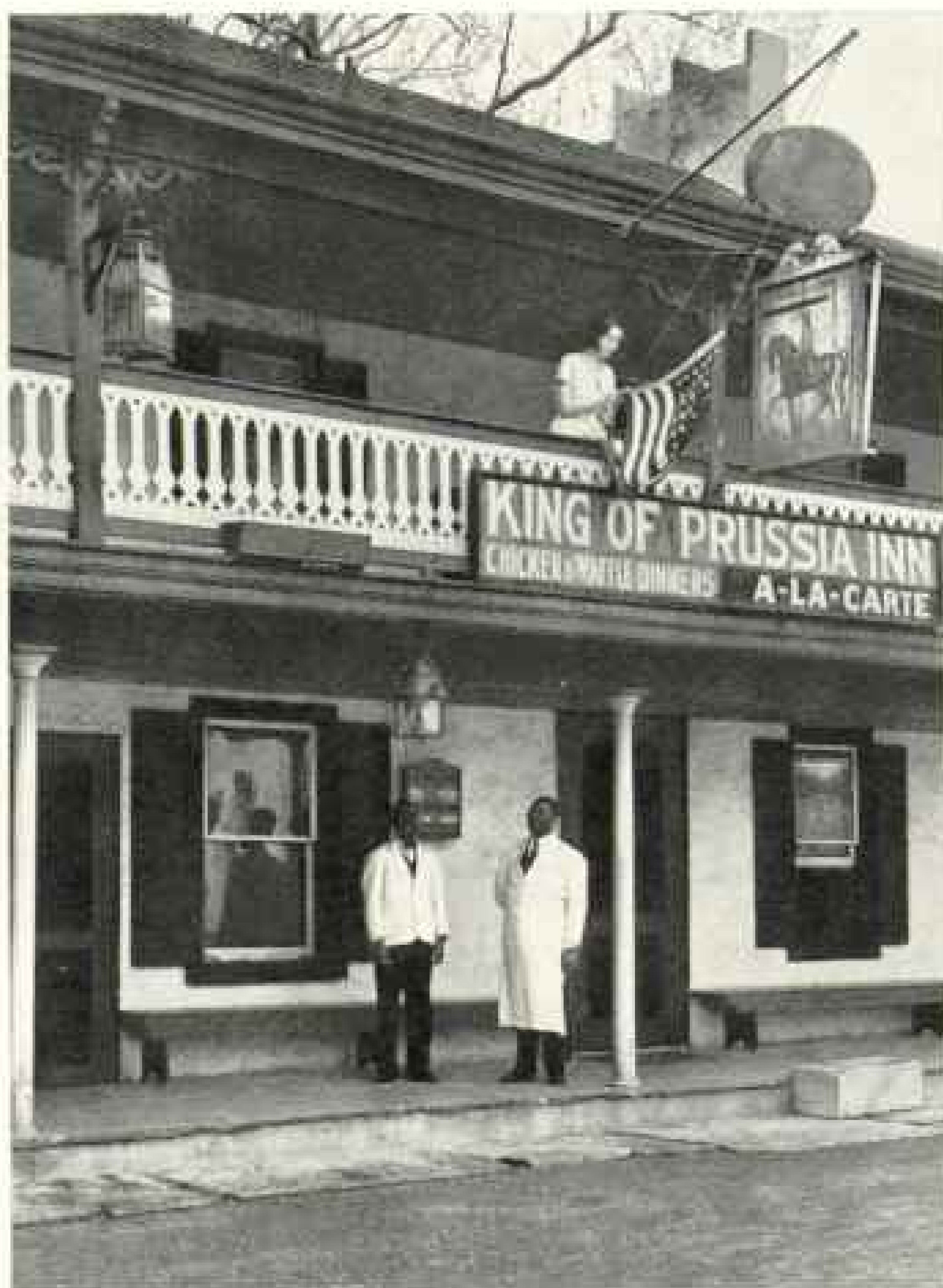
GIRARD ESTABLISHES A COLLEGE FOR POOR BOYS

But when his will was read, what a heart of gold it revealed that he had possessed!

Its principal bequest was for the establishment of a college for poor boys of Old Philadelphia, with those of Pennsylvania, New York, and New Orleans eligible to any vacancies not filled by Old Philadelphia boys.

But that was not all. A trust fund was set up for improvement of the water front, the building of model dwelling houses, and the furtherance of his ideals.

Under his will some 500 model dwellings, furnished with heat, light, and hot water from a central plant, have been built, and more than 105,000,000 tons of coal have been mined, the profits accruing to the College Endowment Fund.



Photograph by Clifton Adams and Edwin L. Wisherd

KING OF PRUSSIA INN, ON THE ROAD TO VALLEY FORGE

Through all the bitterness of World War times, when German streets became Liberty streets, German fried potatoes transformed themselves into American fried, etc., this old inn clung to the Teuton title given by its founder, a Prussian of pre-Revolutionary days. It is said to have been a hide-out for British spies during the days when Washington fought around Philadelphia.

Girard College, located in a quadrangular inclosure that was once the Peel Hall Farm, where more than 1,700 boys compose the student body, will ever be the principal monument to the memory of this remarkable man. The plant has cost upward of $10,000,000 and its endowment now reaches the magnificent total of $85,000,000 (see, also, Color Plate V).

Much has been made of the provision of Stephen Girard's will that no minister of the Gospel be allowed to enter the grounds. But Girard himself explained that it was to

Photograph by Clifton Adams and Edwin L. Wisherd

IN THE GARDEN OF FAMOUS OLD STENTON

The home of James Logan, secretary to and confidential friend of William Penn, was built in 1728. It was here that Thomas Godfrey, a glazier, developed the idea that gave the world the sextant; that Howe had his headquarters before and during the Battle of Germantown; that Washington had his headquarters as his forces moved to the Battle of Brandywine. The city of Philadelphia now owns the property and it serves as headquarters for the Colonial Dames.

keep the confusion of denominational controversies from the minds of the students, and was not to be construed as casting "any reflection upon any sect or person whatsoever."

The booklet giving the history of this fine institution says that the Bible was the first book brought into the College, and that it has always had a foremost place in the teachings of the institution.

Stephen Girard was probably the greatest philanthropist of his time.

SUBURBS ATTRACT COMMUTERS

Always a fascinating phase of the life of Philadelphia is the beauty of its suburban areas and the perfection of its commuter train service.

With the opening of the Pennsylvania Railroad's monumental new Broad Street Suburban Station, the development of the city's splendid series of pedestrian subways beneath and around the City Hall and reaching to Filbert, Arch, Chestnut, and other surrounding streets, it now is possible for scores of thousands of people to live out in the country, take the train into Broad Street, and get to their places of business in the heart of the city without once venturing into the maelstrom of traffic that surges around City Hall.

What a joy it must be to live out on the Main Line, where Overbrook and Merion, Narberth, Wynnewood, and Ardmore, Haverford, Bryn Mawr, and Rosemont, Villa Nova, Radnor, and St. Davids offer so many rare places to live! Or up in the Chestnut Hill country, in such spots as Allen Lane, Tulpehocken, and Westmoreland; or out Norristown way, in the Bala-Cynwyd, Barmouth, Manayunk area; or out in the Langhorne, Neshaminy Falls, Bethayres, Jenkintown, Elkins Park region.

One may look the suburbs of all the cities of the world over and nowhere find the best that the country has to offer more delightfully convenient to the heart of a city than one can find in the environs of Philadelphia. So rapid and dependable is

the transportation between Philadelphia and its suburbs that an office worker residing miles away can reach his place of business at least as quickly as the city dweller.

Philadelphia has too much to write about for one to hope even to touch the bottom of the subject within the limits of a magazine article.

For instance, there is the story of the Dutch, who first settled there. They built Fort Passyunk, from which the settlement that still claims that title got its name. Also, there is the story of the Swedes, who were at Wicaco and had built themselves a considerable settlement, where Gloria Dei, or Old Swedes' Church, now stands (see, also, Color Plate II). It is almost a toy church in its smallness, but withal quaint, fascinating, and reminiscent of days before the city had passed the village stage.

We would like to ramble around among the glorious old churches and meetinghouses, where men and women have given their thanks to God for so many generations. Christ Church, with its memories of early America, where Washington worshiped; St. Peter's, the aristocratic old high-towered edifice, standing in the midst of its own graveyard; St. Joseph's, oldest Catholic church in Philadelphia, where Lafayette, Rochambeau, and De Grasse worshiped, and where Washington himself came when he arrived in the Quaker City to attend the Constitutional Convention; the old Quaker meetinghouses in the heart of the city and in Germantown, Merion, and a dozen other suburban points.

It would be fine, too, if we could wander around the old city to the spots where art, the drama, literature, and science had their beginnings, visiting the scenes where Benjamin West, Charles Willson Peale, Thomas Sully, Gilbert Stuart, and others laid the foundations for the preëminence in art that always has distinguished Philadelphia (see, also, Color Plate III).

How fascinating would be a following of the first footsteps of science, up on Ridge Avenue to 13th Street, where Benjamin Franklin first caught the lightning with a kite and proved its identity with electricity; or to Norriton, where David Rittenhouse, the first American paper manufacturer, built his own telescope and made the first observation of the transit of Venus. That was one of the greatest feats of the history of science. Even the Royal Astronomer of England wrote that it was "the first approximately accurate results in the measurements of the spheres given to the world, not by the schooled and salaried astronomers who watched from the magnificent observatories of Europe, but by unpaid amateurs and devotees to science in the youthful province of Pennsylvania."

THE FRANKLIN MEMORIAL WILL BE A MUSEUM OF PROGRESS

Recently it was announced contracts had been let for the Franklin Memorial, to be built at the corner of 20th and Race streets, and to be one of the finest structures of its type in the world. More than $5,000,000 was raised for its construction. It will contain 11,000,000 cubic feet of space, with façades facing Logan Square and the north, each 365 feet long. It promises to be one of the greatest museums of progress in the world, rivaling even the Deutsches Museum of Munich.

Down in the block bounded by Market, Chestnut, and 30th streets and the Schuylkill River the foundations have been laid for Philadelphia's new $7,500,000 post office, a five-story building that will have 23 acres of floor space. It will straddle the tracks approaching the Pennsylvania's new station, and is being planned on a scale to make it one of the greatest post offices in the world, directly accessible to railroad, airplane, and motor communication.

Likewise studies are being made looking to the erection of a series of great buildings in the area bounded by Fifteenth, Market, and Eighteenth streets, and on Pennsylvania Boulevard occupying the space hitherto occupied by the "Chinese Wall," on which the tracks of the Pennsylvania entered the old Broad Street Station.

Thus we begin to see with what confidence Philadelphia, its citizens, and the Federal Government view the future of the great city on the Delaware.

Thus, for the time, we say farewell to the metropolis of old Father Penn, feeling that as it has pioneered in American art, science, industry, and commerce, blazing trails in every field of endeavor, it is moving forward to an even richer future.

Photograph by C. Veiga

GRIM GLACIERS GUARD THE STRAIT WHICH BEARS MAGELLAN'S NAME

Icy mountains face across the channel toward the Land of Fire, Tierra del Fuego. The mighty Andes seem to clutch the sea with long, gaunt fingers, that separate fjordlike inlets which Magellan explored for many futile days. This glacier was photographed in April, at the beginning of the Southern Hemisphere winter, when the snow, after the first heavy fall, comes down to the water's edge.

Photograph by Franklin Adams

LISBON: A PORT OF FAMOUS VOYAGES

Down the Tagus sailed Diaz to round the Cape; Vasco da Gama to found Portugal's vast empire in the East; and Magellan on his first voyage to the East.

THE GREATEST VOYAGE IN THE ANNALS OF THE SEA

By J. R. Hildebrand

Author of "Edinburgh, Athens of the North," "The Pathfinder of the East," "Budapest, Twin City of the Danube," etc., etc., in the National Geographic Magazine

ONE summer evening of the early nineties in the fifteenth century, most probably in the magic year 1492, an undersized, awkward boy wandered down to the water front at Lisbon and beheld a sight that held him spellbound.

Ships! Ships nosing and warping into docks. Ships loading and ships weighing anchor. Ships half built and dirty, barnacled ships undergoing repair.

Haughty officers in gaudy uniforms mingled with begrimed sailors. Dock hands, tarred from their own buckets, calked and sang. The boy's nostrils were assailed with the sweet odors of Eastern spices and the salty smell of oakum and hawsers. He was yelled at by scurrying roustabouts and nearly deafened by the din of saws and mallets.

All this activity was the day's work for one of the Peninsula's busiest ports of the Portuguese maritime trade.

All was incomprehensible to the lad, just come down from a hill town of the wild, wooded province, Traz-os-Montes. He had ridden horses of a breed still famous and he had herded sheep and goats that still abound in those stony mountains. But ships were a novelty. Only kings and the clergy had books and pictures; he probably had not even seen a picture of a ship.

The country boy must have asked questions—his was ever a restless, inquiring mind—but the seamen's scorn for a landlubber was restrained by the lad's uniform. He was a queen's page.

Wide-eyed and wondering, the lad drank it all in—glamorous tales of new places, strange tribes, tropical riches!

WHEN GOING TO COURT WAS LIKE GOING TO COLLEGE

Was it even then, fresh from Portugal's only province that does not touch the sea, stunned and fascinated by this new world of ships and sails and cargoes, that the boy we now know as Ferdinand Magellan first dreamed of being first to encircle the expanding seas?

Had he lived to-day, or even a century later than he did, Fernão de Magalhães would have been sent to college; for his was a noble family. "Of the oldest in the kingdom" was his own word for it. Then it was the custom for heirs of the nobility to receive their education at the court of their sovereign.

Magellan was an early Lisbon comer among thousands of boys who trooped down from hill farms and pastures to join the gold rush, the slave rush, the palm-oil rush, the spice rush. They swarmed aboard the ships they never before had seen to go places their sovereign hoped might be there.

Under Magellan's youthful eyes, for the first time in history, virtually a whole nation took to the sea. During his lifetime he saw three major deeds of geographic discovery, Diaz rounding the Cape, Columbus sailing to a new hemisphere, Vasco da Gama first voyaging to India,* and he crowned these with the fourth by circumnavigating the world.

BIG NEWS STORIES OF GEOGRAPHY

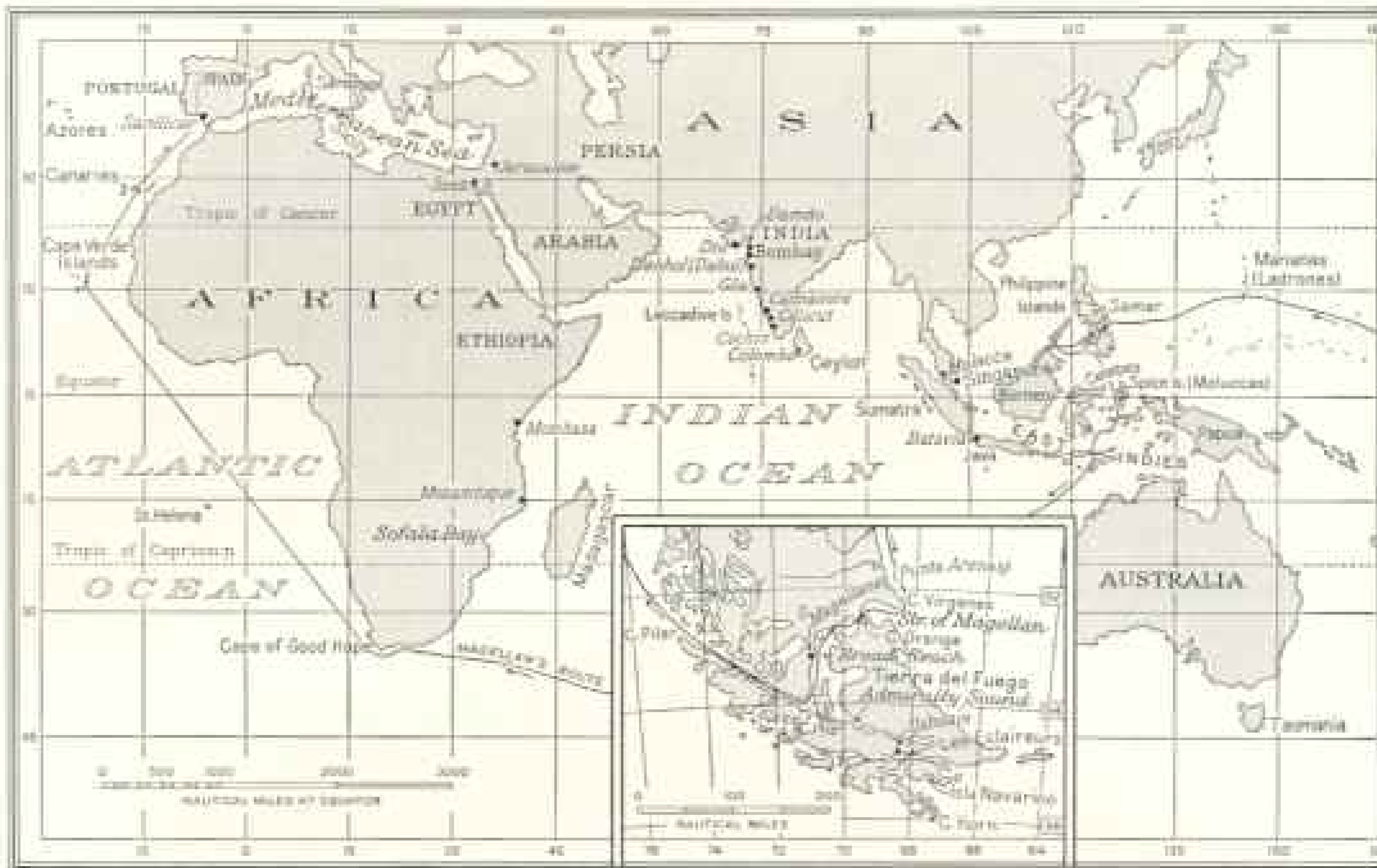
King Manoel, whose reign was to reap the ambitious dreams and constant reconnaissances of four kings, came to the throne in 1495. Magellan, then about 15 years old, was transferred to his service.

Nine years followed that are blank in our knowledge of the young courtier's progress. Like his most authoritative biographer,† we would gladly trade some of our minute knowledge of his famous voyage, such as records of the count in dozens of the darts he stocked, the number of fishhooks provided, the name of his youngest cabin boy, for a few more scraps of information about the circumnavigator's youth.

Those were nine years of momentous events in geography, years like the summer when Lindbergh, and later Byrd, flew the Atlantic.

* See, also, "The Pathfinder of the East," by J. R. Hildebrand, in the National Geographic Magazine for November, 1927.

† F. H. H. Guillemard, author of "The Life of Ferdinand Magellan and the First Circumnavigation of the Globe."



MAP SHOWING THE ROUTE OF MAGELLAN'S VOYAGE

The insets depict Spain and Portugal, radiating points of early world exploration; parts of the East Indies which the Portuguese explored, and the Strait of Magellan, which enabled the navigator to link western Europe with eastern Asia by sailing to the west (see, also, opposite page).

Had there been newspapers, their headlines would have proclaimed: "Da Nova's Fleet Discovers New Island—Names It St. Helena"; "Ships Sent to Search for Missing Cortereals Explore Bleak Labrador"; "Coelho Cruises Along Mysterious Coast—May Be New Continent." (It was—South America.)

Magellan was at Lisbon, focus of all this activity, and in 1504 he reappears in chronicles of the period, in very tiny type, on the roster of the mightiest fleet, with most momentous mission, thus far sent to India.

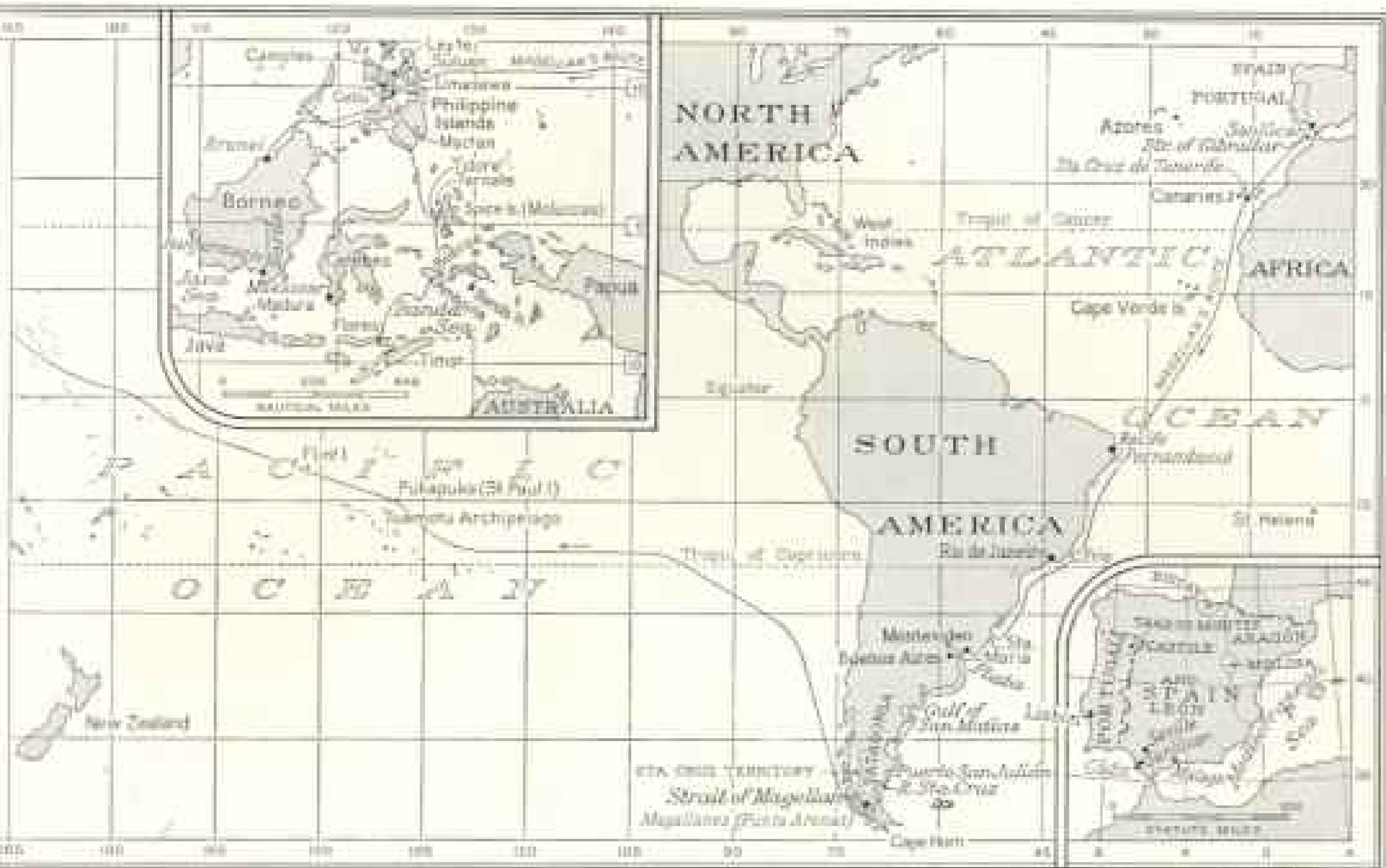
"AND WHAT SHIPS!"

It was the fleet of stalwart, incredibly honest Almeida, "Viceroy of India for our Lord the King," whose comprehensive task it was to make an actuality of King Manoel's expansive signature, "Lord of the Conquest, Navigation, and Commerce of India, Ethiopia, Arabia, and Persia." A solemn and grandiose spectacle that, when one man from a tiny, obscure European State sailed away to organize and govern vast scattered countries whose very names the Portuguese scarcely knew, whose myriad peoples they had never seen.

To patrol waters as broad as the Mediterranean and subdue colonies over an area nearly the size of all Europe, the Portuguese were willing to put themselves out a bit. Twenty ships at least, perhaps more; planks and beams aboard already shaped to build others in India; 1,500 men at arms, 400 seamen, 200 bombardiers; artillery, ammunition, supplies "in the greatest abundance yet seen"; among the officers "many fidalgos and cavaliers, and people of distinction." Also, a common seaman, age 24, very green, possibly very homesick, if not seasick, on his first sea voyage, to wit, the young mountaineer-courtier, Fernão de Magalhães.

"And what ships!" So said the proud Portuguese as they marveled at the amazing fleet. So, also, would exclaim the modern mariner, but in quite another tone.

To sail them windward was a mighty feat of ingenuity and patience. They had only lateen spankers, no fore or aft sails. They constantly drifted leeward; a head sea staggered their half-moon bows; they



Drawn by A. H. Bumstead

EXPLORATIONS THAT FIRST MADE A WORLD MAP POSSIBLE

Members will be interested in tracing on The Society's supplement, The Map of the World, published with this issue of their Magazine, the amazing spread of civilization and new sovereignties over the areas which Magellan visited, discovered, or explored.

looked top-heavy; they could make time only in a stiff breeze, blowing in the direction they headed. One vessel foundered in the tropical doldrums, sprang a leak, and only a few survivors ultimately reached Mozambique.

Magellan is not mentioned specifically until he is listed as wounded in a famous sea battle off Cannanore, one of the most celebrated engagements in all the Portuguese encounters in the East.

Inspired by the Moors, who had been quick to foresee a dangerous trade rival in the Portuguese, every port poured forth vessels to mobilize off Calicut. Eighty-four native ships and 125 praus swarmed there to attack 11 Portuguese ships. The rest were scattered.

VICTORS TAKE CENSUS OF THE DEAD

No quarter was given; none asked. Soon the sea ran with blood. The bodies washed ashore next day "formed as it were a hedge." The victors set about counting the dead and grew weary after they had enumerated 3,600. Some 80 Portuguese fell, 200 more were wounded, and among the latter was Magellan. The dead were buried at sea, that the Moors might not know the loss; the wounded, Magellan among them, were treated at a hospital ashore.

FRUITS HEAL THE SICK, THOUGH MAGELLAN DID NOT KNOW WHY

After being a patient, Magellan had to play nurse. He was assigned to a detachment that sailed to reinforce his compatriots, stricken by Mozambique's climate, at Sofala Bay. He helped feed marmalade and conserves to the sick and marveled, in that pre-vitamin era, that such simple addition to their diet sped their recovery.

Magellan's ship returned to Cochin to find Portuguese stock had slumped. Had Lisbon had radio reports there would have been panic selling of Overseas, Ltd.

Native princes were rebelling. Stirred by the dwindling stream of spice shipments and his consequent loss of tolls, the Sultan of Egypt allied his fighting forces with them. In the first battle in which the Egyptians participated Viceroy Almeida's brave and beloved son, Lourenço, was slain,

Photograph by Franklin Adams

OXCARTS STILL CREAK OVER ROADS OF MAGELLAN'S MOUNTAIN HOME

This boy is driving his quaint vehicle in Traz-os-Montes (Behind the Mountains) Province, Portugal, where the navigator was born. Here it is still common to decorate the heads of oxen with bizarre ornaments.

Pereira was killed, Magellan again was wounded, but the power of Portugal was established in the Eastern seas.

No sooner had Magellan returned to Cochin than another armada arrived, four vessels commanded by Diogo Sequeira and assigned to sail farther east, to Malacca.

Believing, or affecting to believe, the force inadequate, Almeida added a fifth ship, commanded by Garcia de Sousa, and on that ship sailed Magellan and Francisco Serrão, who later became bosom friends—a chance incident which was to alter the maps of the world!

The little fleet sighted Ceylon, touched Sumatra, and, coursing through waters never before plied by European vessels, put in at Malacca September 11, 1509.

Malacca long had been the spice El Dorado of Europe's dreams. The Portuguese galleons obtruded among the praus from farther India's ports and junks from China. Portuguese sailors mingled with Arabs, Burmese, Javanese, and other nationalities ashore. A panic ensued. The traders, the middlemen, the warehousemen, the Bengal Sea shippers, all knew the fate of Calicut, of Cochin, of Dabul, which had resisted the Portuguese.

Enraged by defeat and personal grief, Almeida rushed his ships toward Diu, to the bloodiest battle fought in the Indian seas. Its devastation passed into a proverb: "May the vengeance of the Franks o'ertake you as it overtook Dabul!"

Pereira, commanding the *Holy Ghost*, that bore Magellan, engaged the enemy flagship. He bombarded with cannon, then attacked with crossbows, mowed down the crew with swords, and made a hand-to-hand finish with daggers. Every enemy aboard was slain and a final broadside sank the ship.

COURTESY CONCEALS A ROYAL PLOT

It was three days before the King received Manoel's envoys; then he did so with a mask of suave courtesy which concealed his design to entrap them.

Natives swarmed about the ships upon pretext of trading pepper. Quick-witted Garcia de Sousa scented the plot and sent Magellan to Sequeira's ship to warn the admiral.

Magellan found him leaning over his chessboard with eight malevolent Malays standing over him. The young courier whispered a warning to his admiral, who, unconcerned, scarcely lifting his eyes, ordered a sailor aloft.

The sailor looked down from above to see a Malay behind Sequeira with his kris half drawn; another motioned him to wait, because the massacre signal had not yet been given.

Just then the sailor also saw Serrão and his companions fleeing on shore. He yelled "Traitors!" Sequeira leaped aside in time to escape his assailant, his men sprang to his aid, and the Malays fled the ship.

Meanwhile Serrão, who had clambered into a skiff, was sore beset by native boats until Magellan and a companion rowed to his rescue. The admiral gave orders to all the Portuguese ships to slip their anchors and attack. Portuguese guns crumpled and sank the flimsy native praus.

Magellan's friendship for Serrão was cemented for all time, and that friendship, it developed, helped germinate the first voyage around the world (see page 704).

CHANCE AGAIN MOLDS MAGELLAN'S FATE

Fortunately Magellan was soon to sail to the East again, even farther east than Malacca, all because of another happy accident; for, after returning to Cochin, he was ordered home. But two ships of the Lisbon-bound squadron, one with Magellan aboard, ran aground off the Laccadive Islands. The small boats were saved and the distance to mainland was not too great, but there was not room enough for all the survivors. There arose an argument over who should go first, the sailors or the "captains, fidalgos, and persons of position."

Magellan volunteered to remain with the crews as a guarantee that help would immediately be sent back from India.

There was more than mere chivalry in Magellan's act. One musty, priceless record notes that "a friend of Magellan's" was also left behind by this medieval rule of "captains first," the unnamed friend being referred to only as "a person of no great importance." This was Magellan's close personal friend, Serrão.

Thus Magellan and Serrão, before they were well out of India, found themselves back again, and soon they reappear in the roster of an avenging fleet which the new Viceroy, Albuquerque, led to Malacca.

With flags flying and guns firing volleys that the Sultan might construe either as a salute or a warning, the fleet sailed into Malacca one sunny morning of July, 1511. Promptly came aboard a messenger to inquire, in effect, "War or peace?"

"Suit yourself," was the gist of Albuquerque's reply. The Sultan temporized, listened to the Moors with one ear and to the Portuguese with the other. The quicker-witted Chinese sailors in the polyglot harbor sensed the idea and sought permission to go home.

"Wait a while, see a glorious battle, and carry back to China the story of Portugal's valor," the Viceroy told them.

CONQUERORS FACE A PAGEANT ARMY

For the focus of his land attack Albuquerque picked a bridge across a tiny stream which threaded its way among the freakish forts, queer towers, and tile-roofed houses of Malacca. Twenty thousand warriors of the Sultan's own, reinforced by Moors and his other allies, bore down upon a mere 1,400 Portuguese fighting men and their Malabari archers.

Like a magnified circus parade, including the Javanese warriors in their amazing polychrome costumes, they approached, flying their pennants, waving their strange, jeweled arms. Next in line was a herd of elephants, with the Sultan ensconced in a gorgeous howdah, aboard the foremost elephant, wielding a lengthy lance, but guarded by a squad of warriors afoot.

Fighting with elephants was wholly novel to the Portuguese. That was fortunate; for, not knowing the ethics of attacking elephantine cavalry, they assailed the perambulating fortresses instead of the warriors. Some of the ambling beasts lurched and sank down like scuttled ships, others stampeded, the rest turned about and fled in jungle fright.

The sacking of the city yielded treasure that eclipsed the victors' wildest dreams: beautiful weapons and costly armor, teakwood chests and hammered brass utensils,

From "The Life of Ferdinand Magellan," by F. H. H. Guillemard

ONE OF THE PENINSULA'S BUSIEST PORTS OF THE 1490's

Few explorers have been thrust into such a seaman's school as that afforded Magellan when he and hundreds of other lads from the farms and pastures thronged to Lisbon (see, also, illustration, page 698). De Bry's old print gives an idea of the craft of the circumnavigator's time, though no exact description of his own fleet is extant (see text, page 713).

tiny bronze images and mighty bronze cannon, and among the last mentioned a magnificent piece the Sultan had received from the opulent Zamorin of Calicut.

Beyond all that, Malacca itself was the most dazzling jewel in Portugal's eastern crown. Its harbor, where rode the ships of countless oriental potentates and peoples, was the golden vessel wherein the Spice Islands, the Philippines, even fabulous Cathay, poured their riches, to trickle out again toward India, Egypt, the Suez, and finally to filter through their costly ways to Mediterranean ports (page 706).

The conquest of Malacca and sure knowledge that Cathay and the Indies were directly accessible constituted a sore temptation to sail eastward with the entire Portuguese fleet. But the astute Albuquerque, always mindful that Portugal's spice line depended upon sure control of strategic points along the way, returned to Góa, leaving three galleons to reconnoiter the promised land of fragrant spices.

Captain of one of these ships, according to one chronicle, was Ferdinand Magellan. More certainly and more important, even from Magellan's standpoint, another ship was commanded by his friend, Francisco Serrão.

The ships skirted northern Java and Madoera (Madura), sighted the Celebes, sailed into the Banda Sea, touched at Boeroe, and took on cloves and nutmegs at Amboina and Banda. By that time they were too heavily laden to visit Ternate, so they turned back for Malacca.

MAGELLAN'S FRIEND OUTWITS PIRATES

Off a tiny island southwest of the Bandas, Serrão's ship was wrecked, broken up on a deserted island, a rendezvous for pirates, where it looked as if the refugees faced certain death, if not from hunger and thirst, from corsairs. But they escaped, and Serrão later became adviser to the powerful King of Ternate, as did Marco Polo at the court of Kublai Khan.* From there he wrote voluminous letters to Magellan in Lisbon, describing the wealth and wonders of eastern lands, "larger and

* See, also, "The World's Greatest Overland Explorer," by J. R. Hildebrand, in the NATIONAL GEOGRAPHIC MAGAZINE for November, 1928.

Photograph by Franklin Adams

A TRIPE SELLER OF LISBON

Early navigators probably brought to Portugal from the Far East the "pole-basket" style which persists to this day (see illustration, page 714).

richer than that found by Vasco da Gama." These letters later spurred Magellan to encircle the world, and also served him as a prospectus to enlist financial backing for his immortal voyage.

For, after seven years of the smell of powder and the scent of spices, seven years of the most stirring episodes of Portugal's history, the erstwhile mountain boy who had been queen's page returned—how he returned we do not know—a seasoned veteran, to an even busier Lisbon. He spent a year there, a year that must have irked him, dreaming daily of going back to the isles of the spices; but he found himself assigned to North African service instead.

BALBOA'S DISCOVERY SPURS MAGELLAN'S PLAN

The Moors of Africa, conscious that Portugal was pouring her resources into the East, thought the time ripe to rebel against paying the taxes the Portuguese king had imposed upon them. Promptly King Manoel dispatched a formidable fleet to settle their status, once for all.

Again Magellan's name does not appear upon the records until he was wounded. This time, in a foray, his leg was pierced by a lance and a tendon below the knee was cut in a way that lamed him for life.

Magellan returned to Lisbon to find all the Peninsula ringing with the most momentous news since Diaz had rounded the Cape.

Balboa had climbed a hill in Panama and scanned the Pacific. He called it the Great *South* Sea, which was significant to Magellan.

Go far enough south, Magellan argued, and one might find a water passage that led to the "spicery." Balboa supplied the final link to confirm his theory.

No matter if North America extended clear across to Cathay, the South Sea was the "short route" to the East. All was crystal clear in the mind of Magellan. First, he would offer his services to his sovereign; he would be assigned to the East, but he would not disclose his plan until he had worked it all out and assembled his proofs.

But not so fast. "Again this bumptious young captain!" seems to have been the King's thought. "Too impulsive. Vasco da Gama himself waited 18 years to get back to India. These explorers are help-

Photograph by Mrs. Gordon Morse

MALACCA, THE SPICE EL DORADO OF MEDIÉVAL EUROPE'S DREAMS

Natives are loading pineapples in the Malay Peninsula port where Magellan made his first contact with the ships that bore spices of the Indies and the silks of Cathay. To-day modern Singapore has robbed historic Malacca of much of its commerce, but the latter still ships out copra, rattan, and palm oil (see, also, text, pages 702, 704).

ful, up to a certain point, but they can't let well enough alone."

Point-blank the young man had to be told his services were no longer needed. Playing his last card, Might he offer them elsewhere? To be sure. Might he kiss the King's hand in token of his continued allegiance? He might not.

That was a blow, but Magellan's single-track mind kept right on with "pilots, charts, and questions of longitude"—especially longitude. Any sailor by that time could locate his latitude; but determining longitude still was hazy. That was why Cabral had stumbled on Brazil.

Even the Pope, advised by Europe's best astronomers, had made a grand gesture of dividing the unexplored world into two hemispheres, by decreeing that Spain's half should be west, and Portugal's east, of a certain meridian to be measured from "a line drawn from Pole to Pole, passing 100 leagues to the west of the Azores and Cape Verde Islands!"

The division meridian, as jockeyed by subsequent treaties, cut through the easternmost projection of South America; hence Brazil speaks Portuguese to this day. But the undetermined circumference of the earth left in doubt upon which side of the antipodal meridian the Moluccas lay—an uncertainty which was to cause Magellan no end of trouble (see sketch map, pages 700-1, and The World Map supplement).

A "NAVIGATOR" WHOSE LIBRARY WAS HIS QUARTER-DECK

Immersed in his study of the oceans and this ticklish question of longitude, Magellan encountered a certain eccentric character of Lisbon, Ruy Faleiro—an astronomer who would sidle along the streets with his eyes on the ground; a "navigator" who spent his years poring over musty books in dim-lit libraries. The boys jeered at his shabby figure. Their elders shrugged and tapped their foreheads.

Queer, morose, sullen, but probably the greatest cosmographer and authority on navigation in the world of his day.

To Faleiro, Magellan revealed his plans.

To Serrão, in the Moluccas, Magellan wrote: "I will be with you soon; if not by Portugal, then by way of Spain."

Photograph by Branson De Cou from Galloway

THIS AFRICAN DANCER CAN NEVER BE OUT OF STEP

Native performers in Mombasa, Kenya Colony, keep time to the rattle of stones in tin cans tied to their legs. In these aboriginal marathons the participants keep going until they drop from exhaustion, and the last dancer to remain on his feet wins a prize. After Vasco da Gama's voyage, Mombasa became a port of call between Portugal and India, and it took the first fleet in which Magellan sailed some four months to cruise the 9,000 or more miles from Lisbon to this distant stronghold of East Africa.

Month after month the strange allies pondered maps, charts, letters. Many were hazy, distorted, contradictory. The maps were marvels of the engraver's art, mostly more illuminated than illuminating. But here and there was a clue, and these clues clinched Magellan's theory. All this time the project struck no spark of interest from the King of Portugal.

Piqued, restive, determined, Magellan set forth, as Columbus had done, to lay his plan before the Court of Spain. He went alone. Faleiro would join him; but Faleiro, with his tables and charts for navigating the most distant lands and undiscovered seas, could not stir himself to go to Seville on a mere few months' notice.

MAGELLAN FINDS A PATRON—AND A ROMANCE

Arriving at Seville one October day, 1517, Magellan found himself among kindred spirits, many of them his own countrymen. Immediately he was invited to the home of another Portuguese expatriate, a friend who was to be his Ambassador Herrick in Spain, Diogo Barbosa.

Barbosa was rich, influential; he even had tasted the joy of exploration, for he had been captain of a ship of the India-bound armada that discovered St. Helena, subsequent island of Napoleon's exile; also, Barbosa had a beautiful daughter, the spirited Beatrice. To make the story perfect, the exiled adventurer, within two months of his coming, married Beatrice Barbosa.

Meanwhile Magellan had laid his plan before the proper authorities, the Casa de Contratación, the India Office of Spain. Promptly it was rejected. However, one official of this body, Juan de Aranda, either more farseeing or more "on the make" than the others, privately interviewed Magellan, then secretly made inquiries about him and Faleiro through friends in Portugal.

Replies were so favorable that Aranda turned every effort toward promoting the

© Wiele and Klein

AT CANNANORE, FISHERMEN'S HUTS MARK THE SHORES WHERE PORTUGAL'S FLEETS ASSEMBLED

Photograph by Cowling from Ewing Galloway

GÔA, A TINY REMNANT OF PORTUGAL'S FORMER INDIA DOMAIN

Magellan took part in the councils which led to the conquest of Góa by Albuquerque. It became a keystone of Portuguese trade and to-day is the capital of all that remains of Portuguese India, which consists of Góa settlement, Diu, and Damão (see sketch map, pages 700-1, and The World Map supplement).

Photograph by Henry R. O'Brien

HUGE CARTS DRAWN BY ZEBU OXEN CARRY FREIGHT AT COLOMBO'S DOCKS

From various Pacific island chiefs Magellan heard of the fame of Ceylon as a source of spices. The warehouses attest the commerce to-day of the capital of the island colony, which has been called Great Britain's "Pearl of the Orient." The cinnamon which was one object of the explorer's search still is exported, but more important are the shipments of cinchona bark, source of quinine, one of the white man's major weapons in his invasion of the Tropics.

Photograph by Publishers' Photo Service

SHIPS LIKE THESE FOLLOWED IN WAKE OF MAGELLAN'S VOYAGE

This native copra boat in the harbor of Makassar, Celebes, is built exactly as the Dutch built such boats three centuries ago, when they began colonizing many of the islands the Portuguese visited. Copra, the dried meat of the coconut, is a valuable product in the Celebes and is the major export of scores of Pacific islands. The Celebes boats, manned by Malays, cruise among outlying islands and coastal towns, picking up cargoes of copra, to be reshipped from Makassar.

enterprise. Just then the gloomy Faleiro arrived, and he was incensed because Magellan had told Aranda so much. The bibliophile could point to the letter of an agreement by which neither he nor Magellan was to divulge their plan without the consent of the other.

Tolerant then, as many times thereafter, Aranda went toward Valladolid, where the King was holding court, by another route from that of Faleiro and Magellan and his bride. Before reaching the city the two groups met again and together they entered, a queer procession, dusty and disheveled, mounted on mules, Faleiro now wrangling with Aranda about the division of proceeds of the expedition, if any.

The boy king, Charles V, had just arrived for a visit to Spain, to him an outlying area of his domain.

Spain, one historian says, was treated as "the milch cow of the Netherlands." In Charles's court, writes another, "Everything was venal and disposed of to the highest bidder."

Far from an opportune time, certainly, to present a highly speculative and costly enterprise, depending upon abstruse theories of geography.

EXPLORER MARSHALS FACTS—AND A HUMAN EXHIBIT

But the unexpected happened. Aranda actually succeeded in obtaining an early interview with His Majesty. He proved his astuteness by having a document ready for both parties to sign.

On that document Magellan, for the first time, boldly wrote himself down as Fernando Magallanes, which is Spanish, instead of Fernão de Magalhães, which is Portuguese.

There followed the inevitable reference to the King's councilors. That, too, looked

Photograph from Helmig

"WAX PAINTING" IS A MAJOR MADOERA (MADURA) ISLAND INDUSTRY

The word "batik," which recently has had such a vogue in our own country, is Javanese for "painting in wax." Hot wax is poured on cloth in designs and then the unwaxed parts are dyed. Batik is used extensively through the Malay islands for decorating clothing of the native peoples.

hopeless. Some were avaricious, others futile; others, to put it bluntly, were royal "racketeers." For example, there was one, Fonseca, the Bishop of Burgos, who had won notoriety by opposing Columbus, calling Cortez a rebel, and defaming Balboa. If the others acquiesced, it must have seemed, he alone would block the project. Yet it was he, amazingly, who espoused Magellan. Perhaps he saw a chance for profit, perhaps he hoped to redeem his prestige; nobody knows.

Certainly Magellan did not pause to inquire his reasons. He appeared at the hearing arranged by Fonseca, with letters from Serrão telling of the wealth of the Indies; he read narratives of voyages to the islands, showing they lay far beyond Portugal's Malacca; he explained how South America tapered westward toward the south, just as Africa tapers eastward toward its cape. There must be a passage around the former, as around the latter, and he was prepared to sail to latitude 70 south to find it.

Most likely his listeners dozed off during this exposition. Like a good showman, he brought them to attention by displaying a native brought back from the Spice Islands and a swarthy slave girl from Sumatra.

The councilors, all but one, were totally unimpressed or hostile. That one, Fonseca, single-handed, wrested from them a decision to report the project favorably to the King.

Now there arose the ticklish question of finances.

Magellan had returned from India a poor man. Faleiro was an impecunious student. The King might approve, but the royal purse, then very lean, might close at the mention of the cost.

ANTWERP MERCHANT UNDERWRITES VOYAGE

Providentially, to Spain just then came Christopher de Haro, very rich and very indignant against Portugal. He was a member of the Antwerp family of Haros, who have been called the Rothschilds of their time, and Christopher had been the Portuguese resident agent of his firm's vast interests. He had quit Lisbon, greatly

Photograph by Amos Burg

DRYING NUTMEG IN THE BANDA ISLANDS

Though the Moluccas, or Spice Islands, which in their wider sense include the Bandas, lack the glamour of the days when Portuguese galleons rounded the Cape of Good Hope to bring back rich cargoes of fragrant spices, nutmeg and mace still are exported from the Bandas. Mace is the dried aril which surrounds the seed of the nutmeg. When fresh it is red; after being dried in the sun a few days, it is bright yellow and has a waxlike texture.

aggrieved because the King's ships had sunk a fleet of the Haro vessels and then ignored his pleas for reparation. Wholeheartedly he offered to underwrite the voyage to the full extent of his resources.

Thus the explorers were able to present to the King two tentative plans, one of which gave them certain concessions, provided he desired to evade the full financing of the cruise.

Negotiations were brought to a head when Charles V, on March 22, 1518, forwarded them a document authorizing the undertaking and clearly stating the terms.

The King contracted to fit out five ships and provision them for two years for a complement of 234 men. With certain reservations, he agreed that no other expeditions should follow in Magellan's path for ten years, but he stipulated that the ships should not invade territories of his "dear and well-beloved uncle and brother, the King of Portugal."

Magellan and Faleiro were to receive a twentieth part of any profits from the voyage; thereafter they might send to regions discovered specified amounts of goods for trading, and they might choose any two islands, if more than six were discovered, from which they were to receive a fifteenth of the profits. The King reserved the right to appoint a treasurer, and other officers we should call accountants, to supervise the expedition's accounts. In an accompanying document, first of a stream of subsequent orders, Magellan and Faleiro were appointed captains general.

A ROYAL WEDDING NEARLY WRECKS THE VOYAGE PLANS

Fine sailing such as this could not last indefinitely. Like a summer shower in his boyhood hills, a storm broke over the preparations. The expedition was all but wrecked, before it started, by a royal wedding.

King Manoel was negotiating to marry Dona Leonor, sister of Charles. At Saragossa, while the details of the expedition were being threshed out, was Alvaro da

Costa, Portuguese Ambassador to Spain, commissioned to arrange the nuptials.

At first the ambassador was annoyed. Of what consequence this harebrained voyage compared to a weighty stroke of statecraft, such as the union of two royal families? Then, as the importance of the project gained credence, he set about to block it.

At first he cajoled, then threatened, and finally tried to bribe Magellan. Next, he appealed to King Charles and wrote letter after letter to King Manoel.

More disheartening to Magellan was the passive resistance of the India House, at Seville, which devised cunning obstacles, including the plea of lack of funds.

The alert young monarch settled all that by a letter in which he assigned certain profits just received from the West Indies to help find the East Indies. He gave clear-cut instructions that ships were to be fitted precisely as Magellan and Faleiro ordered. He wrote fully to King Manoel, explaining that the explorations were not treading on his lands.

Overjoyed, the two explorers proceeded to Seville.

FIVE LITTLE SHIPS MAKE UP THE FAMOUS FLEET

Aranda had gone shopping for the ships. He scarcely knew a jib boom from a topmast, but he could drive a hard bargain. He bought five vessels at Cádiz.

Consul Alvarez spread the word: "They are very old and patched, and I would be sorry to sail even for the Canaries in them; their ribs are as soft as butter."

The vessels were: *Santo Antonio*, 120 tons; *Trinidad*, 110 tons; *Concepción*, 90 tons; *Victoria*, 85 tons; *Santiago*, 75 tons.

Five tiny ships, composing one of the half-dozen most famous fleets of all time! It would be in order to describe them. How they had tall, top-heavy forecastles and stern castles; how they all boasted decks (only one of the vessels of Columbus was decked); how their clumsy portholes opened like trapdoors. Their bows were high, rounded, and blunt, with fantastic ship's heads thrust forward like a turtle's neck. Their freeboards were as tall and ungainly as a wooden fence around a rural baseball ground (see, also, page 704).

How many masts, what type of sail, what manner of rigging? Not a contemporary line. There were no photographers to record what the chroniclers forgot. A. D. 2000 the historians of 1932 may give more thanks for one George Eastman than for half a dozen Bancrofts.

As for supplies, we have enough about them to make the reader dizzy. Certainly Magellan must have been after he completed the list. He engaged calkers, carpenters, sawyers—apparently a carpenter of that day disdained a saw. He bought oakum, pitch, tar, resin. He ordered pumps, nails, pitch ladles, 173 pieces of canvas for sails, 32 yards of coarse canvas to make sacks for the ballast.

Admiral Byrd said it was the "Battle of New York," the battle of infinite details, that conquered the Antarctic.

Magellan's "Battle of Seville" must have been akin to Byrd's when Byrd sailed for the largest nonshop area of this day. For Magellan was to sail around the world with not a civilized supply station along most of the way.

Day in, day out, he was all over this ship, then that. After the repairs came the stores: biscuits and wine, beans and olive oil; cheeses, sugar, raisins, onions, and figs; pots and baking ovens, knives and lanterns, mess bowls and funnels; account books, quicksilver, grindstones, hones for the barbers, and "all the necessary appliances for the chaplain to say mass."

Each ship a tiny cosmos, aboard must be every item of the normal daily living of the time.

FISHHOOKS AND VELVET AND IVORY

There also were articles for barter with natives; fishhooks and knives, crystals and brass bracelets, velvets and ivory, 20,000 bells and 2,240 pounds of "quicksilver," 500 pounds of crystal and "looking-glasses for women, great and fayre."

No long list of applicants clamored for a place on Magellan's expedition. Public criers paced the streets of Seville for volunteers; then officers went to Cádiz, Málaga, and other cities seeking a crew. Even the most adventurous seamen shied off. The dangers were too great, the pay too small, and Portuguese enemies had spread far and wide the story of the flimsy ships.

The expedition finally sailed with the most polyglot crew ever enlisted for a major exploration. In addition to Spaniards and thirty-seven Portuguese (among

Photograph by David J. Martin

A FRUIT VENDER OF BATAVIA, JAVA

These street sellers are thought to have set the style of transport which survives in Lisbon to-day (see illustration, page 705).

edition" — there was only one copy — and with that in hand Magellan was ready to sail.

For his flagship the commander chose the *Trinidad*. The larger but less seaworthy *S. Antonio* was given to rebellious Juan de Cartagena. Gaspar de Quesada was assigned to the *Concepción;* the traitor and treasurer, Luis de Mendoza, was given the *Victoria*, and João Serrão commanded the tiny *Santiago*.

On September 20, 1519, the little fleet sailed, after a halt at Sanlúcar. The Admiral's ship took the lead. Each night the other ships were to salute the flagship, take orders, if any, and then burn reed torches for signals.

In six days the ships put in at the Canary Islands for wood, water, and pitch. While they were there, a caravel arrived which brought a secret warning from Diogo Barbosa that certain captains, particularly Cartagena, already were plotting mutiny. Magellan sent back word to his father-in-law that, whether his men were good or bad, he would go about his work.

them Magellan's brother-in-law, Duarte Barbosa) on a Spanish expedition, there were Sicilians, French, Germans, Greeks, Basques, Neapolitans, Genoese, Negroes, Malays, and even an Englishman.

In the archives of Seville are numerous letters, proclamations, and orders that the solicitous Charles sent Magellan. All this Magellan must have scanned impatiently, if he read it at all, for there was just one document he must have: that was Ruy Faleiro's book of navigation and methods of astronomical observation; for Faleiro had eliminated himself from any part in the expedition. Faleiro's brother finally turned over to Magellan this priceless "rare

PIGAFETTA, THE PEPYS OF THE FLEET

With the expedition sailed a certain Antonio Pigafetta, who enlisted, by his own statement, because, "knowing by the reading of many books and by the report of many lettered persons the very great and awful things of the ocean, I deliberated to experiment and go and see with my eyes a part of those things."

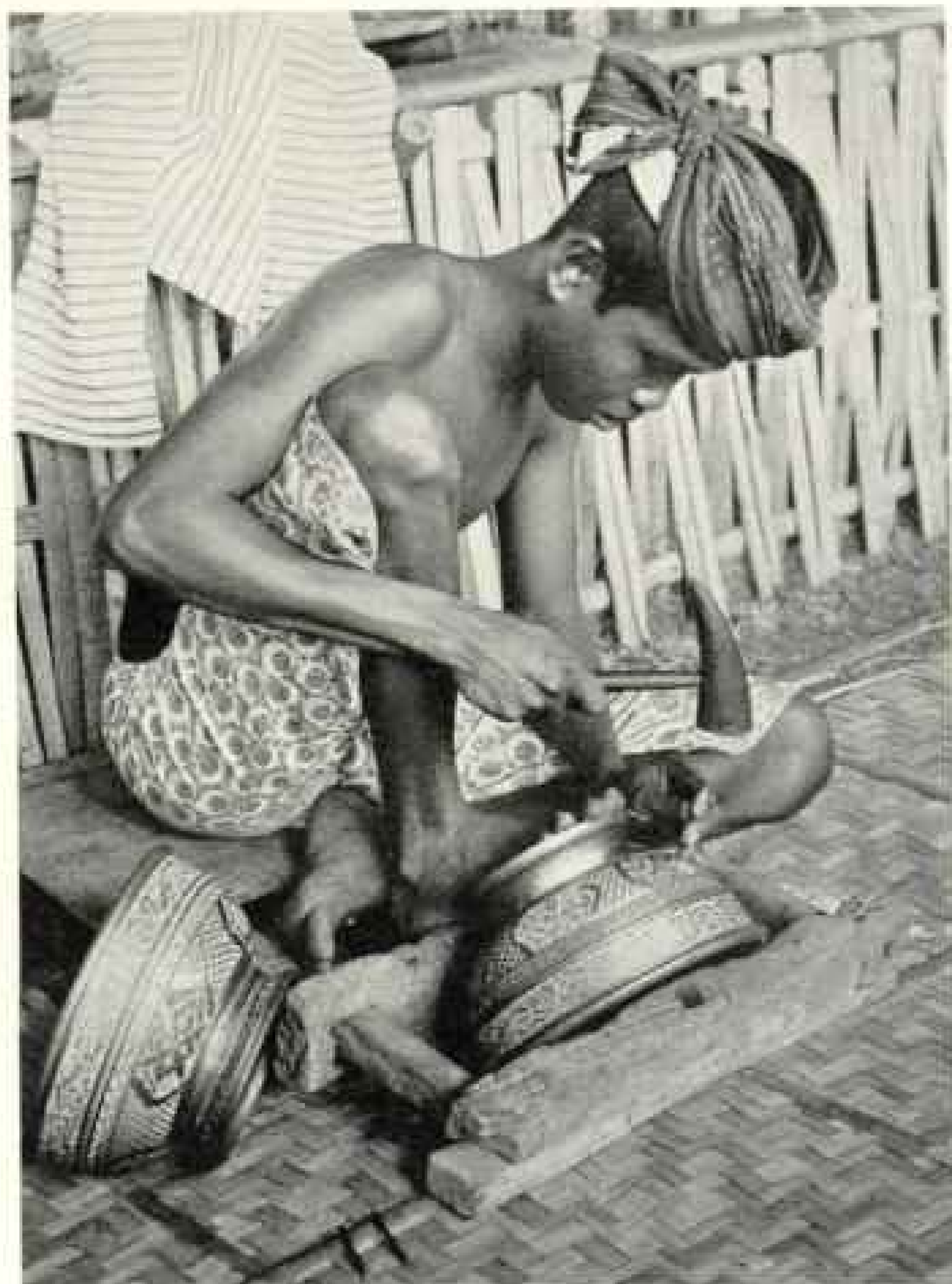
Pigafetta's naïve, gossipy journal affords a major sourcebook of the voyage,

all the more entertaining because of the "Alice-in-Wonderland" descriptions from the fresh viewpoint of a layman in respect to sea, science, and Nature.

A CAPTAIN SOWS THE SEEDS OF MUTINY

From the Canaries the ships sailed south, sometimes changing the course to southwest. One morning the *S. Antonio* cut across the stern of the flagship, and Cartagena complained that Magellan was deviating from the course agreed upon. Magellan replied that the ships were to follow his pennant by day and his torch by night.

Two weeks of good weather, three weeks of calm and erratic winds; then a month of head winds and violent storms. Often they ran "under bare poles at the mercy of the wind." Several times it seemed that they must cut away the masts.



Photograph from Mrs. George Heywood

A JAVANESE CRAFTSMAN BEATS OUT A BRASS LATTICE

Native metal workers fashion complicated patterns in silver, gold, and brass relief upon weapons, bowls, betel boxes, and tobacco containers.

Such slow progress caused grave concern for the food supplies, and the rations were cut down. More serious were the studied insults of Cartagena, which culminated one evening when he came up for salute and omitted to address Magellan by his title of captain general. Magellan reproved him, to which Cartagena replied that next time he would send a page to salute him.

Magellan said no more. Some days elapsed and the captains were summoned to the flagship for a court-martial. Cartagena, mistaking Magellan's silence, boldly criticized his commander's navigation.

Magellan clapped his hand upon his shoulder and exclaimed, "You are my prisoner!" Vainly the captain called upon his colleagues to turn upon Magellan. Antonio de Coca was made captain of the *S. Antonio*.

Veering westward, the squadron sighted South America near Recife (Pernambuco); then hugged the land southward until they rounded a bold headland and entered a spacious, mountain-rimmed harbor. The cape was Frio, the harbor, Rio, which they called the Bay of Santa Lucia, the saint of the day they entered, December 13.

The ships took on wood and water. The crews, after their short rations, feasted on fowl, tapirs, sweet potatoes, and pineapples, easily obtained by trading with the good-natured natives.

Pigafetta drove one bargain of six geese for a face card of an Italian pack. He relates how the natives slept in "nets of cotton" and made boats "of a tree, all in one piece, which they call 'canoo'."

On the day after Christmas the fleet resumed its voyage southward, again nosing along the shore line, taking frequent soundings. Passing a low, flat cape, they lost the land, ran into a storm, and doubled back northward. They found a shallow shelter, for they were in the mouth of the Plata; the cape was Santa Maria.

The vast Rio de la Plata, which was to nurture mighty Buenos Aires and beautiful Montevideo, demanded exploration as a possible water route to the Pacific. After two days the pilots protested that sailing at a three-fathom depth was dangerous.

Canoes of natives clustered about the ships when they anchored. When small boats were manned, the visitors fled to the shore. There "they made such enormous strides" that the Europeans could not catch up with them.

EARLY EVIDENCE OF SOUTH AMERICA'S MINERAL RICHES

By night an Indian, dressed in skins, paddled alone to the flagship. Magellan gave him a cotton shirt and a colored coat, and then showed him a platter of silver. The native indicated that silver was used by his tribe.

Not satisfied with merely sailing up the river, Magellan determined to find the width of the water body. He cruised for 15 days and found fresh water on the opposite side; so he was definitely able to chart the bay as a river mouth.

Juan de Solis had been there before, but his explorations had come to an untimely end. As Pigafetta explains, "In past time, in this river, these huge natives named Canibali ate a Spanish captain, Juan de Solis, and sixty men who had gone to discover land."

Sailing southward, the ships nosed their way into various inlets which promised "an outlet to the Moluccas," discovered and named the Gulf of San Matias (see The World Map supplement), and just beyond sailors were sent ashore for wood and water.

All the men could find were "strange geese," meaning penguins, and "sea wolves," meaning seals; so they filled their boats with the animals. A storm came up; they could not return to the ships; so they spent all night on the rocks, shivering from the bitter cold and from fear that these creatures, like sharks, might devour them.

Next day was calm enough for them to get back to the ships, but that night another storm broke with even greater fury. Despairing sailors prayed for deliverance and made vows of pilgrimages to holy shrines, as the seas lashed the ships and swept away the top-heavy forecastles of several vessels.

REBELLION GREATER MENACE THAN STORMS

When this storm abated the vessels sought shelter in another inlet, only to encounter fiercer winds and higher seas. Obviously, it was time to put in for the winter; so, after days of hardship, the squadron anchored in Puerto San Julián, south of Puerto Deseado, March 31, 1520, where abundant fish and protected waters promised a haven.

There Magellan was to face a far greater menace than storms at sea.

Fagged, cold, and homesick, the crews scanned the desolate shores. A long, hard winter in this dreary waste, at the very season when the grapes and olives were ripening at home, and, when Antarctic spring came, nothing ahead but this interminable sailing in and out of bays and rivers—all in search for a passage that by now it was obvious to any sane man did not exist!

Magellan, too, foresaw a long, hard winter, noted that fish and fowl were plentiful, and wisely reduced the rations of bread and wine.

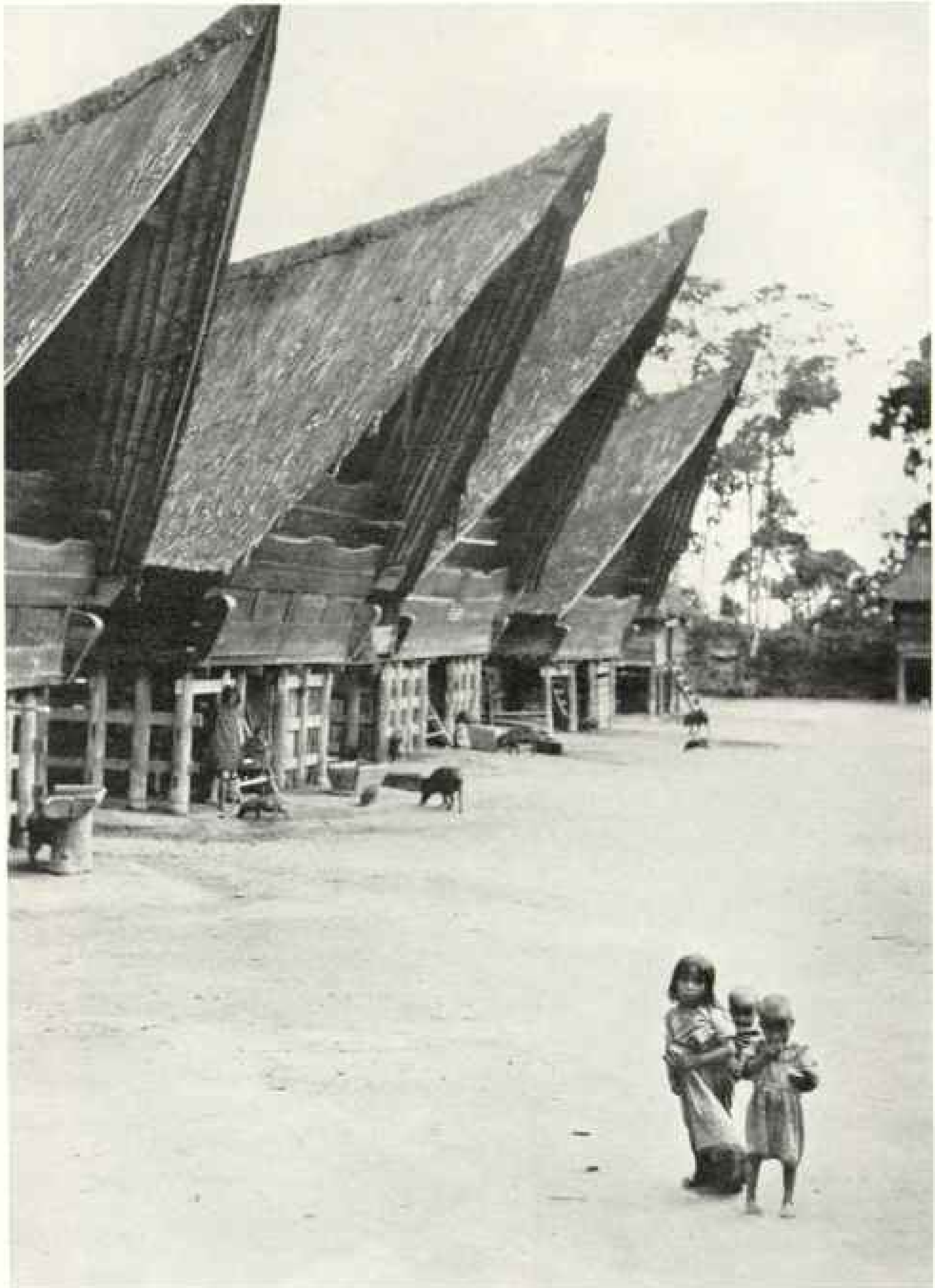
That action stirred the men to bitter protest. Three of the captains joined them. They urged the expedition had failed; it had proved there was no strait; the King would wish them to turn back.

Magellan: "Most certainly not."

The spokesman: "But why remain? There is no strait. Are we all to stay here and die?"

Magellan: "We may die, here or farther along. There is a strait. The King's orders are to find it, and there will be no turning back until we do."

On Easter Sunday Magellan ordered that all captains, pilots, and other officers attend mass, after which the captains were to dine with him. Only one responded, Alvaro de Mesquita, Magellan's cousin, who had replaced Antonio de Coca aboard



Photograph by Willard Price

WHERE THE SKYLINE LOOKS LIKE THE PROWS OF ANCHORED SHIPS

Native houses in Batak villages of Sumatra are considered the most comfortable native shelters in the Dutch East Indies. Their enormous roofs slope from projecting ridges to low, overhanging eaves. These children have no school, for civilization has not yet permeated to the Batak tribes, who are thought to be distant ethnological cousins of the Dyaks of Borneo.

Photograph by Dr. Franz Stoedtner

CELEBES GIRLS RIDING TO WORK

Among many of the native peoples on this island, the women are harder and more consistent workers than their husbands and brothers.

Photograph by A. T. Coombe, Jr.

TREE ROOTS ENFOLD AN ANCIENT FORT

These ruins on Ternate Island, where Serrão, Magellan's friend, became adviser to its king (see text, page 704), were formerly a dungeon.

WOMEN BEAT THE DRUMS FOR A DYAK WAR DANCE IN BORNEO

Crews of the *Trinidad* and *Victoria* were amazed at their reception on this island, for the king sent out the royal canoe decorated with gold and peacock feathers, bearing a present of potent rice liquor, which "had its due effect upon many of the crew" (see text, page 738). Later, elephants were sent to carry the expedition leaders to the palace, where they first learned the complex court etiquette before they were received by the powerful island monarch.

Photograph by John Edwin Hogg

HUGE CROCODILES INFEST THE BARITO RIVER IN DUTCH BORNEO

This specimen, killed near a settlement which is nine days' journey by stern-wheel steamboat from the port of Banjermasin, is by no means one of the largest "crocs" to be seen along the river.

the *S. Antonio*. It was a lonely and sober meal.

Early next morning the captain general dispatched a boat to the *S. Antonio* to pick up some men to go ashore for water. When they got alongside they were sharply ordered to keep off, and told that ship was commanded by Quesada, not Magellan.

LOYALTY POLL SHOWS HEAVY ODDS AGAINST LEADER

They hastened back to warn Magellan. In a flash he realized what had occurred, and ordered the boat to ask the others for whom they declared.

"For the King and myself," was the reply of each captain except João Serrão, aboard the little *Santiago*.

Very soon a boat came up with an ultimatum from Quesada, stating that if Magellan met the demands for full rations and immediate return to Portugal, the captains would again acknowledge his authority.

Sparring for time, the captain general invited them aboard his ship for discussion. They replied they would see him only aboard the *S. Antonio*. Magellan seized the boat which brought the message, and he pieced together the details of the night's mutiny.

Quesada, Cartagena, and Juan del Cano, along with some 30 armed men, had boarded the *S. Antonio* in the middle of the night and, with drawn swords, broken into the cabin of the loyal Mesquita. They put him in irons. Meanwhile the scuffle had attracted Lorriaga, the ship's master, and that loyal Basque made a bitter protest.

"This fool can't stop us!" yelled Quesada, who felled him, and stabbed him again and again with his dagger.

Other officers had been overpowered; the crew could only submit; they were disarmed. Stores were broken open and the captors feasted on bread and wine.

STRATEGY AND STORM AID LEADER

Quesada took command of the *S. Antonio*, sent Cartagena to his own ship, the *Concepción;* and Mendoza, who had been rebellious from the start, had the *Victoria* in line to join the mutineers.

Three against two! Ninety-eight men, it is estimated, against some 170 mutineers!

The *Trinidad* and the *Santiago* could not continue the voyage alone. Two ships could not openly hope to attack the three, and nothing was farther from the swarthy, limping little captain general's mind than turning back. Strategy was his only recourse.

First he dispatched Espinosa and five men in a skiff, their arms concealed, to the *Victoria*, with a letter to Mendoza. He selected the *Victoria* because that ship had fewer Spaniards aboard than the others. The letter summoned Mendoza to report immediately to the *Trinidad*.

Mendoza read the letter, laughed at such a simple ruse, and refused, as it was expected he would. Espinosa, acting upon Magellan's orders, drew his dagger, stabbed Mendoza, and at that instant a boatload of fifteen men was rushed from the flagship.

Panic-stricken at their captain's death, many loyal anyway to Magellan, the crew surrendered as the fifteen men joined the brave five who had first boarded.

Barbosa, in command, hoisted Magellan's pennant again, and maneuvered the *Victoria* alongside the *Trinidad* at the harbor entrance. The *Santiago* came up on the other side.

The score was 3-2 in Magellan's favor, with the two other ships effectually bottled from escape. Still the mutineers declined to surrender.

Magellan judged that they hoped to escape during the night. He ordered the flagship cleared for action. Stones, darts, and lances were piled on deck. Every man was issued extra rations, ordered to arm, and the watch was doubled.

A GRIM DUEL OF SHIPS

That night a storm brewed. The surf beat the ships' lofty sides; the wind howled through the masts, stripped of every rag of canvas; the lookout reported the mutineers had put out their lights.

Suddenly, lurching out of the pitch-black night, hove the *S. Antonio*. Crazily she veered and reeled; it soon appeared she was not attacking, but dragging her anchors. All the better for Magellan.

A fateful, fortunate shift of wind hurled her alongside the flagship. Bombards poured shots into her; then the *Trinidad* grappled and the crew poured on the rebel's decks.

Quesada, clutching a shield and waving his lance, yelled like a madman for his men to rally. He was not prepared for this; Magellan was. The mutineers straggled aloft, and each was challenged, "Who are you for?"

Some loyally, others cannily, sensing the tables were turned, replied, "For the King and Magellan."

Quesada and his conspirators were seized; Mesquita and his comrades were quickly freed.

Four to one. There was no argument when the *Trinidad's* boat called upon Cartagena to surrender.

FORTY FOUND GUILTY OF TREASON

The mutineers were tried; forty men were found guilty of treason and sentenced to die. Then Magellan pardoned all except three. Mendoza was dead. Quesada was beheaded by his own servant, his body was quartered, the quarters spitted on poles. Cartagena, possibly because he was a protégé of the King, was marooned. A third, half-crazed conspirator had to be executed because he sought to start a mutiny all over again.

At no time, amid all the perils and hardships of the rest of the voyage, was Magellan's authority again questioned in the slightest degree.

The pardoned mutineers were not freed immediately. They were kept in chains and put to work at the pumps, while carpenters overhauled the ships.

Magellan accounted the inaction of his men, loyal or otherwise, his greatest danger. So, late in April, he assigned faithful Serrão, commanding the *Santiago*, with 37 picked men, to reconnoiter the coast to the south.

Nosing his way along the shores, Serrão put in, May 3, at the mouth of a sizable river which he named the Santa Cruz.

The fishing was good; the men marveled at the enormous size of the seals. Scarcely had they cast off when another sudden, fierce Patagonian squall whipped the little ship toward the shore, smashed her rudder, and tossed her on the beach. Every man but one escaped by dropping from her forward rigging.

Escaped—but huddled on a strange beach some sixty miles from base, separated by

Photograph by Talbot M. Brewer

THE VEGETABLE MAN'S DISPLAY TEMPTS SEVILLE'S HOUSEKEEPERS

a 3-mile-wide river from an overland return. The masts of their wrecked ship came crashing down. Presently the hull parted and went to pieces, like an overripe melon, before their eyes.

When the sea subsided the castaways fished and retrieved the ship's planks as they were washed ashore. After a week each man shouldered his peak load of timber, but before they arrived at the river hunger and exhaustion had compelled them to abandon most of their raft-building timbers.

There were enough planks, however, to build a small craft, which enabled two of the crew to cross and make their way to Puerto San Julián. For eleven days these two unnamed heroes struggled on, eating roots, leaves, and shellfish.

When they arrived the weather was so threatening that Magellan feared to send another ship; so he dispatched two dozen men, with biscuits and wine, to rescue the marooned crew. The relief party suffered almost as much as the two couriers, because of the intervening marshes and the lack of any water except that melted from occasional patches of snow.

Finally they reached the river, and there they brought over the castaways in the little raft, two or three at a time, and got them back to base, tattered and haggard, but without loss of a single life.

Serrão was given command of the *Concepción*. The *Santiago's* men were distributed among that ship and the other three. With these reinforcements and the loyal Mesquita aboard the *S. Antonio*, and the captain general's brother-in-law, Duarte Barbosa, on the *Victoria*, the Magellan expedition was consolidated and his band strengthened, rather than otherwise, by the mutiny and the wreck.

Meanwhile, despite their anxiety about their comrades, the men who remained at San Julián had some comedy relief. For two months they had seen no sign of native habitation. One day there suddenly appeared "a giant on the shore, quite naked, dancing and leaping and singing, and whilst singing he put sand on his head."

Magellan sent a man ashore to leap, dance, sing, and sprinkle his head with sand, by way of reassuring the native.

Closer view of the tall visitor disclosed a large face, painted red, eyes smeared with yellow, and two hearts painted on each cheek.

The man was persuaded to come aboard and, in describing the clothing he then donned, Pigafetta gives the first European's description of the guanaco, probable wild ancestor of the llama.

HOW PATAGONIANS WERE NAMED

Moreover, the visiting giant, and the others of his kind observed later, used a large, clumsy sandal of the hide of the same animal, which fact led Magellan to call them Patagones, Big Feet, the name which remains to this day.

In many ways the Patagonians were so amazing that Magellan waived his rule against annexing useless mouths to feed. For instance, they ate the rats aboard, skin and all, with evident relish. They had a magician's trick of seeming to swallow arrows.

Two were held on board, and one complained so bitterly about the loss of his wife that Magellan sent a party ashore to capture her. This kindly act was unfortunate, because the natives fled, the sailors pursued, and one of the latter was struck down and instantly killed by a poisoned arrow.

Magellan decided to spend the rest of the winter at the mouth of the Santa Cruz, where the *Santiago* was wrecked. The change of place afforded no change of scene. More than 300 years later Charles Darwin, in the "Voyage of the *Beagle*," pictured the desolation of that very anchorage.

"The level plains of arid shingle support the same stunted and dwarf plants, and in the valleys the same birds and insects," he wrote. "The curse of sterility is on the land."

THE LONG-SOUGHT STRAIT FOUND AT LAST!

Magellan seized the first signs of the Southern Hemisphere's spring, mid-October, to press on. This time he especially counseled the ships to watch the shores for a possible opening.

Three days of scrubby pines and chalk cliffs; then the lookout sighted a low-lying sandy headland, covered with more stunted and matted growths, but beyond that "an opening like unto a bay." The date was October 21, St. Ursula's Day; so Magellan named the point Cape of Eleven Thousand Virgins. Posterity called the "bay" by Magellan's name, for he had found his long-sought strait!

There was little time for rejoicing. The tide rose 40 feet, flooding the sandy beach, and the ships were only four miles off the shoals when darkness came and a storm broke.

Magellan had sent the *S. Antonio* and the *Concepción* ahead, while the flagship and the *Victoria* awaited them near the Cape of the Virgins (Cabo Virgenes). The latter two had a rough time, standing on and off, while the others, nearing Cabo Orange, could only sail before the wind, hoping for an opening to the west.

They entered the narrows and soon, toward the southwest, saw the wide expanse of water which fortified their hope that here, at least, was a passage.

"WE WILL GO ON!"

Magellan and his men awaited the return of the other two ships with increasing anxiety, and when faint wisps of smoke appeared on the shores, they feared both vessels had been wrecked. Suddenly, one morning, the two missing ships hove in sight, gayly riding under full sail, all their flags flying.

The base ships discharged their bombards and the crews danced for joy on the decks. This demonstration was for their safety; the rejoicing was renewed when the scouting captains reported the channel soundings were of great depth; that the flood tides were so strong there must be an outlet—in short, that the strait must continue!

Magellan immediately took counsel with his ships' officers about the further sailing of the strait. To a man, they were now for pressing on, all except Gomez, pilot of the *S. Antonio*. He argued that, having found the passage, the fleet should return to Spain, so that a larger armada might be sent out.

Magellan made a characteristic reply: "We will go on, even if we have to eat the leather on the ships' yards!" He then gave orders, drastic to modern ears, that instant death would be dealt anyone discussing present privations or danger ahead.

Passing what now is Magallanes (known to many by its old name of Punta Arenas),

Photograph by Wilhelm Tobien

PILES OF LUMBER CLUTTER THE CANARY ISLANDS' HARBOR WHERE MAGELLAN PUT IN FOR WOOD, WATER, AND PITCH

Santa Cruz de Tenerife is an important coaling station, nestling on a narrow plain encircled by volcanic hills. In describing the island, industrious Pigafetta, the Pepys of Magellan's fleet (see text, page 714), wrote that there were no springs or rivers, but "all water is obtained, each midday, from a tree which is miraculously enveloped by a cloud." A naturalist would have noted, more prosaically, that the heavy foliage of the island evergreens condenses water from the mists.

Photograph by Capt. A. W. Stevens

RECIFE (PERNAMBUCO), HEADLAND OF PORTUGUESE EXPLORATIONS IN SOUTH AMERICA

Near this Brazilian promontory Magellan first sighted New World land. Vicente Yáñez Pinzón, one of Columbus's captains, had coasted along there in 1500, and later in the same year Cabral, a Portuguese captain bound for India, driven out of his course by trade winds, cruised along these shores. To-day Recife ships out Brazilian sugar, cotton, timber, tobacco, and fruit (see, also, text, page 715).

Photograph by Capt. A. W. Stevens

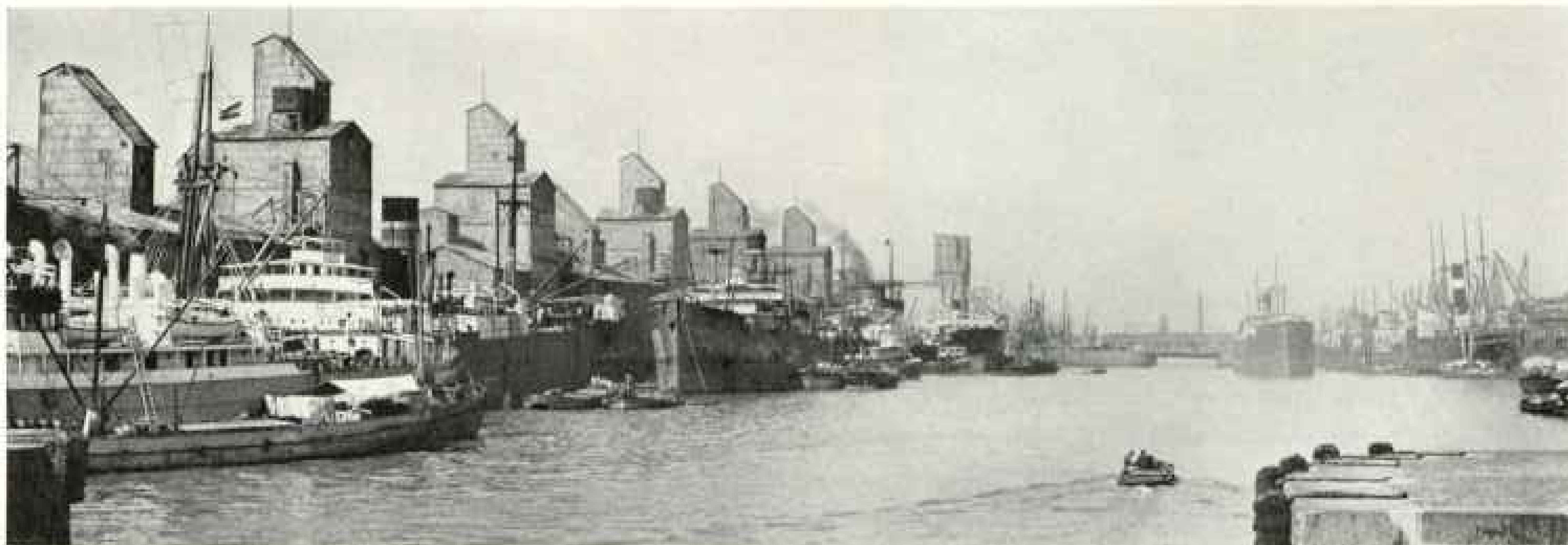
MAGELLAN'S "BAY OF SANTA LUCIA" IS BEAUTIFUL RIO DE JANEIRO OF TO-DAY

Another Portuguese explorer sailed into the bay on New Year's Day, and, thinking he had entered the mouth of a mighty river, called it by its present name, which signifies River of January. Pigafetta, historian of Magellan's fleet, wrote: "It had not rained for two months before we came there, and the day that we arrived it began to rain, on which account the people said that we came from heaven. They imagined the small ships' boats were the children of the ships, and when the boats were alongside the ship they thought that the ships were giving them suck" (see, also, text, page 715).

Photograph by Federico Kohlmann

NAVIGATION IS TREACHEROUS IN TIERRA DEL FUEGO CHANNELS

Submerged rocks menace travel in many estuaries that Magellan's ships explored while passing through the strait. This motorship was wrecked near Les Eclaireurs Islands shortly after leaving Ushuaia (see sketch map, pages 700-1).



Photograph by Jacob Gayer

HUGE GRAIN ELEVATORS LINE THE HARBOR FRONT OF BUSY BUENOS AIRES TO-DAY (SEE TEXT, PAGE 716)

Photograph by Jacob Gayer

RIVER SHIPPING IN THE HARBOR OF MONTEVIDEO, URUGUAY

There is a brisk river steamboat traffic between the capitals of Uruguay and Argentina, a distance of about 125 miles on the River Plata. Not only local freight and passenger steamers, but also most overseas boats call at both ports (see The World Map supplement).

Magellan decided to split his fleet for exploration of the arms of the strait, already reported to him by ships sent ahead for reconnaissance.

With the *Victoria*, the *Trinidad* sailed along the main channel, Broad Reach (Canal Ancho), and anchored at a stream Magellan called the River of Sardines. The location of that river—in fact, most points mentioned in the very brief accounts of the passage—cannot be identified in the nomenclature of modern geography. It is amazing that Pigafetta and other narrators who expound minor incidents with voluminous detail dismiss the mighty navigation feat in the strait with such casual and hazy comment.

Instead, the chroniclers jotted homely notes about flying fish, and even tell how men went ashore to cut wood, which was so fragrant "it afforded them much consolation." The expedition needed one good ship news reporter in place of the highly colorful feature writers.

From the River of Sardines a boat was provisioned to explore what lay ahead. In three days it returned with the joyful news of sighting a cape beyond which lay the vast, open sea!

After four days of waiting, there was no sign of the other two ships. So Magellan sailed back to find them. Soon they met the *Concepción*—alone!

The *Concepción* could give no news of the *S. Antonio*. Every reach of Admiralty Sound, which the *S. Antonio* had been assigned to explore, was searched. Still no sign of her.

The conclusion was inevitable. She was lost or had deserted. The realization, upon the heels of the triumph, was a bitter blow. She was the largest ship and carried the largest store of the fleet's supplies.

Hoping against hope that she would return, Magellan placed ensigns on the shores, with instructions buried in the ground beneath.

THE FIRST SHIPS INTO THE PACIFIC FROM THE EAST

Rather than prolong a hopeless waiting and risk further disaffection, the undaunted explorer ordered salvos of artillery fired, and with a great show of

confidence the three little ships sailed back through the strait and out into the broad Pacific—the first Europeans to sail into the Pacific from the east. The date was November 28, 1520.

The ships headed north along the rugged fjords of the coast. Pigafetta bustled about with his notebook. He made signs and showed various objects to the captive Patagonian and evolved a long vocabulary. The native died and the industrious diarist turned to observing the "abundance of fish."

MAGELLAN NAMES THE PACIFIC OCEAN

He relates "a very amusing chase of fish"; how the albacore and the bonito pursue another fish he called *golondrina*, Spanish for swallow. "The swallow fish," he wrote, "fly more than a crossbow shot, as long as their wings are wet," while the others chase the shadow of the flying fish through the water. Thus, when the aërial fish descended, the pursuers were on the spot to gulp them down—"a sight," he adds, "marvelous and agreeable to see."

After three weeks the little fleet bore out to sea toward the northwest. For almost two months there was no sight of land; but the peaceful seas were such a welcome contrast to the tempestuous South Atlantic that the crews were happy. And Magellan called the ocean the Pacific.

Then, on January 24, 1521, the lookout shouted for joy and the crews crowded on deck to observe a tiny bit of land overgrown with trees. The soundings were deep and no human beings were sighted; so they gave it a name, St. Paul's, and passed on. Its present identification is less complimentary; it is Pukapuka, Dog Island, of the Tuamotu group.

Eleven days more and another disappointment. A small, desolate island, where no water or food was to be had, but offshore were many "man-eating fish." So Magellan called it Tiburones, Shark Island, and sailed wearily on. This may have been Flint Island, now dotted with copra plantations.

Again the crews were desperate. "They ate by ounces, and held their noses as they drank the water, for the stench of it." The biscuit they ate was "but a powder full of worms."

Magellan's vigorous threat, that they would proceed even if they had to eat the ships' leather, came true (see, also, text, page 723). They took the hides from the main yard, soaked them for three or four days, then baked them. These were served with side dishes of sawdust, and rats became such a delicacy that the men paid half a ducat apiece for them.

In this pitiable state the ships sailed on and on, day after day, week after week, hoping each morning, as Columbus did, for a sight of land, seeing each day only "a sea so vast that the human mind can scarcely grasp it." *

It was another month before land was sighted again, in March, 98 days after they had sailed out from the strait into a wholly unknown ocean.

Several islands came to view. The one where they anchored probably was Guam, now a lone outpost of Uncle Sam's domain. The islanders swarmed out in their swift praus, and the Europeans marveled at their deft seamanship (pages 735-7).

The ships had scarcely dropped their rusty anchors when the visitors stole a skiff from under the very stern of the flagship. Scores clambered aboard, climbed about like monkeys, and stole everything not nailed down.

Quickly the commander gave orders to clear the ships, but the visitors were so loath to leave that the crews had to resort to arms and several islanders were killed.

From this experience Magellan named the archipelago the Ladrones, meaning Thieves, a name that clings to this day in spite of a later appellation, the Marianas.

Angered by the theft of his small boat, Magellan landed next morning at the head of some fifty men, armed with arquebuses, bows and arrows. When a show of resistance made it necessary to shoot arrows into the crowd, those who were struck would pull the arrows from their flesh and examine the strange missile with keenest interest.

The ship-bound sailors lucky enough to get ashore raced about, ate strange "long figs," which were bananas, drank the refreshing milk of coconuts, chewed upon toothsome sugar cane.

Seven days more brought the ships to the Philippines. They first sighted Samar,

* It is very strange that Magellan should have missed landfalls in the South Pacific. Not far from his course were islands where food was plentiful (see sketch map, pages 700-1).

PATAGONIAN INDIANS APPEARED AS "GIANTS" TO MAGELLAN AND HIS MEN

These Tehuelche tribesmen average better than six feet in height and individual members sometimes grow many inches taller. The woman on horseback is about to start off on a shopping trip to the nearest trading post.

but finally anchored off a tiny island. Many of the men were still sick, despite the refreshing halt at the Ladrones; so Magellan set up tents for them ashore and visited them daily, as the King's lengthy instructions prescribed.

NEARING THE SPICE ISLANDS, GOAL OF MANY VOYAGES

Two days passed before any natives were seen. Then came a prau bearing a delegation from neighboring Suluan. Magellan gave them beads and bells and other trinkets; they reciprocated with "figs a foot long and two cocchi." The Europeans were much more interested in the spices they had, for spices were omens of the proximity of the Moluccas, than in the bananas and coconuts, which, in centuries to come, were to be two of the richest products of all the Tropics.

In three days the natives came back, bringing with them a tattooed chief who wore gold earrings and heavy gold bracelets. This time they added oranges to their gifts, and a cock to show they possessed fowls.

When the sick had recovered the fleet set sail, cruised along the shores of Leyte, and halted at Limasawa.

Already the explorers were elated. They were in the East, they were finding islands, islands that promised rich traffic, in which trade they were to share, and now the near attainment of their goal was further emphasized.

The slave that Magellan had brought from Malacca found the people of Limasawa understood his Malay. The cumbersome talking by sign language was over; Pigafetta ceased compiling his curious vocabularies.

These natives were shy. They hovered around, but they would not approach the ships. Magellan had to put gifts on a plank and float the plank toward their boats.

After a few days of patient diplomacy, during which presents were exchanged at such arms' length, the king himself came aboard and Magellan placed on his shoulders a Turkish robe, bright red and yellow, and gave him a scarlet cap. The Europeans made a prodigal display of their

Photograph by Federico Kohlmann

SEA LIONS STILL BREED ALONG THE SANTA CRUZ COAST OF ARGENTINA

These animals, which so amazed Magellan's crew, appear periodically at the same breeding places. They are found in larger numbers in summer, when the young ones are born. Male sea lions, with the heavy mane, grow to about ten feet in length; the females are considerably smaller and have no manes.

stock for trade. The king seemed most impressed with what they told him of the vast size of the Pacific.

The upshot of all this was a pledge of brotherhood. The king and Magellan each pricked his own flesh and tasted the blood of the other—a queer, barbaric ceremony, which marked one of the historic moments of the ages. It was the first pact of Europe with the ancient East across the span of the new-found ocean.

Then Magellan ordered his men to don their suits of armor, while some were chosen to attack the others. One would receive the thrusts and cuts of his armored comrade with no effort at defense; then would raise his helmet and smilingly show he was uninjured.

Again the king was mightily impressed.

Magellan immediately asked that two of his officers be escorted ashore to see the king's country. Fortunately Pigafetta, with his notebook, was one of them.

Upon landing, the king raised his hands to heaven. His guests did likewise. The king took Pigafetta by the hand and led him under "a canopy of canes" to a gallery. There they sat in state, surrounded by armed warriors.

"A dish of pork with a large vessel full of wine was brought, and at each mouthful we drank a cup of wine," continues the Philippine Pepys. "If, as rarely happened, any was left in our cups, it was put into another vessel. . . . I was unable to avoid eating meat on Good Friday."

AFTER MUTINY AND PRIVATION, RICHES AND TRIUMPH

A sip with every bite, yet Pigafetta remained sober enough to write down the names of the various objects; also, many things that were said; then to read back their conversations to the king and his company. And that demonstration of legerdemain impressed His Highness most of all.

It was supper time. One dish was filled with rice, the other with pork and gravy. Then the king escorted Pigafetta to his

A TIERRA DEL FUEGAN ARCHER

He is a member of the Ona tribe of Indians, a robust people, who wear long guanaco or sheepskin robes and sandals of the same materials (see, also, text, page 723). They anoint their bodies freely with grease to protect them against the cold.

palace, "in shape like a sort of hayloft, covered with banana leaves and supported on four large beams which raised it from the ground." They had to climb ladders to enter.

There fish and ginger were served, more wine, more rice, more wine, until, Pigafetta sadly records, "My companion, having eaten and drunk too much, became intoxicated." Soon they all slept on cane mats and cushions stuffed with leaves.

The following Sunday was Easter. Magellan ordered that it be celebrated with fullest ceremony. The explorer was naturally religious, but he also must have had in mind that the day marked the anniversary of the outbreak at Puerto San Julián (see text, page 716). Since then mutiny, privation, desertion, scurvy; now victory, riches, success. There was every apparent reason for rejoicing.

Two kings attended, the monarchs of Limasawa and of Suluan, where they had first landed. They knelt when the ship's company knelt; they kissed the cross as did the Spaniards. At the elevation of the Host the ships fired a broadside. After mass a cross and a crown of thorns were brought and the kings promised to place the symbols on the highest island hill.

Having won this allegiance, Magellan was anxious to sail on. He asked for pilots. The King of Limasawa offered to guide the fleet himself if Magellan would wait a few days and permit his men to help harvest the rice. The captain general assented, but when the day of sailing came both kings slept soundly all day, from either eating or drinking too much.

But next day the King of Limasawa put out in his prau, and the fleet trailed him along the coast of Leyte, touched at several small islands, then outdistanced their pilot, and awaited him at the Camotes. Thence they sailed on to Cebu.

The shore of Cebu, dotted with busy villages, was a marked contrast to the primitive Ladrones, even to the sparsely settled Philippine Islands already visited. Upon anchoring at the capital, Magellan ordered salvos of artillery, which naturally frightened the natives. The commander sent a

messenger ashore to assure the people that the thunderous noise was merely a friendly gesture.

The king may have been frightened, but he was not overawed, and sent back word that the ships were welcome, but every vessel entering his port must pay tribute. A Siamese trader was in the port; he told the king how the Portuguese had dealt with stubborn potentates of India. The monarch of Limasawa added his opinion that these were no ordinary traders. The Cebu king sealed a pact of blood brotherhood with Magellan, and granted Spain exclusive trading rights in his domain.

Successful as a treaty-maker, Magellan immediately turned evangelist again. He was practical about his preaching; he remonstrated with the islanders, especially for their neglect of the aged and infirm. His zeal was contagious, for the chiefs and many natives signified their conversion. Moreover, he was singularly fair for his time, for he warned against embracing Christianity from fear or from hope of temporal reward.

MAGELLAN HUMAN IN HIS HOUR OF TRIUMPH

Magellan, man of iron, indomitable as a triphammer in a crisis, grows very human in his hour of triumph. Weeping for sheer joy, he embraced the chiefs, pledged eternal peace between the King of Spain and the King of Cebu. He had attained his goal; he had extended Spain's claims across two oceans and a continent; he had pried open the portals to the wealth of the Indies.

And there was no hint of the swift tragedy about to befall him.

The captain general ransacked his stores for another bright robe and red cap, heaped cheap beads on a costly silver tray, and sent the ship's reporter, now the pompous diplomat, ashore to the king.

Only a few days later the king expressed a desire to become Christian. His baptism was made an occasion for elaborate ceremony. Magellan marched behind the royal standard, escorted by 40 men in armor. The captain and the king sat in thronelike chairs draped in velvet. A massive cross was raised in the market place; the people were instructed to bow before it every morning and noon.

Meanwhile the Spaniards had commandeered a large building ashore for a warehouse, and when this was stocked with bronze and iron, combs and mirrors and beads, capes, caps, and robes, trading began. The natives lined up with quantities of gold that fanned the greed of the sailors. Magellan had to caution them to restrain their desire for gold; "otherwise every sailor would have sold his all for gold, which would forever have ruined our future trade."

NATIVES HAD ACCURATE SCALES

What further amazed the Europeans was that the natives had accurate measures of weights and quantities. Their scale was a spear shaft suspended by a cord. At one end was a basin supported by three strings; at the other a lead weight.

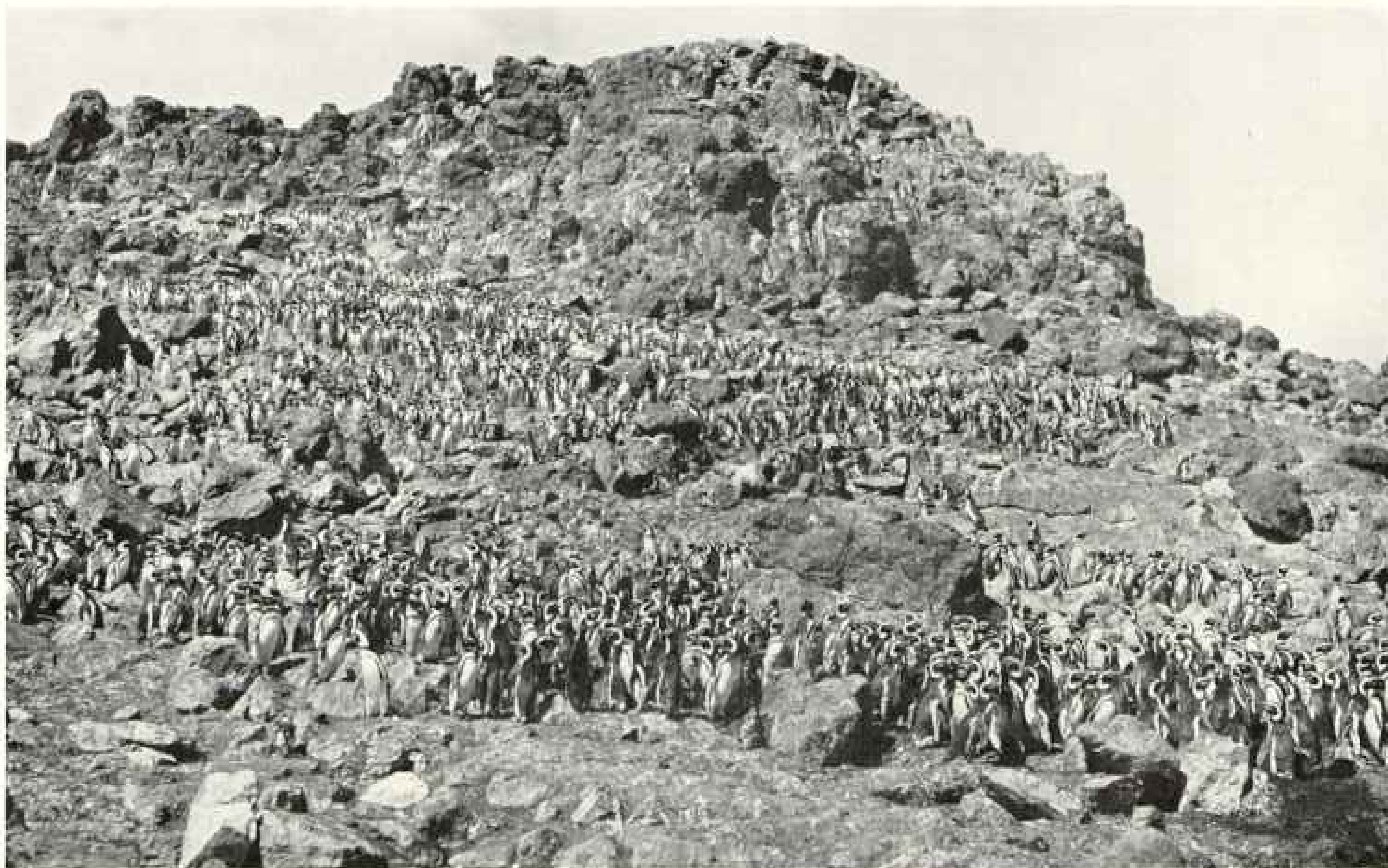
From morning till night the village was bustling with trade and baptisms. After the king, and later the queen, had embraced the new religion, their people came in droves to do likewise. More than 800 joined the church in one day; the total number received ran into the thousands.

It seemed politic to Magellan, having formed such a solid alliance with Cebu's king and his people, to make sure the other island chieftains recognized that monarch's ascendancy. So he summoned them and cautioned them to allegiance, under penalty of death and confiscation of their lands.

All of them assented. One, from the island of Mactan, went home and thought better of it. Magellan promptly sent an expedition, which burned the first village it came to and planted a cross on the smoldering ashes.

Even that act did not intimidate the rebel. Sensing an opportunity to advance himself, one of the potentate's minor chiefs sent Magellan a tawdry present with the word that his king would not permit him to offer a worthy gift.

Incensed, Magellan instantly started organizing a punitive expedition. The King of Cebu advised against it and reluctantly pledged his support. Level-headed Serrão remonstrated. Already the crews were short-handed. The fleet should not risk the loss of another man, nor should it be left without protection while its soldiers invaded another island.



Photograph by Federico Kohlmann

A PENGUIN CENSUS OF THIS ROCKY ISLAND WOULD RUN INTO THE THOUSANDS

Magellan's men were continually astounded at the abundance of "sea wolves" (seals) and penguins they encountered along the Patagonia coast. In one place the latter were so numerous, wrote Pigafetta, that "the whole fleet might have been laden with them." This populous penguin colony inhabits Isla Penguinos, near Puerto Deseado, Argentina. It is one of the farthest-north breeding places for these Antarctic birds.

Photograph by P. Simpson

CITIZENS OF GUAM PAY TRIBUTE TO THEIR ISLAND'S DISCOVERER

Magellan came upon this tiny mid-Pacific patch of land in 1521. School children have arranged a program of dances, songs, and speeches in honor of the explorer. Guam was occupied by the United States when the cruiser *Charleston* arrived there, in June, 1898, during the Spanish-American War.

Photograph by P. Simpson

A MARKET MAID OF GUAM

In the palm-leaf basket she carries vegetables from her country home. The container is deftly woven around the produce, and it is opened by slitting the rib of the leaves down the center with a knife. It is discarded after it has been used once.

Just before the start his officers joined in protest. But Magellan had succeeded so far by flying in the face of advice; it is not surprising that he ignored it now.

At midnight, April 26, 1521, three boats, manned by picked men from the fleet, rowed out of Cebu's calm waters. Following them in the black of the night paddled a stealthy cordon of some 30 war canoes, with more than 1,000 native fighting men, led by the king in person.

Arriving at the landing place of Mactan, only a few miles distant, the attacking party lay offshore. Magellan sent a courier to warn the rebel sultan to submit and be spared; otherwise he would learn the feel of a Spanish lance. The monarch replied that his people had lances, too, deadly lances of reeds and stakes hardened by fire. He added a curious request, that the attack be delayed until morning, since he expected reinforcements at daybreak.

Magellan and the King of Cebu figured that out. The attack had been anticipated. The people of Mactan had dug ditches and devised pitfalls. Night fighting would be all in their favor.

MAGELLAN DIES FIGHTING

When daylight came the loyal King of Cebu wisely urged that his warriors knew the ground and should lead the assault. Magellan was not the man to permit that. He told his ally to remain in his canoe along with his men and watch how Spaniards fought.

Shallow water and the coral rocks prevented landing on the beach; so the party had to wade through "two good crossbow shots" of water, high above their waists, before reaching shore.

Instantly hordes of shouting savages, brandishing strange native weapons, surrounded the 49 Europeans. The lowest estimate of their number was 1,500; other reports said 6,000.

Magellan split his puny force into two bands. The musketeers and crossbowmen fired for half an hour. Occasionally a native was pricked or scratched through his wooden armor, but reinforcements kept coming up. Emboldened, the enemy attacked from in front and from both flanks, closed in and showered "arrows, javelins, spears hardened in fire, stones, and even mud."

Hoping to disperse the warriors by strategy, Magellan sent men to set fire to the village houses. The sight of the flames made the savages more ferocious. They swept down by the hundreds on the handful of Europeans. They could not pierce the body armor of Magellan's men, but they saw the invaders' legs were exposed, and they aimed for them.

A poisoned arrow pierced Magellan's leg. He shouted the command for retreat. The retreat became a flight. Only six or eight men remained at the captain's side.

Photograph by P. Simpson

NET-CASTING CONSTITUTES A FINE ART IN SOME OF THE PACIFIC ISLANDS

Fishermen of Guam cast their fine-meshed hand nets in the comparatively shallow waters inside the reef. They make good hauls, but mostly of the smaller fry. Despite the fact that the island waters are well populated, the fishing industry has not been developed there to nearly its full capacity.

Surrounding their leader, the faithful few slowly made for the shore, under showers of lances and stones, hurled by yelling, dancing, infuriated savages. They reached the water line and, fighting every inch, waded out toward the boats. Their pursuers followed, picked up the spears they already had cast, and twice knocked Magellan's helmet from his head.

Splashing and churning the shallow water, they fought for more than an hour. Finally one native thrust a bamboo spear straight into the captain's face. Magellan pierced his assailant with a lance; it stuck in his body, so he reached for his sword; but he could not draw it, for a javelin had wounded his sword arm.

Seeing the leader's plight, the natives made for him. One took a steady stance with a wicked, saberlike spear drawn far back over his shoulder, and with all his strength he cut the whistling air, landing the full force of the stroke on Magellan's legs. The leader dropped with a dull splash and a thud, face downward, and in an instant the savages threw themselves on him, running him through again and again with spears, lances, swords.

Sorrowfully the flotilla returned to Cebu. Repeated efforts were made to recover their leader's body. The Mactan sultan was firm in his refusal; the body of Magellan was a trophy of his proudest victory. To-day a monument marks the place where he is thought to have fallen.

AT LAST, THE ISLANDS COLUMBUS SOUGHT

To succeed Magellan a dual command was established—that of Duarte Barbosa and João Serrão, the latter not to be confused with Francisco Serrão (see text, pages 702, 704). Within a few days both were lured ashore by the King of Cebu, now turned traitor, and massacred.

Only 115 men remained of some 275 who had sailed from Seville. The leaky *Concepción* was abandoned, and the other two ships, with Carvalho in command, sailed south from the islands of their glorious triumph and swift tragedy.

Photograph by Amos Burg

SUNSET IN THE TUAMOTU ARCHIPELAGO

There is no twilight in the Tropics. The sun rises at 6 and sets at 6, swooping down past the horizon, leaving no time for the lingering sunsets of more northerly latitudes. The Tuamotus extend over 15 degrees of latitude and are so low that, during hurricanes, breakers have washed across areas of the atolls. Because of this extremely low elevation, only the crests of the islands' palms enable them to be seen from the sea.

They cruised along the coast of Borneo, visited Brunei, where Pigafetta reveled in notes for his diary, and early in November, 1521, they anchored off Tidore Island, in the Moluccas.

The expedition had reached its goal. The Spice Islands, lure of the three greatest voyages in history, for they were the objectives of Columbus and Vasco da Gama, had been attained. And the victor had perished, "his life wasted in a miserable skirmish with savages."

Immediately the Europeans inquired for Magellan's friend, Francisco Serrão (see page 704). They learned he had been poisoned, months before, on the very island they were visiting, following a war between Tidore and neighboring Ternate.

The rich islands were ruled by a proud king. When he was entertained aboard the *Trinidad* the upper deck had to be cut away so he might enter without stooping or bowing his head.

Precious gifts were showered upon the Europeans. Among them, Pigafetta writes, were "birds as large as thrushes; they have small heads, long beaks, legs slender like a writing pen. They have no wings, but instead of them long feathers of different colors, like plumes. They never fly except when the wind blows. They call them divine birds."

That is the first European description of the bird of paradise.

Cloves were bought in abundance. When the first loads were taken aboard a salute was fired, "as they were the chief object of our voyage." When the supply of barter articles was exhausted, the men gave their coats and their shirts for yet more cloves.

A week before Christmas both vessels were laden, overladen, with spices. The creaky old *Trinidad* sprang a serious leak. Day and night the men pumped and pumped, zealous to save their hard-won cargo; but the waters gained on them.

The sultan sent divers, swarthy men, with long, flowing hair down to their waists. These divers would go under with their hair loose, so that the suction from the in-

rushing waters might pull it toward the hole, and thus locate the leak.

All to no avail. It was decided to leave the flagship behind for repairs. The *Victoria* took advantage of the east monsoon to sail. The Portuguese already had learned that all the sailing ships they might muster could not control the eastern seas when the monsoons were not right.

Sebastian del Cano, a mutineer at Puerto San Julián (see text, page 716), now commanded the last of the flotilla, the first to sail for home. With him were 47 of the original 275.

The storm-battered, worm-eaten, multi-patched little *Victoria* battled high seas, adverse winds, starvation, and scurvy. She limped around the Cape of Good Hope, away south of it, according to Pigafetta, to 42 degrees.

Not until June did she cross the Equator, in the Atlantic, and by that time the men were dying. Every day saw a funeral at sea. Pigafetta wrote on and on. "We noticed a curious thing," he penned. "The Christians remained with the face turned up to Heaven, the Indians with the face downward."

The last thing Del Cano wished to do was to stop at the Cape Verde Islands and encounter the Portuguese; but bitter necessity forced him to anchor. The men were warned to say they came from America; but a sailor tried to sell some cloves ashore and the secret was out.

Instantly the Portuguese seized every man who was then ashore and sent out boats to capture the *Victoria*. But Del Cano weighed anchor before the enemy could board. That left 18 Europeans and four natives, scarcely enough to man the ship.

CREW PERPLEXED BY THE LOSS OF A DAY FROM CALENDAR

All the way to Spain the men were discussing a strange thing. By the ship's records and their own, they had gone ashore at Cape Verde on Wednesday, July 9. But ashore it was Thursday, July 10!

Surely Pigafetta would know. Had he not kept a record of every day? He had. And his diary for that day was dated Wednesday, July 9.

All the way to Seville they wrangled.

"We could not persuade ourselves that we were mistaken," Pigafetta wrote after he reached Spain. "I was more surprised than the others, since I had every day, without intermission, written down the day that was current.

"But we were afterwards advised that there was no error on our part, since as we had always sailed toward the west, following the course of the sun, and had returned to the same place, we must have gained 24 hours!"

THE FIRST SHIP TO SAIL AROUND THE WORLD

With its skeleton crew the hulk of the *Victoria* staggered toward the mole at Seville, September 8, 1522, the first ship to sail around the world! It was just 12 days short of three years since the fleet of five had sailed proudly away.

Their departure had been celebrated with all the pomp and ceremony that attended the King's presence at a mass. The day after their return a handful of emaciated and haggard men, all those aboard who were able to walk, marched barefoot to a shrine to give thanks for their return.

Ferdinand Magellan's fame rang through the Peninsula and echoed through Europe.

His wife was dead, his child was dead, he was dead, but his name was to be immortal.

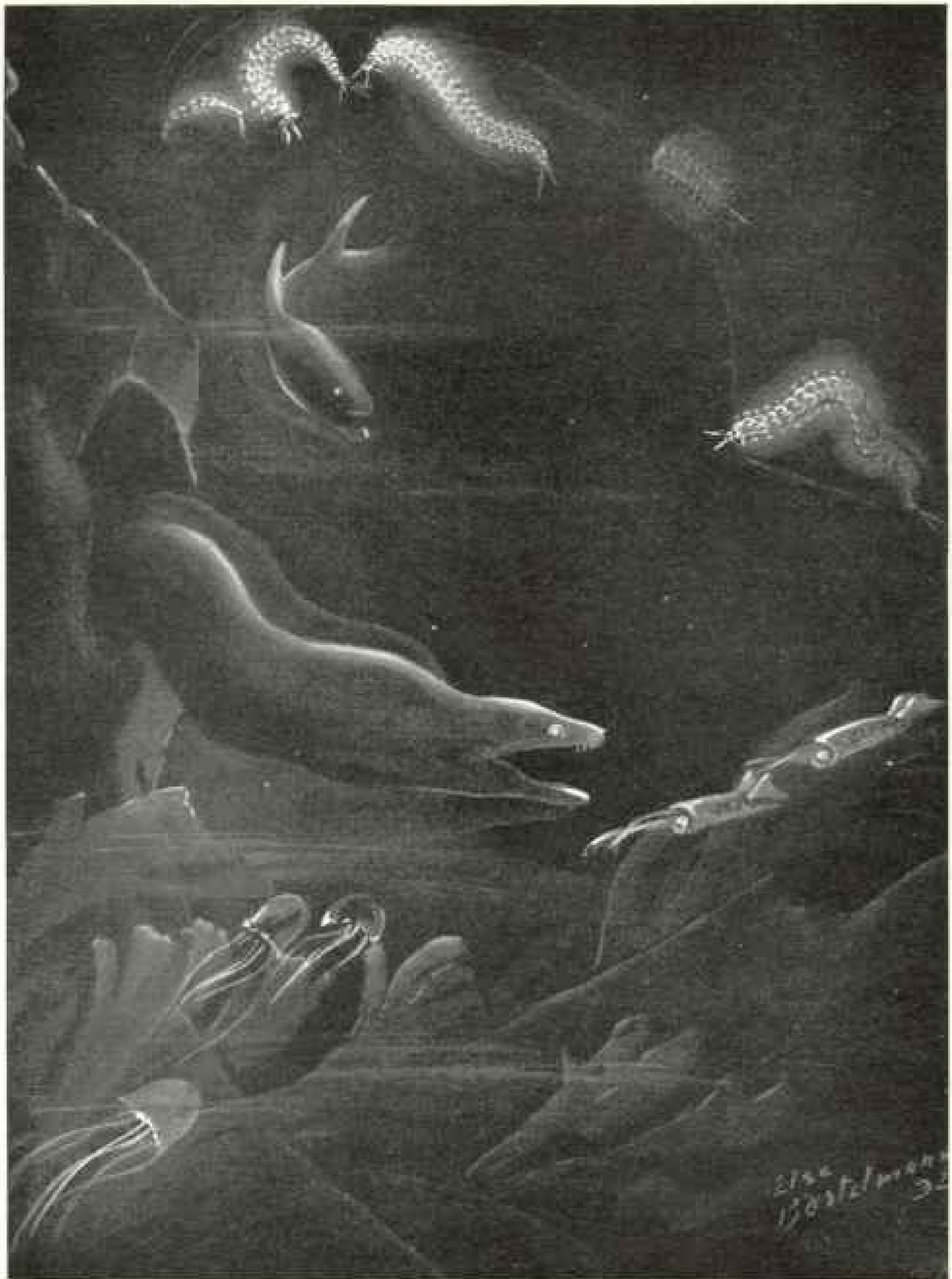
A contemporary wrote: "The track the *Victoria* followed is the most wonderful thing and the greatest novelty that has ever been seen from the time God created the first man. Neither has anything more notable in navigation ever been heard or described since the voyage of the patriarch Noah."

That is a bit extravagant.

Columbus and Vasco da Gama opened far richer lands than the Spice Islands they set out to find.

Magellan's expedition reached its destination, though no cargoes of spices ever came back by the strait he discovered. Even to-day taking a sailing vessel through is a high adventure.

But as a nautical feat it is generally conceded that Magellan's voyage stands supreme in the history of the seas. He crossed two oceans, delimited a continent, proved the world was round, and first showed the true relation of the great land and water bodies of the hemispheres.



FISH NEVER SEEN BY DAY COME OUT AFTER DARK

Moray eels choose this time to do their hunting. Jellyfish, squids, worms, and a host of other small creatures are phosphorescent and glow with wonderful radiance in the dark.

A WONDERER UNDER SEA

By William Beebe

Author of "A Round Trip to Davy Jones's Locker" and "The Depths of the Sea," in the National Geographic Magazine

With Paintings from Life by E. Bostelmann

When I put on a diving helmet and for the first time climbed down my submerged ladder, then I knew that I had added thousands upon thousands of wonderful miles to my possible joy of earthly life: let me escape from dry-land etymology and say instead—the joys of planetary life; for personal exploration under the ocean is really unearthly; we are penetrating a new world.

After we have dived hundreds of times we learn to all but discount the fears upon which we have been nurtured since childhood. And when the needless terrors of being water-inclosed, of the imputed malignity of octopi, sharks, and barracudas have ceased to trouble our supreme delight in the strangeness and unbelievable beauties of this newly conquered realm, then we begin to appreciate the real significance of our achievement.

To enter into and to enjoy this new phase of life requires no practice or rehearsal, no special skill or elaborate preparation. If one dives and returns to the surface inarticulate with amazement and with a deep realization of the marvel of what he has seen and where he has been, then he deserves to go again and again. If he is unmoved or disappointed, then there remains for him on earth only a longer or shorter period of waiting for death; there can be little worth while left in life for him.

Eight years of diving on New York Zoölogical Society's expeditions have taught me all the primal necessities. The only requirements are a bathing suit and a pair of rubber-soled sneakers, a copper helmet with glass set in front, an ordinary rubber hose, and a small hand pump. A folding metal ladder is excellent, a rope is quite sufficient. Down you go into two, four, six to eight fathoms, swallowing as you descend to offset the increase of pressure. If your ears pain severely a few feet below the surface, ascend at once and go to the nearest aurist, for something is wrong and should be attended to, whether you ever dive again or not.

Forty feet is a good limit to set, and indeed the most brilliant and exciting forms of shore and reef life will be found in shallower depths. There is no danger of falling. If you stumble over the edge of a submerged cliff or lofty terrace, you simply half drift, half float, gently to the bottom. But when you stand on the edge of a deep chasm, and are already eight or ten fathoms down, don't let any alluring shell or coral tempt you deeper. Our ears cannot withstand too great pressure.

DEVISING NEW APPARATUS

After you have made a dozen descents you will wish to do something more than stand amazed, or to try to catch the fish which swim close to the glass and look in.

As we have done, you can begin to devise all sorts of new apparatus. You wish to make notes, so get sheet zinc or pads of waterproof paper and write as easily as if you were sitting in the boat. Be sure to tie your pencil tightly around, for otherwise the wood will separate and float to the surface, while the core of lead sinks to the bottom, to be nibbled at excitedly by small fry (see page 744).

Motion pictures can be taken down to twenty or twenty-five feet by placing the camera in a tight brass box with a bit of glass in front. If you wish to paint, weight your easel with lead, waterproof your canvas or skin, and sit down with your palette of oils. You will have to brush away small fish from time to time, for some of the paints give forth an attractive odor and your palette will often be covered with a hungry school of inchlings.

If you take your seat in the midst of a coral reef, you may be attacked, not by giant octopi or barracudas or sharks—don't give them a thought—but you may feel a faint nip or a push at your elbow, and there is a little fish, a demoiselle as long as your thumb, all azure and gold, furiously butting at you. Her home is near by, and in its defense she fears nothing which swims, crawls, or dives. Soon she will accept you as a harmless new kind of sea creature, and

THE OBSERVER ABOVE KEEPS CAREFUL WATCH THROUGH THE WATER GLASS

When a diver is down, no matter how experienced he may be or how easy the dive, the person at the hose on deck never relaxes vigilance.

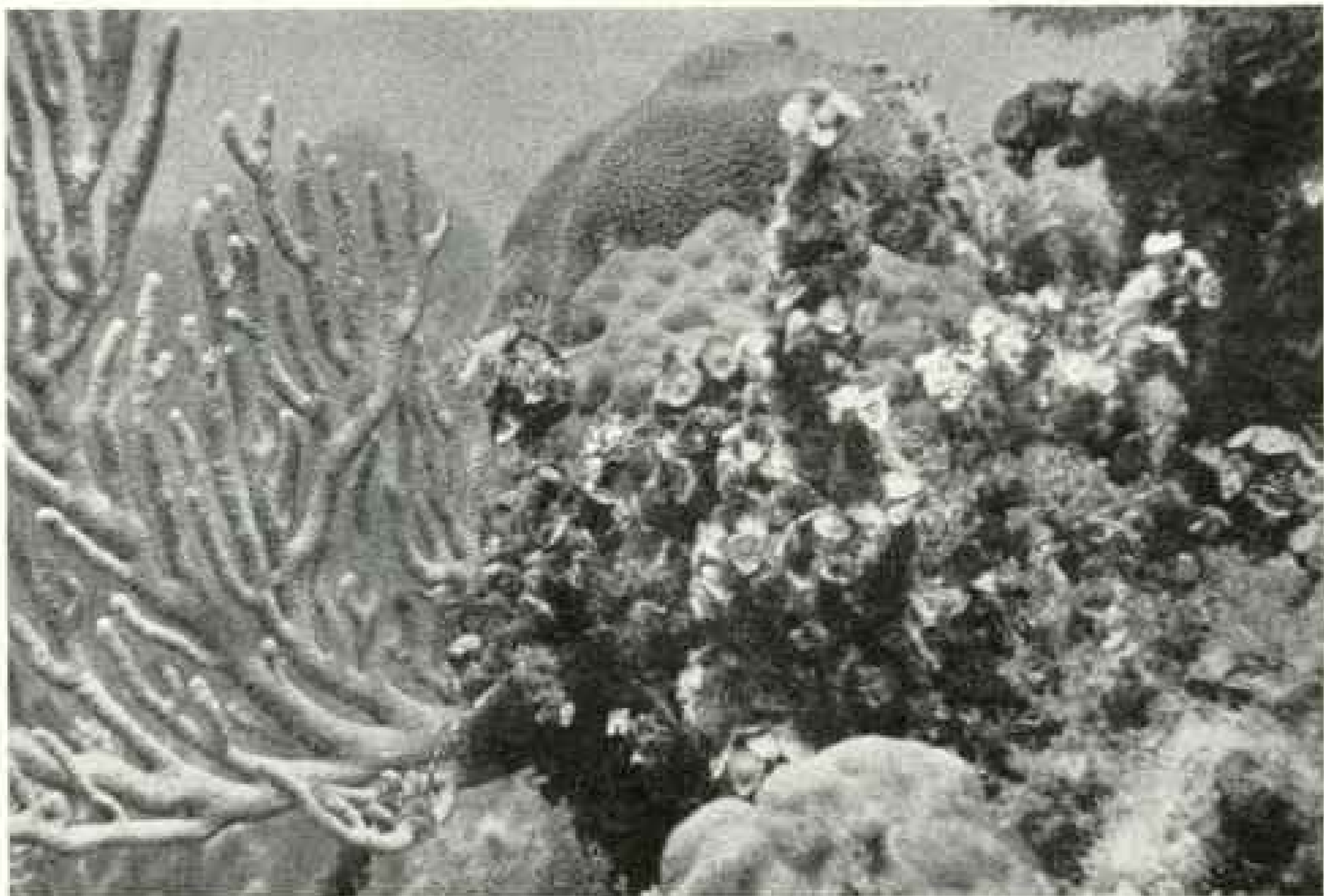
Photographs from Dr. William Beebe

FIVE FATHOMS DOWN, THE DIVER EXPLORES A NEW WORLD

Equipped with helmet and hose, a human being can climb, walk, creep, and leap almost as easily under the surface as in the air.

AFTER A 60-FOOT DIVE THE AUTHOR RETURNS TO THE SURFACE

In his hand Doctor Beebe holds a cluster of sea cucumbers which he picked from the ocean floor. Undersea animals resemble many varieties of plant life (see, also, below, and page 758).



Photographs from Dr. William Beebe

THESE VEGETABLELIKE ANIMALS ARE IN CONSTANT MOTION

They sway with every movement of the water, and their color alters radically, according to whether the hundreds of individual polyps are expanded or contracted.

Photographs from Dr. William Beebe

THE AUTHOR MAKES ELABORATE NOTES UNDER WATER

With the help of a sheet of zinc or of waterproof paper, it is easy to write details of impressions at any depth down to ten fathoms (see text, page 741).

HEAVY IN AIR, THE HELMET IS LIGHT UNDER WATER

The device is made of copper, with the glasses set in the front, and rests on the shoulders. In the depths its weight is negligible. Vision is clear through the windows.

Photographs from Dr. William Beebe

MOTION-PICTURE PHOTOGRAPHY CONQUERS THE DEEP

With a camera in a water-tight brass box, the operator is able to get full-timed negatives without the use of artificial light. The tripod must be weighted with lead.

THE WATER GLASS FINDS DIVING PLACES

The best locations are high, abrupt reefs rising from a sandy floor, where it is possible to wander about and reach or climb for whatever specimens are needed.

off she goes to drive away an approaching snapper or surgeon fish.

If you are inclined to sport, invent submarine sling shots and crossbows and shoot what particular fish you wish with barbed arrows of brass wire. I now use dynamite caps on the end of a weighted fishpole, but sling shots and throwing grains are safer for the beginner.

If you wish to make a garden, choose some beautiful slope or reef grotto and with a hatchet chop and pry off coral bowlders with waving purple sea plumes and golden sea fans and great parti-colored anemones. Wedge these into crevices and in a few days you will have a sunken garden in a new and miraculous sense. As birds collect about the luxuriant growths of a garden in the upper air, so hosts of fish will follow your labors, great crabs and starfish will creep thither, and now and then fairy jellyfish will throb past, comparable in beauty with nothing in the upper world, more delicate and graceful than any butterfly.

Our grandmothers lined their garden paths with conch shells, but under sea it is more difficult to do this, for the giant snails will insist on walking away as soon as you have planted them. But exquisite shells can be scattered about, and the easiest and quickest way to discover these is to search until you have found the hiding place of an octopus, and here you will be certain to find a collection of empty shells of all kinds. The octopus is an adept at searching out toothsome mollusks. He carries them to his lair and devours the inmates at his leisure. The shells, quite perfect, are then thrown outside into his kitchen midden.

HEDGING A "MARINE PLANTATION"

Finally, as a border to your marine plantation, collect a score of small, rounded brain corals all thickly covered with tube worms. When you lay them in place they will be of a drab, dirty white. It is their momentary winter; but wait patiently, and in five minutes you can see spring approach and a host of pastel buds appear; and in another five minutes full summer comes, and your ivory mounds are ablaze with scarlet, mauve, blue, yellow, and green animal blossoms. All are in motion, though there is no current, and, like Alice's Tiger-lily, we feel that there would be nothing remarkable in their suddenly saying, "We *can* talk, when there's anybody worth talking to."

The wise diver will refrain from written descriptions of his experiences. What I have published of under-seascapes has aroused commendation on the part of fireside and dry-land readers. The moment, however, one of them puts on a helmet and goes to see for himself, thereafter all words and phrases, similes and superlatives, become hopelessly inadequate.

Just as the colors under sea are nameless in the gamut of terrestrial hues, so our language becomes thin and vague when we try to fashion from it adequate submarine imagery. The commonest fishes and other organisms of our shallows are like different creatures when viewed from their own element and level, instead of from a man's vertical height above water; our human friends as seen from a second-story window are strangely unlike them face to face!

A KINGDOM SIX TO SIXTY FEET DEEP

Our new Helmet Kingdom is not only a new experience for us, but was the place in past eons of time of fiercest competition and spectacular evolution. It is a ribbon of a kingdom, of negligible depth—from six to sixty feet—and narrow—from a few inches to two miles. Its length is amazing—perhaps one hundred and fifty thousand miles of winding, submarine paths, rimming the rocks and cliffs of temperate fjords and bays; all along the palm-lined shores of southern continents and the circles and rings of tropic isles and atolls.

Perhaps the most exciting places are the reefs and shallows far from shore, like those of Bermuda which I have named Almost Island, where one can go overboard and to the bottom surrounded by depths forbidden to present exploration.

When the summer's sun has warmed our northern waters, let us climb down the ladder off some rocky coast, say of Maine or Massachusetts. At once we begin to realize our new-found superiority. Yesterday we crept painfully over legions of barnacles and peered ineffectually into outer depths. Now we pass quickly beyond the barnacle zone, below lowest tide-mark, where things have been wet since creation. A little farther down and the last of the steel-blue mussels passes from view, and then we perceive the great clinging roots of the giant seaweeds, with their leathery fronds stretching up and up to the surface. Green urchins give place to other larger

© National Geographic Society

ALASKAN OCEAN LIFE AS WEIRD AS SPRITES

Where icebergs float with most of their bulk beneath the surface, sharks and other predacious fish pursue their prey, great jellies pulsate, and ghostly white anemones adorn the rocks of shallows.

© National Geographic Society

LITTLE WONDER THE CATALINA GLASS-BOTTOM BOAT IS POPULAR

Some of the largest of the laminaria seaweeds grow in the shallow water of California coasts, and the haliotis snails creep about the bottom, together with a multitude of variously shaped starfish, and brightly colored mollusks which find life good without having to carry about great houses of lime.

© National Geographic Society

CORAL REEFS OF THE WEST INDIES TEEM WITH MARVELS

From the bottom ooze spring up false plants—lowly animals which simulate vegetation with stiff, angular purple branches, or spreading "moose antlers." Among these swim parti-colored angelfish and scarlet squirrelfish, above an undergrowth of brain coral and urchins armed with sharp black needles.

© National Geographic Society

UNDER-SEA PEOPLE OF THE GALÁPAGOS LOOK FORMIDABLE

Here jet-black lava rocks cast shadows hardly less dark, and from deep crevices and caves creep sinister-eyed, brick-red octopi and schools of scarlet bump-heads, while over the stones, and up into the air, crabs crawl in their search for food and mates and safety.

© National Geographic Society

HAWAIIAN REEFS PRESENT A SUNBURST OF COLOR

In the shallows over which sweep the lazy swells of the Pacific, great monoliths of coral lift their heads, alive with a maze of beings; seafans enhance the beauty seen through their waving, purple veils; and graceful fish show clashing yet harmonious patterns and colors.

© National Geographic Society

JAPANESE ART DRAWS INSPIRATION FROM MARINE LIFE

Scenes like this glimpsed through the clear waters recall pictures painted on fans and screens by artists who have found in the graceful lines and subdued colors of seaweeds, and the delicate shapes of fish and snails, never-ending and ever-new compositions. And the great mask-backed crab seems to have been the veritable pattern for the devil masks of old Nippon.

© National Geographic Society

MYSTERY SHROUDS MUCH OF THE AUSTRALIAN BARRIER REEF

Expeditions are beginning to explore this great underwater world, where there is a dearth of plumes and seafans but an amazing abundance and variety of coral forms and colors. Here are found not only seahorses similar to those of our own shores, but sea-dragons, with angular, many-pointed armor decorated by scores of waving tassels and plumes and feathery appendages.

© National Geographic Society

SUBMARINE LIFE COLLECTS ABOUT A SUNKEN SHIP OFF THE MAINE COAST

Though no corals or sea plumes grow here, and the dominant tone is subdued, the shades of brown, purple and green are beautiful. Beds of polished mussels and ivory barnacles cover every suitable surface; seaweeds in fringes and pleated, wavy lines decorate the skeletons of wrecks. Snails and blue crabs creep about, and swift schools of sardines or mackerel hurry past on their lawful occasions.

species, and two or three fathoms down we enter the home of the beautiful basket starfish, hinting of the crinoids which have now almost vanished from the earth (Pl.VIII).

We take our seat upon a mat of seaweed and watch the life of midwater. Shrimps come in great numbers, drifting past like ghosts of living beings; the first squid seen, head on, will never be forgotten, nor will a galaxy of ctenophore jellyfish when the sunlight sets their cilia ablaze. Whelks and small, curious crabs clamber upon our canvas shoes, and suddenly a thousand comets dash past—a school of herrings in search of spawning grounds. Only an impatient jerk on the hose will remind us that we have long overstayed our allotted time.

TROPICAL WATERS BRILLIANT IN COLOR

At the first dive in the Tropics, say in the West Indies, we are impressed by the sheer increase of amount of life and the unbelievable brilliancy of color. Off New York we perhaps picked up a tiny crumb-of-bread sponge and on a clamshell found a bubble of coral the size of a marble. Here, in the midst of a tropical reef, corals form bowlders six and eight feet across, or branched arborescent growths into which we can climb. Anemones and fish are rainbow-tinted—harlequin angelfish and large-eyed scarlet squirrels. Horny corals send up unearthly purple branches like nothing conceivable above water, and the joy of it all is that everything that moves has little or no fear of us. We are made to feel at home—returning natives, not intruding strangers (see Color Plate III).

When many dives have been made at one place, so that the seascape has become familiar and individual fish are known on sight and can be claimed as friends, then is the time to come out late some starlit evening and go down in the dark.

Choose a night when there is strong phosphorescence, and climb down the ladder very slowly. When your eyes pass just below the level of the water, the illumination of the ripples is beyond any mere man-made fire.

At first, as we stand on the bottom, we seem to be in utter darkness, with only a dull glow coming down from above. A glance upward shows the keel of the boat turned to molten silver, and now our eyes have become readapted and our individual cosmos begins to be filled with galaxies and constellations, meteors and comets of blue and white light. These in turn are resolved by our intelligence into definite organisms. Some of them, such as the shrimps and sea worms, have lights of their own, but most of these shallow-water forms are illuminated by proxy. Every move they make evokes brilliance from the minute Noctiluca and other microscopic creatures.

Now and then the passage of some great fish lights up all the surrounding reef with its caves and waving fronds, and memory, from our diurnal dives, supplies a host of details. Again language fails us utterly; we can only stand and look and feel, and later remember enough of the marvel of it all to wish to experience it again.

Swinging to the Pacific and to the north, off the shore of Japan, we find less of intensity of tropical color, but more delicate tones. Many a Nipponese artist must often have peered down through the clear waters to have been able to transfer so much of the feeling of under sea to his screen or *kakemono* (hanging panel-shaped picture). The sparsity and graceful curves of seaweed fronds or plumes recall the exquisite flower arrangement of the Japanese, and if we come across one of the big sponge crabs our sustained simile reaches its climax. On the back of the crab is a perfect mask of the devil dancers—a mask of some god of the Samurai, so realistic that the fishermen have a score of legends of its origin (see Color Pate VI).

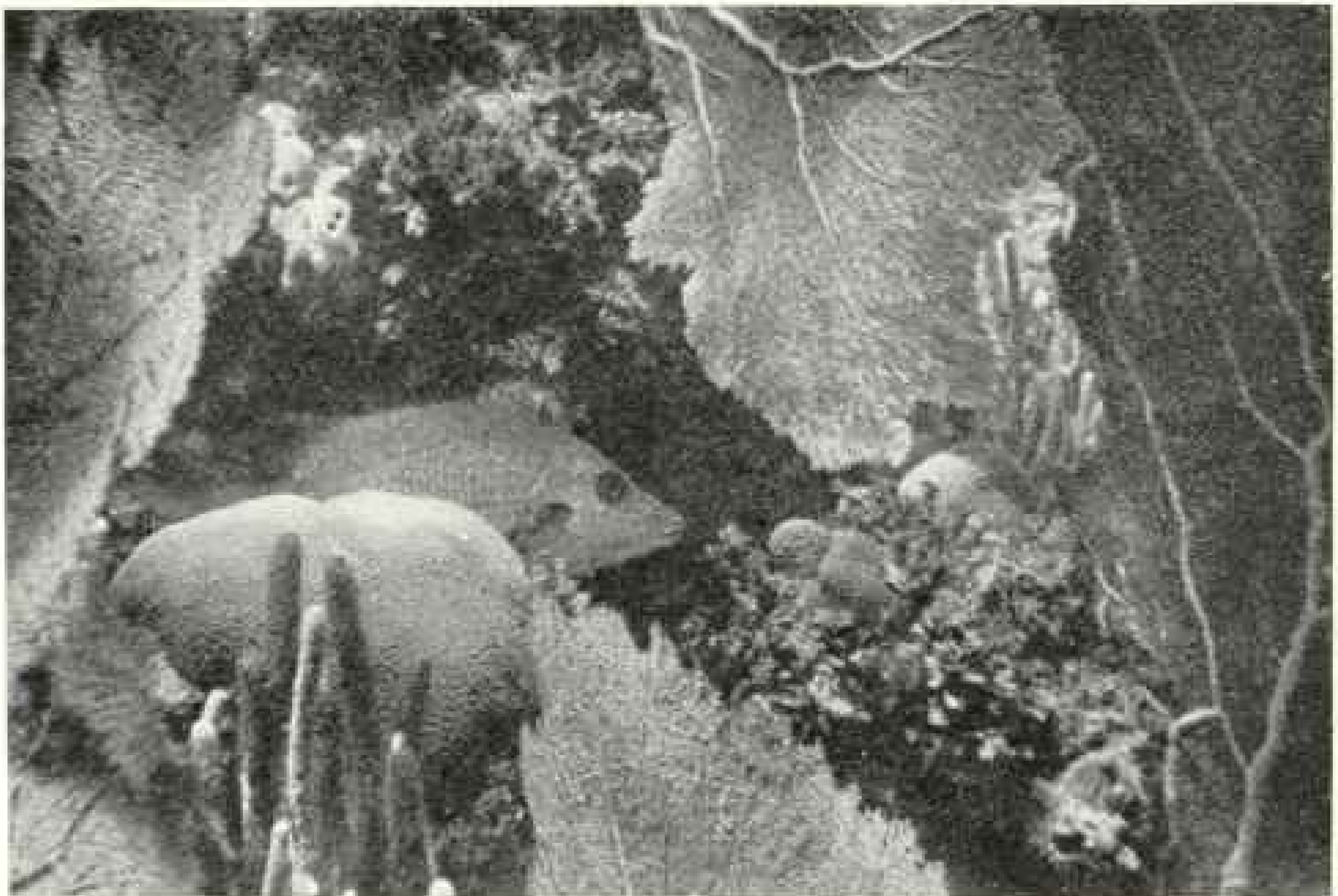
Once, in a fisherman's boat, I drifted off the shelf or terrace some four fathoms beneath me and suddenly saw, far, far down in the deep-blue, breath-taking depths, five of the largest fish I have ever seen, tearing at a trap in which I had a single glimpse of a small scarlet fish. Almost immediately the scene passed from view, but my last memory of a Japanese shallow was of this pitifully small being waiting, while five giants bit and tore at his prison.

AMAZING VARIETY OF FORMS

Passing south in the Pacific, we come to the most luxuriant reefs and shallows of all oceans. Beginning with Hawaii and extending over all the equatorial South Seas, the host of islands and atolls offers indescribable riches for the Helmet Explorer of the future, be he artist, scientist, or just a superhuman being filled with a desire to experience the supreme joys of this world of under sea.

THE DIVER CAN LURE HUNGRY FISH WITH A FEATHERED SEA URCHIN

It is necessary merely to break a hole in the shell. The odor and particles of food escaping from the injured animal attract scores of undersea dwellers.



Photographs from Dr. William Beebe

MOTION-PICTURE FILM BRINGS BACK RECORDS OF THE DEEP

A cave about 20 feet below the surface is richly decorated with purple sea fans, brain coral, and the fish which call this grotto home.

Photograph from Dr. William Beebe

INDIVIDUAL FISH BECAME LIKE OLD FRIENDS TO THE DIVERS

Almost Island, near Nonsuch (see text, page 746), was studied until the investigators learned to know the tenants of every cave and crevice.

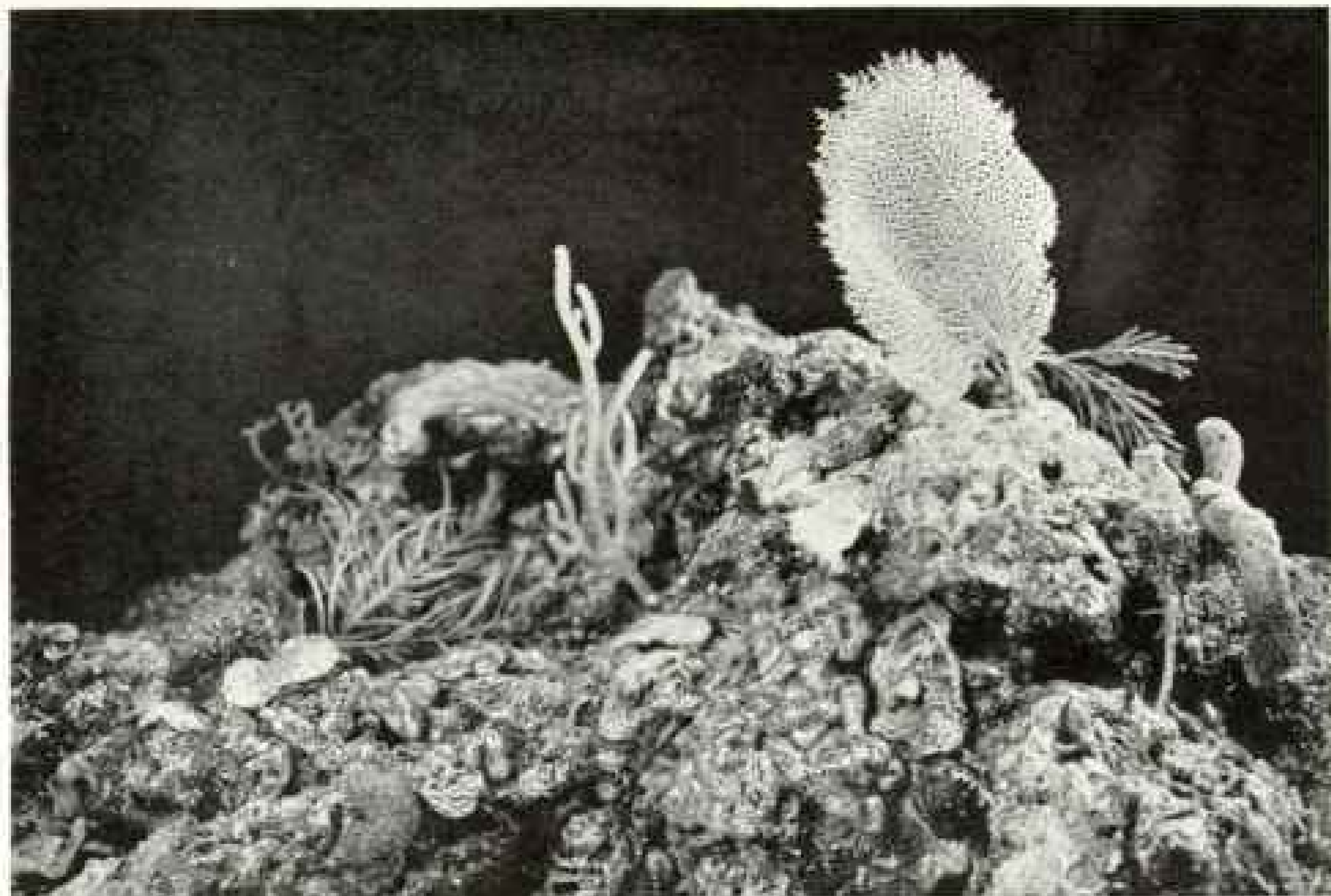
A thousand paintings need never repeat species, form, pattern, or color in their composition. I have chosen in this instance two among many weirdly colored trigger-fish, swimming through a forest of animal plants—in appearance dead stumps and shredded, skeletonized fronds—which actually are living corals and sea plumes whose thousands of tiny architects live happy lives in their cubicles of horny branches and marble monoliths (Pl. V).

For contrast let us turn swiftly northward again, to colder regions, where we must encase ourselves in heated, wool-lined suits if we would dive in helmets beneath the surface. Seaweeds are small or absent, but snails, anemones, crabs, squids, and shrimps still hold their own, while giant Arctic jellies sometimes a hundred feet in length throb through the icy waters. Sharks are not Arctic as a race, but have been found well within the area of floating icebergs, and there is always an abundance of food for them in the great schools of fish which haunt these waters (Plate I).

Another shift to another contrast, from this land of whiteness to the blackest seascape I have ever seen through my helmet glass. The black lava shores of the Galápagos slope down to the water's edge and on out through the shallows with very little change, except that the cleansing liquid has washed away all aërial dust.

Great ebony cliffs and terraces reveal gaping caves and grottoes, and now and then a flat stretch of bottom, covered with sand, black as jet, affords shelter to a field of waving seaweed. The tenants of the black cliffs are of astonishing variety. Some seem especially appropriate, autochthonous as the lava itself, such as a great dusky octopus, which slides out of its cave, perceives me, and, with a change of emotion, shifts its color to brick red, and then to mottled red and gray. Its arms slither about like separate, conscious Medusa locks, investigating crevices, crossing one another, twisting into meaningless corkscrews.

From other crevices emerge little, particolored demoiselles—blue, black, and red—while scarlet crabs cling close to the lava. A school of vermilion wrasse swims slowly past, and we realize that almost every organism in sight, besides black, is adorned with some shade or hue of red. Before we



Photograph from Dr. William Beebe

SUBMARINE GARDENS CONTAIN LIKENESSES OF TREES, SHRUBS, BUSHES, AND BLOSSOMS (SEE ILLUSTRATIONS, PAGE 743)

ascend we remember the unnamable scarletness of this lava when first it poured forth from under ground, and we perceive a very unscientific appropriateness in the color patterns of octopus, crab, and fish (see Color Plate IV).

Finally let us seek out the antipodes, and imagine ourselves somewhere along the largest area of submarine shallows in the world—the Great Barrier Reef of Australia, which for well over one thousand miles extends along the shores of Queensland.

So much is in view at low tide that there has been little temptation to explore the deeper portions. But the few fortunate ones who have gone down to where the pearl divers glean their harvest tell of seascapes wholly unlike the flat-topped coral masses so abundant at the surface. This is the home of the giant clam whose shells are sometimes five feet long and weigh more than five hundred pounds. When once a human hand or foot is by accident placed inside the valves, they close like a bear trap, and there is no hope of escape for the unfortunate diver.

Just as on the neighboring shores we find such weird creatures as kangaroos, koalas, and emus, so here live the sea-dragons, which are to ordinary seahorses as orchids are to violets or birds of paradise to house sparrows. They swim about as horizontally as pipefish, are orange and lavender and vermilion, and from every spine sprouts a tuft of floating plumes. I have never seen one alive, but before I die I intend to watch these eerie creatures under water in their native haunts, swimming and feeding and mating among sponges and corals, urchins and waving algæ, of colors and shapes far other than those of any animal or vegetable life on land.

Instead of gazing down through water buckets and glass-bottomed boats, in addition to watching the fish milling about in aquariums, get a helmet and make all the shallows of the world your own. Start an exploration which has no superior in jungle or mountain; insure your present life and future memories from any possibility of ennui or boredom, and provide yourself with tales of sights and adventures which no listener will believe until he, too, has gone and seen, and in turn has become an active member of the Society of Wonderers under sea.

THE STORY OF THE MAP

WITH this issue of its Magazine, the National Geographic Society presents its new Map of the World, a striking illustration of man's progress since the Babylonians drew maps on clay tablets, centuries before Christ (see page 762).

Even so-called "savages" were often able to draw and understand maps. On the deck of Capt. Charles Wilkes's ship, a South Sea Islander with a piece of chalk drew a good map of the Tuamotu Archipelago. Marshall Islanders mapped their country with a framework of bamboo; its sticks showed the sea waves, while insets of cowrie shells represented the islands.

To guide them on night marches, our Pawnees used a star chart painted on elkskin.

Montezuma gave Cortez a map of the Mexican Gulf coast painted on cloth. Pedro de Gamboa, in the "History of the Incas," says they not only used sketch maps, but also made relief maps. The Ninth Inca, who died in 1191, made the first known relief maps of a district he had conquered and planned to colonize.

Rameses II is credited with the first maps of estates along the Nile, drawn around 1300 B. C. On a tomb at Thebes is a picture showing "two chainmen measuring a field."

In the Turin Museum are two of the most ancient "maps" known. They are drawn on papyri and show the location of gold mines in the Nubian Desert.

Another Turin papyrus shows the return of Seti I from Syria, the road to Heroopolis, and the canal from the Nile, with crocodiles in it. (Centuries before the Suez Canal, a ditch for navigation connected the Nile with the Red Sea.)

Thus no one race alone invented the map. It grew, improved, and approached perfection as science advanced with civilization.

MAP-MAKING AMONG THE GREEKS

Aristagoras, when urging the Spartan king to fight Persia, showed him "a bronze tablet upon which the whole surface of the earth was engraved." But now, on a tablet unearthed in Iraq, appears a map of the world dating from about 1000 B. C. It shows the earth as a disk, with water all around it and Babylon in its center.

It was the Greeks, however, and not the Babylonians, who blazed the way to correct maps. The intellectual vigor of Anaximander, and the pioneer work of other scholarly Greeks of his time, finally suggested the true shape of our world.

Eratosthenes, keeper of the library at Alexandria, believed the world to be round and sought to estimate its size by a scientific means.

Using measurements of Egyptian surveyors, he calculated the distance from Alexandria to Syene (Aswan), "took the sun" with his crude gnomon, or measuring stick, and then sought to figure the length of a meridian. From that he attempted to estimate the distance around the world. Another idea of his was to use on his map a network of lines with which to locate places, as we do to-day by latitude and longitude.

PTOLEMY AN EARLY GEOGRAPHER

Most famous of all early maps, however, are those in the atlas or "Geography" of Claudius Ptolemy, an 8-volume work dating from about 150 A. D.

Though lost to the world of learning through the Dark Ages, Ptolemy's books were later rediscovered. One of the oldest manuscript copies was found at Mount Athos, and a reproduction made in 1867 is on display in the Library of Congress at Washington, D. C. Six of his eight books consist of tables of latitude and longitude for about 8,000 places. In his remaining books, Ptolemy discusses the stars, mathematical problems of geography, the length of days, the sun's course, and differences in time at different places.

With his books are maps of 26 countries and one map of the world.

In his colossal task Ptolemy used all geographic lore that had accumulated to his time. Though crude and full of mistakes, it was the greatest step ever made in presenting world geography in scientific form (see illustration, page 765).

His maps show how traders and adventurers had pushed the rim of the known world as far north as the Shetlands and given size and shape to the British Isles. More of the Nile was shown and part of Africa below the Equator. The Indian Ocean got a new and more accurate map-

Reproduced from Capt. John Smith's "General History"

CAPT. JOHN SMITH'S MAP OF VIRGINIA, PRINTED AT OXFORD IN 1612 BY JOSEPH BARNES

ping, based, no doubt, on notes brought by silk traders from the Far East.

No wonder civilization was astounded when, after centuries of Dark Age oblivion, these amazing maps were resurrected!

ROAD MAPS BY EARLY ROMANS RESEMBLED OUR OWN

Pliny and Seneca both say the Romans made topographic maps, and history mentions their maps of Italy and Armenia; but no such work survives.

Fascinating proof exists, however, that the Romans made road maps strangely like those used to-day by motor tourists and in railway folders. Such a road map, reaching from England to the mouth of the Ganges, in India, was copied by a monk of Colmar about 1265. This remarkable map, called the "Peutinger" after one Conrad Peutinger, who unearthed it in 1507, is now in the Vienna State Library. It is 18 feet long, about one foot wide, and painted in colors.

In 12 sections, it pictures the Roman Empire and some of the outside world of "barbarian tribes" about the time of Augustus. Like Ptolemy's map, the Peutinger is pre-Christian in conception. Later artists, however, have inserted popular features of Bible geography, such as the desert where the Children of Israel wandered for 40 years and the mountain where Moses gave them the Ten Commandments.

Not only does this pagan map show all the main roads in red, but standardized illustrations show the towns and cities. Drawings of tiny houses indicate small towns, while vignettes show the big cities—Rome, Antioch, and Alexandria. You know that Constantinople is a capital because there, on the map, is a ruler sitting on a throne! Sketches of trees show large forest areas in what is now Germany.

This map is not drawn to scale. As some modern railways distort their maps to give travelers the idea that theirs is the shortest route between certain places, so

Photograph Courtesy C. S. Hammond by Wide World

IN THE MANUFACTURE OF GLOBES, THE MAP IS IMPOSED IN GORES, OR SECTIONS

Globes were in use before Christ to illustrate geographic theories, but they were not widely used in navigation and schools until the Middle Ages. The astronomer Nasir-al-din built a globe in 1258 "showing the five climates"; Behaim's globe, 1492, shows one concept of the world map before America was discovered. Some early globes were engraved on bronze.

the Peutinger map takes many liberties with distance and proportion.

To meet the needs of the Crusaders, flocking down the highways of Europe and into Asia Minor, there developed a sort of pictorial road map. A good example in the British Museum is a copy of a drawing by a St. Albans monk, Matthew Paris. Its crude pictures show the towns along the route from London to Jerusalem. The "map" of Palestine also shows the sea, with ships carrying crowds of people.

When Rome began to crack, the art of making maps, among the Christians at least, suffered a setback. For centuries after the rise of the Byzantine East, such maps as the Christian world drew were used mostly to illustrate books on religion.

Beatus, a Benedictine monk, drew a world map for his "Commentary on the Apocalypse." It shows the spread of Christianity; and several copies have insets of Adam and Eve and the snake.

And there was Cosmas, the learned monk who wrote "The Christian Topography" and drew maps to prove the world was flat, with four corners!

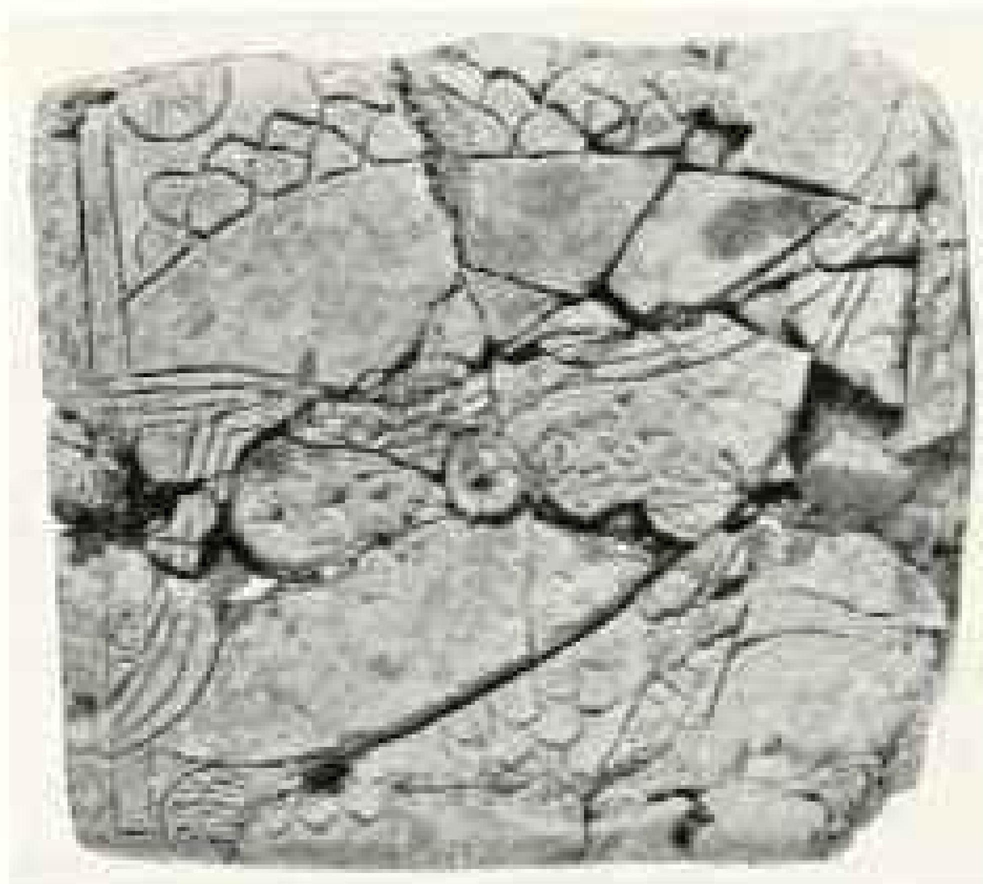
Men standing feet to feet he pictured, also, to show how ridiculous a round world would be; where, in the antipodes, rain would fall up instead of down!

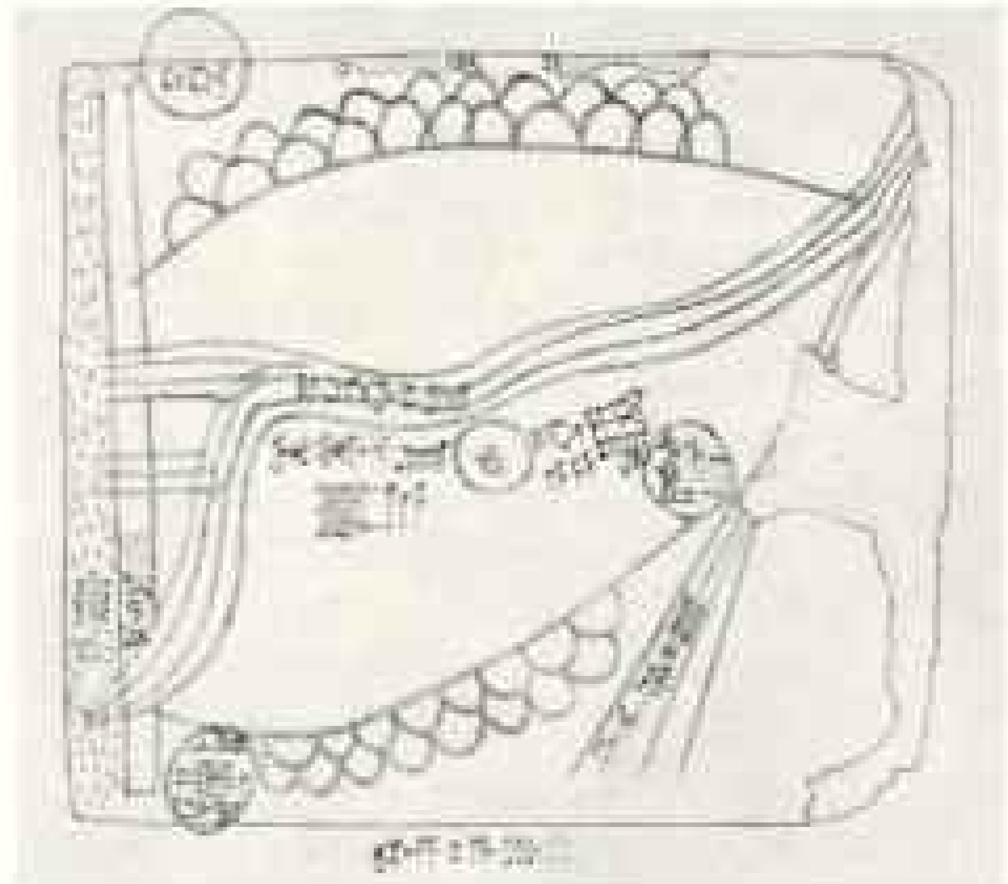
WHEN BAGHDAD WAS THE WORLD CENTER OF LEARNING

Meanwhile, however, the Arab scholars at Baghdad had seized the torch of learning, and during Europe's Dark Ages they carried it forward.

Islam was making maps and globes, excellent for that day, when similar Christian work was still primitive. Nearly a thousand years ago Ibn Haukal, of Baghdad, wrote in his "Book of Ways and

YOUNG ANDALUSIANS PAY ATTENTION AS THEIR TEACHER EXPLAINS THE MAP OF SPAIN, PAINTED ON A SCHOOLHOUSE WALL AT ALMERÍA

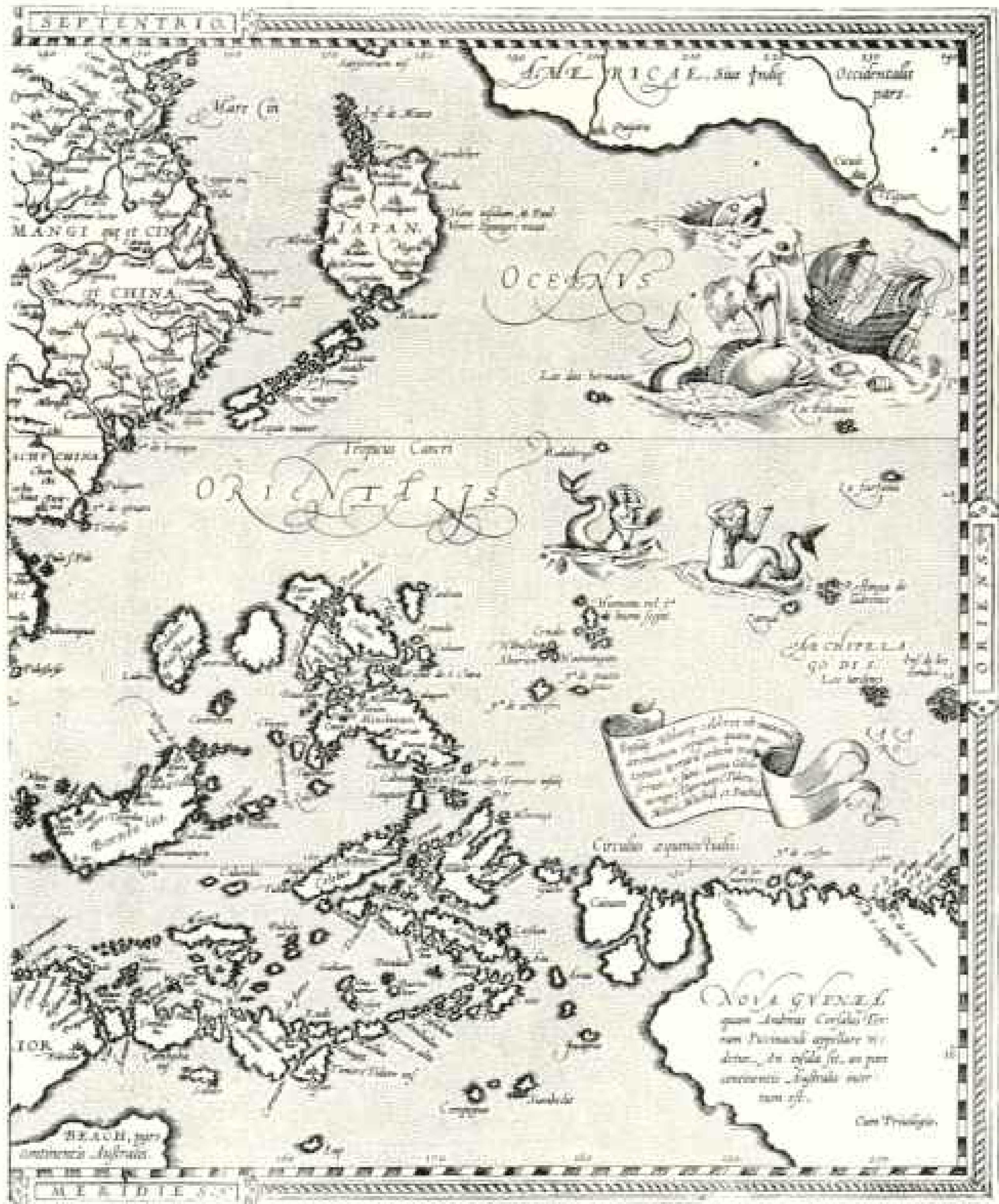




Photographs from Semitic Museum, Harvard University

AN ANCIENT CLAY MAP FOUND AT NUZI, IN IRAQ

"It represents a sea, two rivers, two mountain ranges and three cities," says a report from the American Schools of Oriental Research. "This is the oldest map (as distinguished from a plan) which has yet been found. . . . If the parallel lines represent caravan routes, we have here a road map, illustrating the commercial activity of Mesopotamia at an uncertain time between the dynasty of Accad and the age of the Cappadocian tablets."



A 16TH-CENTURY MAP-MAKER'S PLAN OF THE PACIFIC

Take out the mermaids, sea monsters and galleon, move the islands about a bit and readjust the coastlines, and there would be to-day's map. This map was published more than 300 years ago in Abraham Ortelius's "Theatrum Orbis Terrarum," and carries such names as Americae, China, Japan, Borneo, Celebes, and Mindanao (see, also, text, page 767).

Provinces": "I have illustrated every region by a map. . . . The boundaries of all these lands, their cities and cantons, the rivers that water them, . . . the routes that traverse them, the trades that flourish in them—all these I have enumerated. In a word, I have collected all that makes geography of interest either to princes or people."

China, Persia, Egypt, all had their part in early map science; and the Arabs undoubtedly borrowed from Ptolemy. Yet it was the Arabs who, when Christian learning lagged in the eighth and ninth

centuries, made the most important geographic advances.

Arabs used the compass long before it reached Christendom. They were trading with China early in the eighth century, when a busy Arab merchant colony was settled in Canton. Chinese junks, steered by a magnetized iron bar set in the bows, and carrying 600 people and more, made frequent voyages to the Persian Gulf.

Baghdad, under the Abbasside Caliphate, flourished for centuries as the hub of power, learning, glory, and splendor in the Eastern World. In Caliph Al Mamun's school of science the works of Ptolemy and Aristotle were translated into Arabic. Baghdad's observatory was studying the obliquity of the ecliptic, and on Mesopotamian plains two degrees of the earth's meridian were measured. The Caliph was checking up on the Greeks, learning for himself the distance around the world.

From the Baghdad library director came a book showing the names of places in the empire, with their latitude and longitude. Others wrote books on the astrolabe and other astronomic instruments.

Ibn Khordadbeh, traveler, writer, and director of posts, mapped the Caliph's mail routes. His work, like that of other imaginative Arab scribes of his day, is a blend of science, superstition, and sheer nonsense. He describes whales 200 fathoms long, snakes that could swallow elephants, and sea-horses "just like those on land!"

ANCIENT MAPS MINGLED FACT AND FANCY

On a lighthouse in Alexandria, he wrote, was a mirror into which you could look and see all that was happening in Constantinople! Despite such absurdities, Khordadbeh, like Masudi and other Arab geographers, helped build up the world map by writings on trade routes, markets, frontiers, rivers, mountains, and climates.

In one of Masudi's books the author discusses the ebb and flow of tides. His map of the world is upside down to us, the south at the top. But what he wrote about the world map, some 1,000 years ago, is still sound! He knew the size of the earth with some accuracy, that it turned about the sun, and how far it was from the Equator to the poles. He knew something about the equinoctial line, latitude and longitude, the poles, and the axis of the world.

Baghdad! That is a name to conjure with! In the shadows of its mosques wise men still sit cross-legged and read the Arab "fish-worm" writing from mysterious, richly bound books. Before bazaar coffee shops, at dusk, bearded story-tellers still regale the loafers with the yarns of Sindbad the Sailor, founded partly on the travels of Suleiman, a famous foreign trader in the days when world culture centered there. Then came that Mongol demon, Hulaku Khan, raids, wars, and floods. Baghdad, as a seat of learning, passed from history.

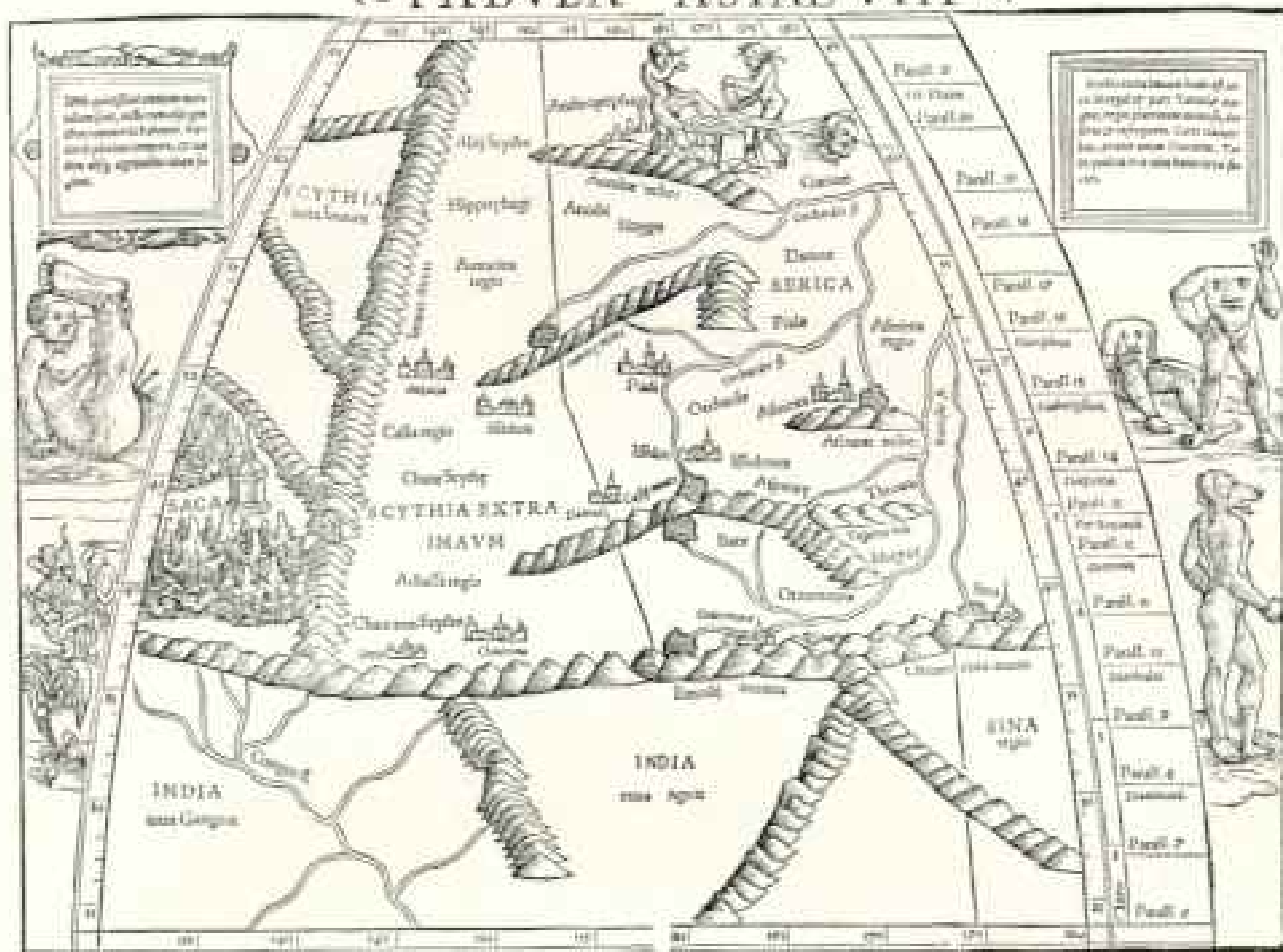
THE PORTOLANO CHART MARKED A GIANT STRIDE IN MAPPING

In Europe now, the eve of the Renaissance, the revival of learning. On the Mediterranean, ships with keels, a new device borrowed from the Vikings, lay their courses by a new kind of chart, developed by Catalan and Italian sailors. Called a "Portolano," or "handy" map, these charts were to have a far-reaching effect on navigation and, eventually, on exploration and discovery.

Compared with the fantastic land maps of that day, they marked a giant stride toward cartographic truth.

Before the Portolano chart, Mediterranean sailors used the Greek "Periplus," which, like our book of sailing directions, described the appearance of towns, capes, and promontories, as observed from out at sea. With it, of course, ships were sure of their position only so long as they hugged the coast.

Aided by the Portolanos, however, ships could now sail a course out of sight of land. These charts, with their network of lines, were based on bearings and distances between cities, capes, etc., on the coasts. But the lines on the Portolano chart did not represent latitude or longitude. Using the cross-staff and astrolabe, sailors got their position from the heavens; then set their course by a system of rhumb lines. These groups of lines radiated from a common center. Some also showed the prevailing winds. Each chart had its scale of Portolano miles, whose length was 1,233 meters. The best of them showed the positions of hundreds of different places on the coast and the distances between them.



GROTESQUE CREATURES OF IMAGINATION PEOPLED THE UNCHARTED LANDS ON ANCIENT MAPS

Published with the Ptolemy atlas, "Geographia Universalis," in 1552, this crude map shows an oddly twisted India, an ancient Scythia, and what may be meant for part of China. In the lower left men are fighting a giant one-footed bird with four toes. Above, a one-legged man sits in the shade of his own huge foot; at the right is a dog-headed man and headless men with faces in their breasts. At the top, cannibals cut up a body (see text, page 759, and below).

The Portuguese, too, made use of similar charts; some were printed on skins and highly decorated. Their use grew, with the use of the compass, until they came to show all the African coastline and even parts of the east coast of the Americas.

MAPS IN THE AGE OF DISCOVERY

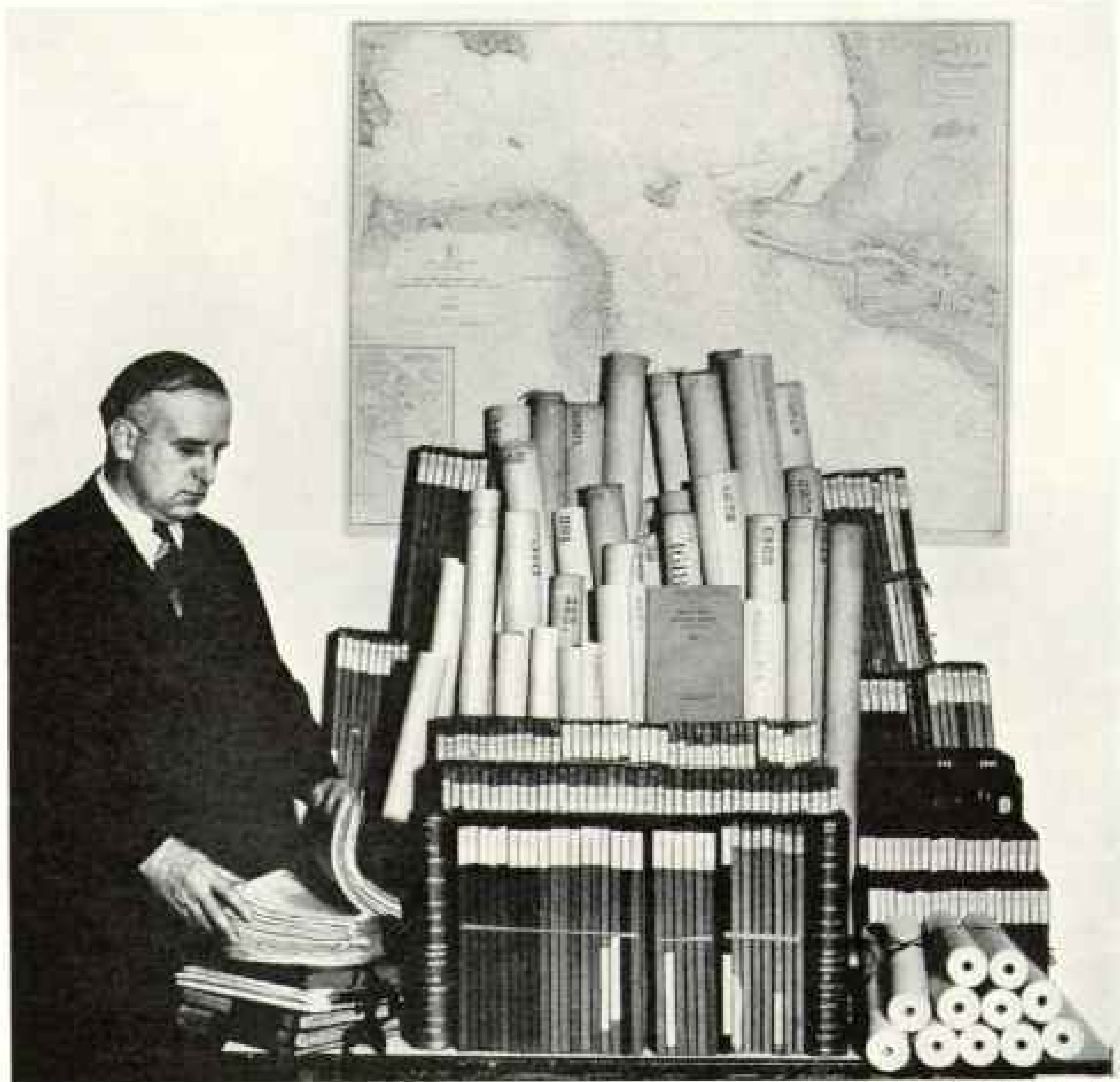
Printing, which, like the compass, probably came to Europe from the East, had the same galvanic effect on map-making as on some other arts. Ptolemy's "Geography," now translated, became so popular that it was to go through more than fifty editions. Columbus used it; despite its errors, or thanks to them, he accidentally found the New World, which discovery ultimately set all civilization to revising its maps.

For decades after the voyages of Columbus, Europe seethed with excitement and new ideas. When Charles V received letters from Cortez describing the splendors of Montezuma's court, with its golden dishes as big as carriage wheels, all Spain was agitated. When news broke that Pizarro had caught an Inca king and held him for ransom of a roomful of gold, equal to $15,000,000, excitement was almost unendurable. All nations that could build or borrow boats put to sea, and map-making flourished.

MAP-MAKING BECAME A BUSY INDUSTRY

As the world's true pattern took form, medieval maps with unexplored areas decorated by sea serpents, mermaids, wrecked galleons, and chubby angel faces blowing the winds, began to fade from use. In later years Dean Swift satirized these imaginative drawings in a quatrain:

> "So geographers, in Afric maps,
> With savage pictures fill their gaps,
> And o'er unhabitable downs
> Place elephants for want of towns."



Photograph by Richard H. Stewart

THE INFINITE LABOR TO PRODUCE ANY IMPORTANT CHART IS SHOWN BY THIS HEAP OF RECORDS AMASSED TO MAKE THE MAP OF SAN FRANCISCO

Comdr. Alfred M. Sobieralski, Assistant Chief, Division of Charts, U. S. Coast and Geodetic Survey, at the left; beside him is the assembled mass of topographic and hydrographic maps, tide records, soundings, and other computations made for use in the completed chart of San Francisco and its adjacent waters, seen hanging on the wall.

Some such rare old maps, preserved in the library of the National Geographic Society, show cannibal feasts; men with dogs' heads; men with no heads at all, their faces set in the breast; a man using his one big foot as an umbrella, holding it up while he sits in its shade; one-eyed people; cows with wings; roosters as big as horses; babies riding lions; Noah's Ark with dormer windows, like a modern suburban home! (See, also, page 765.)

Gerhard Kremer, known by his Latinized name of Mercator, was among the first to break with these old traditions. Famous mathematician and cartographer of Flanders, he drew a world chart in 1569 on the "Mercator Projection" which gave navigators a new and safer system for plotting their courses.

By this projection lines of latitude and longitude are mathematically spaced and drawn at right angles to each other. On this grid sailors have merely to rule a straight line as their course and sail to port. Because the earth is round, this does not give the shortest route between two points, but it does show the right "bearing," or direction.

In his time Mercator helped to change map-making from an art into a science. New and accurate instruments for measuring the ground were coming into use, and slowly they led the way to topographic surveys.

After Mercator died his friend, Ortelius, issued a "Theater of the World" (see page 763). It was an atlas of 53 maps, compiled from the work of various geographers. It ran through many editions. Despite the excellence of the Strasbourg edition of Ptolemy, the work of Ortelius is now looked on as the parent of the modern atlas, of which that issued by the Italian Touring Club of Milan is one of the world's finest examples.

SON CARRIED ON MERCATOR'S WORK

Mercator's son, Rumold, carried on his father's map trade. When Rumold died his brother-in-law, Jodocus Hondius, took it over. The Hondius earth map of 1595, now in the British Museum, traces Sir Francis Drake's course around the world.

Willem Blaeu, in Amsterdam, founded the greatest map-publishing business the world had yet seen. His work was so good that Dutch ship captains were forbidden to use any other. In printing, engraving, and coloring, his maps were unrivaled and gained wide use among all maritime powers.

Conspicuous in the long list of atlases and geographies issued by the Blaeu firm is the work on Brazil, by Caspar Barlaeus. It contains 25 colored maps and many drawings of ships, natives, and coastline scenes.

Dutch map publishers led the world in the 17th century and the French in the 18th. A French scientist rolled a carriage wheel across the northern French plains to measure a degree arc of the meridian. In time came D'Anville, issuing a new map of China drawn by the Jesuits in 1718. Other good map-makers arose in Germany, England, Austria, and Switzerland. Stimulated by Mercator and Hondius, map publishing was now a flourishing business, as was also the piracy of maps.

Dedicated to Queen Elizabeth, an atlas of England was issued by Christopher Saxton in 1579. It was "based on nine years of travel and survey." At this time Englishmen often sent their maps to be engraved by the Dutch.

John Speed published "A Prospect of the Most Famous Parts of the World" in 1627. Its China section carries margin pictures of "Chinian men and women" and an illustration of how criminals there were executed.

John Ogilby, "King's Cosmographer and Geographic Printer," is remembered for his early English road maps and guides for "gentlemen and travellers, being made fit for the pocket."

A PIONEER IN THE USE OF SYMBOLS SEEN ON MAPS OF TO-DAY

Long after him John Cary mapped the mail routes "by command of His Majesty's Postmaster General." Cary's maps reveal a complete break with the past. By 1793 he was using hachures, short lines for shading and denoting different surfaces, to show land slopes; dots for towns, instead of pictures of buildings; precise scale of miles, colors, and other quite modern map symbols.

Coincident with Cary's work was the development of modern cartography in Germany. After the middle of the 19th century, German atlases were unsurpassed. Berghaus, Kiepert, Perthes, Petermann, and Andree and Stieler, all rank high in the history of cartographic achievement. They are to German map-making history what Cary, Bartholomew, Johnston, and others have been to England.

Finally, it was Dr. A. Penck, of Berlin, who proposed the international map of the world, a monumental map venture, with which many nations are now occupied. Its scale is 1 to 1,000,000.

SEAS MAPPED BY BRITISH ADMIRALTY

No country is so well surveyed as Great Britain; no maps anywhere are comparable, for information and range of scale, with those of its Ordnance Survey.

While the largest scale standard map of the United States Geological Survey is one inch to the mile and the total number of sheets drawn on this and smaller scales is less than 4,000, the largest scale map of the United Kingdom is 25 inches to the mile, of which there are actually 51,456 separate sheets, the size of each sheet being three times that of a standard Geological Survey sheet. There are, in addition, over 15,000 maps on the scale of six inches to the mile, for the whole of Great Britain,

Photograph by Keystone-Underwood

MARQUETTE MADE A MAP OF PART OF THE GREAT LAKES REGION

The relic is drawn on a piece of paper and is now a treasured possession of St. Mary's College, in Montreal. It is dated 1673 and was made on the journey which resulted in the great explorer and his companion, Joliet, reaching the Mississippi River. On this map Lake Michigan is labeled "Lac des Illinois."

every acre of it, as well as complete series on the scales of one, one-half, and one-quarter inch to the mile.

Every feature of these 25-inch maps is strictly to scale; every bend in a road, the actual outline of buildings, fields with their acreage, down to the back yard of the humblest dwelling. Often even individual trees are delineated.

As to hydrographic charts, the British and the Americans, individually and by exchange, supply most of the maps used to-day by navigators. Of those now in general use at sea, the British Admiralty has supplied about 5,000 and the U. S. Hydrographic Office about 4,000 (see p. 771).

EARLY MAPPING IN THE UNITED STATES

Before the Revolution such maps of our country as existed were drawn mostly by those European powers who had colonies here. Among such were the early Spanish maps of Florida, the Southwest, and California; also Lewis Evans's map of the

"Middle British Colonies in America," published at Philadelphia in 1755.

What has been called the most important map in United States history is that drawn by Dr. John Mitchell, showing the French and British dominions in North America. After Cornwallis yielded at Yorktown and British diplomats met the Americans at Paris to frame the treaties of 1782-83, this map was used. Of it John Adams wrote: "We had before us . . . a variety of maps; but it was the Mitchell map upon which was marked out the whole boundary lines of the United States."

During the first half of the 16th century such Spanish explorers as Cabeza de Vaca, Coronado, De Soto, and others had made crude maps of their routes; so had the French, voyaging the Great Lakes and canoeing down the Mississippi. William Clark, of the Lewis and Clark Expedition, in 1804-6, made a map showing their route to Oregon and the north boundary of Louisiana, then in the upper Missouri basin. Later came Zebulon Pike, the Santa Fe traders and the beaver trappers from St. Louis—Bonneville, Walker, Frémont, and others—all shown on Frank Bond's "Routes of the Principal Explorers," published by the United States Land Office in 1907.

HOOKING OUR SHORE LINE TO THE STARS

No ship can enter port safely without a chart that shows buoys, lights, shoals, channel depths, and prominent objects ashore to steer by.

The U. S. Coast and Geodetic Survey has been making such charts for 116 years.

Their value is dramatically suggested by a Revolutionary War incident off Sandy Hook. A superior French fleet under Count d'Estaing blockaded the British ships, commanded by Lord Howe. Having no accurate charts showing where the deepest channel was and fearing to run aground should he venture in to attack the British, D'Estaing did nothing.

A brisk sea trade sprang up along our eastern seaboard after the Revolution. So the United States sent a Swiss surveyor, Ferdinand Hassler, to Europe to buy instruments for mapping our harbors. That was the origin of the Coast and Geodetic Survey.

For its own and all other surveys, it fixes by astronomy and triangulation and leveling the exact geographical position and elevation of control points. Along our coasts and at thousands of inland positions, its familiar triangulation station marks and "bench marks" are set up to identify those spots that have been precisely located in latitude and longitude and altitude. The triangulation stations are made at the tops of mountains, when practicable, in order that the instrumental sights to other points may be as long as possible. This adds not only to the economy of the survey, but to the accuracy.

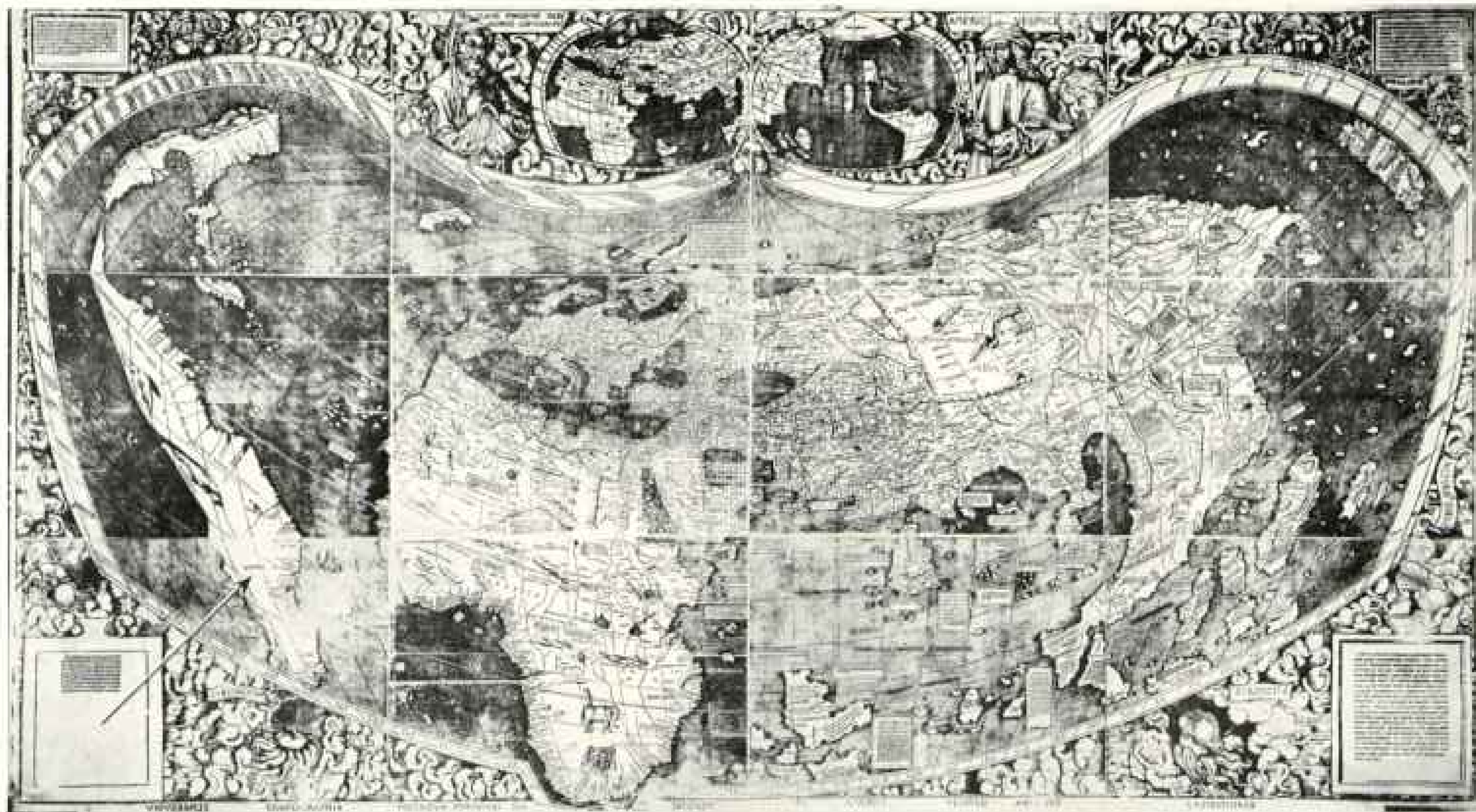
This "Control Survey" is not a map in itself, but it forms an exact frame on which all maps are built and correctly placed with reference to one another.

UNCLE SAM AS A MAP-MAKER

After the Civil War, mapping of the United States, particularly of the great West, began in earnest, directed by the newly created U. S. Geological Survey. Long before that, to aid settlers, the Government Land Office had done much mapping, often under contract and not always accurate.

In one part of Texas, for example, "the original survey was made on horseback, at times under Indian attack, and the unit of measurement was the horse's pace, estimated at a *vara*, or Spanish yard!" Yet, despite its handicaps, the Land Office, in opening the vast public domain to settlement, mapped hundreds of thousands of square miles. To this day, in many regions, these maps are still in use, or are recalled by the rectangular, made-to-order road net, which incloses each square mile or "section."

Because the United States is so vast, no private firm or person could afford to survey and map its whole area. Only the States and Federal Government, sharing the cost, can do this. For more than 50 years the United States Geological Survey has been working to complete the topographic mapping of the Union. Of its total area of more than 3,000,000 square miles, about one-half is now surveyed and the results published in nearly 3,800 topographic maps. In the stock room of its engraving plant at Washington it has on hand more than 7,000,000 maps, which it sells and gives away at the rate of 2,500 a



THE FAMOUS WALDSEEMÜLLER WORLD MAP OF 1507, REPUTED THE FIRST TO CARRY THE NAME "AMERICA"

In December, 1901, geographic circles were startled by news that the long-missing Waldseemüller map, described in the "Cosmographiae Introductio" of 1507, had been found. A Jesuit teacher of geography came accidentally upon this long-lost and enormously valuable map in the library of Wolfegg Castle, in Württemberg. It is printed from a wood engraving and made in 12 sections, which, when fitted correctly together, form a complete world map measuring 8 feet by 4 feet 6 inches. An arrow, set in the lower left, points to the name "America," applied to the strange-shaped land conceived in 1507 as our Western World.

day. These include, also, many maps the Survey has made of Alaska and our overseas domains.

"Accurate maps," it has been said, "serve as the base on which most problems affecting human activities are studied and plans made for their solution."

"Easy reading is hard writing." With its many symbols and key colors, the "shorthand of the map" tells far more facts, on a given surface, than could be printed on the same space in words of the smallest type. Thus, in economic charts to show population, crops, forests, livestock, raw materials, or distribution of industries, the map is increasingly used.

FROM WHALE CHARTS TO AIRPLANE MAPS IN THE HYDROGRAPHIC OFFICE

Pilot charts made by our Navy have been famous since Lieut. Matthew Fontaine Maury first issued his unique Whale Chart. On it, in military formation, regiments of whales are seen stretched from Bering Sea to Cape Horn, with map symbols to show which are sperms, "rights," etc., and also at what season they appear in certain seas.

The first scientific and mapping expedition sent to sea by act of Congress was that led by Captain Wilkes, in 1838. His long survey included the discovery of the Antarctic Continent and ranged from the coast of Brazil to Madeira, Patagonia, up through the Pacific isles, Sulu Sea, Philippines, Japan, China, Fiji, Hawaii and Samoa, Alaska, Strait of Juan de Fuca, and the Columbia River.

From these surveys 87 charts were later issued, and to this day they form the base for many charts made by other maritime powers.

"PATHFINDER OF THE SEAS"

Maury, the same who drew the Whale Chart, had charge of the Hydrographic Office for nearly 20 years. His studies and writings on oceanography brought him world-wide fame.

For years he patiently scanned the logs of men-of-war and merchant ships, gathering with infinite pains the facts used later in his nautical charts. Wind, current, and pilot charts he drew, track charts, trade-wind, storm, rain, and whale feeding-ground charts—all to make navigation safer in the known waters of the globe.

"Pathfinder of the Seas," the navigators call Maury. As early as 1855 he marked off the steamer lanes in the North Atlantic practically as they were adopted years later. He worked out a system for deep-sea sounding and was among the first to suggest submarine cables between continents.

The Navy's Hydrographic Office to-day aids the mariner, just as the Portolano makers did in olden times (see page 764).

Agents in foreign seaports distribute its charts, and many correspondents send it map news, such as the discovery of new shoals or the placing of new lights or buoys.

Bottles set adrift in ocean-current study also enlist the aid of friendly correspondents overseas. When recovered they show the trend of ocean currents.

These bottles are sent out with ships to be cast adrift at given points. In each bottle is a paper of directions, printed in eight languages, so that the finder may send the paper by mail back to the Hydrographic Office. Some bottles are soon found, only a few miles distant; others may drift for years. One was cast overboard off South Africa and picked up on the west coast of Chile, 8,800 miles away.

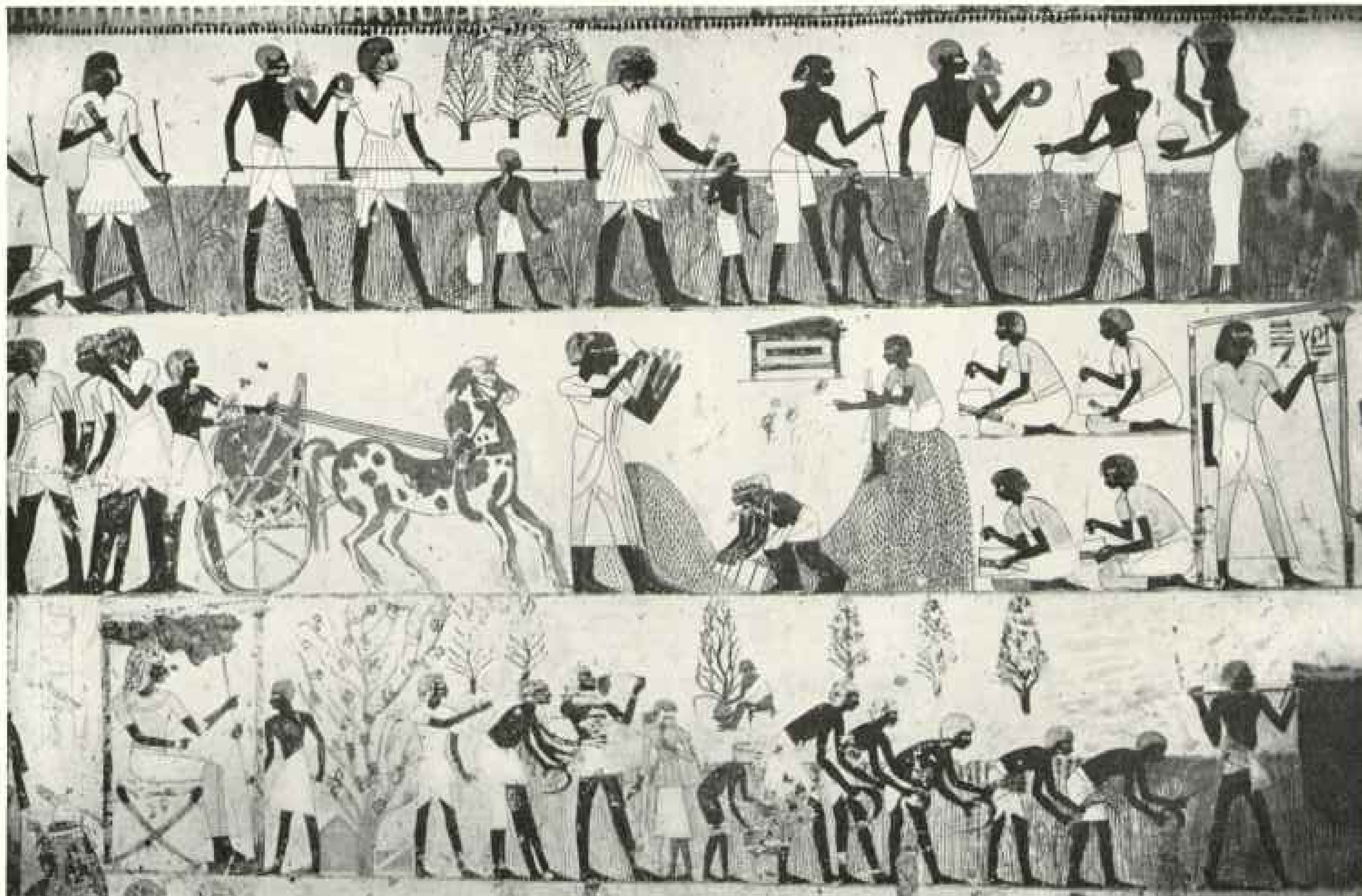
AIR MAPPING TAKES MINUTES WHERE GROUND SURVEYS REQUIRE MONTHS

The growth of air traffic along our coasts, through the West Indies and around Latin America, calls steadily for more and better maps.* Sets of air charts for these cruises are made by the Hydrographic Office. They show the pilot not only the coastal details, but also facts as to beacons, mileage, landing fields, fuel, and repair facilities.

In making engineering maps, coastal charts, and in city planning, air cameras are much used. From the air Washington was mapped in about two and one-half hours, and less than 200 exposures were used. Working on the ground and recording similar detail of buildings, monuments, trees, waterways, streets, parks, etc., would have taken months, maybe years.

In mapping flat areas, plains, marshes, deltas, etc., aërial photography has largely taken the place of ground surveys.

* See, also, "Skypaths Through Latin America," by Frederick Simpich, in the NATIONAL GEOGRAPHIC MAGAZINE for January, 1931.



Photograph by A. Gaddis and G. Seif

PICTURES ON THE TOMBS OF NOBLES AT THEBES SHOW EGYPTIAN SURVEYORS AT WORK

In the top panel, on the tomb of Menna, men measure a field of grain with a knotted rope, corresponding to a surveyor's chain. In the second panel Menna's chariot and servants await to carry him to the fields. In the lower row he sits under a canopy, while farm work proceeds about him. One girl appears to be taking a thorn from another's foot.

In its long career the National Geographic Society has printed for its members and distributed scores of millions of maps. In this December issue of its MAGAZINE it mails more maps than existed in the world when Columbus discovered America.

"The war had unrolled a map of the Union and hung it in every man's house," wrote Emerson during the Civil War.

So it was again in the World War, when all eyes were on the Western Front. To show its host of members in every continent and innumerable islands of the sea just where in Europe the mighty armies were locked in conflict, the National Geographic Society issued in 1918 its famous Map of the Western Theater of War.

Among its other interesting achievements have been the New Map of Europe, maps of each of the continents, the first map of George Washington's travels, etc. Each map was issued as a supplement to THE GEOGRAPHIC.

Coöperating closely with our Federal Government in many ways, The Society has furnished, upon request, maps to the State, War, Navy, and Post Office departments, especially of those areas where constant name changes make foreign places difficult to identify.

United States Army round-the-world flyers, Admiral Byrd on his dashes to the poles, the Citroën-Haardt Trans-Asiatic Expedition—all these and many more have carried maps made by The Society.

In addition to its large wall maps in color, The Society illustrates most of its NATIONAL GEOGRAPHIC MAGAZINE articles with sketch maps, which form valuable reference sources for geographic data on thousands of world areas.

A NEW WORLD MAP ON THE VAN DER GRINTEN PROJECTION

To the long list of The Society's maps already in use among schools, industries, governments, and in homes is now added the new Map of the World.*

Large enough to be read easily, yet not unwieldy, this 26 x 39-inch map can be conveniently held in the hands, or unfolded on a small table.

One of its outstanding features is the use of the Van der Grinten Projection. More than any other, this projection appears to minimize the distortions of scale which arise when the whole round world is mapped on one plane sheet.

Try to take the skin off an orange or the cover off a baseball and lay it flat; then you see why it is mathematically impossible to map any spherical surface exactly on a plane and yet keep a constant scale. Distortions are inevitable; but with the Van der Grinten Projection they are much reduced.

YEARS OF SURVEYS AND RESEARCH ARE REPRESENTED ON MODERN MAPS

The old Mercator Projection, though useful to navigators, makes no attempt to reduce scale variations. On it Greenland appears as large as South America, though hardly more than one-ninth as great. This exaggeration, by the Van der Grinten method, is cut about in half.

Hand lettering instead of type is also used on this new map. Greater clarity results, because in putting names on by hand the draftsman may use the size and shade of lettering desired to emphasize the relative importance and exact location of cities, mountains, rivers, etc.

Inset maps of the Arctic and Antarctic Regions carry the latest information from recent exploration of the polar areas.

Interesting facts as to forests, farm areas, deserts and regions of snow and ice are shown by colors on the inset map at the lower left. Warm and cold ocean currents, and their direction of flow, are indicated by arrows.

Color symbols, in the same way, are used on the inset in the lower-right corner to show the density of population in the various inhabited areas; here, also, arrows indicate the direction of prevailing winds, and the length of arrows shows the winds' constancy.

The Map of the World is based on two different drawings. The first, showing the cultural works of man, such as cities and railways, and such topographical features as mountains, is drawn in black. Reduced by photography, the negative is then transferred to a zinc plate by photo process, and from this plate the map's first impression is printed.

From a second drawing of exactly the same size, but showing drainage, or hydrography—rivers, lakes, coastlines, etc.—another similar zinc plate is made, and its

*Additional copies of The Map of the World may be obtained by members at 50 cents per copy, paper edition; $1.00 on map linen.

pattern now printed, in blue, on the first black, or culture map.

Three more trips through the press are made by the map to take on the tints, pink, yellow, light blue, and their combinations. This areal coloring identifies and differentiates the various nations, colonies, protectorates, and mandates.

More than 42 tons of special paper, made so as not to shrink or stretch, were used for the Map of the World. This paper is of a quality that can be folded and refolded many times without splitting.

To print it, more than 5,000,000 impressions were made, wherein the sheets traveled a total distance of more than 2,560 miles in passing through the presses. The printer's difficult task is to make each impression register accurately, so that town marks, rivers, boundaries, roads, etc., will stand in correct relation. Nearly two tons of special inks, ground and mixed in the lithographing plant, were used.

NAMES FOR HISTORIC PLACES CHANGED

Of course, no printing press now exists large enough to print a legible map of the world showing *all* its place names; hence the selection of names which may be crowded on a map of convenient size requires research by trained geographers. Likewise the ultimate value of the map in many respects depends on the geographer's judgment in choice of place names to be used.

On this new Map of the World, 4,831 names appear. About one-fourth of these have changed their spelling within the past few years, or are new names for hitherto unnamed map spots, as in the polar regions.

While towns, cities, and other map spots are usually static, their names often change. Since the World War, particularly in smaller countries, where nationalistic spirit is intense, familiar old names for many cities have yielded to strange new forms.

In Soviet Russia hardly a square inch of map but takes some new names for old. Long-familiar Nizhni Novgorod, for example, becomes "Maxim Gorki," and Ekaterinburg of Tsarist days masks itself under the new name of "Sverdlovsk."

To this World Map, in comparison with that The Society published in 1922, 521 new place names were added; the spelling of 1,226 place names was changed.

Recent explorations in the Arctic and Antarctic have changed some of the nomenclature in those regions, as well as coastlines.

South America, too, shows name changes here and there; one of its southernmost towns, long known as Punta Arenas, has become Magallanes.

National spellings for towns, rivers, etc., of each country are given preference, in most instances, but occasionally the forms most familiar to us are put in parentheses; for example, Lisboa (Lisbon), Warszawa (Warsaw), 's Gravenhage (The Hague), and Helsinki (Helsingfors).

The areas and frontiers of States and mandated territories are shown in color. The British Empire, for example, is also shown all in one color—red. Iraq, until recently a British mandate, now is mapped as an independent nation. The former Kingdom of the Hejaz and Nejd is given its new official title, Kingdom of Saudi Arabia.

Changes of sovereignty are shown, as in the case of Clipperton Island, off the west coast of Central America, which in 1931 passed by arbitration from Mexican to French possession. Regions of indefinite status or undetermined boundaries are likewise so indicated, such as Manchuria, Peru, Bolivia, etc.

NEW RAILWAYS LINK MANY AREAS

The advance of new railways into hitherto isolated regions is indicated on the new map. In North America, to reach Hudson Bay and James Bay, two new lines are shown in Canada. In Africa, in Portuguese Angola, appears the new Benguela line, completing link in the first steel to span that mighty continent. In Asia the newly completed "Turksib" has bridged the last gap in rail connections between the Trans-Siberian line and the railway system of Central Asia.

Such, in brief, are a few of the many hundreds of changes in our world map since that published by the National Geographic Society in December, 1922.

Your editors venture the prediction that, no matter how many times the reader examines this new world map, no matter how long he studies it, on every reëxamination he will discover something new. The student will repeatedly find in it a surprise, some fresh knowledge.

NATIONAL GEOGRAPHIC SOCIETY

GEOGRAPHIC ADMINISTRATION BUILDINGS

SIXTEENTH AND M STREETS NORTHWEST, WASHINGTON, D. C.

GILBERT GROSVENOR, President
JOHN OLIVER LA GORCE, Vice-President
O. P. AUSTIN, Secretary
GEO. W. HUTCHISON, Associate Secretary
JOHN JOY EDSON, Treasurer
HERBERT A. POOLE, Assistant Treasurer
FREDERICK V. COVILLE, Chairman Committee on Research

EXECUTIVE STAFF OF THE NATIONAL GEOGRAPHIC MAGAZINE

GILBERT GROSVENOR, EDITOR

JOHN OLIVER LA GORCE, Associate Editor

J. R. HILDEBRAND
Assistant Editor

FREDERICK SIMPICH
Assistant Editor

FRANKLIN L. FISHER
Chief Illustrations Division

MAYNARD OWEN WILLIAMS
Chief Foreign Editorial Staff

WILLIAM JOSEPH SHOWALTER
Chief Research Division

MELVILLE BELL GROSVENOR
Asst. Chief Illustrations Division

ALBERT H. BUMSTEAD
Chief Cartographer

CHARLES MARTIN
Chief Photographic Laboratory

BOARD OF TRUSTEES

JOHN JOY EDSON
Chairman of the Board, Washington Loan & Trust Company

DAVID FAIRCHILD
Special Agricultural Explorer, U. S. Department of Agriculture

C. HART MERRIAM
Member National Academy of Sciences

O. P. AUSTIN
Statistician

GEORGE R. PUTNAM
Commissioner U. S. Bureau of Lighthouses

THEODORE W. NOYES
Editor of The Evening Star

RAYMOND S. PATTON
Director U. S. Coast and Geodetic Survey

CHARLES EVANS HUGHES
Chief Justice of the United States

JOHN J. PERSHING
General of the Armies of the United States

GILBERT GROSVENOR
Editor of National Geographic Magazine

J. HOWARD GORE
Prof. Emeritus Mathematics, The George Washington University

FREDERICK V. COVILLE
Botanist, U. S. Department of Agriculture

GEORGE SHIRAS, 3D
Formerly Member U. S. Congress, Faunal Naturalist and Wild-Game Photographer

JOHN OLIVER LA GORCE
Associate Editor National Geographic Magazine

CALVIN COOLIDGE
Formerly President of the United States

CHARLES G. DAWES
Formerly Vice-President of the United States

JOHN BARTON PAYNE
Chairman American Red Cross

A. W. GREELY
Arctic Explorer, Major General U. S. Army

GEORGE OTIS SMITH
Chairman Federal Power Commission

O. H. TITTMANN
Formerly Superintendent U. S. Coast and Geodetic Survey

ROBERT V. FLEMING
President Riggs National Bank

ORGANIZED FOR "THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE"

TO carry out the purposes for which it was founded forty-four 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. Contributions should be accompanied by addressed return envelope and postage.

IMMEDIATELY after the terrific eruption of the world's largest crater, Mt. Katmai, in Alaska, a National Geographic Society expedition was sent to make observations of this remarkable phenomenon. Four expeditions have followed and the extraordinary scientific data resulting given to the world. In this vicinity an eighth wonder of the world was discovered and explored—"The Valley of Ten Thousand Smokes," a vast area of steaming, spouting fissures. As a result of The Society's discoveries this area has been created a National Monument by proclamation of the President of the United States.

AT an expense of over $50,000 The Society sent a notable series of expeditions into Peru to investigate the traces of the Inca race. Their discoveries form a large share of our knowledge of a civilization waning when Pizarro first set foot in Peru.

THE Society also had the honor of subscribing a substantial sum to the expedition of Admiral Peary, who discovered the North Pole, and contributed $55,000 to Admiral Byrd's Antarctic Expedition.

NOT long ago The Society granted $25,000, and in addition $75,000 was given by individual members to the Government when the congressional appropriation for the purpose was insufficient, and the finest of the giant sequoia trees of California were thereby saved for the American people.

THE Society's notable expeditions to New Mexico have pushed back the historic horizons of the Southwestern United States to a period nearly eight centuries before Columbus crossed the Atlantic. By dating the ruins of the vast communal dwellings in that region The Society's researches have solved secrets that have puzzled historians for three hundred years. The Society is sponsoring an ornithological survey of Venezuela.

TO further the study of solar radiation in relation to long range weather forecastings, The Society has appropriated $65,000 to enable the Smithsonian Institution to establish a station for six years on Mt. Brukkaros, in South West Africa.

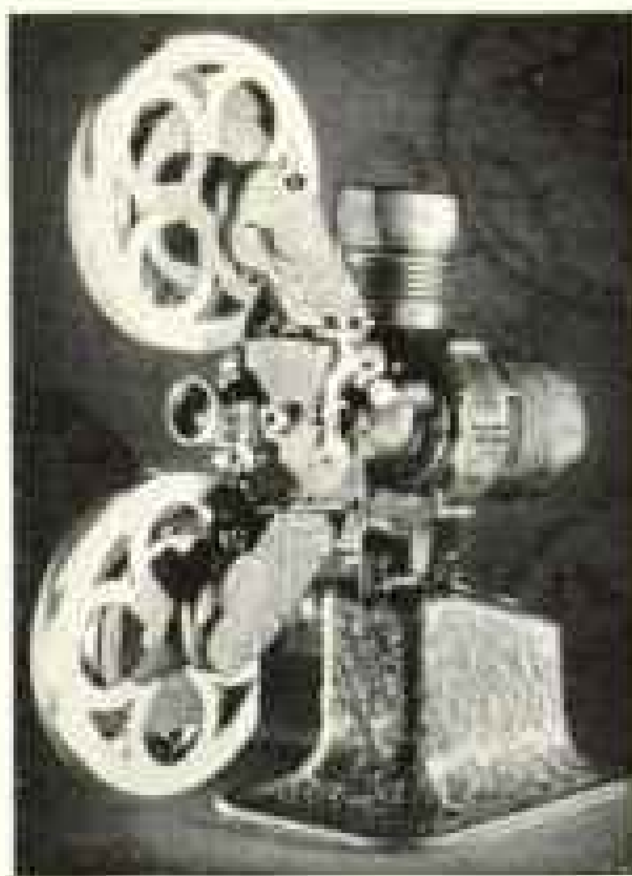
Copyright, 1932, by National Geographic Society, Washington, D. C. International copyright secured. All rights reserved. Quedan reservados todos los derechos. Printed in U. S. A. Entered at the Post Office at Washington, D. C., as Second-Class Mail Matter. Acceptance for mailing at special rate of postage provided for in Sec. 1103, Act of October 3, 1917, authorized July 1, 1918. Cover design and names registered in United States Patent Office. Marca Registrada.

"*What You See, You Get — With Filmo.*" The famous Filmo 70-D Camera — of startling simplicity in operation but versatile as any professional cameraman could wish. Three-lens turret, seven film speeds, variable viewfinder. In beautiful Sesamee-locked Mayfair case, $245 and up. Other Filmos $92 and up. Bell & Howell pays the Federal tax

Dad decided that only the finest would do

"Only once does baby learn to walk, only once will Junior have a sixth birthday, only once can we take movies of each trip, each vacation. The moment is too precious to lose. We must have the movie camera that's always dependable, and always able to catch the movie, whatever the photographic condition. That's why I decided on a Filmo."

Thus does Dad explain his choice of the family's Christmas gift. And it is a wise choice. Bell & Howell, maker of Filmo, years ago introduced personal movies, giving them the excellence and the versatility for which Bell & Howell professional movie making equipment is so famous. Go where you will, you'll find Filmo the choice of knowing movie-makers, sportsmen, explorers, statesmen and royalty. These people, who demand the best, logically select Filmo.



Filmo JL—The finest 16 mm. Projector you can buy. Powerful 400-watt illumination. Gear-driven, no belts. Power rewind. Many other features. With case, $298. Other models $155 up.

And you too can have a Filmo Camera and Projector this Christmas. Go to your dealer's today for a demonstration of their marvelous simplicity, their jewel-like precision, their obvious sturdiness and longevity. Or write direct to Bell & Howell for literature. Filmo Cameras and Projectors use Eastman 16 mm. Safety Film in the yellow box, obtainable anywhere, and are licensed by Eastman Kodak Company for taking and showing Kodacolor movies in full color.

BELL & HOWELL FILMO

Personal Movie Cameras and Projectors

BELL & HOWELL CO., 1804 Larchmont Ave., Chicago, Ill., New York, Hollywood, London (B & H Co., Ltd.) *Established 1907*

BELL & HOWELL CO., 1804 Larchmont Ave., Chicago, Ill.

Gentlemen: Please send me booklet "What You See, You Get" and complete information on Filmo Personal Movie Cameras and Projectors.

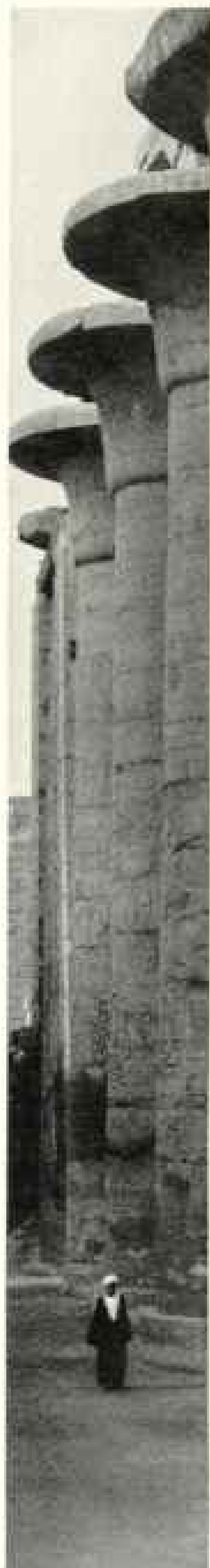
Name ____________________

Address ____________________

City ____________ *State* ________

PROFESSIONAL RESULTS WITH AMATEUR EASE

MEDITERRANEAN CRUISE



EMPRESS OF AUSTRALIA

Spacious and distinguished cruise favorite

FROM NEW YORK JAN. 31

69 DAYS
25 PORTS

● New idea in cruising: pay-as-you-go for just-what-you-want 'round the whole Mediterranean.

$550 (UP) FIRST CLASS for ship cruise, shore excursions optional.

$855 (UP) FIRST CLASS for complete standard ship-and-shore program.

$300 (UP) TOURIST CLASS for ship cruise, shore trips optional.

$510 (UP) TOURIST CLASS for complete standard ship-and-shore program.

SHORE EXCURSIONS

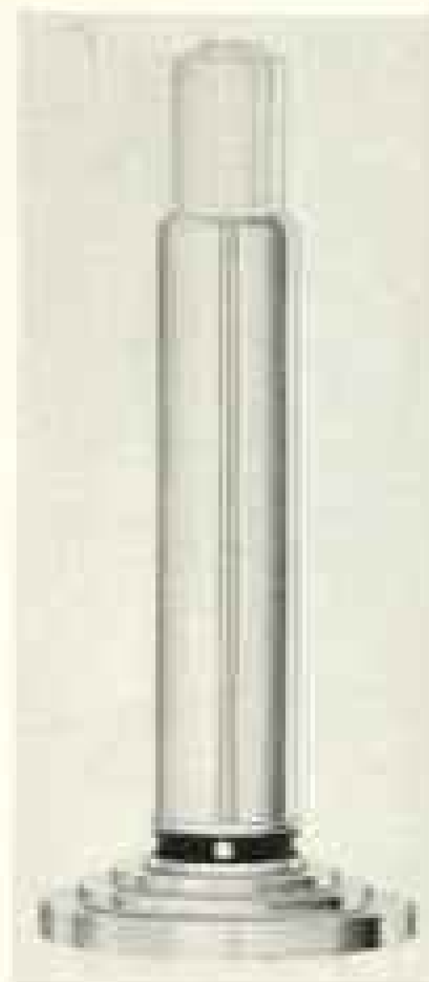
3 options: (1) Buy shore excursions ashore or from ship's purser, when and as you please. (2) Complete standard shore program, all First Class, $305. (3) Complete standard shore program, Tourist Class, $210.

25 PORTS . . . the entire Mediterranean, from the smart western end to the historic eastern end.

● Study the different rates, options. See deck plan, itinerary. Your own agent, or any Canadian Pacific office in New York, Boston, Chicago, Philadelphia, Montreal and 30 other cities in U. S. and Canada.

CANADIAN PACIFIC

Two gifts that ring the Christmas Bell



BEAUTIFUL, useful gifts! The Eveready Electric Candle lights when you pick it up. Goes out when you put it down. Also a steady light, if you want it. Easily found in the dark, by the little radium dots. (Powered by two Eveready batteries.) The Eveready Candle is perfect for night-tables, nurseries, telephone-stands, and a score or more of places. Only $1.55, without batteries.

The Eveready Pocket Light. Fascinating in its operation! You press the button, and the entire lens slides forward—fully illuminated! This new Eveready light is the exact size for a man's vest-pocket or lady's handbag. Beautifully finished in shiny nickel and buffed French enamels in red and black — only 85¢, without battery. Both lights sold at all leading stores.

The longest-lasting batteries that modern science can make — Evereadys! Only 10¢.

EVEREADY

WIRELESS-ELECTRIC LIGHT

NATIONAL CARBON COMPANY, INC.
General Offices: New York, N. Y.

RAE-84
A new, 12-tube Bi-Acoustic Automatic Combination Radio-Phonograph.

"For 30 years I've heard world-famous artists

Now the past's great music and today's comes to you with new tone beauty . . . on records and on the air . . . through Bi-Acoustic Radio-Phonograph magic!"

"My boss, the RCA Victor Company, has a new musical instrument that is one hundred per cent real orchestra, real voice!

"I'll tell you why. It's because of Bi-Acoustic magic. In radio you hear programs with two more octaves of music. Every instrument, from a violin to a bass horn, comes in richer, fuller . . . You hear instruments you've only half heard before!

"Then listen to your favorite Victor records. You'll get new rich beauty, new tone quality from them. And automatic record changing helps your pleasure even more . . . for you can play *ten* records at a time!

"And say—on this wonderful instrument you can make Phonograph records at home . . . priceless mementos of loved ones . . . or an amusing record of your next party.

"Nine new improvements . . . each a real feature . . . ranging from new tubes to a new speaker, give you this unsurpassed Bi-Acoustic music . . . with its 266 extra musical tones . . . the kind of music you want when you want it!

"Hear one of these new radio-phonographs. It's called model RAE-84. Drop in any RCA Victor dealer's store."

* * *

Here's a great Christmas gift for children—"Winnie-the-Pooh Songs"—Milne's popular child poems put to music. Three beautiful, indestructible picture-records in six brilliant colors. Handsome album . . . $2.00

The RCA Victor Co., Inc.
Camden, N. J.
"RADIO HEADQUARTERS"
A Radio Corporation of America Subsidiary

RCA Victor *Bi-Acoustic* Tone

2 MORE OCTAVES

RCA VICTOR RADIOS AND PHONOGRAPH COMBINATIONS, $48.75 TO $310.00

Who says so? Stand in the paddock and watch the crowds at Belmont, Arlington or Churchill Downs. Look around you on Wall Street, where successful men dress the part. Mingle with the students at Princeton and Yale. Everywhere you see *chains,* and in particular the new BIG Chain—a style note which harks back to the days of the old-time "topper". Simmons, creators of watch chain styles for over 60 years, offer strikingly handsome models in the new BIG Chain. See them at your jeweler's and if you're wondering what to give the *men* on your Christmas List remember *watch chains* are in style again—and the Big Chain is Back.

R. F. SIMMONS CO., Attleboro, Mass.

Chain shown is No. 28735 Yellow, Gold Filled Waldemar in the "Boston" Link $9.50

The Swivel says it's a Simmons

A TRIP ABROAD

en route to

CALIFORNIA

or **NEW YORK**

via Panama Canal

● **Sail with the splendid new Santa Rosa, Santa Paula, Santa Lucia or Santa Elena! Go ashore—on your way—in sunny Havana, Colombia* (Eastbound*) Panama, Costa Rica, El Salvador, Guatemala and Mexico! Join Grace-conducted inland excursions through miles of tropic grandeur . . . tea and dance to a marimba orchestra in a Spanish patio! All within 16 days . . . New York to California!**

For as little as $325 you can enjoy the complete rail-water "'Round America" cruise-tour *including* rail fare from your home to either coast, Grace Line to the opposite coast, and return home again by rail. Fortnightly sailings from New York, San Francisco, Los Angeles; also to and from Victoria, B. C., and Seattle, Wash.

• **4 NEW LINERS** •
for greater speed & pleasure

First American ships having *all outside staterooms with private baths.* Single rooms. Double rooms. De luxe suites. Controlled ventilation and temperature. Largest outdoor tiled swimming pool on any American ship. Gay Club and smart Orchestra. 20 knots speed . . . and three-quarters of a century of Grace prestige!

Book for one of these gala *maiden voyages:* Santa Rosa from San Francisco December 26; Santa Paula from New York January 7. Write NOW for full information.

New York: 10 Hanover Sq.; San Francisco: 2 Pine St.; Chicago: 230 N. Michigan Ave.; Los Angeles: 548 So. Spring St.; Seattle: Hoge Bldg.; also Boston and New Orleans

Give Waterman's *the Pen with the Perfect Point*

A gift of rare beauty . . . a gift of daily usefulness . . . a gift of known quality . . . these mean one thing . . . Waterman's. And no matter whether your Christmas budget calls for modest or generous expenditure, you can be sure of getting in a Waterman's the utmost in value. Below are a few gift suggestions. *Your dealer will show you the complete Waterman's line.*

Just as there is a Waterman's Pen to fit every purse, there is a Waterman's point to suit every style of handwriting. And the well-known superiority of the Waterman's point is assurance of years of perfect writing performance. There is only one thing that is better than giving a Waterman's at Christmas . . . *and that is receiving a Waterman's!*

Waterman's

PENS · · · PENCILS · · · INKS

What the Microscope Shows

Other Make No. 1—Right point longer and narrower than left; sharp inner points on tips.

Other Make No. 2—One point flatter than other; tips not symmetrical; thin, pitted iridium.

Other Make No. 3—Jagged ink channel; irregular tips; flat sides end in ridges on writing surface.

Waterman's—Note symmetry of points, roundness of tips, smoothness of writing surface.

Waterman's Pens $2.75 *to* $10.00

Pencils to match $1.00 *to* $5.00

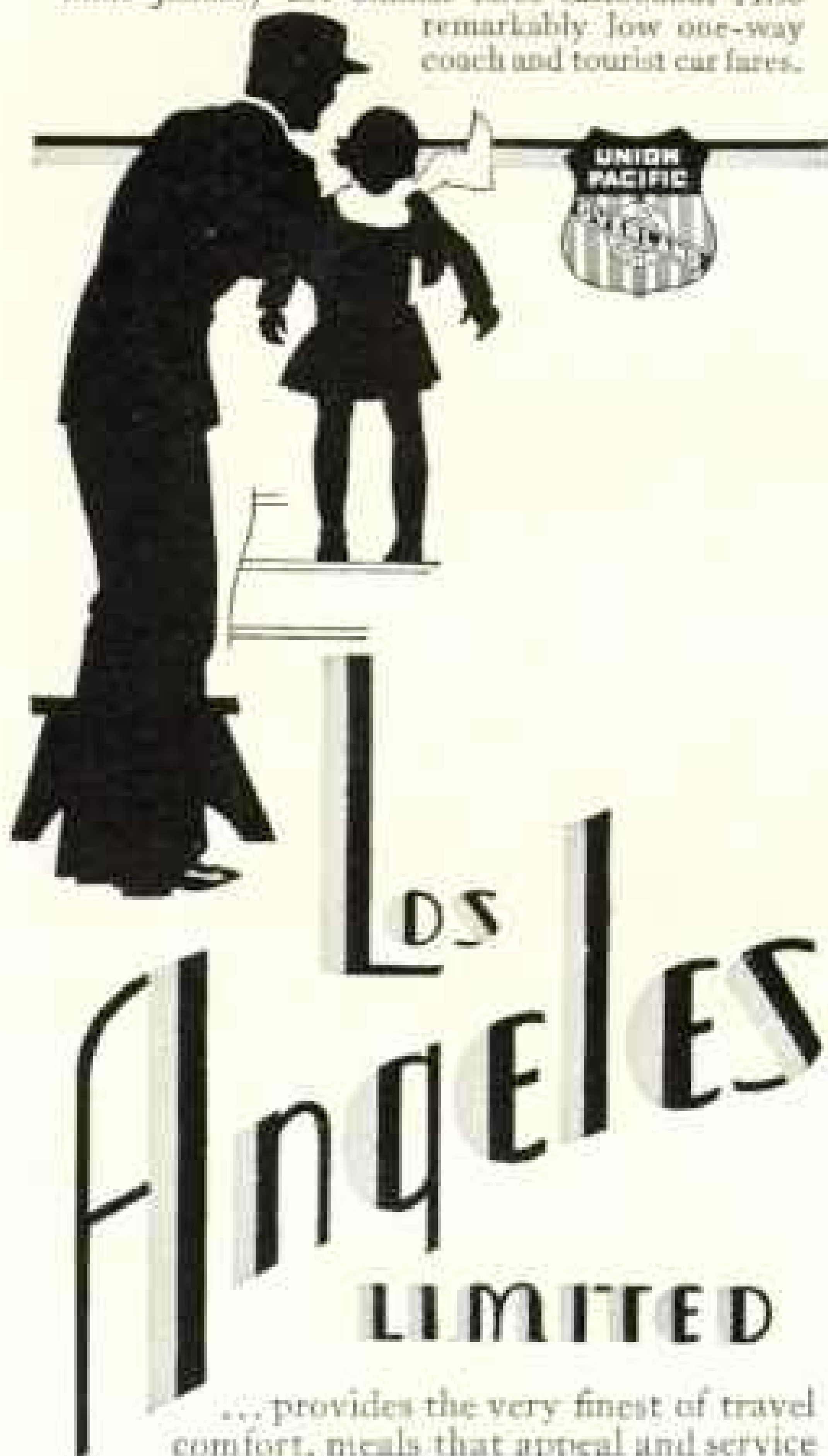
SOLD IN SETS OR SEPARATELY

L. E. Waterman Co.
New York City

Chicago, Boston,
San Francisco, Montreal

REDUCED FARES *to California or the Pacific Northwest*

Round trip tickets for only 1⅓ the regular one-way fare. On sale daily until December 22. Return limit January 25. Similar fares eastbound. Also remarkably low one-way coach and tourist car fares.



Los Angeles LIMITED

... provides the very finest of travel comfort, meals that appeal and service that satisfies. Air-conditioned dining cars. Bath, barber, maid, manicure and valet service. Excellent service to and from California also on the San Francisco Overland Limited and other fine Union Pacific trains.

W. S. Basinger, Passenger Traffic Manager
Room 333, Union Pacific System, Omaha, Nebr.

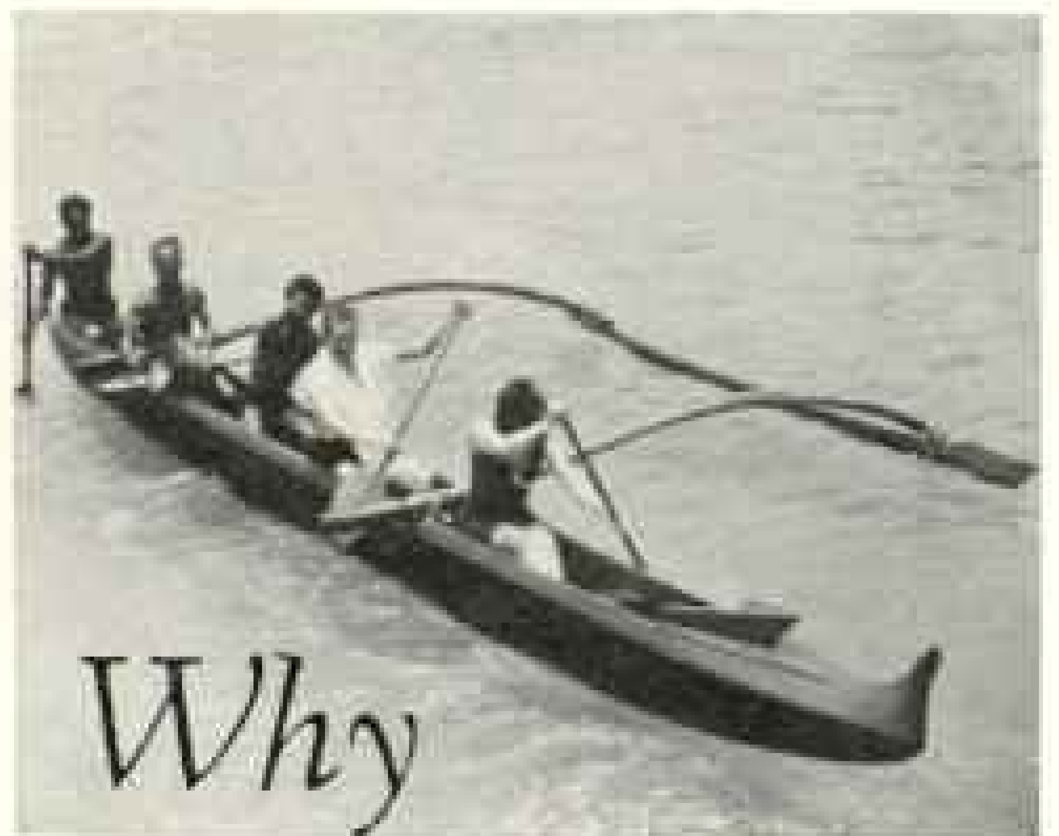
Please send me information about fares to

....

Name .... Street ....

City .... State ....

UNION PACIFIC



Why 20,000 people *missed their boats!*

You don't want to keep sailing dates in Hawaii. Waikiki's clock is easily forgotten. It doesn't seem important. You try to recall those troublesome affairs you should be going home to worry about. Oh well—there'll be another ship . . . how do the old timers say "later"? . . . *mahope!*

Another swim, another saunter along the hibiscus trail. Let's take a boat to Kona tomorrow and troll for swordfish at Napoopoo. Let's fly over to Maui or have an afternoon at Hanalei beach on Kauai. One more night under the coco palms, the moon making rainbows against the mountains—the sea whispering of nights drifting by and other nights to come.

Let Hawaii's tropic sunshine, its balmy fragrant breezes wash old gritty trouble out of your mind. From the moment your ship swings into Honolulu harbor and hospitable Hawaii greets you with her fragrant flower leis of friendship you become a new person.

Golf in tropical settings; swim in water warmer than the air; hunt, fish, ride, hike, explore, join in happy "luaus" (native feasts). And rest . . . Where you can't even remember what you came to forget.

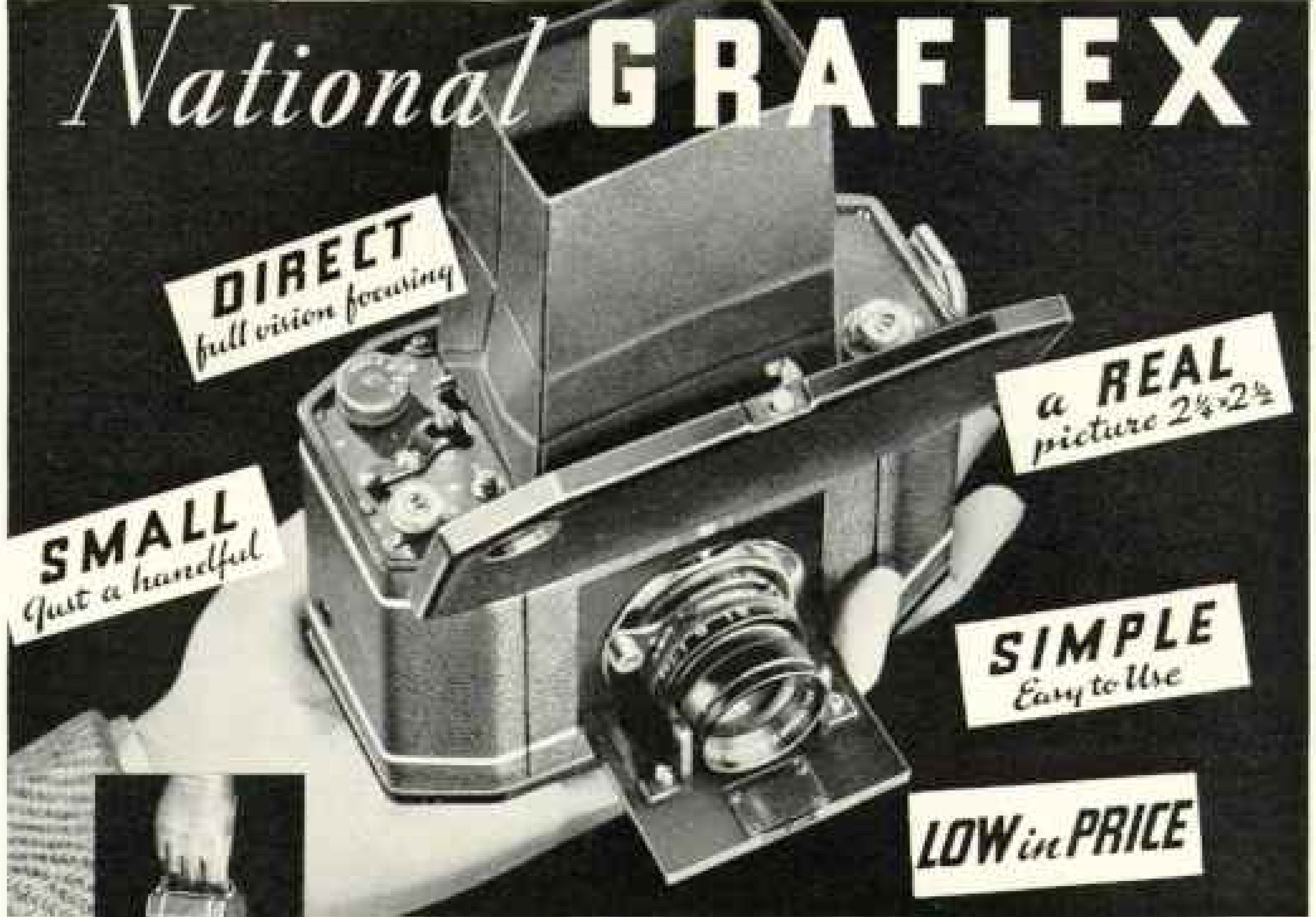
$275 **or less,** can well cover the expense of an 18-day round trip from the Pacific Coast. Allows first-class accommodations, a good hotel or cottage, meals and sightseeing.

HAWAII

HAWAII TOURIST BUREAU
(HONOLULU, HAWAII, U. S. A.)
1523 Russ Bldg., San Francisco

The Hawaii Tourist Bureau will, on request, mail you FREE, authoritative information about the Islands. For a special booklet on Hawaii, illustrated in full color, send ten cents to defray cost of handling.

now... for Everyone... the NEW



With the famous GRAFLEX FEATURES

YOURS! . . . Every thrill of GRAFLEX photography . . with this new, amazing *National* GRAFLEX that now eliminates *Picture Taking Guesswork!*

- Direct, Full Vision Focusing . . . *through the lens that takes the picture* . . . sharp, exact . . . up to instant of exposure. Focusing guesswork eliminated!
- Clear, *Full-size view* . . with true illumination values . . . enables you to get the arrangement, effect and picture you want. Composition guesswork eliminated!
- Exclusive GRAFLEX *Exposure Guide* . . . on the camera, right before you . . . shows correct shutter speed and lens setting for all conditions. Exposure guesswork eliminated!

National GRAFLEX . . with celebrated TESSAR SERIES IC *f*.3.5 lens . . . now gives everyone GRAFLEX ground glass focusing, GRAFLEX focal plane shutter action, GRAFLEX lifelong precision construction, GRAFLEX assurance of better pictures.

Economical, too . . . *National* GRAFLEX gets TEN pictures 2¼ x 2½ from inexpensive No. 120 eight-exposure roll film . . real contact print pictures . . superior enlargements.

Learn *National* GRAFLEX scope, convenience and beauty first-hand . . . at your Dealer's . . . today! It is the latest addition to the Famous GRAFLEX Family.

Just in Time for Christmas!

National GRAFLEX Facts:

Only 5 5/8 x 3 9/16 x 2 9/16 inches. Light, compact, simple, quick, easy to use. Opens instantly.
Guesswork Eliminated:
Through Direct, Full Vision Focusing on Ground Glass.
Through Clear, Full-Size View.
Through Exclusive GRAFLEX Exposure Guide on the Camera.
Famous Focal Plane Shutter.
TESSAR Series IC *f*. 3.5 lens.
10 Pictures — 2 1/4 x 2 1/2 from No. 120 eight-exposure roll film.
Real contact prints . . sharp, superior enlargements.
Self-centering film winding feature with indicating dial.
Beautiful appearance, sturdy construction. Concealed controls, smooth exterior. Convenient to carry, no case needed.
Low price makes it available to every GRAFLEX *enthusiast . . . to you who have always wanted a* GRAFLEX *. . . to all desiring better pictures.*

Ask for National GRAFLEX *folder and a free copy of* "SEE AMERICA," *a wonderful modern photographic story of our United States.*

FOLMER GRAFLEX CORP., ROCHESTER, N. Y.

Send me National GRAFLEX folder and FREE copy of "SEE AMERICA."

Name ______________________

Address ______________________

City ______________ *State* ______________

Gifts for Men ..Correct..Smart

Get out that Christmas List. Check off the men you want to *particularly please.* Make a note of "Krementz Evening Jewelry" for *them. There's* a smart gift, an intimate gift, and a memorable one. At fashionable dealers everywhere. Booklet with Correct Dress Chart upon request.

KREMENTZ & CO.
Newark, N. J.

Illustrated above, "Black Knight," a handsome Dress set for wear with the Dinner Coat. In attractive gift box $7.50. Correct Sets for Full Dress wear $7.50 to $17.50. Also "Business" and "Sports" Jewelry.

KREMENTZ
GIFT *Jewelry*

Winter sunshine! In the land of the orange, oleander and cactus giant! Desert charm! Seashore delights! For you!

Go via *de luxe*

GOLDEN STATE LIMITED

Rock Island-Southern Pacific

No extra fare

to

ARIZONA CALIFORNIA

The Train That Challenges Comparison

"Best service yet!"—"Hours quicker to Phoenix!"—"Low altitude comfort to San Diego, Coronado, Los Angeles and Santa Barbara!"—these are the comments you'll hear in Observation, Club, Through Sleeping Cars and air-conditioned Diner. Only 61 hours Chicago-Los Angeles.

Morning and evening trains from Chicago.

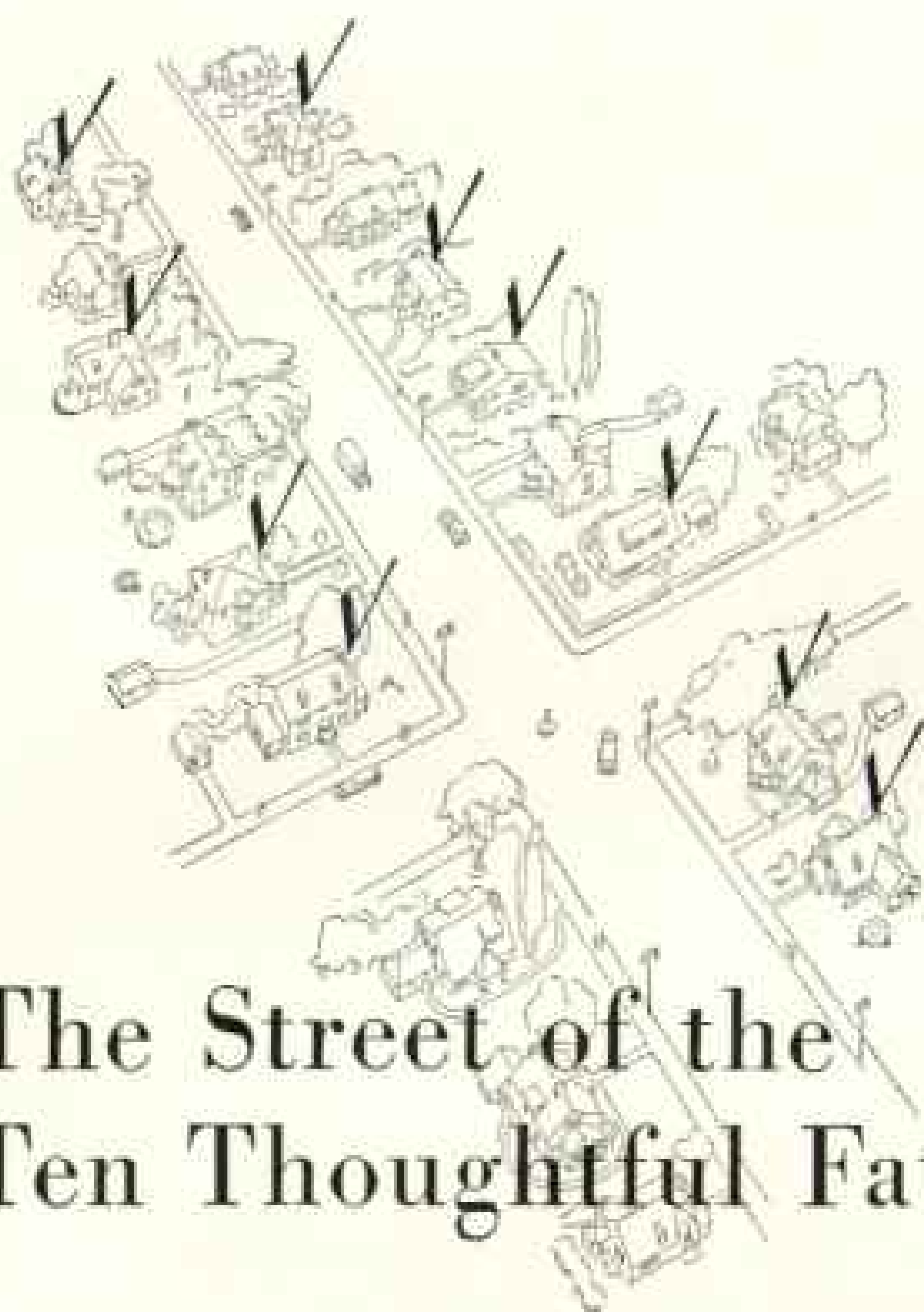
Stopover at Excelsior Springs, Mo.—a main line point.

For further information, write

L. M. ALLEN
Vice Pres. and Pass'r Traffic Mgr.
Rock Island Lines
713 La Salle St. Station
Chicago, Ill.

1204

ROCK ISLAND
THE ROAD OF UNUSUAL SERVICE



The Street of the Ten Thoughtful Fathers...

The best advertisement for life insurance was never written . . . It was *lived* (and is still being lived) on a quiet, tree-lined street of a small Pennsylvania city.

Ten of the many beautiful homes on this street are occupied by widowed mothers and their children. The running expenses for these ten homes are cared for by Equitable monthly checks. Had it not been for the farsighted devotion of ten husbands and the services of The Equitable, these families would not be able to remain in such comfortable homes, or to maintain their accustomed standards of living.

These ten families constitute a ten-fold demonstration of the wisdom of adequate insurance protection. They should cause every husband and every father to pause and ask himself: "Would *my* family be so fortunately situated?" The Equitable's Family Income Plan is providing for thousands of families similar to the ten above.

Investigate this plan. It offers double protection — it protects your family and protects *you* — for it may also be used to provide a retirement income for your own future days of leisure.

THE EQUITABLE

FAIR — JUST

LIFE ASSURANCE

SECURITY — PEACE OF MIND

SOCIETY

MUTUAL — COOPERATIVE

OF THE U.S.

NATION-WIDE SERVICE

The EQUITABLE Life Assurance Society of the United States, Thomas I. Parkinson, *President*
393 Seventh Avenue, New York, N. Y.

Please send me information about The Equitable family income plan. 31 G

NAME .... AGE ....

ADDRESS ....

HAWAII . . *FAR AWAY? EXPENSIVE?* . . *not with these* **FAST SHIPS** *and* **LOW FARES**

▪

Stateroom comfort blended with an artist's touch . . . on the famous Matson-Oceanic liners 'Mariposa,' 'Monterey,' 'Malolo.' Meals a world-famous restaurant would vaunt . . . social life that begins in the wide open spaces on deck and ripples through sumptuous public rooms.

Total the on-shore cost of a parallel regime. Compare with the cost of a ticket to Hawaii that *includes all this.* Reason enough for voyaging to these South Sea Isles.

▪ ▪ *Fast Through Service* to NEW ZEALAND and AUSTRALIA via Hawaii, Samoa and Fiji. A new world of travel lure. Extremely moderate First Class and Cabin Class Fares.

NEW YORK to CALIFORNIA Maiden Voyage of the S. S. Lurline, sailing from New York Jan. 12... gala voyage of 1933.

Details at any travel agency or . . . .

MATSON LINE • OCEANIC LINE

New York • Chicago • San Francisco
Los Angeles • Seattle • Portland

Never neglect ankle injuries. Always pat on Sloan's as soon as possible.

SWOLLEN ANKLE

—bruises, sprains

Injuries to ankles and leg tendons can become serious if neglected. In every case, pat on Sloan's as soon as possible. It rushes fresh blood to the injured spot instantly, relieves the pain, keeps swelling down. At the same time, healing white blood cells mend broken tissues and prevent complications . . . Always keep a bottle of Sloan's handy—at home and in camp. Costs only 35¢ at all drug stores.

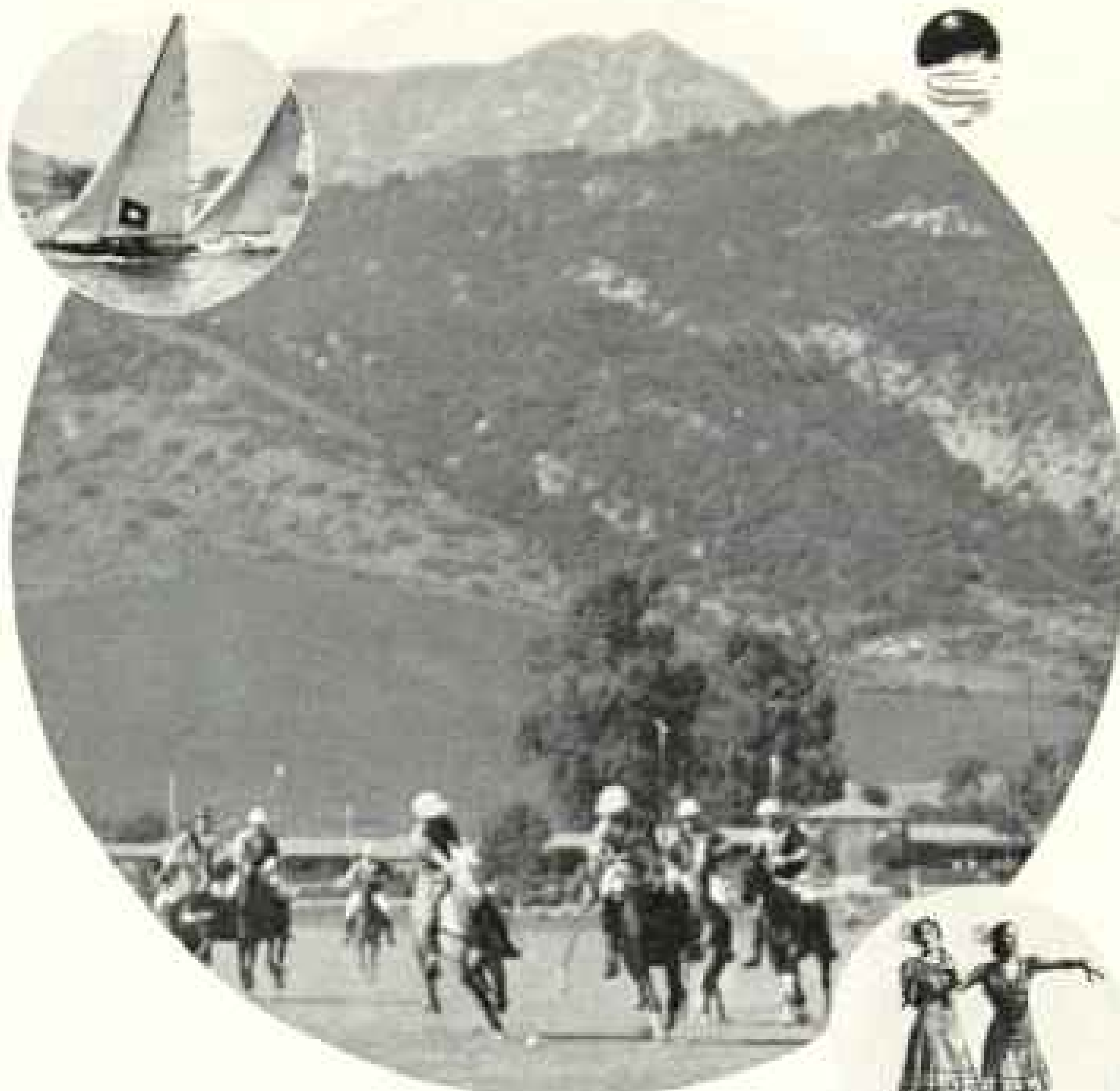
SLOAN'S LINIMENT

Have some *fun* this winter

BREAK AWAY! Life's not meant for work and worry alone. Give yourself this unforgettable vacation, now, when you *need* it.

It's *easy* to do. Southern California—land of sunshine, laughter and play — is only 2½ days from most of America. Here you escape "peak prices" necessary in one-season resorts. Costs, normally about 16% under the U. S. average, are lower than ever now. And no where else are there so *many* ways to have a good time!

Here are sun-drenched beaches, mighty forested mountains, the mystery and peace of the desert. Pleasure islands, race tracks, Hollywood's gay night life, ancient Missions the Spanish padres built, orange groves, palm-lined boulevards, luxuriant gardens, Old Mexico, every sport. Close to big, cosmopolitan Los Angeles are colorful cities and resorts like Santa Monica, Pasadena, Beverly Hills, Long Beach, Pomona, Glendale . . . scores of others. Make it yours *now!*



Sports, new experiences, foreign-land glamour make each day here a new adventure.

FREE Vacation Book

To help you plan, we offer *free* one of the most complete vacation books ever published . . . just off the press . . . 72 pages, 150 interesting gravure photographs, map, information about routes, itemized costs and day-by-day details of everything to do and see here. Send coupon today for your free copy. Or for further unbiased, authoritative information, write us your own questions about a Southern California vacation.

Come to California for a glorious vacation. Advise anyone not to come here seeking employment, lest he be disappointed; but for the tourist, the attractions are unlimited.

All-Year Club of Southern California, Ltd.,
Dept. 12-Q, 1151 So. Broadway,
Los Angeles, Calif.

Send me *free* illustrated book giving complete details (including costs) of a Southern California vacation. Also send *free* booklets about the counties I have checked.

- ☐ Los Angeles
- ☐ Kern
- ☐ Orange
- ☐ Riverside
- ☐ Santa Barbara
- ☐ San Diego

Name ______________________

Street ______________________

City ______________________

State ______________________

(Please Print Your Name and Address)

This Winter COSTS ARE LOWER THAN EVER IN

SOUTHERN CALIFORNIA

BERMUDA $60 ROUND TRIP

Twice weekly sailings on *S. S. Pan America* or her sister-ships. All airy, outside rooms equipped mostly with beds and private bath. **5 days all expenses, including hotel at Bermuda $66; 7 days $78.**

NASSAU • MIAMI • HAVANA

CRUISES 12½ days . . . at less than $10 per day

Weekly sailings from New York on *S. S. Munargo* and alternate steamers. The steamer is your hotel. 3 days at Nassau, 2 days at Miami, 2½ days in beautiful Havana, or take the steamer round trip to Nassau only and stay 7 days at the *Royal Victoria Hotel* at greatly reduced all expense rates.

WEST INDIES & SOUTH AMERICA

14 days $125 . . . 25 days $150

Fortnightly sailings to Trinidad with calls at 12 islands, 14 days $125, or you can stay on the ship and make the 25-day round trip to Demerara, $150 all expenses. No passport needed.

SOUTH AMERICA Fortnightly sailings to Rio de Janeiro, Santos, Montevideo, Buenos Aires. All rooms are large, airy and outside.

All sailings from pier 64 N. R., New York

Special arrangements available for large parties or Conventions. For further information see Local Tourist Agent or

MUNSON Steamship Lines 67 Wall Street, New York, N.Y.

FOLLOW THE SUMMER to PHOENIX ARIZONA

CLIMATE

Warm, rich sunshine, cloudless blue skies, outdoor life every day in this delightful, dry, semi-tropical climate.

ROMANCE

Colorful desert - palms -- flowers -- orange trees -- scenic wonderland over paved highways -- Indian villages -- Spanish Missions -- the "land of the last frontier."

SPORTS

Golf at its best, swimming and tennis, desert picnics, fast polo, riding and motoring -- something to do every minute.

ECONOMY

Phoenix--the progressive, fast-growing city--state capital and center of business and social life. Here you will find moderate living costs and accommodations to fit the budget of all classes.

WRITE DEPT. 5 FOR A BEAUTIFUL BOOKLET

PHOENIX CHAMBER OF COMMERCE
PHOENIX, ARIZONA

NAME ____________________

ADDRESS ____________________

Here you are . . in the heart of

the Vieux Carré NEW ORLEANS

You are beside the Place d'Armes; Bienville planned it two centuries ago. The Cathedral watches over the quiet square. And the Pontalba Buildings, with lacy balconies, whisper of Creole courtships. The charm of the Vieux Carré (French Quarter) is undimmed by mortal worries or the modern city's haste. This is your thrifty trip abroad. ¶And New Orleans fairways are green always. Thoroughbreds are racing, chefs are working wonders. Write, or call when you arrive; we'll help make your visit enjoyable.

New Orleans Association of Commerce
311 Camp Street New Orleans

MARDI GRAS - FEBRUARY 23 TO 28 - COME!

Holiday Cruises to Havana

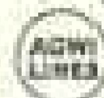
SAIL on the "Morro Castle" or "Oriente"—newest, finest and fastest ships in exclusive Havana service. Ship your hotel on 6½-Day Cruises. Room, bath and meals in fine Havana hotel on ten or fourteen day trips. Sightseeing included in all trips.

6½-DAYS—$65 Minimum. 2 days 1 night in Havana. Leave New York Dec. 20 "Oriente." Return Dec. 27. Leave New York Dec. 24 "Morro Castle." Return Dec. 31. Leave New York Dec. 27 "Oriente". Return Jan. 3. Same steamer both ways.

10-DAYS—$95 Minimum. 5 days 4 nights in Havana, leave New York Dec. 24 on "Morro Castle." Return Jan. 3 "Oriente."

14-DAYS—$115 Minimum. 9 days 8 nights in Havana, leave New York "Oriente" Dec. 20. Return Jan. 3 "Oriente."

Apply Gen. Passenger Dept., Pier 13, E. R., ft. of Wall St. 545 Fifth Ave. New York City or any Authorized Tourist Agent



WARD LINE

Where can you get so much Good Writing Paper FOR SO LITTLE MONEY

300 Note Sheets *Formerly* **200**
150 Envelopes . *Formerly* **100**
450 Pieces . . . *Formerly* **300**

All Printed with your Name and Address

$1.00 POSTPAID

THE ordinary box of stationery contains 24 sheets and 24 envelopes. The "450" Package contains ***300 sheets and 150 envelopes!***

Cheap paper? Not a bit of it. ***Finer paper is used in the "450" Package than in many boxes of high priced social stationery!***

And each sheet and envelope is neatly printed with your name and address—the smart and logical way to have your stationery finished. It is convenient—protects your letters from loss in the mails—helps business houses get your name accurately and lends a neat distinction to your notes.

Two million people can't be wrong—and two million people have sent to Peru, Indiana, for American Printed Stationery!

Try it. It's the same style note paper we have sold for 18 years—same printed name and address—same correct size, 6 x 7—same price. ***But the quantity is now 50% greater!***

Send one dollar—check, bill or money order ($1.10 west of Denver and outside of U. S.). Your package will be printed and mailed within 3 days of the receipt of your order. Sold by mail only. No agents or dealers. Absolute satisfaction guaranteed or your money promptly refunded.

AS CHRISTMAS GIFTS. Being printed with the recipient's name and address, American Stationery makes a distinctly personal gift—and a most pleasing one. Simple, neat, fine quality, in good taste—and inexpensive. Make up your Christmas list at once. All orders printed and mailed within 3 days of receipt of instructions.

THE AMERICAN STATIONERY COMPANY, 300 PARK AVE., PERU, INDIANA
Originator and World's Largest Manufacturer of Printed Note Paper
Here is $1.00 for a box of "450" Stationery to be printed as shown below. ($1.10 west of Denver and outside of U. S.)

Name ______________________________

Address ______________________________

____

OVER 2,000,000 CUSTOMERS — ALL OVER THE WORLD

Plan now your trip to OREGON

● See Oregon in 1933! Nature's handiwork here will thrill you. Magnificent mountain ranges, fertile valleys, verdant hills combine to make ever-changing vistas of rare scenic charm. Three distinct and mild climates, each one free from the extremes of heat and cold. Thousands of miles of improved highways, including the new Oregon Coast Highway paralleling Oregon's nearly 400 miles of superb ocean front. Throughout Oregon you will enjoy modern, comfortable accommodations, delightful surroundings, true western hospitality.

Ask for booklet "118 Interesting Things to See and Do in Oregon." Address On-to-Oregon, Inc., 1411-B Public Service Building, Portland, Oregon.

"On to Oregon!"

The cry of the pioneers is again ringing through the land. Oregon is calling you! Plan now to see this rich, growing country, so full of opportunity. Enjoy the most wonderful vacation of your life while considering Oregon as a better place to live, to work, to play.

The Treasured Gift

WEBSTER'S COLLEGIATE

The Best Abridged Dictionary

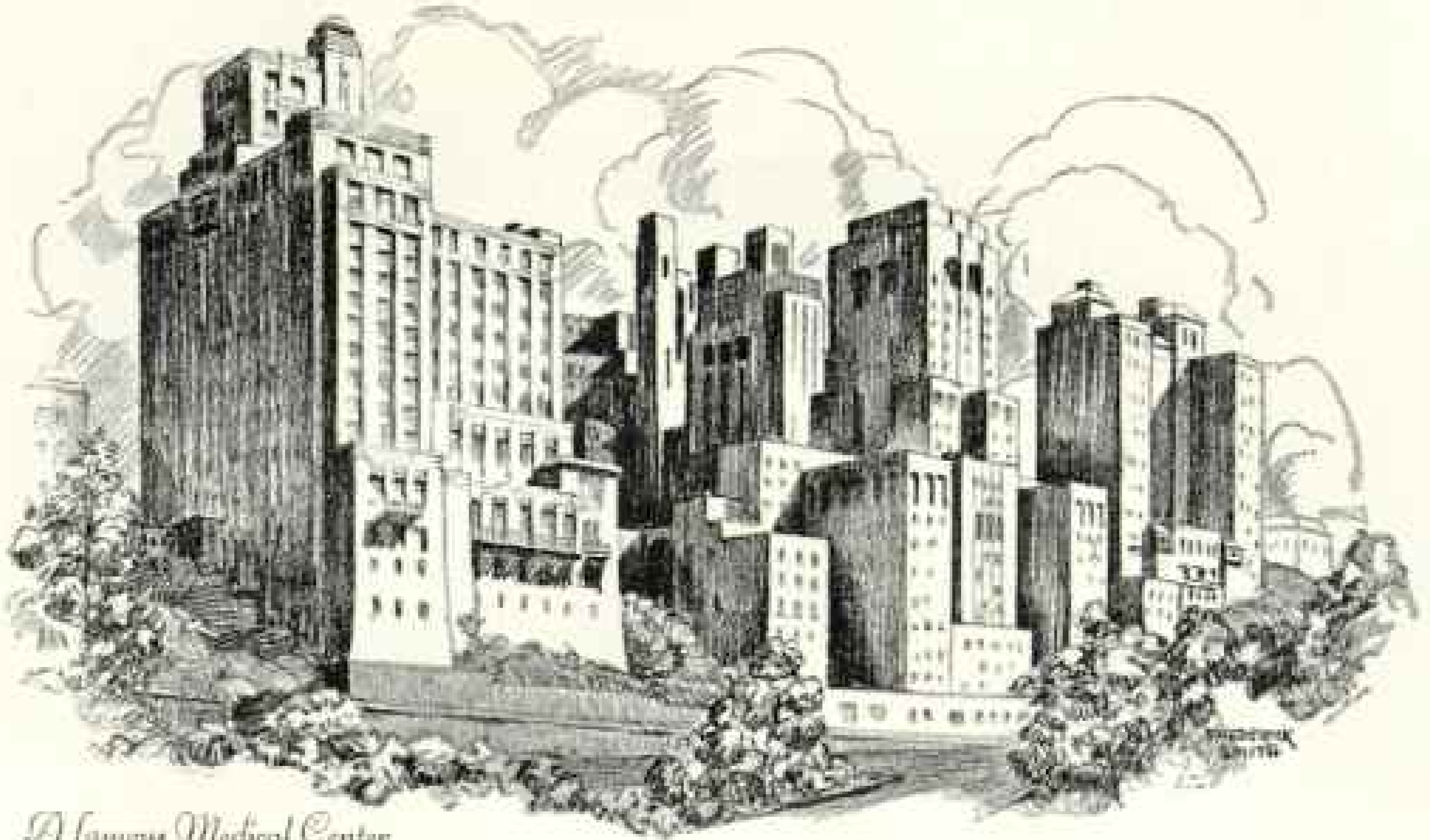
New Fourth Edition—best because it is based upon the "Supreme Authority" Webster's New International Dictionary; 106,000 entries; many helpful sections; 1,268 pages; 1,700 illustrations.

New Low Prices—Thin-Paper Edition, Cloth, $3.50; Fabrikoid, $5.00; Leather, $7.00.

Get the Best—Purchase of your bookseller or send order and remittance direct to us; or write for information. Free specimen pages if you mention this paper.

G. & C. MERRIAM COMPANY
152 Broadway Springfield, Mass.

A Fortress of Health



A famous Medical Center in New York City

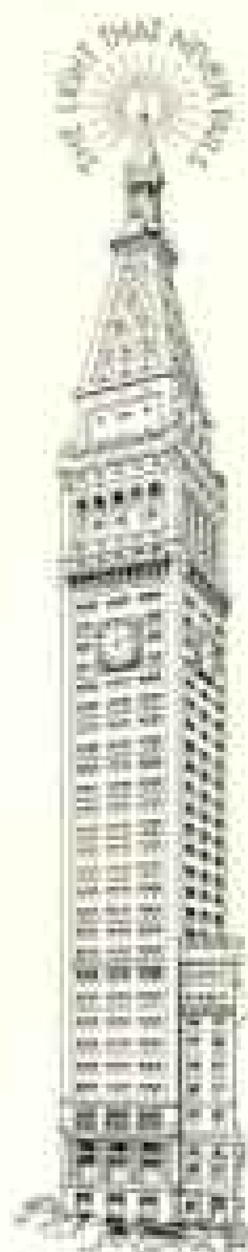
IN peace-time as well as in war-time a hospital is a fortress of health.

Our fine modern hospitals are the richest storehouses in the world of medical knowledge and skill. They are health centers which guard the people of their communities.

While your hospital is nursing the sick and the injured, its laboratories are finding new ways to protect your health. As a result of medical research in hospitals, many diseases are disappearing.

Modern surgery, aided by skilful nursing in hospitals, restores to health tens of thousands each year.

In the past, people generally have thought of hospitals merely as the best places to which they could go in case of accident or when an operation was unavoidable. Today people are rapidly beginning to realize that the hospital is the best place in which to be in event of any serious illness.



No home, no matter how comfortable, is so well equipped to furnish the many forms of service—any one of which may be needed instantly and imperatively—as a properly conducted hospital.

People unfamiliar with the wide scope of hospital work think only of the patients in hospital beds. One great hospital in New York City treats in its clinics an average of 1400 visiting patients each day. The hospital of the future will play an even greater part in caring for the health of the people. It will be a medical center which radiates health protection.

National, State and County hospitals are supported by taxation. A few private hospitals and sanatoria are on a self-supporting basis. But the great majority of private hospitals are dependent upon endowments and sustaining contributions for bare necessities—proper equipment and needed surgical, medical and nursing staffs.

Appreciate Your Local Hospital.

METROPOLITAN LIFE INSURANCE COMPANY

FREDERICK H. ECKER, PRESIDENT — ONE MADISON AVE., NEW YORK, N. Y.

© 1928 M. L. I. CO.

SINGERS who have never been particularly popular in the household become favorites overnight—when PHILCO enters the home.

With PHILCO the family hears the singer's voice just as though the artist were present in person. PHILCO reproduces the highest notes of a soprano with a richness that does full justice to the original. And PHILCO does equally well on the other side of the scale—bringing the deepest notes of a basso with never a trace of "booming".

PHILCO is the only radio scientifically designed as a musical instrument. PHILCO will not only bring every note of every singer on the air into your home—but PHILCO will also become a whole symphony orchestra from the topmost notes of a high-pitched piccolo down to the lowest growl of the tuba.

Leading dealers everywhere are happy to show and demonstrate PHILCO.

See it. Hear it. Buy it. Enjoy it.

PHILCO · PHILADELPHIA · TORONTO · LONDON

PHILCO

A musical instrument of quality

$18.75 *to* $295

FEDERAL TAX PAID

PHILCO MODEL 15X, shown above, $150 Tax Paid—PATENTED—Contains every worthwhile radio improvement—many exclusively PHILCO. Musicians, especially, appreciate the following scientific points of superiority:—1. The PHILCO Inclined Sounding Board throws all sound up into field of listener, making all high notes heard for the first time. 2. Large area of sounding board insures full reproduction of low notes. 3. Echo Absorbing Screen at the back prevents echo and blur, the first radio to deliver sound only from front of speaker. 4. Open sounding board instead of sound chamber affords clear unboxed tone.

* * *

PHILCO REPLACEMENT TUBES IMPROVE THE PERFORMANCE OF <u>ANY</u> SET

* * *

Philco-Transitone Radio (superheterodyne) for motor cars and boats, average price complete, installed and tax paid on cars equipped with aerial, $69.50. ALL ELECTRIC (no dry batteries) $79.50.

Soup is the modern luncheon!

The luncheon that fits the needs of today is deliciously tempting, invigorating, nourishing and convenient. It must not take too much time in the preparation or in the eating. Campbell's Vegetable Soup. The exact answer! It's ready to serve almost instantly and it brings to your table a satisfying meal in the one dish. And your enjoyment of its appealing flavor makes luncheon a real pleasure.

LOOK FOR THE RED-AND-WHITE LABEL

MEAL-PLANNING IS EASIER WITH DAILY CHOICES FROM CAMPBELL'S 21 SOUPS

NEWS! FOR 400,000 EXECUTIVES WHO REGULARLY READ THE GEOGRAPHIC

For over a year, on their own initiative, at their own expense, R. L. Polk & Co., city directory publishers, have been analyzing markets of the United States.

To date they have studied markets in 93 cities and towns. Ultimately, they plan to analyze markets in communities typical of more than 70% of the country's total population.

The Polk Columbus, Ohio, Consumer Analysis is the most recent release in this national market study. The procedure used there is standard for all Polk surveys.

The buying head of every twentieth household is interviewed to supply facts about recent purchases. These market research interviews provide answers to questions concerning 140 sales factors.

Simple, non-leading questions are used. Each interview is checked for completeness and consistency. Every fifth interview is rechecked by calling again personally or by telephone.

Polk assembles these market facts and isolates them by reader-groups of leading magazines to show the worth and buying power of subscribers.

For the first time a clear-cut comparison of the advertising value of leading magazines is available.

Heretofore, income-statistics have been the common denominator. Now there are spending-statistics.

These figures, in usable form, show comparative buying power, commodity ownership, buying activity.

Thirty significant spending indices have been drawn from the Columbus report by us to show where today's markets are.

Using these thirty indices, you find THE NATIONAL GEOGRAPHIC MAGAZINE first twenty-eight times. You find a wider spread between THE GEOGRAPHIC'S first and any second than between magazines of lower standing.

If you are using THE NATIONAL GEOGRAPHIC MAGAZINE now, see how these reports confirm your judgment.

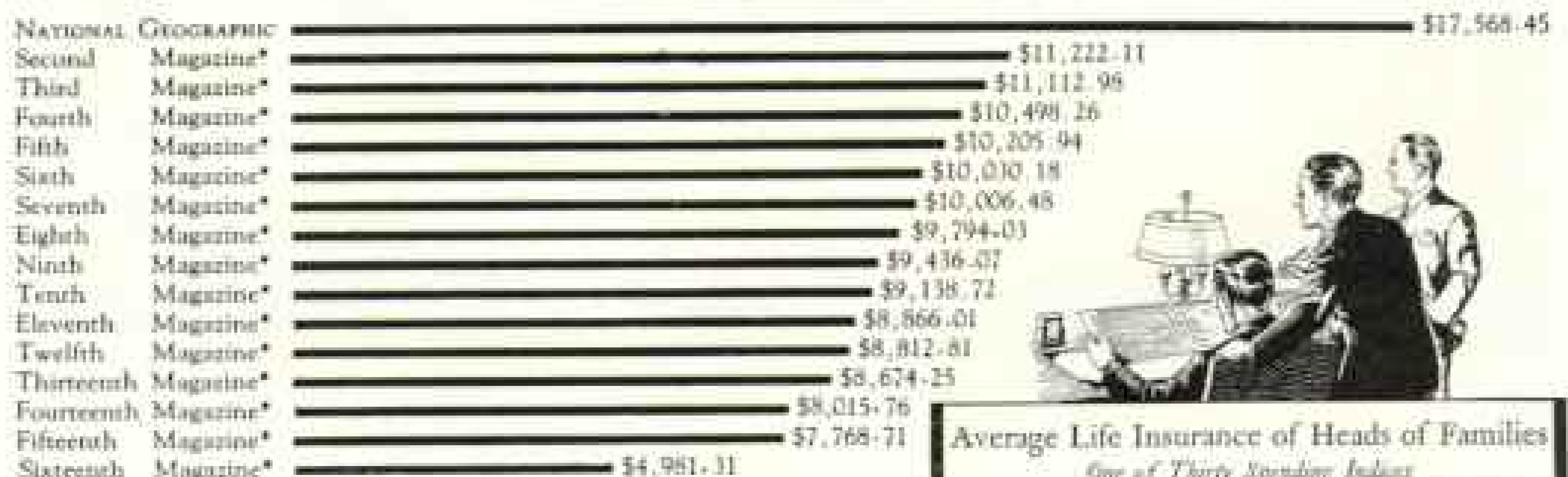
If you are not using it, here is concrete evidence upon which to base a revised advertising schedule.

It is important that you have the clearest view of today's markets and today's media ever offered.

A brief summary of The Polk Columbus, Ohio, Analysis of 45,500 magazine-reading households has been prepared for executives who read THE NATIONAL GEOGRAPHIC MAGAZINE.

Please address L. W. Gillette, Director of Advertising, 16th and M Sts., N. W., Washington, D. C., asking for "I sent a dollar to market."

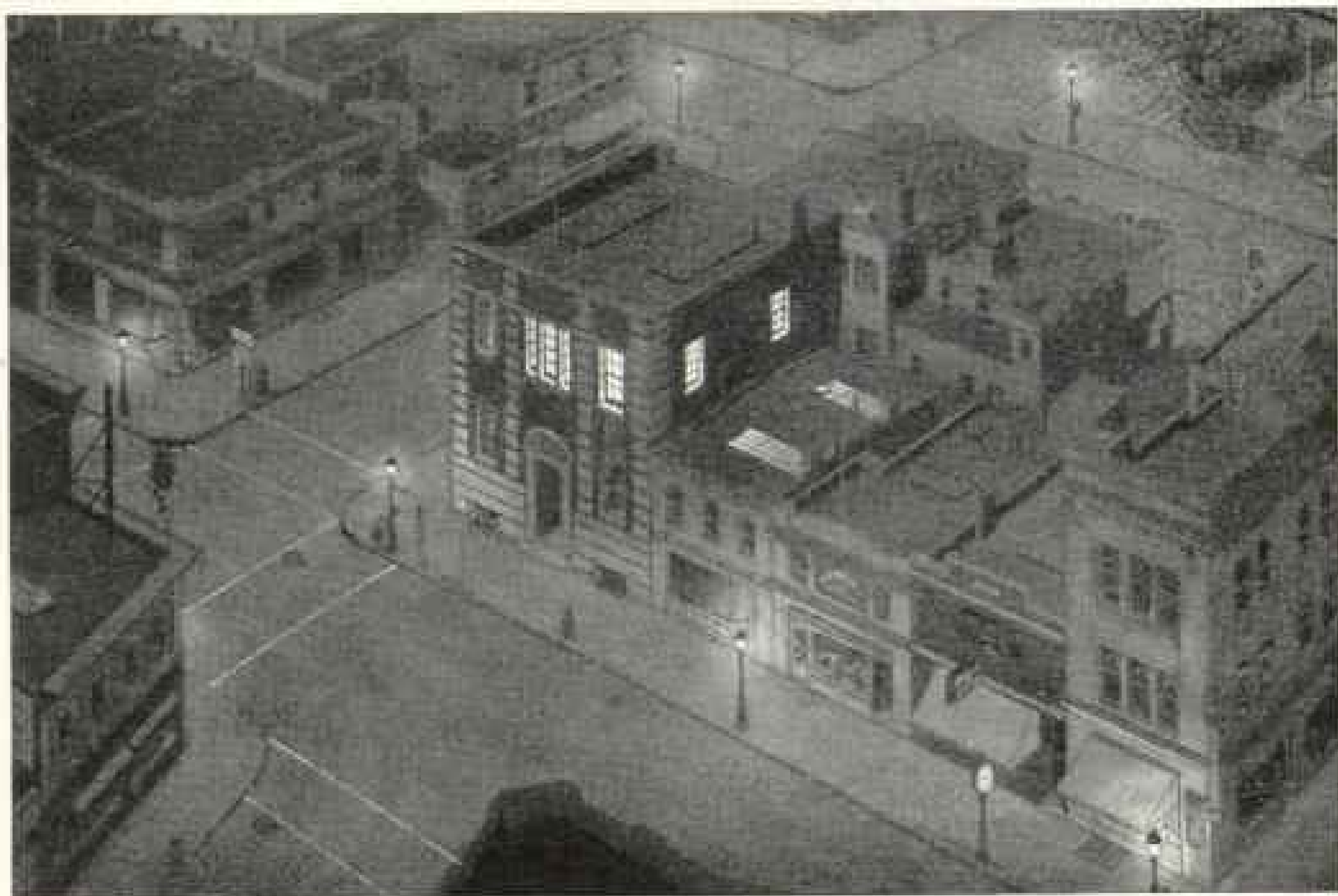
THE NATIONAL GEOGRAPHIC MAGAZINE



Average Life Insurance of Heads of Families
One of Thirty Spending Indices

* Name on request.

A light forever burning . . .
A voice that is never stilled



NIGHT comes on and spreads a blanket of darkness upon sleeping cities and towns. Here and there a lone policeman. In the distance a clock tolling the hour.

In the dark silence of the night, there is one light forever burning . . . one voice that is never stilled. That light is the light in the telephone exchange. That voice is the voice of your telephone.

A city without telephones would be a city afraid—a city of dread.

For the telephone brings security. Its very presence gives a feeling of safety and nearness to everything. In times of stress and sudden need it has a value beyond price. In the business and social activities of a busy day it is almost indispensable.

The wonder of the telephone is not the instrument itself but the system of which it is the symbol . . . the system which links your own telephone with any one of eighteen million others in the United States and thirteen millions in other countries.

Every time you use your telephone you have at your command some part of a country-wide network of wires and equipment, and as many as you need of a great army of specialists in communication.

There are few aids to modern living that yield so much in safety, convenience and achievement as your telephone.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY

Maybe she doesn't believe in Santa Claus

but

Maybe you haven't done your share? She'll surely believe—feel the true spirit of the occasion if you send Flowers! Without them, even little Mary-Jane may have doubts! Flowers create real Christmas Cheer. Santa Claus takes on reality when the house is bright with flowers and all those Christmasy things your florist can supply.

SEND FLOWERS BY WIRE

Even those last minute gifts can be taken care of properly. No matter how great the distance that separates you from loved ones and friends, you can wish them "Merry Christmas" the best way of all by sending flowers. Through any member of the FLORISTS TELEGRAPH DELIVERY ASSOCIATION, flowers can be wired ANYWHERE . . . ANYTIME . . . AT MODEST COST.

"Say it with Flowers"

Fill your home with wreaths, mistletoe, and all those holiday decorations that make Christmas. Your florist will advise you.

© 1932, Society of American Florists & Ornamental Horticulturists

Yachting Cruises TO THE

SPANISH MAIN

BRAND-NEW CRUISE SHIPS

COLOMBIA and HAITI

The Only Air-Conditioned Ships in Exclusive Tropical Service.

REMARKABLE new liners with all the latest refinements . . . from air-cooled dining salons to built-in outdoor swimming pools and sound movies. Every room outside.

To strange out-of-the-way ports in Haiti, Jamaica, Colombia, South America and Panama. On the 17½ day and the Jamaica cruises, you live aboard ship. On the Haiti cruise, hotel accommodations are provided. No passports required.

Weekly Sailings Commencing DEC. 15

***11½ to 17½ DAYS $110 up** including ALL EXPENSES

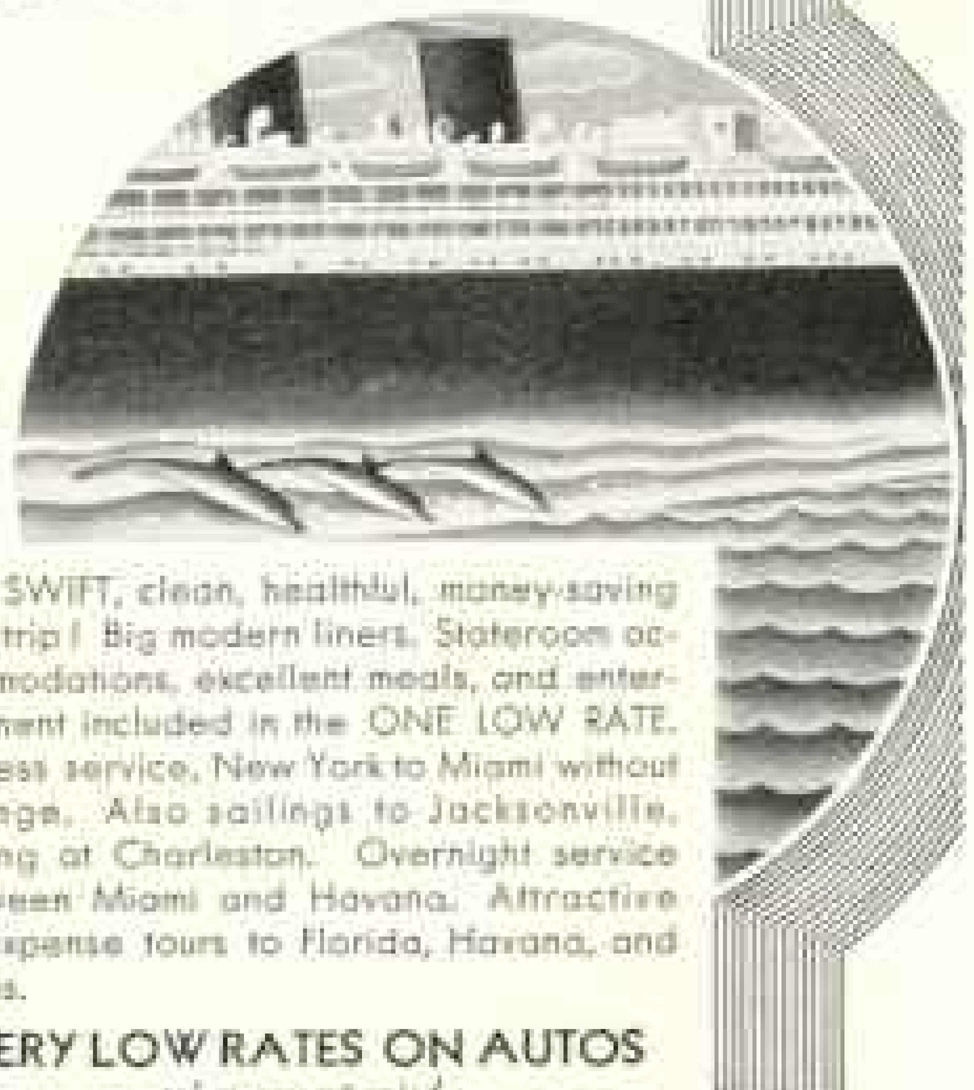
**11½ Day Cruises begin with Maiden Voyage of the "Haiti," Dec. 22.*

For further information and illustrated literature, apply to any authorized tourist agent or

COLOMBIAN Line

17 Battery Place or 552 Fifth Ave., New York

Enjoyable Economy to FLORIDA and HAVANA



A SWIFT, clean, healthful, money-saving trip! Big modern liners. Stateroom accommodations, excellent meals, and entertainment included in the ONE LOW RATE. Express service, New York to Miami without change. Also sailings to Jacksonville, calling at Charleston. Overnight service between Miami and Havana. Attractive all-expense tours to Florida, Havana, and Texas.

VERY LOW RATES ON AUTOS

when accompanied

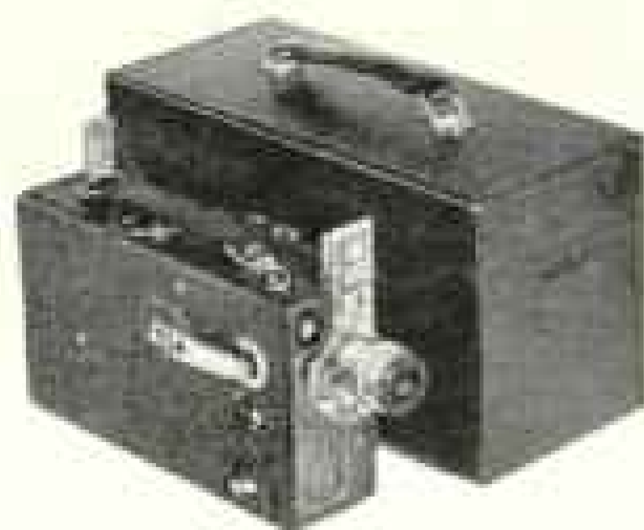
545 Fifth Avenue, New York, or any Authorized Tourist Agent

"Our Ciné-Kodak is giving us *More pleasure* than any other gift"

"The color movies we took of the children in Florida are beautiful."

"We made some splendid movies of the sports at Lake Placid."

"It's always a thrill to see our children, friends and travels on the screen."



• A munificent gift—for everlasting interest and entertainment. Makes movies of theatre-like brilliance. Capturing the romance of far-away places, the charm of a child's fleeting expression.

Ciné-Kodak Model K "does everything." Telephoto. Wide-angle. Kodacolor (movies in full color). Loads with 100 feet of 16 mm. film. Anyone . . . traveler or stay-at-home . . . will be delighted over the gift of Ciné-Kodak "K." Priced from $110, with carrying case to match. Eastman Kodak Company, Rochester, New York.

for Christmas **Ciné-Kodak "K"**

Eastman's finest Movie Camera

"My Financial Problems"

—a booklet which describes the many ways in which Life Insurance can help solve these important problems for you and your family.

Send for your copy.

John Hancock
MUTUAL
LIFE INSURANCE COMPANY
OF BOSTON, MASSACHUSETTS

JOHN HANCOCK INQUIRY BUREAU
197 Clarendon Street, Boston, Mass.

Please send me your booklet,
"My Financial Problems."

Name ____________________

Street and No. ____________________

City ______________ State ______________

N.G.

S.S. LURLINE

SOUTH SEAS & ORIENTAL CRUISE

FIRST VOYAGE of a great new liner . . . the lure of 20 ports...the wonders of 14 lands! At an attractively low cost, a 25,000 mile itinerary, starred by direct calls at Port Moresby and Bali...optional tour to Angkor Wat.

Sails from New York . January 12
from San Francisco . January 27
from Los Angeles . January 28

FARES
From NEW YORK . . $1585 up
From CALIFORNIA . . $1250 up

Reservations should be made now. At any travel agency or

THE OCEANIC STEAMSHIP CO.
MATSON LINE

NEW YORK • CHICAGO • SAN FRANCISCO • LOS ANGELES • SEATTLE • PORTLAND

COME...to the warm sunny winter of your dreams

BALMY sunshine from morn 'til night—clear blue skies—rose gardens in full bloom—out-of-doors living all the day—this is "winter" in Tucson.

Costs are always moderate here. Yet accommodations are of the best. And there's practically no end of things to do...golf...tennis...hunting...riding...motoring...with Indian villages and Old Mexico itself only a few miles away.

Send the coupon below or wire us for descriptive booklet and full information as to hotel reservations; rentals; air, rail and highway data, etc. Winter rates and stopovers now available on both Rock Island and Southern Pacific Lines.

TUCSON
Sunshine-Climate Club
ARIZONA

1204-A Old Pueblo Bldg., Tucson, Arizona
Please send me the free "Sunshine Booklet"

Name ____________________

Address ____________________

Statendam
TO THE
MEDITERRANEAN
EGYPT & PALESTINE

Sailing, from New York
FEBRUARY 9TH
56 PERFECT DAYS

First Class *from* $575
Tourist Class *from* $295

For the first time, this famous de luxe transatlantic liner sails to the Mediterranean countries, including Egypt and the Holy Land.

Details and bookings from your own agent, American Express Co., Frank C. Clark or

HOLLAND-AMERICA LINE
24 State St. New York

AND ALL PRINCIPAL CITIES

The Flamingo Hotel

America's Winter Playground

Miami Beach, Florida

Internationally known for its charming location, excellent cuisine, efficient service and every convenience.

Spacious private swimming pool, cabañas, and solarium—six tennis courts on grounds. Unexcelled golf courses, polo, Gulf Stream surf bathing, fishing.

Revised rates with traditional standards maintained. American plan, *$8 per day* up. Bungalows with hotel service available. Season opens January 10.

Write for illustrated book

The Flamingo Hotel

C. S. KROM, MANAGER

Miami Beach, Florida

Unique Greetings

Beautiful Geographic photogravures make a graceful gift for the person who should receive more than the customary Christmas card.

14 Subjects

Your greeting thus takes on an original touch that lends distinction and unusual interest to your remembrance.

Illustrated list on request from

NATIONAL GEOGRAPHIC SOCIETY
Washington, D. C.

Lido all the way

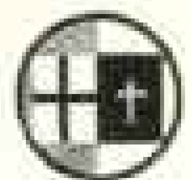
WORLD CRUISE of the AUGUSTUS

LARGEST MOTOR SHIP IN THE WORLD

JAN. 14 – MAY 23, 1933

See the world and enjoy it all the more from the Lido Deck of the AUGUSTUS! In patrician splendor you trace an itinerary of 34 ports and 99 localities—with an exclusive call at Tripoli and an unforgettable visit in Bali, "The Last Paradise". Famous 33,000-ton vessel with open-air tiled pool, observation bridge for passengers and noted Dining Salon on the Promenade Deck! $2100 up includes 70 *complete shore excursions.* Write for beautifully illustrated literature.

Apply local agent or 1 State St., *New York*; 1601 Walnut St., *Philadelphia*; 86 Arlington St., *Boston*; 944 Arcade, *Union Trust Bldg., Cleveland*; 333 N. Michigan Ave., *Chicago*; 386 Post St., *San Francisco*; 129 Decatur St., *New Orleans*; Architects Bldg., 1133 Beaver Hall Hill, *Montreal.*



ITALIAN LINE

In Cooperation with AMERICAN EXPRESS CO.

NOW . . . a Radio GUARANTEEING WORLD-WIDE RECEPTION

New
15-550 METER
SCOTT
ALL-WAVE
Deluxe

RECEIVE broadcasts from Europe, the Orient, Australia—'most anywhere on the globe you choose—*direct!* This new, laboratory-built instrument of precision engineering is guaranteed to tune in foreign stations 10,000 miles or more away, with full loud speaker volume and natural tone fidelity, at all seasons. What a way to broaden your world-culture! Hear press dispatches from England's stations . . . typical national music from Spain—symphonic music from Germany . . . opera from Rome . . . other fascinating programs from the ends of the earth. Superb on domestic broadcasts, too! Costs no more than many less efficient models of ordinary receivers. Send for details, specifications and performance proofs.

USE THIS PROOF COUPON

E. H. SCOTT RADIO LABORATORIES, INC.
4450 Ravenswood Ave., Dept. NG-122, Chicago, Ill.

Send me full particulars regarding the SCOTT ALL-WAVE DELUXE, 15-550 Meter Superheterodyne Radio Receiver.

Name..............................

Street..............................

City.............................. State..............

Vt. Maple Hearts

THE famed maple flavor is glorified in this deliciously smooth and tasty confection, mailed fresh daily from the heart of maple-land. 1 lb. 5 oz. net in a daintily packed "Sap Bucket" of natural wood. Chock-full of gift atmosphere.

New GIFT "Sap Bucket"

Just right for "remembrance" friends or for Bridge candy or prizes. We mail to your list, $1.25 postpaid (West of Miss. R. $1.40). Bucket filled with assorted Bridge shapes if preferred. Write for price list of pure Maple Syrup, Sugar and dainty confections.

Maple Grove Candies, Inc.
Route 17
St. Johnsbury, Vermont

NOW this ALL-inclusive WORLD CRUISE

on the luxurious S. S. PRESIDENT JOHNSON, specially chartered from the Dollar Steamship Lines

FOR AS LOW AS $9.68 PER DAY including shore trips, visiting 140 world-renowned cities and places

COMPLETE RATES ONLY $1325 to $2850

EASTWARD to 37 countries and islands; 33,888 miles; 137 days. First class only. All staterooms outside. From New York February 4. See your travel agent or send for our illustrated booklet A3.

JAMES BORING COMPANY, Inc.
642 Fifth Ave., New York
333 N. Michigan Ave., Chicago

"Mm-m-m, boy! . . . do you see what I see?"

"LOOK, mistress is opening a can. I hope it's Ken-L-Ration."

"Sure, it's Ken-L-Ration! Smell the fresh meat? Our mistress knows quality, too, and she wouldn't take a chance on feeding us a cheap imitation."

Your dog can quickly detect the quality in Ken-L-Ration. It's the natural juices of the fresh meat and all of the other fresh ingredients that thrill the palate of every dog. Ken-L-Ration is as pure and wholesome as the food on your own table. For sale at all quality stores.

Send us a Ken-L-Ration label for a free copy of Dog "Autobiographies."

CHAPPEL BROS., INC.
89 Peoples Avenue Rockford, Ill.

KEN-L-RATION
THE DOG FOOD SUPREME

CHAMPION-INTERNATIONAL COMPANY

MANUFACTURERS OF

National Geographic Paper

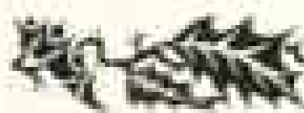
and other high-grade coated paper

LAWRENCE, MASS.

THIS MAGAZINE IS FROM OUR PRESSES

JUDD & DETWEILER, INC.
Master Printers
ECKINGTON PLACE AND FLORIDA AVENUE
WASHINGTON, D. C.

For Novice and Naturalist Young and Mature



BECAUSE there is something of interest and value in each of these nature books for each member of the family, they form, as a whole or separately, pleasing Christmas gifts for anyone.

Children too young to enjoy the text are fascinated by the colorful pictures. Older brothers and sisters find the general articles diverting and the biographical sections of value in school work. Amateur naturalists, hobbyists, get valuable suggestions for feeding, care of animals; an easily carried guidebook for trips afield.

Book of Birds

By Henry W. Henshaw; full-color portraits of 331 birds by the naturalist-artist Louis Agassiz Fuertes; 12 bird migration maps, and bird "biographies" are contained in this 252-page volume. It offers fascinating reading to lovers of bird life. Royal Octavo (10 x 7 in.). Molloy-made binding de luxe, $4.

Horses of the World

The development of the horse as man's companion in war, in farming, in trade, and in sport fascinatingly described by the late Major General William Harding Carter. Twenty-four full-page illustrations in color painted by Edward Herbert Miner and 72 black and white engravings with descriptive narrative enable one to distinguish the many breeds; 118 pages. Royal Octavo (10 x 7 in.). Molloy-made binding, $3.

Cattle of the World

For all who own or enjoy cattle, this authoritative and richly illustrated masterpiece will prove a lasting delight and a constantly used work. By Dr. Alvin Howard Sanders. Twenty full-color reproductions of wild types and modern breeds by Edward Herbert Miner; 142 pages. Royal Octavo (10 x 7 in.). Molloy-made binding, $3.

Book of Wild Flowers

Revealing intricate mysteries of plant life and containing paintings of 250 flowers and plants in exact color, it enables even a child to understand plant life and to identify leading varieties; 243 pages. Royal Octavo (10 x 7 in.). Molloy-made binding de luxe, $4.

The Book of Dogs

A veritable "Bench Show" by leading authorities who discuss mankind's best friend; full color portraits by Louis Agassiz Fuertes and Hashime Murayama and biographies of 102 dogs; 109 pages. Molloy-made art binding, $3.

Book of Fishes

All types of fishermen find lasting delight and accurate information in this wonder book by John Oliver La Gorce and other authorities. Illustrated with full-color portraits of 92 fishes in action and 134 engravings, its 243 pages are full of interest for all who fish in brook, lake, or sea. Royal Octavo (10 x 7 in.). Molloy-made binding de luxe, $4.

Wild Animals of North America

By Edward W. Nelson, former chief of United States Biological Survey. Four-footed animals of field, forest, and park are illustrated with 109 full-color portraits by Louis Agassiz Fuertes. Also track sketches; 254 pages. Royal Octavo (10 x 7 in.). Molloy-made binding de luxe, $4.

National Geographic Society
Dept. J,
Washington, D. C.

Enclosed find $.................. for

.... copies, FISHES
.... copies, BIRDS
.... copies, HORSES
.... copies, CATTLE
.... copies, WILD FLOWERS
.... copies, DOGS
.... copies, WILD ANIMALS

Please mail prepaid to name and address below:

NAME ....

ADDRESS ....

UNIVERSITY of CHICAGO

HOME-STUDY COURSES

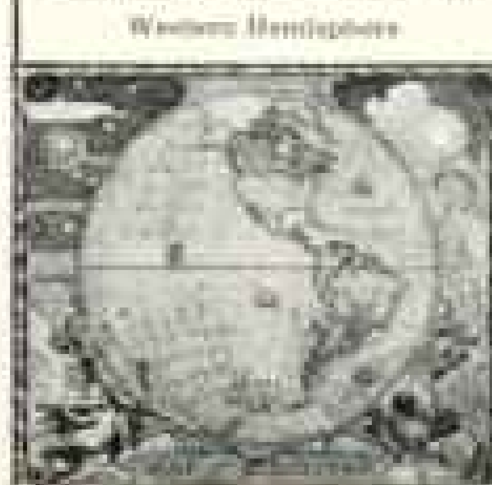
MEN and women who have gained a cosmopolitan outlook through travel, observation, and study will find *pleasure* and profit in the home-study courses based upon the University's *new plan* of education. World History from primitive times to the present, Anthropology, A Survey of Art, which traces the development of architecture, sculpture, and painting through the ages; Comparative Religion, Philosophy, Oriental and Modern Languages and Literatures, Geology, Economics, and other alluring subjects may be studied by correspondence under leading members of the faculties. The 450 courses offered may be used to continue either a high school or college program. Ask for free booklet.

THE UNIVERSITY OF CHICAGO
777 Ellis Hall **Chicago, Illinois**

MAPS OF DISCOVERY

Giving the effect of age-worn, time-colored, fanciful Fifteenth Century charts, the two companion **Maps of Discovery** of the Eastern and Western Hemispheres trace accurately the courses followed by the Great Discoverers from Marco Polo (1277) to Peary's trip to the North Pole (1909). These superb full-color reproductions of N. C. Wyeth's murals measure 18¾ x 19 inches. *Ideal* **for den, office, library.**

Western Hemisphere



Each Hemisphere—Print, $1
Framed, $4
Postpaid in U. S. and Canada
Obtainable only from
National Geographic Society
Washington, D. C.

Your NATIONAL GEOGRAPHICS Deserve These Beautiful Bindings

AT LAST—a binding that opens flat as a bound book! Now you can save shipping by binding your National Geographics at home in a few minutes and add a beautiful, permanent set of books to your library. Covers ready for 1910-32. Each holds six issues. Ten days' free trial. Mail coupon TODAY.

ONLY $3.45 *for two volumes* **$2.00 Each**

SUCKERT LOOSE LEAF COVER CO. 234 W. Larned, Detroit, Mich. Mail post paid 2 De Luxe Bindings for year........Nat. Geog. Will remit $3.45 in 10 days or return binding collect.
Name..
Address..

Postage prepaid in U. S., Can., Mexico. Foreign countries extra. Foreign orders must contain remittance to comply with customs. Remittance returned if bindings are not satisfactory.

WEBSTER'S NEW INTERNATIONAL DICTIONARY

The Gift for a Lifetime — The "Supreme Authority"

The perfect gift for all the family offering a lifetime of usefulness. Universally accepted and used in **courts, libraries, schools. 452,000 entries, 32,000 geographical** subjects, **12,000 biographical** entries. Over 6,000 illustrations, 100 valuable tables.

See it at any bookstore or send for FREE illustrated pamphlet containing sample pages of The New International.

G. & C. MERRIAM CO. 192 Broadway SPRINGFIELD, MASS.

DUES

Annual membership in U. S., $3.00; annual membership abroad, $4.00; Canada, $3.50; life membership, $100. Please make remittances payable to the National Geographic Society, and if at a distance remit by New York draft, postal or express order.

RECOMMENDATION FOR MEMBERSHIP

IN THE

NATIONAL GEOGRAPHIC SOCIETY

The Membership Dues, Which are for the Calendar Year, Include Subscription to the National Geographic Magazine

PLEASE DETACH AND FILL IN BLANK BELOW AND MAIL TO THE SECRETARY

....193

To the Secretary, National Geographic Society,
Sixteenth and M Streets Northwest, Washington, D. C.:

I nominate..

Occupation..
(This information is important for the records.)

Address..

....*for membership in the Society.*

....

12-32 ....

Name and Address of Nominating Member

TO FATHERS WHO WANT TO BE PROUD OF THEIR SONS

DO you want your son to be keen-witted, quick-thinking, resourceful—or don't you care? A lot depends on you. These are the years in which your boy's body and brain are forming the habits that will make or break him later on.

Do all you can *now* to keep life from giving him an ugly break. Help him form the most important habit of all, *the habit of thinking things out for himself.* We can help you in this, just as we have helped thousands of other fathers, because Lionel Electric Trains are more than toys. They teach boys how to develop skill with their hands and, above all, skill with their brains. They help boys form the all-important habit of thinking problems out for themselves because they make these problems into a fascinating game. For instance, your boy will not only have the fun of building his railroad and operating it; he will have the opportunity to tackle actual problems of railroad operation such as how to prevent wrecks; how to clear traffic in freight yards; and other fascinating things which give him training in both electricity and mechanics. Incidentally, this year you can buy your boy these sturdy, lasting trains for as little as $5.95.

Give him this help. Clip the coupon below. Take it to your nearest department store, hardware, electrical, toy or sporting goods store. There you can get, *free*, the new 52 page *Lionel Model Railroad Planning Book* that shows you exactly what you and your boy want to know about (1) how to plan and build a model railroad system and (2) what to get to make it true-to-life to the last detail. *Note:* If it is not easy for you to go to a Lionel dealer's store—mail the coupon to us and we will send you this expensive book if you will send 10c to cover handling and mailing costs.

NOTICE TO ALL AUTHORIZED LIONEL DEALERS: *The bearer of this coupon is entitled to receive, absolutely free, one copy only of the new 1932 Lionel Model Railroad Planning Book.*

NOTICE TO THE PUBLIC. *If your dealer cannot supply you with a Lionel Railroad Planning Book, or if it is not easy to go to his store, mail this coupon to the LIONEL CORPORATION, Dept. 59, 15 E. 26th St., New York City. We will send you this expensive book if you enclose 10c to cover handling and mailing costs.*

NAME..

STREET..

CITY.............................. *STATE*..............................

LIONEL *Electric* TRAINS

A Distinguished WEST INDIES PROGRAM by the Aristocrat of Cruise Ships

Conte GRANDE

THIS year more than ever the "Conte GRANDE" fills a definite travel need! . . . offering the Italian Line courtesy and finesse that have won the loyalty of *initiated* travelers. With her de luxe accommodations, complete program of cruise festivities, distinguished cuisine—and *long calls* in each port, thanks to her unusual speed—she provides the kind of cruise you are looking for! Abnormally low rates.

CHRISTMAS CRUISE

12 Days, Four Famous Ports, Dec. 23 to Jan. 4 $145 up

CHRISTMAS at SEA • NEW YEAR'S in HAVANA

A festive sailing to Kingston (Jamaica), Colon and the Panama Canal, Havana for a red-letter New Year's Eve, Nassau and Paradise Beach. Special holiday program. Optional shore excursions at all ports.

OTHER WINTER CRUISES on the Conte GRANDE

16 Days, 3 Cruises - Feb. 11, Mar. 4, Apr. 8 $190 up

Fort de France, St. Pierre, Trinidad, La Guayra, Curaçao, Colon, Kingston, Havana.

14 Days, March 23 . . . $167.50 up

Port-au-Prince, Jamaica, Colon, Havana, Nassau.

Also 9 Days, April 26, $95 up—10 Days, May 6, $105 up

To the MEDITERRANEAN, Holy Land and Egypt, Jan. 7, 32 Days, 12 Ports, first class, $510 up; tourist, $225

Write for complete illustrated literature.

Apply local agent or 1 State St., New York; 1601 Walnut St., Philadelphia; 86 Arlington St., Boston; 944 Arcade, Union Trust Bldg., Cleveland; 333 N. Michigan Ave., Chicago; 386 Post St., San Francisco; 129 Decatur St., New Orleans; Architects Building, 1133 Beaver Hall Hill, Montreal.

Also Regular Sailings to ALL

EUROPE

via the De Luxe Southern Route

Now fast express service on the REX and Conte di SAVOIA. Also regular express sailings on the AUGUSTUS, ROMA, Conte GRANDE and the Cosulich liners SATURNIA and VULCANIA.

ITALIAN LINE

APPLY LOCAL AGENT OR ONE STATE ST., NEW YORK

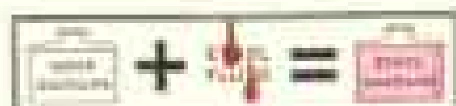
Ethyl CONTROLS *the* GIANT POWER *of* Gasoline

JUST AS the strength of the elephant must be controlled to be of service, so gasoline needs a trainer to deliver its power smoothly.

Regular gasoline goes "wild" inside the engine. It explodes unevenly, violently—causing harmful knock, overheating and loss of power. Leading oil companies add Ethyl fluid to good gasoline to prevent this. It controls combustion—turns *more* of the gasoline's energy into power—so that less takes the form of harmful heat.

The high compression motors, now offered by nearly every car manufacturer as either standard or optional equipment, *require* Ethyl Gasoline. Older cars thank you even more for its greater power.

Stop at the Ethyl pump today and get the *full* value—the *best* performance of the car you own. Ethyl Gasoline Corporation, New York City.



Ethyl fluid contains lead

© E. G. C. 1932

Buy ETHYL GASOLINE

PRESS OF JUDD & DETWEILER, INC.
WASHINGTON, D. C.

"I *am glad you smoke a pipe!*"

Just try it!

"WHY DO I say that? Well, just as soon as you come into the house and pack your pipe with Granger, you seem to be in a good humor. I like that Granger, too . . . the aroma is very pleasing. It seems different from other tobaccos."

You are right! Granger is made for pipes; and you *want* tobacco in your pipe that's made for pipes.

© 1932, LIGGETT & MYERS TOBACCO CO.

GRANGER ROUGH CUT . . . AMERICA'S PIPE TOBACCO