

VOLUME LXXII

NUMBER THREE

# THE NATIONAL GEOGRAPHIC MAGAZINE

SEPTEMBER, 1937

Machines Come to Mississippi

With 34 Illustrations and Map

J. R. HILDEBRAND

Magnolia State Mosaic

26 Natural Color Photographs

J. BAYLOR ROBERTS

Crossroads of the Caribbean

With 19 Illustrations

LAURENCE SANFORD CRITCHELL

Tropic Color in Trinidad

14 Natural Color Photographs

EDWIN L. WISHERD

Platinum in the World's Work

With 17 Illustrations

LONNELLE DAVISON

Nature's Most Dramatic Spectacle

With 16 Illustrations and Map

S. A. MITCHELL

Eclipse Adventures on a Desert Isle

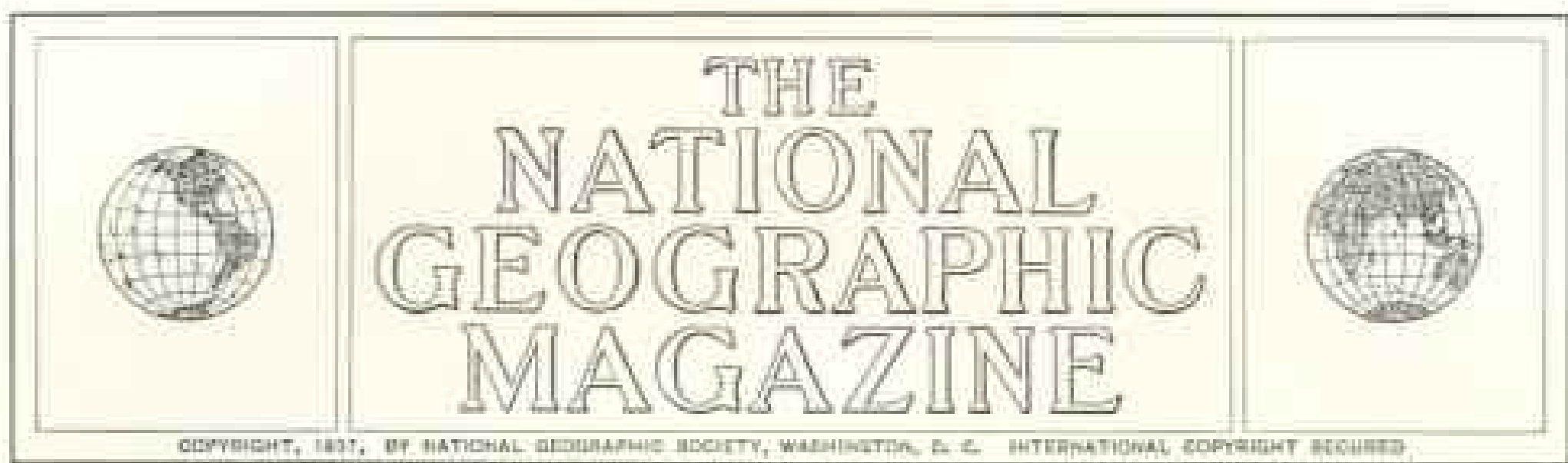
With 14 Illustrations and Map

J. F. HELLWEG

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

\$3.50 A YEAR

50c THE COPY



## MACHINES COME TO MISSISSIPPI

BY J. R. HILDEBRAND

*With Illustrations from Photographs by Joseph Baylar Roberts*

**M**ACHINES are coming to agricultural Mississippi.

After a morning tour of industrial Jackson I had to scrape from my shoe soles layers of cottonseed oil, pungent creosote, and clayey bentonite, all caked hard with dried mud from a petroleum well being dug by special appropriation of the State Legislature.

Twice daily the red and silver streamline Rebel train flashes through the State—past ox teams plodding along sunken roads, new myriad-windowed garment factories, negroes driving ramshackle buckboards—and glides beneath airplanes that are heading into the capital's spacious, four-way airport.

The train hostess was holding a platform reception as we alighted at Jackson, greeting many passengers by name, thanking one woman for flowers she had sent her the week before, while another called, "I'm going to bring you a jar of my peach preserves when I go back next week."

### HOOP SKIRTS AND COVERED WAGONS

Over in Natchez girls in lavender hoop-skirt gowns trimmed with rare old lace sidled into Fords and Chevrolets to drive annual pilgrimage-week visitors to ante-bellum homes straight from the pages of *So Red the Rose*.

Up in the Delta a sprightly gentleman of 82 years called his chauffeur to take *THE GEOGRAPHIC's* photographer and me in his Packard to a log cabin still standing on the plantation of 6,000 acres of cotton, corn, pecans, and hay. He and his uncle built the cabin only 65 years ago, after they

had cleared the land and floated the timbers in from the surrounding forest and the chimney brick from the river dock ten miles distant (page 264).

This epic from covered wagon to limousine in one man's lifetime is a clue to why Mississippians call their State "the last frontier."

### THE GENESIS OF JACKSON

Busy, modern Jackson illustrates the transformation. The city is no upstart; it has been the State Capital since 1822. Stately homes with Wistaria growing over columned porticoes and with crape myrtle on the lawns line wide avenues.

Barber shops still are spacious forums of political argument where a southern colonel may doff his broad-brimmed hat in courtly salutation without toppling over a coat rack. Rooms in hotels, office buildings, and homes knew not the builder who estimates costs in cubic feet.

From sidewalks beneath rusty tin roofs you look across the street toward shop fronts with onyxlike tiles, burnished metal, and neon lights (Plate VIII).

One tall office building with cubistic floors and chromium elevator doors rises knife-edged to carve an otherwise gracious skyline just opposite a colonial-type home now painted green and occupied by the Salvation Army.

Taking swift elevators to the 18th floor, the visitor may see how the city is laid out in mammoth squares which usually have only six or eight dwellings to a block—houses set far apart in the parklike expanse of gardens, trees, and lawns.



FROM COVERED WAGON TO LIMOUSINE IN A LIFETIME

"This part of the Delta was a marshy wilderness when we built this cabin in 1872," John Holmes Sherard tells his granddaughter (page 263). Today the patriarchal pioneer's mansion is flanked by the homes of his son, daughter, and grandchildren. His feudal community has its own general store, post office, railroad station, church, and school. One son-in-law is an able physician whose busy practice is wholly among the 1,000 residents of the plantation.

A lofty office building, which modified its design and added gargoyles to conform to an adjacent Gothic church, houses a modernistic cafe that faces the pillared Governor's Mansion, serene in a mid-city lawn shaded by oaks and native cedars.

#### GAS WELLS ON COLLEGE CAMPUS

Natural-gas wells click in pastures within sight of the State Capitol; shafts on their campuses help supply heat and educational revenue for Millsaps and Belhaven colleges; several State Street residents have pooled their rock gardens to give space to a highly productive digging.

Growing pains, these, of a pioneering city implanted upon a community which retains the gracious leisure of the Deep South.

As recently as 1920 century-old Jackson still had only 22,817 people; by 1930 it counted more than twice that number; in 1937 a local census estimated nearly 60,000, a rate of growth rivaling that of Los Angeles.

The citizens disclaim any boom. The in-

crease, they assert with reason, is the normal result of several obvious causes.

One impetus was the discovery only seven years ago of natural gas which now flows from nearly 100 wells in the city limits, much of it into pipe lines that radiate all over the State and reach even into Louisiana and Florida.

Another change was putting through high-power transmission lines—the State had none until 1925—and the consequent encouragement of factories in Jackson as well as in many other places.

Most important factor, perhaps, is the road-building program which gives centrally situated Jackson an ever-wider wing-spread as a shopping point, and controverts the old taunt that "Mississippi has three big cities: Mobile, New Orleans, and Memphis."

#### MYRIAD USES OF A COTTON BOLL

Early among Jackson's industries, naturally enough, were cottonseed-oil mills.

In the musty archives of the squat Old State Capitol are ante-bellum laws which

prohibited gin owners from polluting streams with cottonseed or dumping it inside town and city limits.

No need for enforcing such laws now, when for every 500-pound bale of cotton the planter may sell an average of 900 pounds of seed for about \$18.

All around Jackson's "hoop skirts," as someone aptly called the outlying industrial belt, tall, circular warehouses with conical metal tops rise like the oasthouses of Kent's hop-growing districts.

Each seed house stores 5,000 tons or so of cottonseed which awaits the mechanical alchemy that will convert its parts into horse collars, salad dressing, blotting paper, cheese crackers, house roofing, and an amazing variety of other products.

Should you be reading your *GEOGRAPHIC* or listening to a recording of Lawrence Tibbett's voice or Guy Lombardo's orchestra, you will be indebted to the velvety cottonseed for ingredients in camera film and phonograph record.

The seeds pour first into huge machines which whirl, shake, screen, and pull out all the dirt and foreign particles. The clean seed goes to delinters where the lint fiber is removed and collected to help make felt, absorbent cotton, mattresses, and even underwear.

Mechanical hullers crack open the seed proper, and the rejected hulls start their way toward becoming fertilizer, dynamite, or stuffing for cheap baseballs.

The kernels, or meats, emerge from a steam-jacketed cooker into hydraulic presses which squeeze out the oil that will be used to pack sardines, make butter substitutes, soap, and cooking oils. The cakes remaining in the powerful hydraulic presses are removed and broken up to feed cattle and rejuvenate the soil.



Photograph from Wide World

#### HANDS ACROSS A FAMOUS SITE

Colonel U. S. Grant 3d (right) and J. C. Pemberton 3d recall the historic "interview" of their grandfathers at Vicksburg and the "tendering" of General Pemberton's sword to General Grant, an occasion which, the latter said, marked the turning point of the War (page 273).



HER AMUSED FRIENDS SUGGESTED MANY TITLES FOR THIS PICTURE

Call it "Whoops, my dear!" said one. Why not "Old-fashioned styles don't go with old-fashioned styles," volunteered another. During the two pilgrimage weeks held at Natchez each year belles wear heirloom costumes to guide visitors through ante-bellum plantation homes and gardens (page 274).

Negroes, stripped to the waist, deftly handle the literal "hot cakes," wrapping them for the presses into mats made of human hair from China, which best withstands the high temperatures.

The odor from the presses is like that of hot buttered toast. At their lunch time we saw the workers dip their bread into the dripping oil, and eat the oil-spread slices with evident relish.

"We don't mind," commented the manager. "No seed-mill worker ever gets pellagra."

#### STATE'S EXPORTS WORLD WIDE

Enter a bathroom of the leviathan *Queen Mary* and you encounter Mississippi composition board; stroll along Atlantic City's boardwalk or go aboard some British man-of-war and your feet tread the State's yellow-pine planks; contract a cold in London, Australia, or Argentina and your prescription is apt to contain pine oil extracted from Mississippi stumps; buy gasoline as you tour Italy or Japan and it may have been bleached by a distinctive product, bentonite, from the State some people call provincial.

A plant at Jackson hauls in each week some 800 tons of bentonite, mined in Smith County. The soft, porous clay, sleek as an alligator's belly, product of ash from volcanic eruptions of bygone geologic times, is dumped from car to conveyer belt, mixed into a slurry, and treated with acids.

You must climb a high platform to see the giant drum, covered with fine cloth, which draws the water content through a screen as it revolves, permitting the residue cake to be scraped from the outside.

#### NEW BOTTLES FROM OLD

A glass-bottle works at Jackson best illustrates Mississippi as a customer of many States and foreign lands.

Tons of old bottles from everywhere are piled high in the yard to be carried on moving belts to crushers, then to be mixed with sand from Arkansas, salt cake from Chile, lime from Ohio, barium from Missouri, feldspar from Colorado, arsenic from Montana, and selenium from Canada, to make enough bottles every day to supply one for each white family in the entire State.

You can look, but not too long, through colored glasses into furnaces where these



Photograph from Illinois Central System

#### "AWAY DOWN SOUTH IN DIXIE"

They always sing when cotton pays in the Delta. These fluffy bolls will go to the high-density compress at Clarksdale where bales are squeezed to half their normal size for export. There Lieutenant Governor J. B. Snider edits one of the State's many influential dailies, and reports of big orders in Japanese mills, or a price rise in Liverpool, are front-page news.

products and others from huge bins are melted by natural-gas flames at 2,700 degrees Fahrenheit.

Seventy tons of raw materials are shoveled out of the bins for each day's production of about a quarter million bottles. Out they go, in carload lots, toward their ultimate destinations on drug-store shelves, cosmetic counters, nocturnal milk wagons, liquor cabinets, and beauty-parlor tables.

#### HAULING 118,000 PUPILS TO SCHOOL

South of Jackson, at Crystal Springs, we came upon one of the most surprising aspects of Mississippi's up-to-date educational system, its huge consolidated schools.

This one has 1,350 pupils, of whom 900 are transported daily. On the average 118,000 children are carried free daily in nearly 5,000 buses to and from more than a thousand schools.

Some of the rural buildings are monumental in size and as modernistic in design as the gleaming new glass and chromium structures of Rome or Mexico City. Adjoining many are small apartmentlike

dormitories, where teachers who used to "board out" now reside.

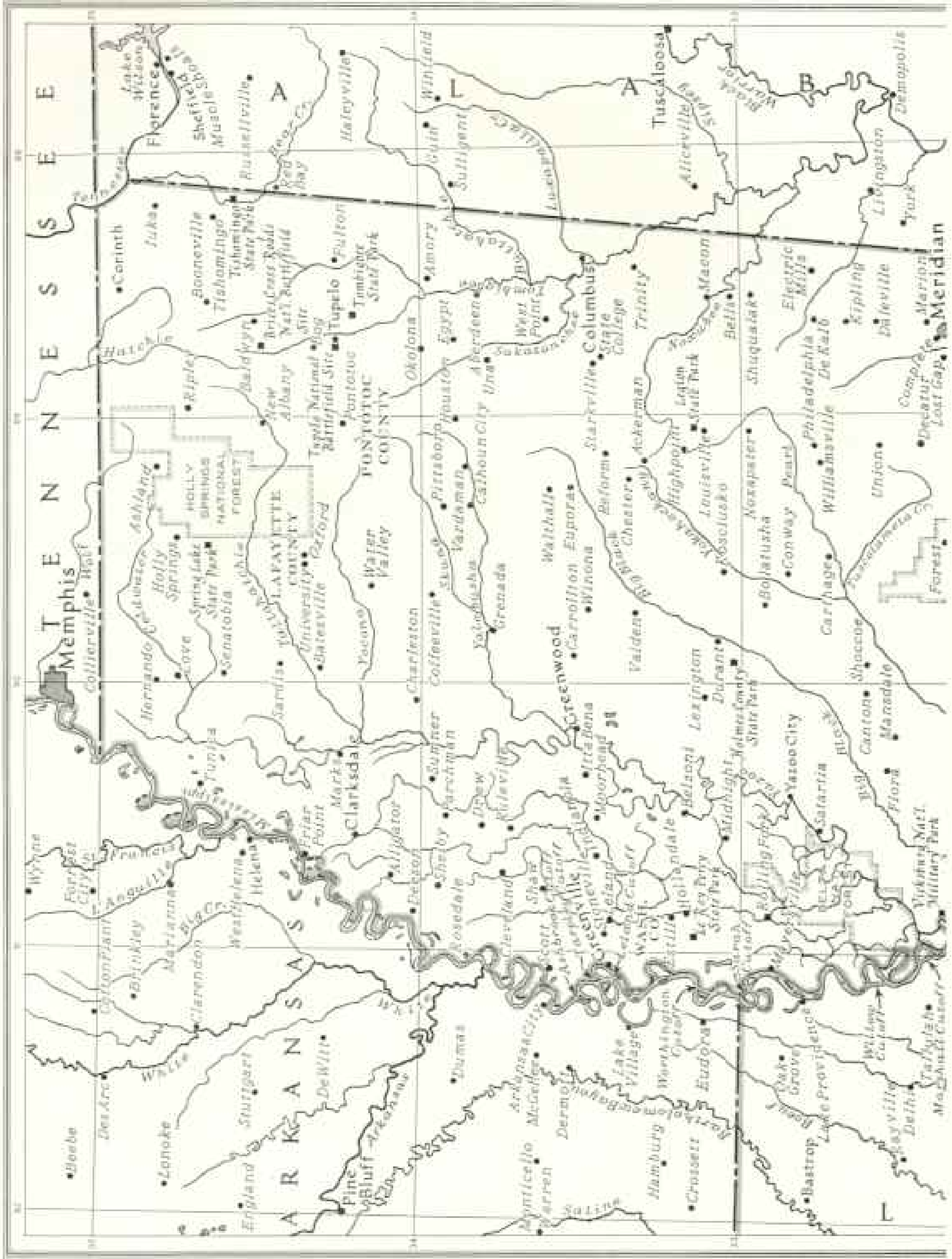
In Crystal Springs still lives the alert, 86-year-old mother of a baseball pitcher famous in southern collegiate games of the nineties, whom a breezy sports writer called "the long, tall canebrake sapling."

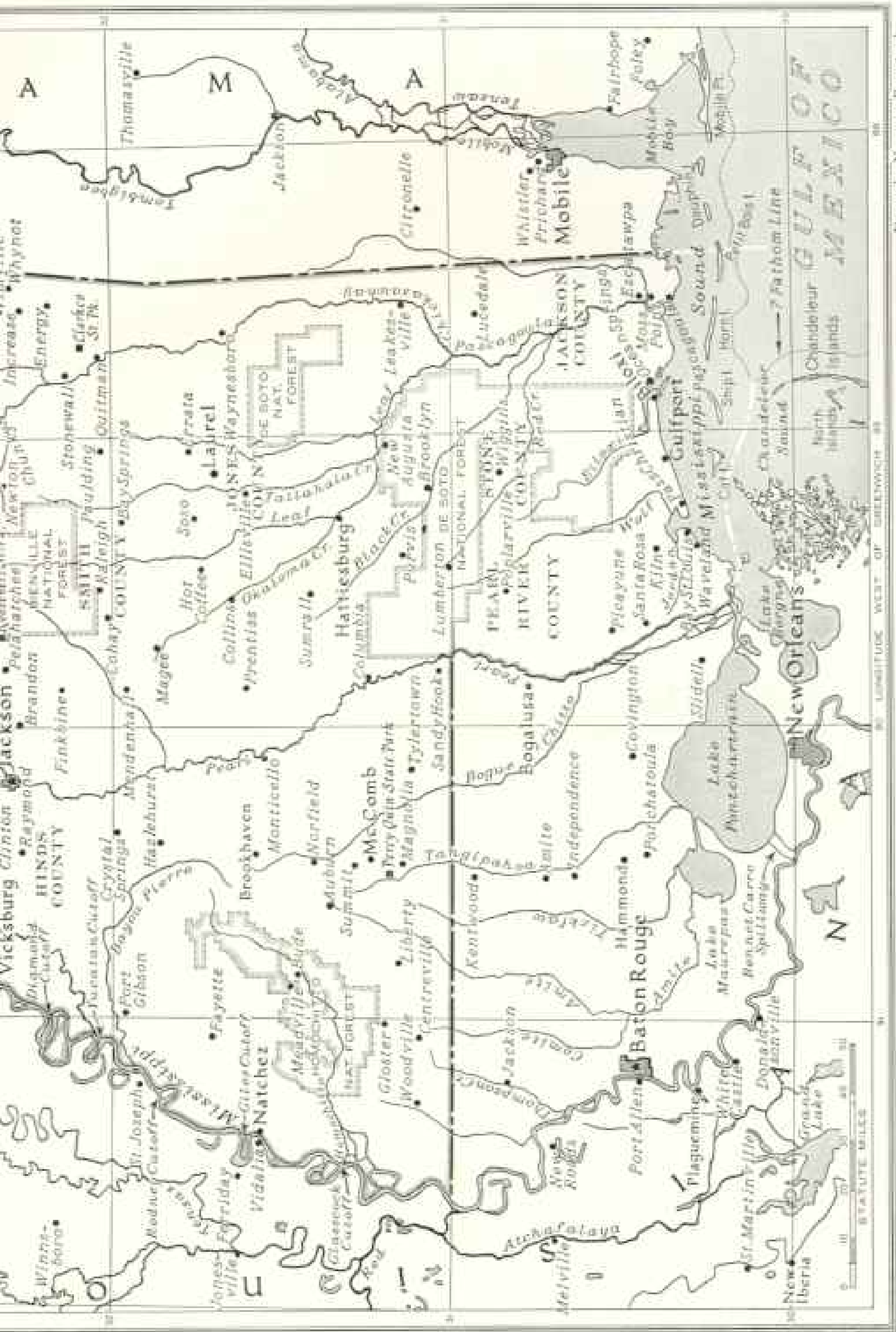
Later the "sapling" taught school until he was elected to Congress at the age of 29 years. Eight years thereafter he defeated James K. Vardaman in a spirited race for the U. S. Senate, and now Senator Pat Harrison is one of the veteran and beloved statesmen in Washington.

#### MOTORING BACK TO HORSE-AND-CARRIAGE DAYS

Driving due west from Jackson to the Mississippi River bluffs, then south along the serpentine channel, was like leafing backward history's pages through the "tragic era" of Reconstruction, to the memorable Siege of Vicksburg, and into the glamorous forties.

Those were the days of melodrama show-boats, palatial stern-wheelers, and proud Natchez planters who sailed up the muddy





Drawn by Newman Baustead

MISSISSIPPI IS VARIED—RIVER BLUFFS, COTTON DELTA, PRAIRIE PASTURES, PINY WOODS, AND GULF FISHERIES

Two major river corridors, the Mississippi and Tombigbee, angle off to neighbor States and help nourish the ports of New Orleans and Mobile. Therefore, Missisippians are elated over the \$42,000,000 road-building program, which they regard as a macadam binder for Jackson shopping and Gulfport shipping.





A GIANT HAND, WITH STERN FOREFINGER POINTING SKYWARD, IS A BEACON OF PORT GIBSON

Originally the odd decoration was oak, but the inroads of woodpeckers led to its replacement by the 7-foot metal figure. Inside the Presbyterian Church are chandeliers from the steambot *Robert E. Lee*, which, in 1870, nosed out the *Natchez* in the most famous Mississippi packet-boat race.

river to bring home European trees, Grecian urns, Spanish grilles, and French furniture, which still grace the mansions where their descendants live.

Ten miles out of Jackson is Hillman College, founded in 1853 as the Central Female Institute. A historic catalogue of the following year advises parents: "The Boarders are allowed to spend no more than 50 cents per month for pocket money. Any young lady Dipping Snuff or bringing Snuff into the Institute is liable to instant expulsion."

Early attention here, and elsewhere, to feminine education is a reminder that Mississippi also was a pioneer in "women's rights." In 1839 a bill was passed giving property rights to married women.

The Pankhurst of that day was a Mrs. Hadley who kept a boarding house in Jackson frequented by members of the Legislature. The story goes that she endured no hunger strike herself, but put the legislative patrons on short rations until they acceded to her point of view!

#### WHERE SLEEP THE DEAD OF NORTH AND SOUTH

As the motorist approaches Vicksburg over newly paved roads, the city still seems in a state of siege. Its sheer bluffs, rising 250 feet and more above where the Yazoo River joins the Mississippi, and the fertility of its rich loess soil that grows a versatile profusion of plants, give it more the aspect of a fortified city of the Rhineland than "the Gibraltar of the Confederacy."

A bird's-eye view of the area's topography tells more vividly than the military books why Admiral Farragut withdrew his gunboats from the booming Confederate cannon in 1862; why Grant and Sherman later abandoned their converging attack from the north; and why General Grant finally evolved the amazing strategy of severing his communication lines and living off the enemy country while he doggedly laid the siege of 47 days in 1863.

The Vicksburg National Military Park is a crescent-shaped tract of rugged scenic beauty, aside from the 898 tablets and the 676 statues, monuments, markers, and other memorials along its 32 miles of well-kept roads.

Most elaborate of these, perhaps, is the Illinois State Memorial, which inscribes in bronze, alphabetically arranged, the names of some 35,000 participants from that State.

Tacit evidence of the healing hand of time is the annual meeting here of many



SHOULDERING THEIR "ONE-EYE AGGIES," OR HOES, CONVICTS HEED THE CALL TO PORK, PONE, AND GREENS

The Mississippi State Penitentiary, at Parchman, grows cotton, corn, hay, and sugar cane on its 16,000 acres. In good years it turns in a surplus to the State Treasury. There are no cells, bars, or paid guards for even the lifers among the 2,500 prisoners. Only trustees may carry guns. Women inmates make the uniforms, and use leftover pieces of striped cloth for crazy quilts.



"GOIN' TO TOWN"

"Sadaday" night is traditional "darkey night" up-State. Then whites stay off the streets and the black families in pre-Sunday best emerge from "catfish rows" and hold orderly carnival. This family is headed for Holly Springs, starting early for the front-yard rummage sales held there week-ends, in which castoff clothing and other goods are spread on garden fences.



A FOUR-FACED CLOCK GRACES THE COURTHOUSE OF THE TOWN THAT TIME FORGOT.

Corinthian columns on the "gallery," two types of windows, proportions of a planter's home—all achieve unity in Oxford's central building. The base of the Confederate Monument affords a siesta place and forum for citizens, and the wrought-iron fence a hitching post for rural shoppers. The bulletin board displays local items as well as legal notices. Neither hour nor date is often mentioned in leisurely Lafayette County. "Come to see me next court" is a popular form of invitation, and the visit is more apt to last a week than a week end.

members from the North and the South enrolled in an organization with the breath-taking title of "Descendants of the Participants of the Campaign, Siege, and Defense of Vicksburg."

Bitterness has vanished, but the tactful Vicksburg visitor will not call "The War Between the States" a mere "Civil War"; and will remember that General Pemberton "tendered" or "presented" his sword to General Grant, and did not "surrender" it (page 265). If "the War" is mentioned, and it will be, he should not inquire "What war?" nor smile if a lady speaks of visiting friends "up north in Virginia."

Lacy iron verandas that overhang steep streets, stately homes with hand-carved furniture, rose-tinted windows, and giant wine demijohns; walls pierced by vagrant cannon balls, and the ante-bellum courthouse built by slave labor—these and many other landmarks attest the proud history of the city of Vicksburg.

#### THE LURE AND LORE OF VICKSBURG

Many are the tales of the Prentiss House, once famous throughout the South for its cuisine and for its proprietor who scorned a printed menu and always presided at the table, calling out the day's dishes in a rich, sonorous monotone.



STARGAZING IS A TRADITION AT "OLE MISS"

Nearly a fourth of the University students take astronomy, a living tribute to Dr. Barnard, a pre-war president, who built the observatory; but delivery of the largest telescope of the time was interrupted by the War (page 299). The white roof of this observatory, now equipped with a fine instrument, was painted by the novelist, William Faulkner, while he was a student here.

Most cherished possession of a few old Vicksburg families are faded war-time editions of the *Daily Citizen*, printed throughout the siege on the plain side of wallpaper, published appropriately by an editor named Swords, whose vitriolic comment on Yankees is recalled by General Grant in his *Memoirs*.

#### INTO THE DEEPEST SOUTH

South of Vicksburg, toward Natchez, the motorist approaches the ever-deeper South of movie sets and romantic fiction. Spanish moss smothers rugged oaks.

The dank, shaded roads, sunk beneath auto-top level in many places, were not excavated by steam shovels, but by the slow erosion of countless wagon and ox-cart wheels cutting the soft loess soil.

Here are ghost river towns, sometimes wholly deserted since freight cars and trucks captured the cargoes of the awkward, blunt-prowed boats that once hauled corn, cotton, whiskey, and hides. Plantation homes, some dilapidated, others restored, attest the easy fortunes of the antebellum cotton boom.

The new Irwin Russell Memorial Bridge spans Bayou Pierre; near it still stands the gaunt hulk of the old bridge the Confederates burned in 1863 to check Grant's approach to Vicksburg. Its rusty pylons, cables, railings, and iron crossbeams reach out crazily to midstream, and its unique flat-spring cables still are an engineering curiosity.

To the wilderness here in 1788 came Samuel Gibson, self-taught stockman, gardener, beekeeper, planter, orchardist, and manufacturer, who boasted that he needed only to buy tea, coffee, salt, and sugar from the outside world.

Here, too, some decades later, came Harman Blennerhassett, first ostracized in England for marrying his niece, then imprisoned for conspiracy in Aaron Burr's empire enterprise, and built a plantation home retreat which he called La Cache.

#### RADIO PANELS AND FAT CATTLE

Even in this quaint town of Old World charm, its bank dimmed by a columned portico, eight churches within three blocks, and wide, tree-shaded streets with hitching posts and troughs for watering horses, there is a busy factory that turns out veneer panels and sounding boards for nationally advertised radio sets. At its annual Fat Stock Show and Auction Sale we met buyers from Illinois, Minnesota, and South Dakota.

The Hermitage still stands, mansion of General Benjamin G. Humphreys, which Andrew Jackson visited and for which he is reputed to have named his own home in Tennessee. General Humphreys, first governor elected after the War, was evicted from the Governor's Mansion at Jackson, and compelled to walk between carpet-bagger and negro troops, some of whom had been his own slaves.

The best-known name here probably is

that of Rezin Bowie, whose body rests in Port Gibson's Catholic Cemetery. The knife, fashioned by a Philadelphia cutler from a blacksmith's rasp after Bowie's model, and first used by his brother in a duel at Natchez, is familiar wherever English is spoken.

#### CROSSING THE NATCHEZ TRACE

Mississippi is not an altitudinous State—the highest point is only 780 feet above sea level—but the highway from Port Gibson to Natchez presents the aspect of rugged mountain scenery. The sunken road, sometimes 30 feet deep, is flanked by escarpments that sheer off to steep declivities and look out over rolling woodland.

Near Fayette is one of the few places where the romantic Natchez Trace is discernible. This Indian trail and subsequent planters' highway saw the first wagon wheels roll between the Atlantic seaboard Colonies and the Mississippi bluffs.

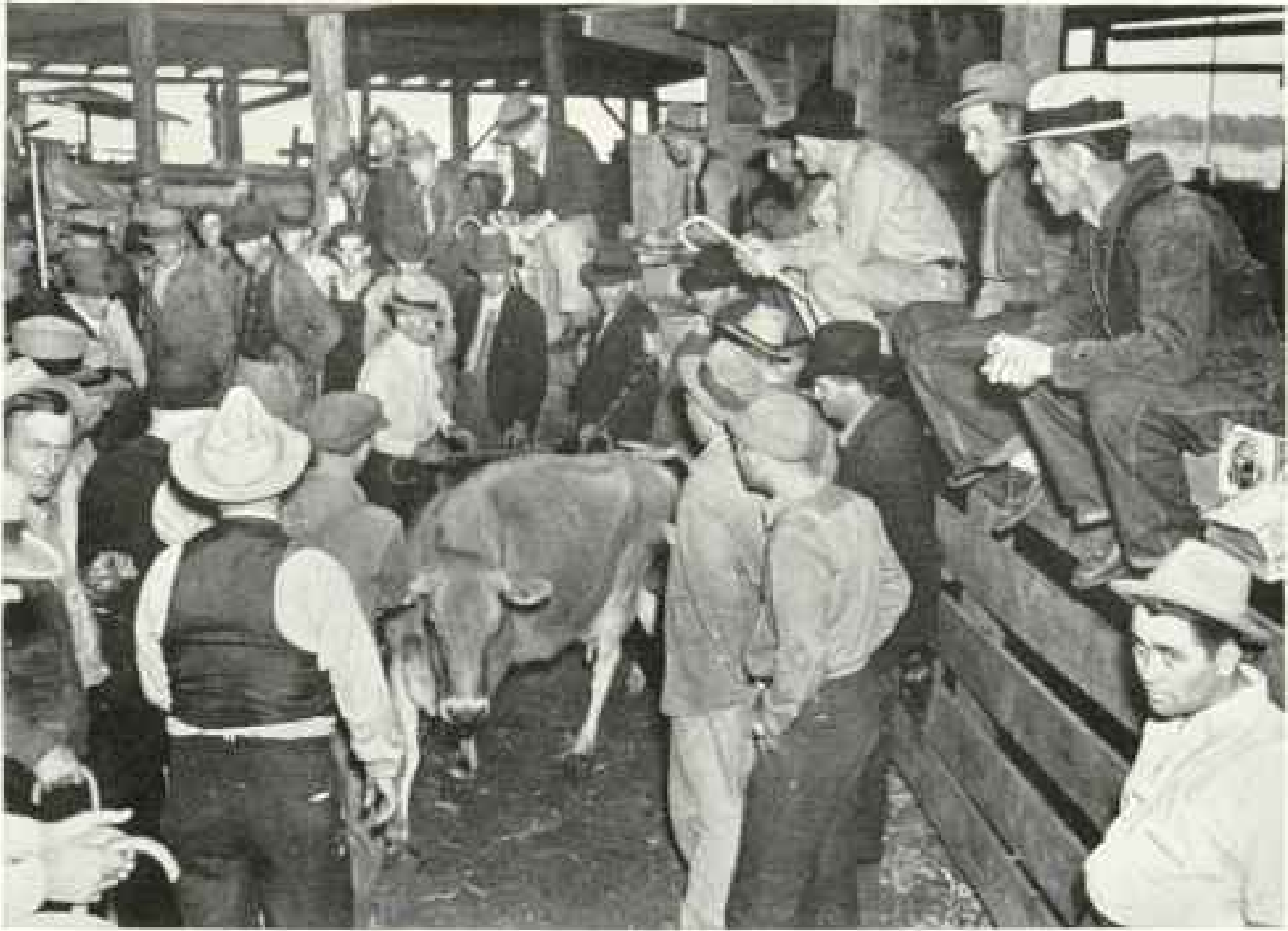
Along it General Andrew Jackson marched his troops to the defense of New Orleans in the War of 1812. Later it was a veritable Khyber Pass for highwaymen and bandits to prey upon travelers going east in stagecoach or luxurious carriage with the moneybags of their cotton-crop yield.

Before entering Natchez one may visit Windy Hill Manor, quaint home of a planter, with its dormer windows in a transverse-ridge roof and its front-door fanlight of opalescent glass tinting its ingenious spiral staircase.

Here, in 1807, Colonel Benijah Osmun sheltered Aaron Burr after the latter's release on bail. Beneath the moss-draped cedars and myrtles on its sloping lawn the courtly Burr met Madeline Price. After he forfeited his bond he risked capture by remaining at the neighboring cottage of Widow Price in a vain effort to persuade Madeline to flee with him.

Natchez is the Williamsburg of Mississippi, with the startling difference that its citizens live on in their ancestral homes, which adhere to no set pattern or period.

In one day we saw mansions in the style of Spanish grandee, English Tudor, French provincial, and Italian villa. Their conglomerate furniture and furnishings ranged from Chippendale to cloisonné, Salem to Neapolitan, early river steamboat saloons to Virginia Colonial, Imperial Peking to Patapsco.



TUPELO'S WEEKLY CATTLE AUCTION BRINGS BUYERS FROM A DOZEN STATES

Though it makes cotton cloth and clothing, the "first T. V. A. city," with its factories, milk plants, and grazing herds in the surrounding countryside, seems more like a Middle West town than a Mississippi community. It is in the heart of the prairie belt, and even had a cyclone that resembled a violent Kansas "twister" (page 300).

Over an Early American mahogany table still is suspended an India punkah which used to oscillate by handpower of a plantation negro in London town house livery.

All this is credible only when you recall that Natchez gave allegiance successively to the flags of France, England, Spain, and the United States, not counting the Confederate interlude. Each occupation left its culture and columns and social castes.

Moreover, in the gay and golden forties Natchez was accounted one of the richest towns of its size in all the world. Its cotton tycoons roamed Europe, New England, and Baltimore to sell their crops and spend their fortunes.

A ship was chartered to bring from Europe the carved mantels, gold-leaf mirrors, and other furnishings of Stanton Hall.

New England coastal houses of the period had their widow's walks to scan the sea for incoming fishing fleets. You can still climb the observation towers of Natchez homes where the lordly planter viewed his acres and his slaves at work.

Faded household accounts show clothing of expensive cloth and stylish cut made to measure in Philadelphia at \$100 a suit, and shoes from Boston and Paris at from \$10 to \$14 a pair.

"There are old libraries here; the letters and the oratory of those times abounded in Greek and Latin quotations; why did they write so little in those days?" I asked a student of the State's history.

"In New England of a comparable era," he replied, simply, "Emerson, Thoreau, Hawthorne were writing a literature of protest. They sought a better life, a more gracious civilization. Natchez had it, and just lived it."

#### SERENES OF FOUR FLAGS

In a morning's stroll around Natchez one may visit shrines of each occupation.

The site of Fort Rosalie, founded by the youthful Bienville in 1716, overlooks the riverside site of the notorious settlement "under the Hill" where desperadoes, renegades, and escaped slaves held sway while



"I USED TO WEIGH 467 POUNDS, BUT I FELL OFF TO 426"

William E. Rankin is the heavyweight rural free delivery mail carrier of the United States. Daily he makes his rounds, while a slender older son runs a consolidated school bus over a 30-mile route. At the historic John Ford home near Sandy Hook, where he lives, with its ground-floor kitchen, gallery, and outside stairway, Andrew Jackson stayed in 1814 on his way to the Battle of New Orleans. A statehood convention met here in 1816, and troops camped in this yard in 1864.

the reputable residents of "Natchez on the Hill" kept literally and figuratively aloof.

The British, arriving in 1763, left fewer traces than either the French who preceded them or the Spanish who followed, after the spirited Don Bernardo de Gálvez, Spanish governor of Louisiana, captured the city 18 years later.

Remaining are the spiral iron stairways, the hand-wrought iron railings, the enclosed gardens, and the broad verandas of the Castilian builders.

Then came the Stars and Stripes, in 1798, and soon the era of planters who erected homes that, even with slave labor, cost tens of thousands of dollars.

Enormous rooms with lofty ceilings, carved panels of rosewood and mahogany, stately columns and elaborate gardens,

huge fireplaces, broad galleries, doorknobs and hinges of solid silver—all attest lavish and lordly expenditure.

There is even a Moorish castle of 32 rooms, opening into a central rotunda and out upon encircling balconies. It has mantels of Egyptian marble, a sideboard of precious woods ornamented with carved figs and various Mediterranean fruits, huge mirrors in gilded frames, and an intricate bronze candelabra.

But the niches which were to hold imported statuary are empty, the place for a marble stairway ordered in Italy is vacant, and a library designed for the owner's 10,000 volumes is comparatively bookless, because the War interrupted the furnishing of this amazing mansion.

Tools were thrown aside, scaffolding



UNDER A HOT TIN ROOF THE PLANTATION SMITHY STANDS

"Yes, suh, we holds by mules," explains a shoer on the mammoth Scott Plantation, which employs no tractors, but has some 900 mules to cultivate its 35,000 acres (page 287). Thus the mule buyer is an important official of this biggest United States cotton plantation; so is the head blacksmith, who has a series of shops and a coterie of negro helpers.

abandoned, buckets of paint were left to dry, and these remain today as more vivid evidence than landscaped battlefields or ornate memorials of the sudden shock of the call to civil arms.

The very names of many estates have the euphony of romance: Melrose, Elmscourt, D'Evereux, Propinquity, Green Leaves, Auburn, Monmouth, Montaigne.

#### A THREE-PERIOD HOME

Richmond demands mention because it incorporates three parts which represent three Mississippi epochs. The central portion is provincial Spanish, with a shallow pitched roof, and a flaring outside stairway of iron balustrades leads to a balcony portico off the drawing room. Below are rooms with brick floors where servants, stable boys, and domestic animals huddled.

The back part is an austere two-story brick wing that might have been transported from Beacon Hill, in Boston. The front is an ornate example of the Greek-planter style, with a two-story portico supported by Ionic columns, and a Colonial entrance with Doric pilasters.

Two treasured antiques within are the piano used by her accompanist when Jenny Lind sang in Natchez, and a cumbersome ante-bellum shower-bath device, operated by heavy hand-wrought iron gadgets, and called "portable." Perhaps it was, when three or four brawny slaves were available to move it about.

#### WHERE COTTON IS KING

Retracing our route to Vicksburg, and driving north toward Greenville and Clarksdale, we plunged straight into the



Delta, that "strange land of huge plantations, feudalistic, cotton intoxicated," the fiber empire of today that Natchez was a century ago.

One road, that to Yazoo City, follows the sharp cleavage between Bluffs and Delta. To the right, sheep and goats graze on hills that seem steep; to the left bland fields of sleek cattle and snowy cotton stretch across an unbroken plain.

To the Mississippian "the Delta," spelled with capitals, is not the Mississippi's marshy mouths, but the Greek-letter-shaped triangle between that river and the Yazoo (map, pages 268-9). There patient Nature laid down the tar-black alluvium and decayed leaf mold that form the richest cotton land this side of the benign Nile.

This Delta "begins in the lobby of the Peabody Hotel in Memphis and ends in Catfish Row in Vicksburg." It is as flat as a Netherlands landscape. In August towns loom like mirages on the pancake level of fluffy fields dotted with black men, women, and children, trailing their bags and singing as they pluck the white gold from the black-earth acres (page 267).

Rows of willows, honey locusts, gleaming birches, cypress, and swamp hickory mark the mesh of rivers, creeks, lakes, and bayous that make this an area of thousands of inland islands. Like a lazy field hand the river drops its silt along its banks, then the channel narrows, twists, and bends to avoid its self-made obstruction. Five or ten miles back of its course the land is lower than at the water's edge.

An endless array of negro cabins, some neat and whitewashed, others unkempt and dilapidated, surround the planters' homes, stores, gins, and barns.

#### LOAM, CLAY, AND "BUCKSHOT" SOIL

Any Delta citizen will talk about soil with the fervor of a Californian praising sunshine, or a Gloucester fisherman sizing up a nor'easter.

They teach soil in the schools, and talk about it before Rotary Clubs. A banker will assay the fine, sandy loam between thumb and forefinger as he passes upon a plantation mortgage. And when it comes to Yazoo clay and the underlying "buck-shot" stratum—then the paeans well to the tenderness of poetry.

The late John Sharp Williams, senatorial "sage of Yazoo," he of ready response and

rapier wit, famed in Washington for World War and States' Rights orations, won many home votes, they say, by sheer eloquence about Delta dirt.

We drove out to the cotton plantations on cotton-reinforced auto tires, steered by a part-cotton wheel, to take a picture of a cotton gin with film that utilized cotton linters.

The Pharaohs of this former flood plain are the affluent planters, also the corporations and northern insurance companies that now operate thousands of acres they took over during the cotton price slump.

"But we are not in the cotton business; we don't want to go into the cotton business," insisted a Boston banker one day in 1931.

"Well, you all mixed in the cotton business in the sixties; anyway, you are in it right now," drawled a Delta planter as he laid a pile of mortgages on the banker's desk, bowed low, and set forth for a trip to Europe.

#### HOW SHARE CROPPING WORKS

The negro provides the labor of this Dixie Egypt that grows enough pyramids of long-staple cotton to sheathe the structures of Cheops and pile up more besides. He represents more than 70 per cent of the Delta population. For the most part he is a share cropper or tenant farmer; sometimes he acquires a patch of land.

"Uncle, did you ever think of buying land of your own?" I asked a white-haired negro who was tinkering with his plough.

"Deed and I has, suh," he admitted. "But now I'se got two mules, a wife, and seven chillun. Come plantin' time and I needs my rations. Come layin'-by and I'se got to buy shoes for the family, and a new dress for the missus. Can't go to camp meetin' with ole clothes."

"Don't your boys work?"

"They helps pick, but they gets schoolin'. Then they gets ideas. Nowadays some young uns are powerful lazy. And seems like the bright ones all want to put on high collars and be preachers.

"Not that I hold agin religion. I goes to meetin'. But these boys who want to preach—all they do is preach on Sundays, and exhort about givin' money to de Lawd. Then they take the money weekdays and you find 'em in back rooms and secret places, doin' nuthin' but drinkin' Coca Cola!"

## MAGNOLIA STATE MOSAIC

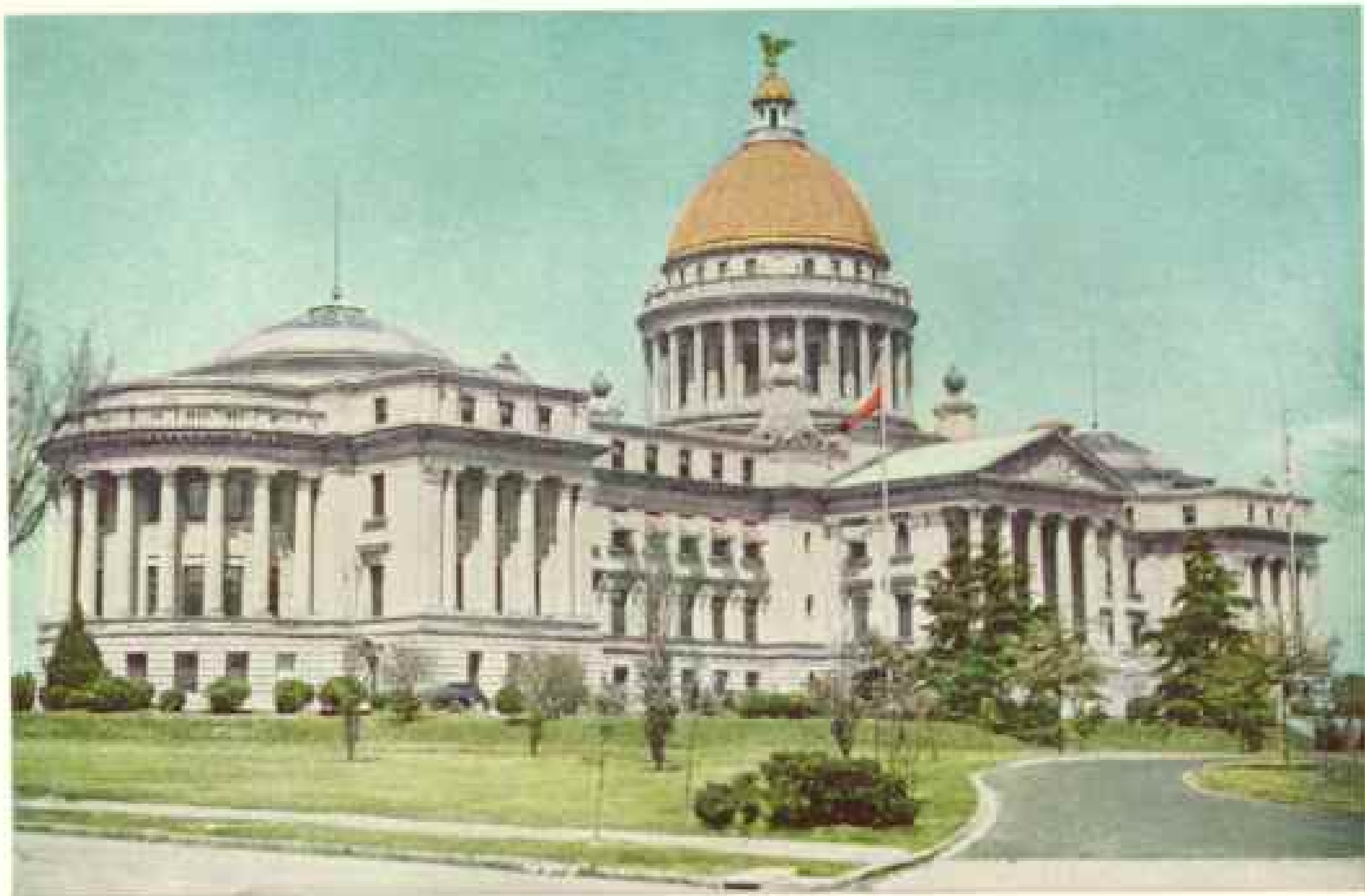


© National Geographic Society

Dufaycolor Photograph by J. Basler Roberts.

### SEVEN FLAGS HAVE FLOWN OVER COSMOPOLITAN BILOXI

Around the site of this historic lighthouse, tended by mother and daughter for 62 years, rose the town which supplanted the earlier settlement on Biloxi Bay, and became the capital of more than half the area that now is the United States. The flags, left to right, are: Stars and Stripes, French, Spanish, British, Confederate, Mississippi Magnolia, and present Mississippi State.



MISSISSIPPI'S STATEHOUSE RISES ON A MAN-MADE CAPITOL HILL.

The penitentiary which occupied this Jackson site was so solidly built that it was easier to fill in and erect the new structure on top the mound. Completed in 1902, the domed edifice, resembling the U. S. Capitol, supplanted the Old Capitol of 1839, which still houses many State offices (Plate VIII).



© National Geographic Society

Dufaycolor Photographs by J. Baylce Roberts

SEVEN FISH IN THE CITY OF SEVEN FLAGS

Biloxi cans shrimps and oysters, and also is a center of commercial and sport fishing. On the line are: channel bass, or red drum; speckled sea trout, or weakfish; spotted brown grouper; Spanish mackerel; sheephead; brown grouper, and red snapper.

## MAGNOLIA STATE MOSAIC



### A COLONIAL CITY HALL ADJOINS AN ULTRAMODERN COURTHOUSE

The Hinds County judicial seat is a contrast to many ante-bellum, slave-built structures, with iron fences, hitching posts, and clock cupolas. Where pansies grow stood Jackson's gasworks before natural gas was found in the city. The city hall is part two-story, part three-story, as its windows show.

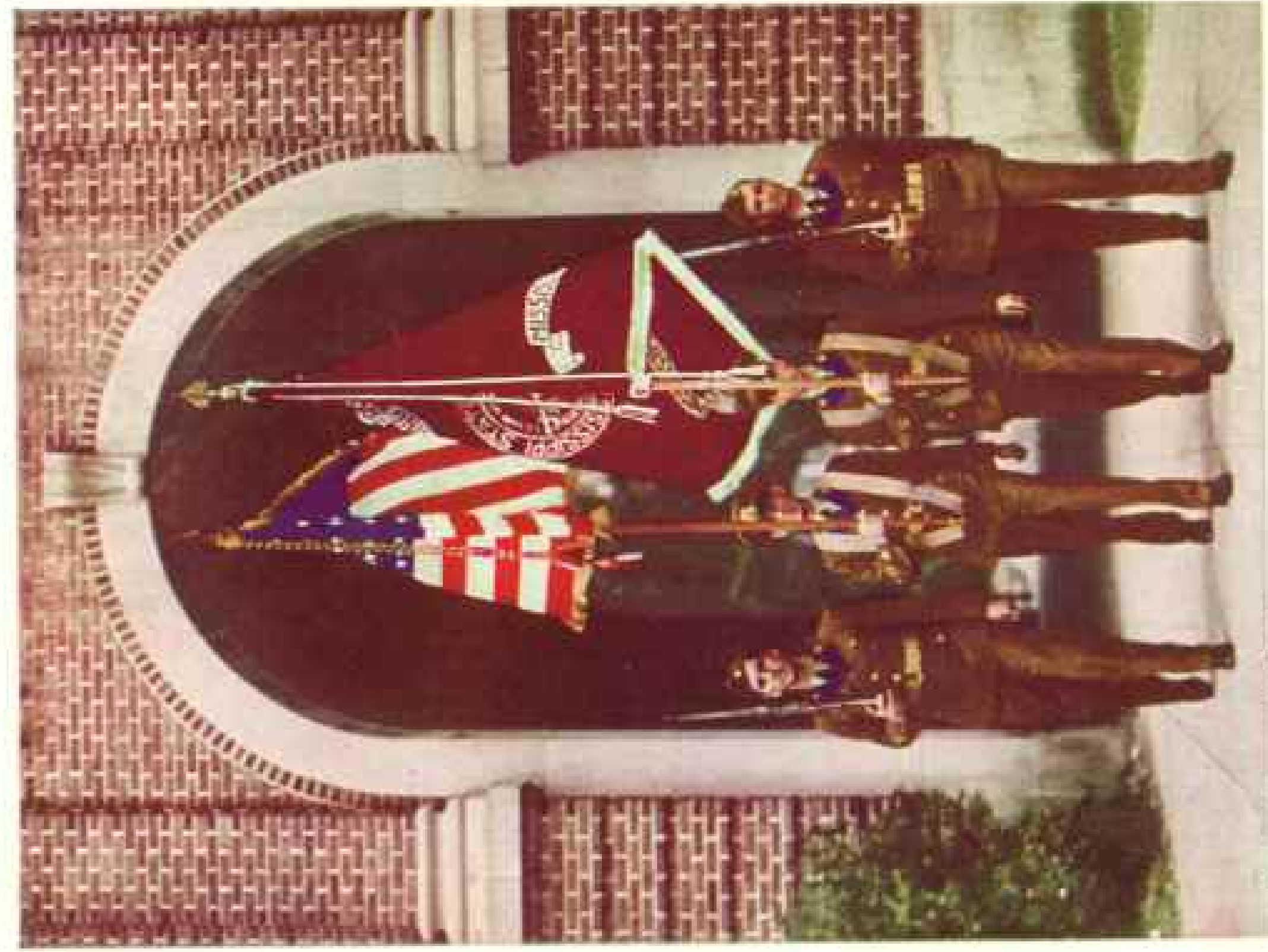


© National Geographic Society

Dufaycolor Photographs by J. Bayler Roberts

### A MILL TOWN IS A STATE ART CENTER

In Laurel's Lauren Rogers Gallery hang paintings by Constable, Turner, Millet, Israels, and modern Americans, such as these landscapes by Thomas Moran. Here, too, is a collection of rare books and baskets from all over the world.



© National Geographic Society

**THROUGH THIS PORTAL PASS 1,200 STUDENT SLEEPERS**

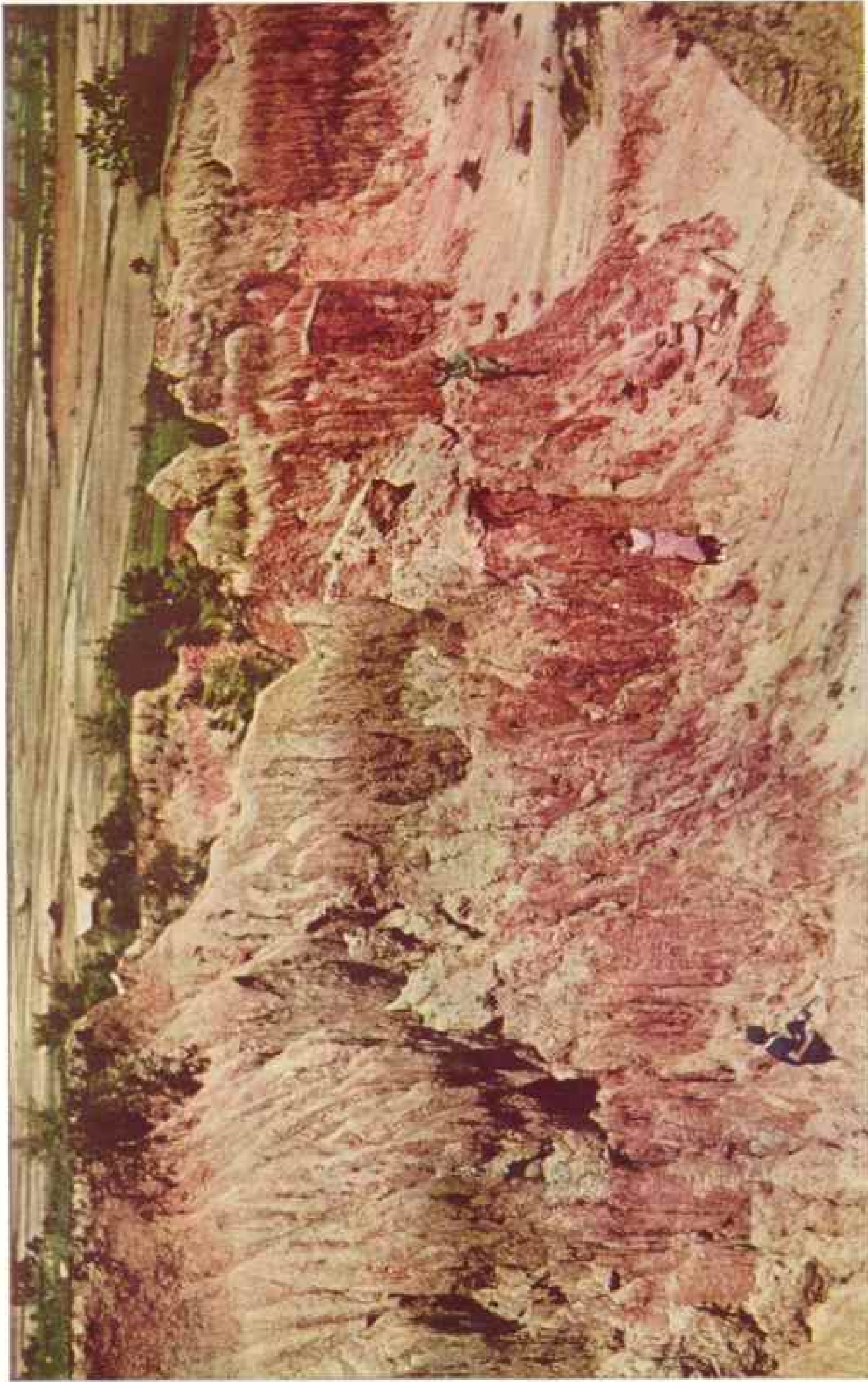
Mississippi State College, near Starkville, has one of the world's largest single dormitories. The R. O. T. C. color sergeants are emerging from the "sally port" with the Stars and Stripes and the school's colors for regimental parade of more than a thousand cadets.



Finlay Photographs by J. Baylort Roberts

**THE AUTHOR OF "HOME" AT HOME IN HIS GARDEN**

I have a need of silence and of stars;  
 Too much is said too loudly; I am dazed,  
 Mississippi's "poet laureate" and world traveler, William Alexander Percy,  
 of Greenville, wrote his popular poem beginning thus while in New York.



© National Geographic Society

Fielder Photograph by J. Taylor Roberts

**BANEFUL EROSION HERE TURNS BENEFACTOR AND REVEALS A NATURAL WONDER**

Rain and wind did the vast excavation which paints the landscape red around Flora. Washing away the loose brown loess soil carved the Petrified Forest in rugged relief. In earlier ages a stream heavily impregnated with lime formed the petrified sculpture which thus was uncovered.



THE OLEANDERS, THE COSTUMES, THE ACCORDION—ALL RECALL HOMELAND

Slavonian girls, descended from migrants when Austria-Hungary was in flower, dance in native costume against pink oleander, which grows profusely along Adriatic shores, to music of a favorite southern Slav instrument.



© National Geographic Society

Finlay Photographs by J. Baylor Roberts

"OURS IS THE DANCINGEST STATE YOU EVER VISITED!"

These girls from the Mississippi State College for Women practice the Commonwealth's most popular art. Interpretative dancing is a part of their course.

## MAGNOLIA STATE MOSAIC



HIGH STEPPING AND HIGH HATTED ARE THE STUDENT DRUM MAJORS

From all parts of the State come school bands to Jackson to compete in concerts, solo numbers, sight reading, and marching (Plate VIII). Here the baton wielders "strut their stuff" before the State Capitol building.



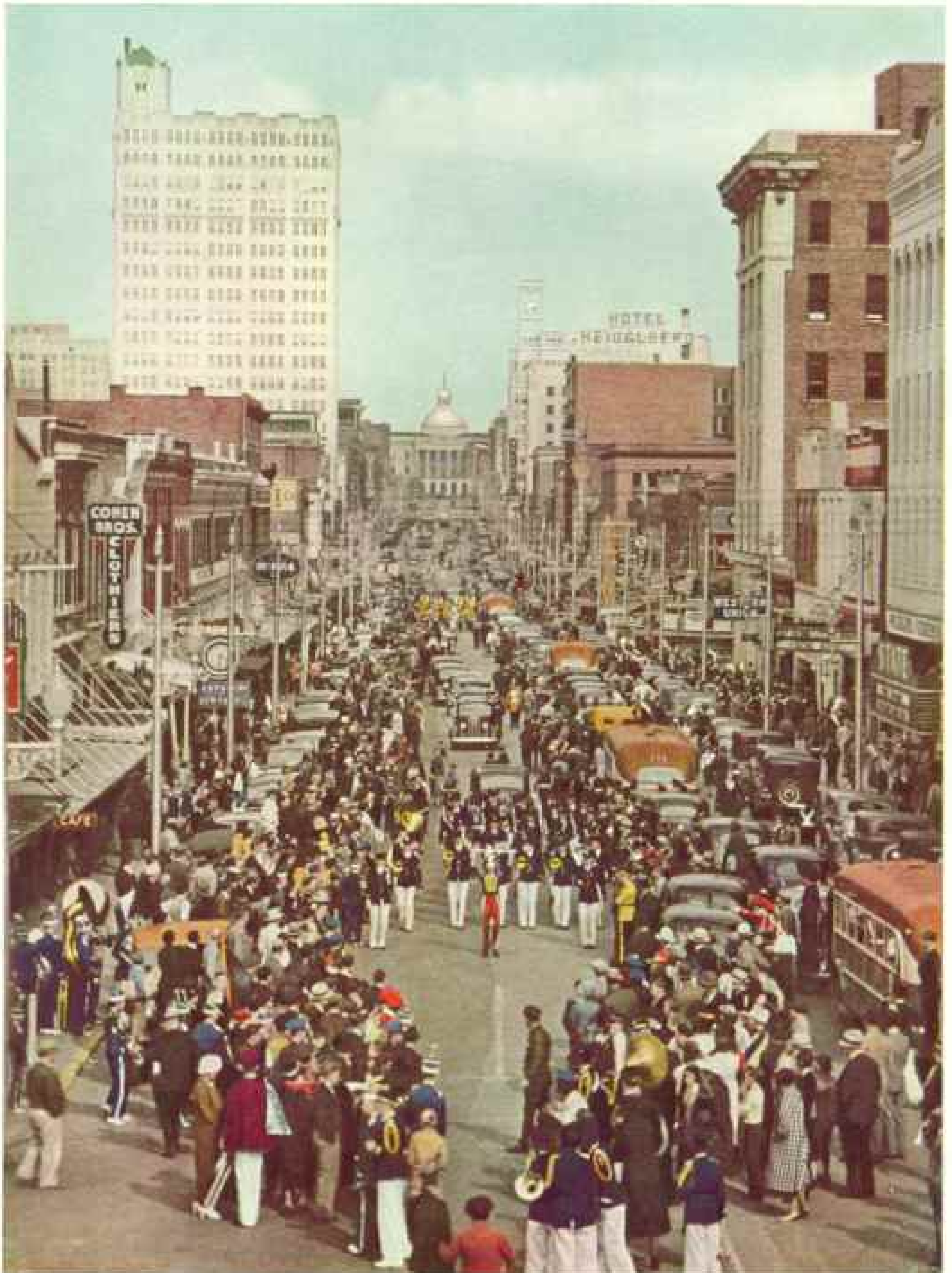
© National Geographic Society

Finlay Photographs by J. Baylor Roberts

### IT MIGHT BE A ZIEGFELD FOLLIES CURTAIN

However, it is a living mural of a dancing group at "Women's State." For campus and classroom wear these students are restricted to an all-blue uniform.





© National Geographic Society

Dulcicolor Photograph by J. Baylor Roberts

**HERE COMES A PARADE—AND IT IS ALL HANDS!**

"Stars and Stripes Forever" play these high school units as they march down Capitol Street in Jackson for their annual concert contest (Plate VII). In the background, seemingly overawed by skyscrapers, is the Old Capitol where Mississippi voted to secede from the Union. Sidewalk awnings generally shelter shoppers from the midday sun.

To the plantation stores, which extend them credit from May "plantin' time" until September "pickin'," come the share croppers for their "three M's"—meat, meal, and molasses. One negro's requisition always was: a peck of corn meal, three pounds of salt meat, one pound of coffee, one gallon of black molasses, and one plug of "Red Coon" chewing tobacco. The only variation was that sometimes he preferred to chew "Brown's Mule" or "Dixie Land."

#### UNCLE SAM'S BIGGEST COTTON FARM

The Scott Farm, north of Greenville, illustrates how share cropping operates on a well-managed plantation, where owners find it profitable to keep workers healthy, happy, and contented to remain year after year.

The Scott establishment is the principal holding of the Delta and Pine Land Company, British-owned biggest cotton plantation in the United States.

It uses mules, not tractors; pays its workers by shares and not in daily wages; and picks by hand, not by machinery. Thus it is typical, except for its size, of many of the larger Delta plantations.

The Scott Farm alone, exclusive of two subsidiary holdings (at Deeson and Estill), spreads over an area nearly as large as the District of Columbia. On it live about 900 families, aggregating 3,300 people. In 1936 it sold 13,200 bales of cotton and more than 5,000 tons of cottonseed.

Managers of each of its eleven units report to a general manager and his staff. Among its experts are research scientists in breeding and a "mule buyer" who cares for its 865 animals. There is a head blacksmith with a gang of helpers (page 277), a building crew to keep its more than 1,000 houses in repair, a meat-curing plant for its croppers, and a savings department where they may deposit their earnings.

A physician is always on call and presides over the hospital where 97 babies were delivered last year. Workers' children attend seven county schools on the premises.

Airplanes are hired to fly low over its fields and dust the plants with powdered calcium arsenate to poison the boll weevil.

For the share cropper and his family the management furnishes a cabin, mules, fuel, water, tools, cottonseed, and credit for clothing, food, and other necessary provisions. Each worker of the family is

allotted six acres to grow cotton, and two more acres for his own corn, vegetable garden, cow and pigs. Credit is extended at the rate of \$1 per acre per fortnight.

At the end of about 125 days the worker receives exactly one-half of the current price of the cotton he raised, the amount of his rations account is deducted, and he is handed the balance in a lump sum.

In some poor years he may receive less than his store bill. Then the account is closed and the plantation takes that loss in addition to overhead.

In 1931 the Scott Farm wrote off \$80,000 in unpaid tenant accounts. Last year it paid a single tenant family of man, wife, and four children \$1,480 for their share of a good crop.

The Scott general store annually reports about \$260,000 gross sales. Negro families at Scott own 280 automobiles, ranging from new cars to Model T's and other museum pieces.

At pay-off time some thrifty croppers buy a patch of land, some deposit their savings, others indulge their fancy for such characteristic Delta negro luxuries as gold teeth, riding on trains, and the inevitable "rolling the bones."

One faithful worker was all for buying his own mules when \$350 was handed him. But his wife and children had other ideas, and they prevailed. He invested the lump sum in an automobile. He forgot about gasoline, but borrowed enough for a few trips. Then he had a puncture. Soon there came a freeze and cracked the radiator.

He descended upon his family in a tirade of impotent indignation. "What did I tell you? You got your auto; now there are no tires, no gas. She's cracked up and no money to fix her. Next time I buys mules; they drains theirselves!"

#### A GREENVILLE PILGRIMAGE, A. D. 2037

Greenville is the Natchez of today's cotton empire of the Delta. One may imagine a Greenville Pilgrimage of 2037, when alert young belles, wearing the tailored suits, short skirts, and quaint cubist hats of today, will meet visitors as they step from their airplane parking field to view the gracious homes, wide streets with trees down the center, and concrete levees sloping steeply to the river port.

Already cacophonous cranes and windlasses have replaced the chanteys of roust-



HERE'S WHERE THE MODERN DEPARTMENT STORE WAS BORN

Horse collars, radios, plug tobacco, cane syrup, straw hats—the infinite variety of a Mississippi crossroads emporium might baffle a buyer from Gimbel's or Marshall Field's. This establishment is practically all of Williamsville; many similar ones are run solely for share croppers on large plantations.

abouts, and tiers of barges anchor there instead of paddle-wheel palaces with mahogany bars, and mustache cups on long, laden tables beneath cut-glass chandeliers and carved ceilings with gilded mermaids.

All the manual power of Washington County would have been taxed to load barges and freight cars with its 1936 cotton crop of more than 119,000 bales, from which planters realized nearly nine million dollars. That is not to mention a million and a quarter dollars in corn, and about a million dollars in alfalfa and hay.

We passed hundreds of acres of soybeans that, back east, we may even now be eating in muffins, soup, salad oil, breakfast food, soda fountain drinks, and sausages; or buying, in the fabricated form of linoleum, waterproof coats, candles, soap, or a bottle of ink to write "thank-you notes" to our Delta hosts.

At Greenwood, which proclaims itself "the world's largest inland long-staple cotton market," the conversation is cotton, cotton, and more cotton.

If you can't talk cotton with the shippers, the buyers, the factors, the planters; or discuss gins, compresses, staple lengths, and cover crops, you will be lonesome there.

In the cotton exchange gather the classifiers, those experts whose fingers are as sensitive to the 150 or so grades of cotton as a taster's palate is to the flavors of tea.

#### BAGHDAD ORDERS A MODERN MAGIC CARPET

On loading platforms, aside from bales enough to build miles of levees—257,256 bales were shipped from here in the 1936-7 season—are large boxes bearing addresses at one time or another of all the 48 States and many foreign lands. We wrote down



THEY WILL MEASURE THESE FIBERS AND TEST THEIR QUALITY.

By ginning and drying methods developed in the laboratories of the U. S. Department of Agriculture at Stoneville, texture of summer evening gowns and durability of automobile tires have been improved. Two-fifths of America's cotton crop is used by industry in myriad products—roofing, boxing gloves, air brakes, balloon covers, shin pads, shower curtains, and parachutes.

a random few: Venezuela, Newfoundland, Poland, Java, Mexico, Borneo, New Zealand, Guatemala, Japan.

These 30-pound packages contain radio-testing instruments manufactured here. If a receiver goes wrong in dusty Peiping, venerable Rome, bleak Patagonia, or lush Martinique, the service man who calls around may be lugging a set analyzer from Greenwood, Mississippi.

His Majesty, Ghazi I, monarch of Iraq, is a radio fan. An order for such equipment from Baghdad recently was signed "Shaker Hameet, the Keeper of the Privy Purse to H. M. the King of Iraq."

Still zigzagging north we veered over to Grenada, the city that was officially married. Following the treaty of Dancing Rabbit in 1830, white men rushed into this Choctaw area and two contiguous

towns sprang up, Pittsburg and Tullahoma. The rivalry of each to swallow up the other was resolved by a resourceful clergyman at a barbecue on July 4, 1836.

He summoned a fair maid from one, a swain from the other, and before the assembled citizens solemnly read the marriage ceremony.

"And now, what shall this united couple be called?" he intoned.

Naturally, the residents of Pittsburg shouted that name; those of the other shouted as lustily for Tullahoma as that liquid appellation could be shouted. An old ferryman of Spanish descent yelled "Grenada."

"I hereby pronounce Pittsburg and Tullahoma to be one, and the name of this happily married couple to be Grenada," concluded the minister.



HE BROADCASTS FROM THE COURTHOUSE STEPS

"Bargains today at Sulm's!" "Vote for Bilbo!" "The *Hindenburg* exploded at Lakehurst!" "Oyster supper tonight on the church lawn!" Like all good announcers, Canton's town crier intersperses his paid political, merchandise, and social items with highlights of the day's news.

Other names on the map of Mississippi suggest the clue of many a story: Soso, Whynot, Alligator, Love, Chunky, Reform, Complete, Vimville, Errata, and, believe it or not, Ripley (pages 268-9).

The steaming brew is still served at Hot Coffee, though the innkeeper who named the village to advertise his beverage long since died.

#### POSTMARKS FROM SUNRISE TO MIDNIGHT

The postmaster at Midnight has the advantage of a year-round business over his colleague at Santa Claus, Indiana. Recently a collector of covers with an ap-

parent astronomical bent asked him to add his cancellation stamp to an envelope which already bore those of Sunrise, Minnesota; Sunset, Maine; and Moon, Kentucky.

Midnight memorializes the memory of that rarity among *Homo sapiens*, a poker player who knew when to quit! The stakes of a game long ago in a frontier shack were acres. When the winner accumulated enough land for a farm he arose, looked at his watch, and announced, "Gentlemen, it's midnight, time to go home, and I'll call my winnings that."

#### PEACH BLOSSOMS AND DOGTROT DWELLINGS

It was peach-blossom time as we drove from Grenada to Oxford. The pink orchards painted

pastel patches against the backdrop of silvery cypress and gums, beech and birch. Every home, even the humblest "dogtrot" shanties, had peach-tree shade.

The dogtrot house is as characteristic of Mississippi as its negro folk songs. In its primitive form this dwelling has two rooms, with a floorless and doorless passage between, and a roof over all (page 293). It emerges now in more elaborate homes with additional rooms on each square side, and the dogtrot is a hallway, floored, furnished, and the doors often have graceful fanlights above.

Prosperity has added porticoes with

columns. But still, all over the State, the cubic units and the passageway are retained.

In contrast to the smooth Delta, with its crazy-quilt stitches of bayous and irrigation ditches, the highland around Oxford drops into fields of eroded clay like folds of a blanket hanging over the foot of a cot.

It is hard to believe that settlers once swarmed like locusts to this scarred and rumpled land.

The sluggish Tallahatchie, tired and jaundiced with loam stripped from the watershed, once was laden with cotton cargoes—"an artery pumping new blood into the lives of its upper valley with each throb of the Liverpool markets."

Then came the War.

Scattered through here today are the human remnants that William Faulkner writes about, often so poor now that they cannot afford a mule to till the worn-out soil.

At Coffeeville is a Soil Conservation Service Camp where some ten million black locust and other seedlings were grown last year to halt the scoop-shoveling of wind and rain. The Sardis Reservoir, at Batesville, will help, too.

#### OXFORD AND "OLE MISS"

Like an oasis in this newborn desert are the University of Mississippi (Plate IX)



A TWO-IN-ONE MODEL

If you take size 56 the Weaver Pants Corporation, at Corinth, can supply you out of stock. If your girth is of larger circumference you will have to order them specially made. One customer takes seventies. Pants from here were made to order for members of the Byrd Antarctic Expedition.

and the adjacent town of Oxford, tree-shaded, with hitching posts and "heaven trees" in the yard of its white courthouse. Pigeons perch in the cupola with its clock of four faces that seldom agree (page 272).

Here lived Lucius Quintus Cincinnatus Lamar, United States Senator, Cabinet member, and United States Supreme Court Justice, whose generous eulogy of Charles Sumner, of Massachusetts, helped heal the wounds of war and reconstruction. Jacob Thompson, of Oxford, served as Secretary of the Interior under James Buchanan, and subsequently was a Confederate war hero.

Oxford is very much the "Jefferson" of



OVER MERIDIAN THE KEY BROTHERS TRAVELED "TWICE AROUND THE WORLD"

Al Key tells boy visitors of the thrills of the monoplane flight which set a world endurance record of 653 hours, 34 minutes, from June 4 to July 1, 1935. Scores of Meridian citizens helped the "home town boys" by making the radio, supplying fuel, and sending up food. One of the 438 contacts with the "sky apartment" was a dental prescription for which directions were given by radio.



"TURN THE TURNIPS THIS WAY, SISTER"

Literal round tables are set for patrons of the Heil Hotel, Mendenhall. The "boarding-house reach" is eliminated by placing service dishes on a revolving piece in the center, and each guest may "spin his own" helping.



YOU RUN FOR YOUR OWN WATER HERE, AND MOTHER CHURNS THE FAMILY BUTTER

In valley pockets of the hills of northeast Mississippi live descendants of the earliest overland settlers from Georgia and other States to the east. This "dogtrot" house, with its central corridor open to hounds and breezes, exemplifies the architecture employed by the covered-wagon pioneers who made clearings in the thick pine forests (page 100). The girl ordinarily would be bare-foot; she was wearing shoes because she had just come in from spreading fertilizer over plowed fields.

William Faulkner's writings. In a Georgian home secluded by cedars and magnolias, seemingly as reticent as its master, lives the author whose folk novels are historic records of the desolate hill country.

Another fragrant yard is the scene of the incident in *So Red the Rose* where a negro boy was shot and killed as he climbed a tree to hide from Federal troops as they entered the town.

Stark Young was graduated from the University of Mississippi and later taught there; Faulkner attended classes there for two troublous years.

They tell at "Ole Miss" of the time when young Faulkner was postmaster at the university town, but his indisposition to carry a mailbag over to the railroad station until it was completely filled resulted in delays

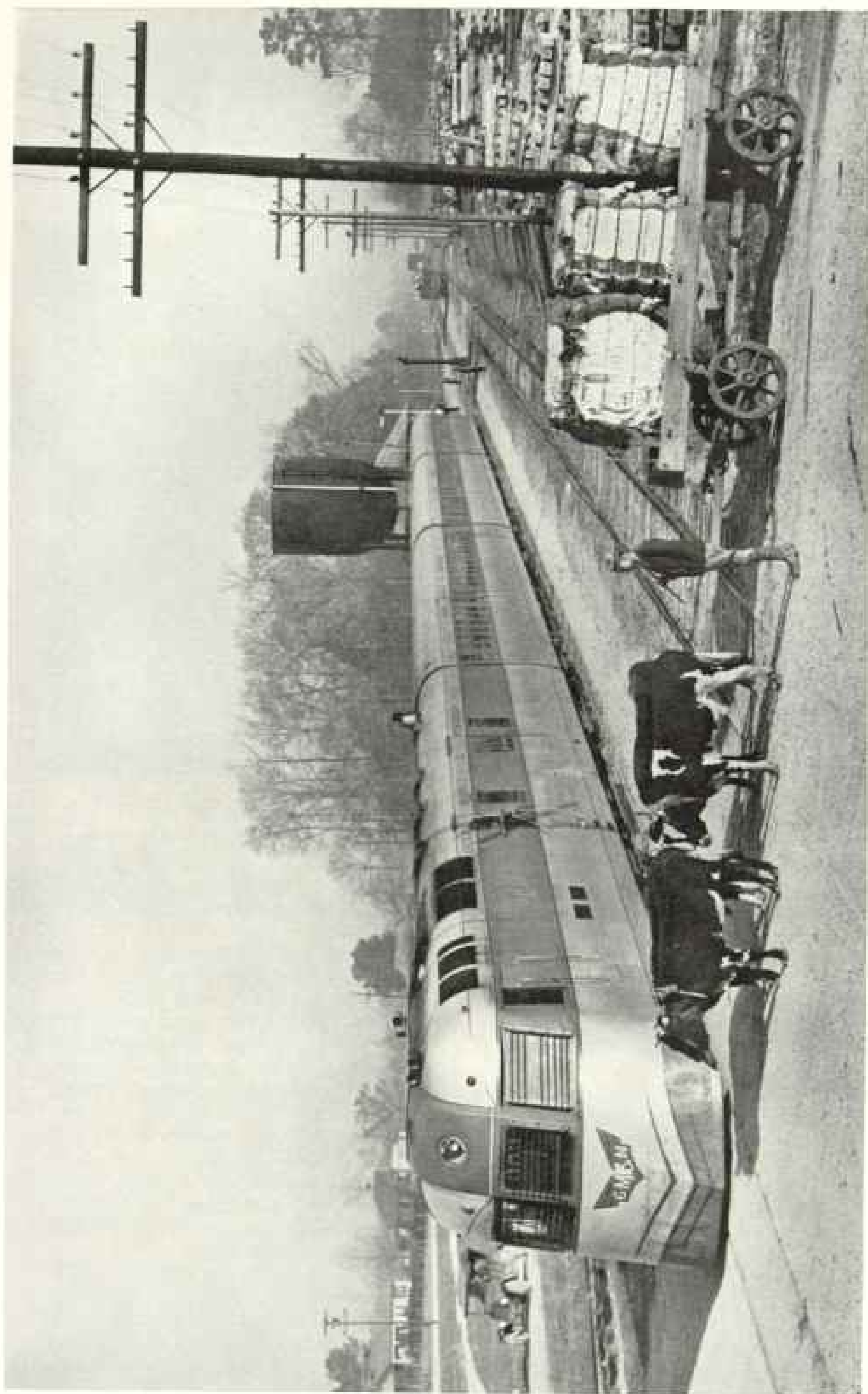
of letters, indignant complaints, and his severance from that job.

Oxford has a general store, dating from 1839, conducted by the fourth generation of its founder's family. Great-grandchildren of its original customers shop there for evening gowns, overalls, lounging pajamas, and sunbonnets.

Behind its millinery counter until a few weeks before our visit was an alert saleslady who once was the belle of levees, tilting tournaments, and the "infairs" of two generations ago which extended wedding festivities over two or three days.

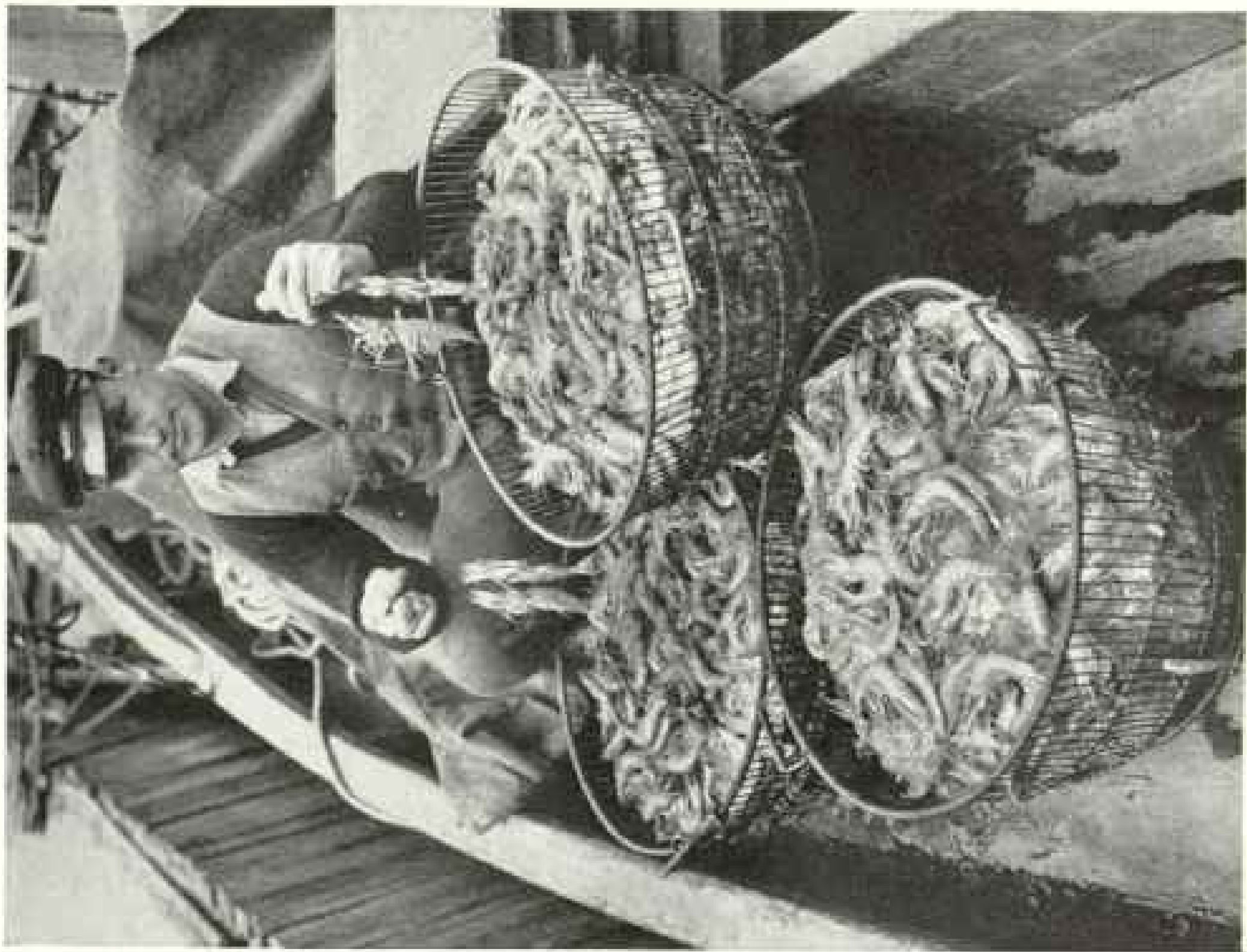
Wearing high-top shoes and lace elbow sleeves, she talked with us from her wheel chair—she was not ill, but had fractured her hip by a fall—and showed us the medal the National Federation of Business and





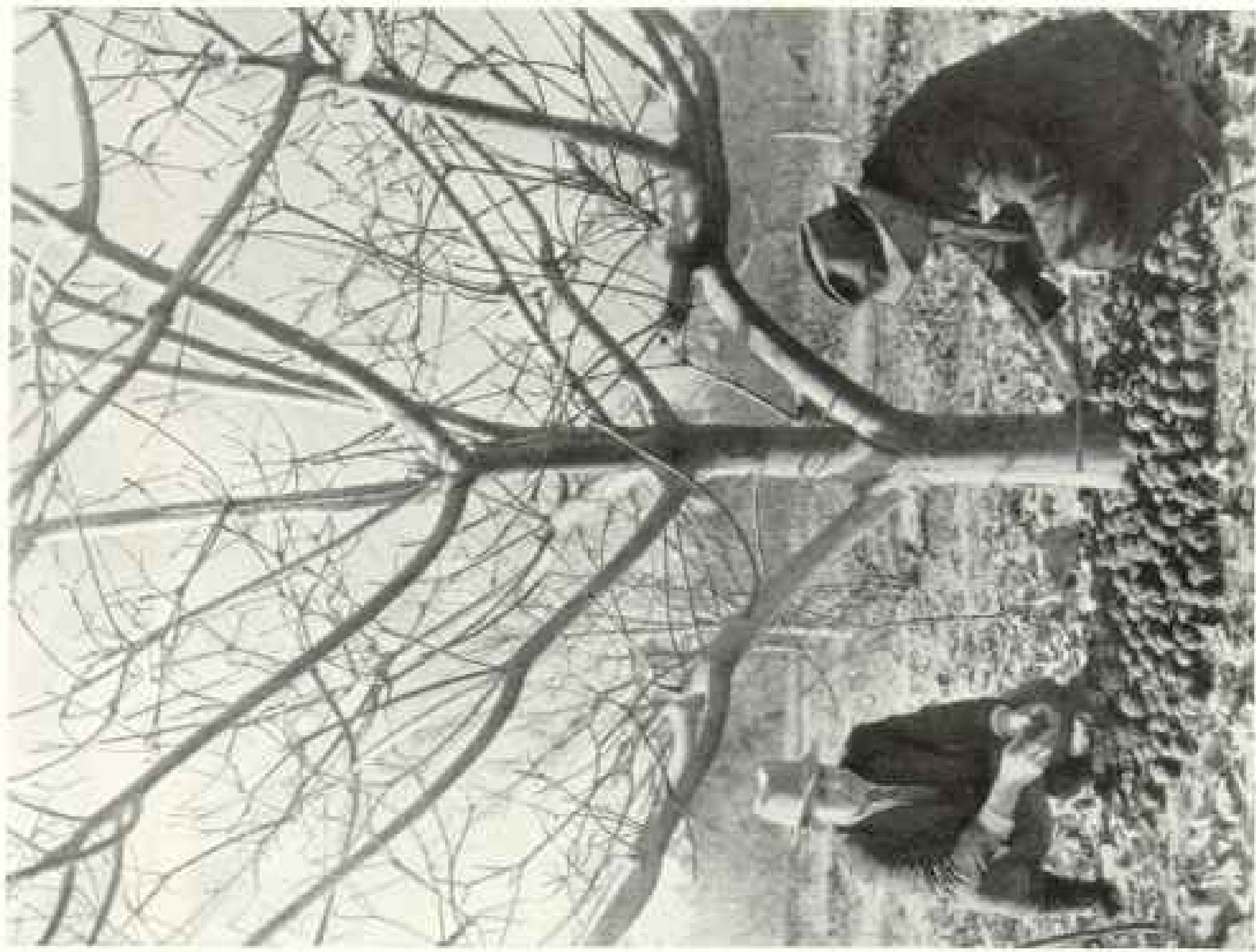
AN ON TEAM HALTS AS "THE REBEL" FLASHES BY

The deep South's streamliner passes through Columbia, city of new industries (page 311), on its way from New Orleans, which Andrew Jackson defended in 1815, to the cities named for him: Jackson, Mississippi, and Jackson, Tennessee. So many legislators ride it that one of them nicknamed it "the New New Capitol."



**WILL YOU HAVE YOURS GRILLED, STEAMED, OR IN JAMBALAYAT?**

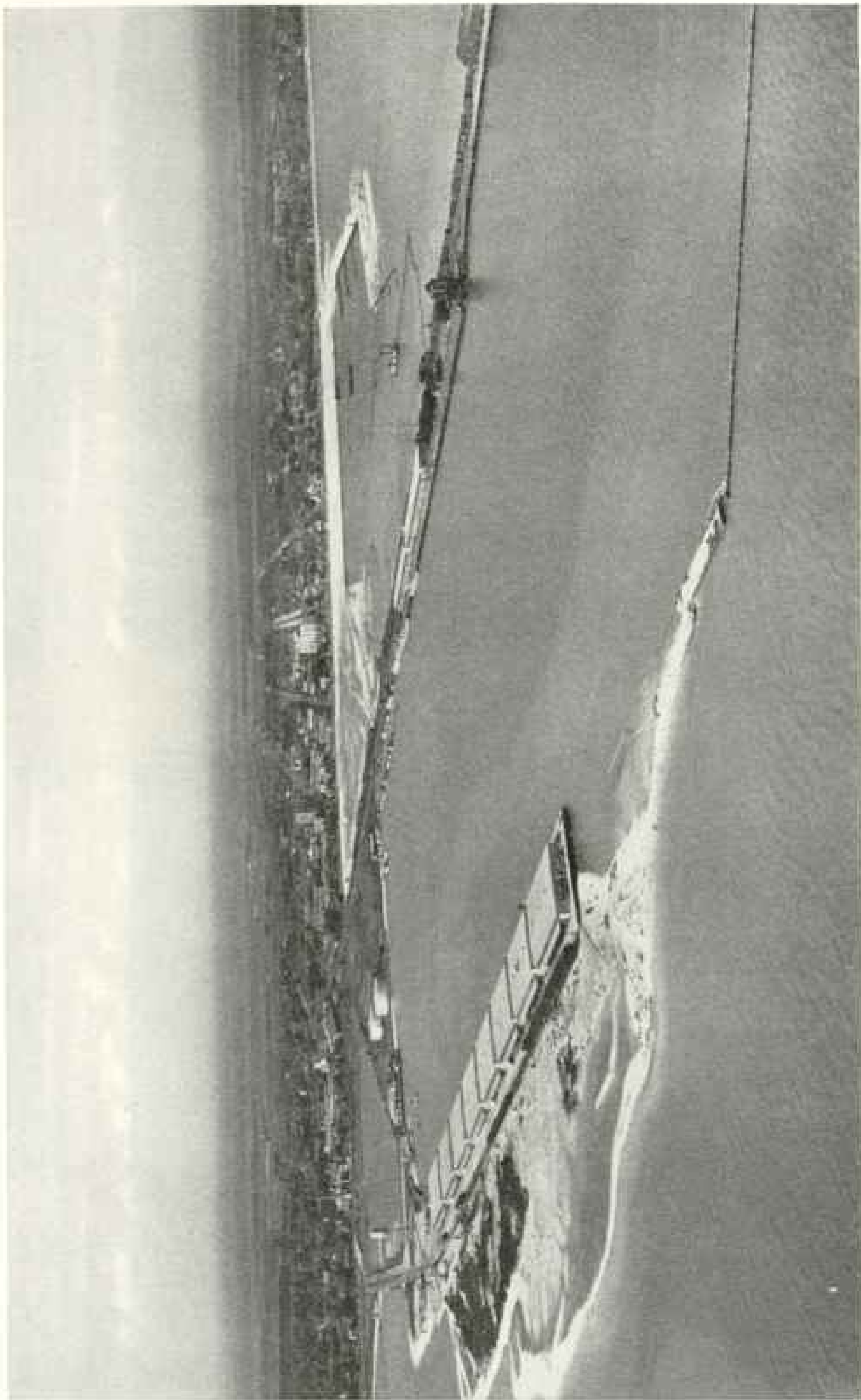
The six-crew schooners that took out seines several fathoms long have given way to motor trawl boats handled by only two or three men. As the power craft moves along, it drags a U-shaped trawl to catch the shrimp. Some trawlers spend a week or more at sea, transferring their catches to freight boats.



Photograph from Illinois Central System

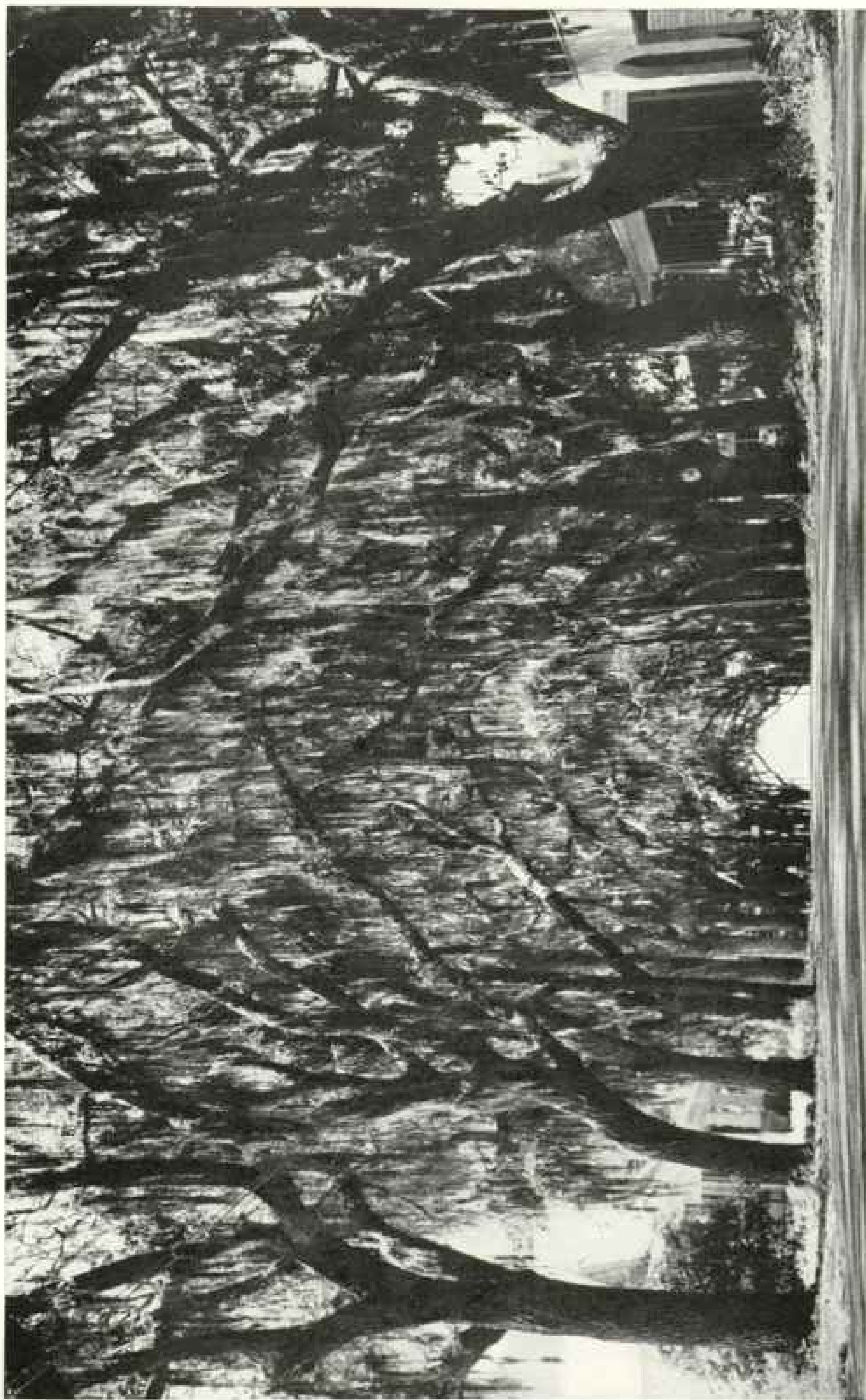
**YOU PLANT THE TUNG TREE, THEN WAIT FOR THE NUTS TO FALL.**

More than half the tung trees in the United States grow in Pearl River County, and barns here are supplanted by crushers for the nuts that yield an ingredient for paints and varnishes—an ingredient we now import from the far-away Yangtze Valley. Pitsyune is the center of this new industry (page 313).



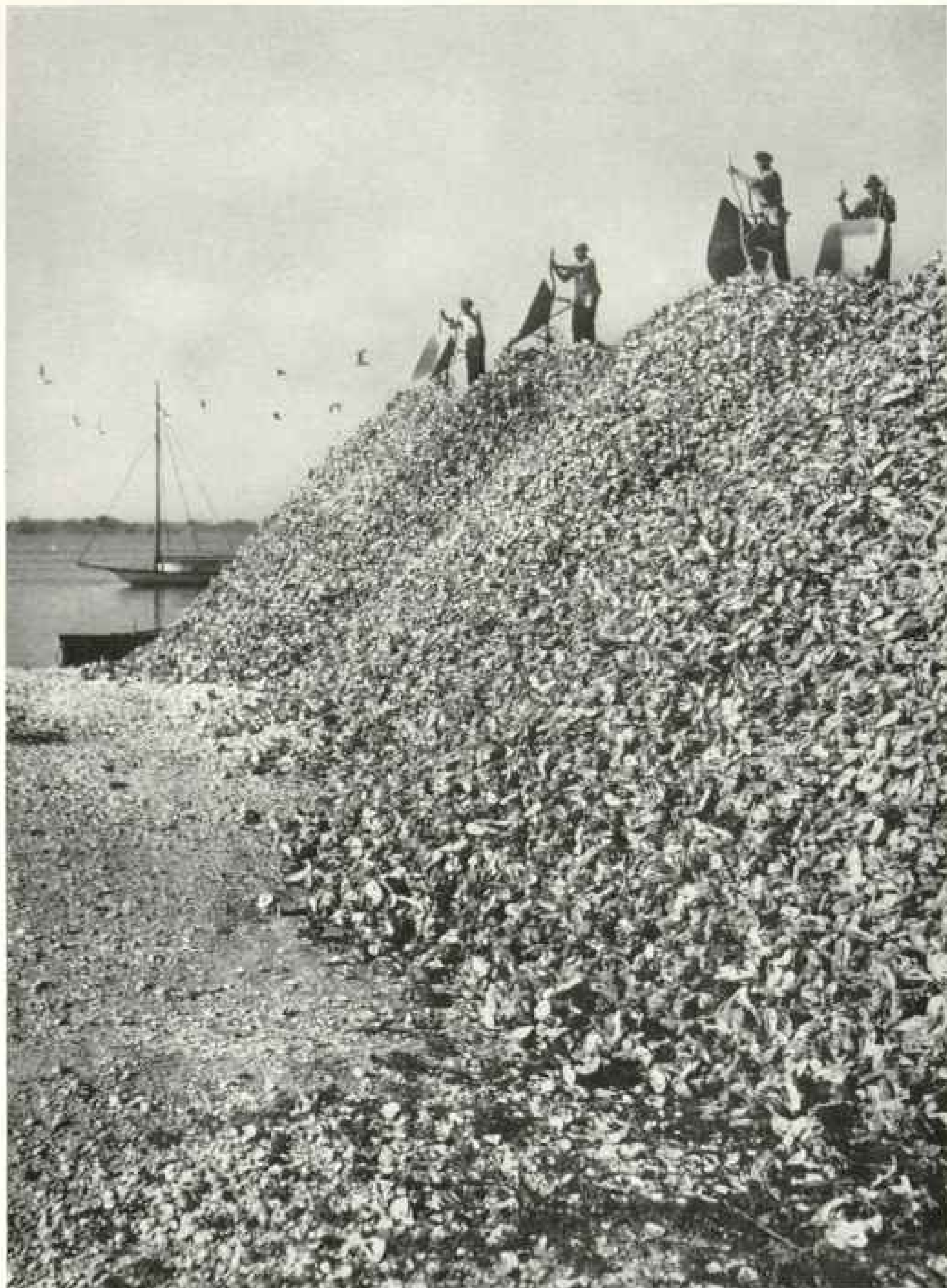
GULFPORT'S NEW PIER (LEFT) IS BIG ENOUGH FOR SIX FOOTBALL FIELDS

Loading thousands of bales of cotton on Japanese ships, unloading sugar from Cuba and asphalt from Trinidad, sacking fertilizer from Chile for southern farms—all are in a day's work at Mississippi's only deep-water harbor. Unlike its venerable neighbors, Gulfport is a new city, conceived when the Gulf and Ship Island Railway, just fifty years ago, chose it for a salt-water terminal, and nurtured in 1902 when Captain J. T. Jones completed the railway, built a resort hotel, power plant, streetcar line, a crossing plant, and a bank. A recent water-front improvement is a commodious harbor for small craft.



BILONT'S "CATHEDRAL AISLE" OF MOSS-DRAPED OAKS LEADS STRAIGHT DOWN TO THE GULF OF MEXICO.

More than a century ago Chevalier Benachi, of New Orleans, planted these trees along the driveway to his home, which faced the water. Today they border residential Benachi Avenue. The road now is hard-surfaced, though formerly it was paved with gleaming white oyster shells, as still are some other Biloxi streets (page 798).



FROM OFFSHORE OYSTER SHELL MOUNDS LOOK LIKE DUNES ON BILONI'S BEACH

Formerly this by-product of the oyster fleet was employed for roads, some of which still are in use along the coast. Now shells are returned to replenish reefs and create bottoms to grow more oysters, or ground for poultry grit, for which England is one of the important customers. Eleven million cans, more than half of all the oysters canned in the United States each year, are packed at Biloxi. From late fall to early spring auxiliary schooners pass through the channel offshore laden down and decks swash with their heavy cargoes (page 300).

Professional Women's Clubs had given her as the oldest employed woman in the United States. Her keen memory failed her only when we ventured to ask her age.

#### COEDS STUDY THE STARS

Beneath a white observatory dome at Ole Miss we saw coeds studying the stars through a telescope and taking notes in large astronomy classes (page 273). The subject is elective, but about 200 students, nearly a fourth of the student body, take it.

This celestial popularity is a living tribute to Dr. F. A. P. Barnard (for whom Barnard College was named), prewar President of the University, who was ambitious to build and equip scientific laboratories of highest quality. Closest to his heart was the astronomical observatory, erected in 1859, for which was planned the largest telescope of that time.

The order for the instrument was placed with a firm of Cambridge, Massachusetts, and the casting of the disk was done in Birmingham, England. The telescope, with its 19-inch lens of flawless optical quality, was ready in 1861, but the outbreak of the War prevented its delivery.

On the first night it was set up in the maker's shop it revealed for the first time



Photograph by Anthony V. Ragusa

#### THE "P. F. P.'S"—OR FIRST FISHERMEN FAMILIES—OF THE GULF COAST

Seeming to laugh at their own jokes, baby pelicans face the photographer. These youngsters on one of the North Islands, south of Biloxi, are about three weeks old. Their first feathers are appearing on their wings; their bodies still reveal a fluffy coat of down (page 315).

the "companion star" of Sirius. Later it was mounted at Dearborn Observatory, of Northwestern University.

Not until 1893 was a comparable instrument acquired at Ole Miss, which, with its accessory equipment, makes up one of the finest astronomical observatories available anywhere for daily use of students.

"And now," said the very learned and human professor of the stars, "come with me to the Oxford Cemetery and I will show you my favorite beginner's lesson in astronomy."



WHEN HOLDS ARE FILLED AND DECKS PILED HIGH, THESE OYSTER BOATS WILL BE LOADED DOWN TO THE GUNWALES

Fishermen with hand tongs bring up the stock for raw bars; dredges raised by windlass harvest the crop for Biloxi's huge canneries. The can catch is loaded direct into cars of iron grillwork, rolled into the steam box, which opens the shells, and shuckers remove the shrunken oysters.

Baffled, I rode with him to the grave where he pointed out, on the tombstone of the famous jurist, university chancellor, and author of *Georgia Scenes*, this inscription:

Sacred to the Memory of  
Augustus Baldwin Longstreet  
Who was Born in Augusta, Ga.  
On the Day the Sun Crossed the Line  
A.D. 1790

Class after class has puzzled over that epitaph, as did their fathers before them.

#### THE MIDWEST THRUSTS A FINGER INTO THE SOUTH

Eastward from Oxford the red clay hills continue past Pontotoc, then drop away as suddenly as they rise from the Delta, and the Midwest seems to thrust a long peninsula into northeastern Mississippi.

Wind-blown fields of grain and tinkling cowbells in well-watered pastures suggest level Iowa farms.

Century-old Pontotoc still holds a "swapping market" on Saturdays. Boxlike churches in the country thereabouts have pine pews and no slave galleries.

On Sunday evenings neighbors from miles around gather in the "front rooms" of farmhouses, where there usually is a feather bed displaying the family's best quilt, and sing ballads and hymns to the accompaniment of a foot-pumped "parlor organ."

Consciously modern is much younger Tupelo, in the prairie, first city to contract for T. V. A. power, and a pioneer in building factories. The newness is emphasized now by more than 500 new houses built since the tornado of April 5, 1936, ripped up



FISHING FLARES, NOT INDIAN FIRES, NOW LIGHT BILONI'S BEACHES

Ghostly "giggers" silently wade the shallow waters with their pieces of iron pipe, a kerosene tank attached to the lower end and a wire-sheathed ball of asbestos fastened to the other, to spear fish that are blinded by the glare of the flambeaux. (page 317).

homes, schools, churches, and mammoth oak trees in its disastrous swath.

#### COTTON, FROM FIELD TO GARMENT

Cotton still prevails. From the Tupelo station platform one may see cotton growing in the fields, wagons and trucks converging along every road with their dusty bales, buyers and sellers fingering sample tufts as they argue prices, and the bales being hauled off again to near-by compresses, gins, warehouses.

Across the street is a smokeless factory where the raw cotton from home farms is cleaned, dyed, made into yarn, and woven into cloth. Not far away the cloth is converted into men's shirts, women's house dresses, and baby clothes.

Frequently 25 miles of cotton goods a day roll out from Tupelo's mills.

However, Tupelo, unlike Delta towns, is not all cotton. Every morning fleets of trucks leave to pick up milk cans from farmers' gates. Returning to a mammoth milk plant, they automatically pour the fluid into sterilized vats. Thence it passes to metal condensers, and is afterwards fed into carloads of tin containers, all without touch of human hand from milkmaid to can opener.

In 28 acres of willow-shaded pools of the United States Fisheries Station are hatched hundreds of thousands of fish annually to restock the lakes and streams of the State.

The hatchery's location at Tupelo was a triumph of Private John Allen's oratory. He concluded his famous plea with a grandiloquent peroration:

"I can say, Mr. Chairman, that while there are larger places than Tupelo, I do not think there is any other place exactly



like it. Tupelo is very near the center of the world. The horizon seems about the same in every direction. We have the ideal place for a fish hatchery at Tupelo. Why, sir, fish will travel overland for miles to get into the water we have at Tupelo. Thousands and millions of unborn fish are clamoring to this Congress today for an opportunity to be hatched at Tupelo."

South through collegiate Columbus and Starkville (Plate IV), toward the busy wholesale and railroad center, Meridian, the prairie belt progresses. Milk plants, vegetable canneries, and cheese factories abound; freshly painted big barns house prize cattle; hay wagons and logging teams park in main streets.

#### THE LAND OF THREE RIVERS

It is less than 150 miles across the State to the Delta cotton towns of like latitude, but they are a thousand miles away in tradition and local flavor. The low Pontotoc watershed was a Rocky Mountain barrier to east-west communication in the days when commerce and travel flowed south along the parallel rivers that empty into the Gulf (map, pages 268-9).

The planters clung to the sinuous Mississippi then, as now. The no-slave pioneers hewed clearings in the piney woods along the Pearl River. But the eastern settlements gravitated around the basin of the Tombigbee, which deserts the State for Alabama and empties into Mobile Bay.

The Mississippi State College for Women, at Columbus, preserves the ideal of sheltered womanhood. Iron fences enclose the shaded campus; students are not permitted to roam the town evenings without a chaperone; freshmen and sophomores must wear all-blue uniforms. Upperclassmen are allowed to wear white jabots which, upon graduation, are initialed by the owners and passed on to cherished friends.

A pioneer public school in Mississippi was Franklin Academy, founded in 1820. Its building at Columbus still is in daily use. Woodsy Lee Park is not named for General Lee, but for the Stephen D. Lee who fired the first shot at Fort Sumter.

Bustling, modern Meridian, though itself in the hills, is the shipping focus for the fruit, truck, and dairy products of the southern prairie. Its stockyard is the largest in the State.

Meridian's new stadium that seats 15,000 people is one evidence of the State's keen

interest in high school athletics. Educators are proudest, however, that their State ranks first in the South with its 47.5 per cent of high school graduates who attend college.

#### THE EPIC OF LAUREL

Southwest from Meridian, on the edge of the famed piney woods, is Laurel, one of the State's most startling cities (Plate III).

Here is a mill town with an art gallery, flowers and evergreens planted along railroad tracks, home-built model homes for workers, 25 active garden clubs, municipal golf courses and swimming pool, spacious parks, a high school with a collegelike campus—a "planned city" which really was planned from its recent beginnings.

One church, the First Presbyterian, which reproduces a 13th-century Gothic cathedral, engages nationally known musicians to give recitals on its 4-manual organ with 3,500 pipes. There are 700 titles of oratorios, anthems, cantatas, and solos in its musical library, and eleven pianos in its commodious clubrooms and parlors.

The pulpit was done by a cousin of Anton Lang, the Bible box has an easel from the vicarage at Norbury, England, the collection plates were hand-carved in Jerusalem, and beneath the Communion table is a rare old Persian rug.

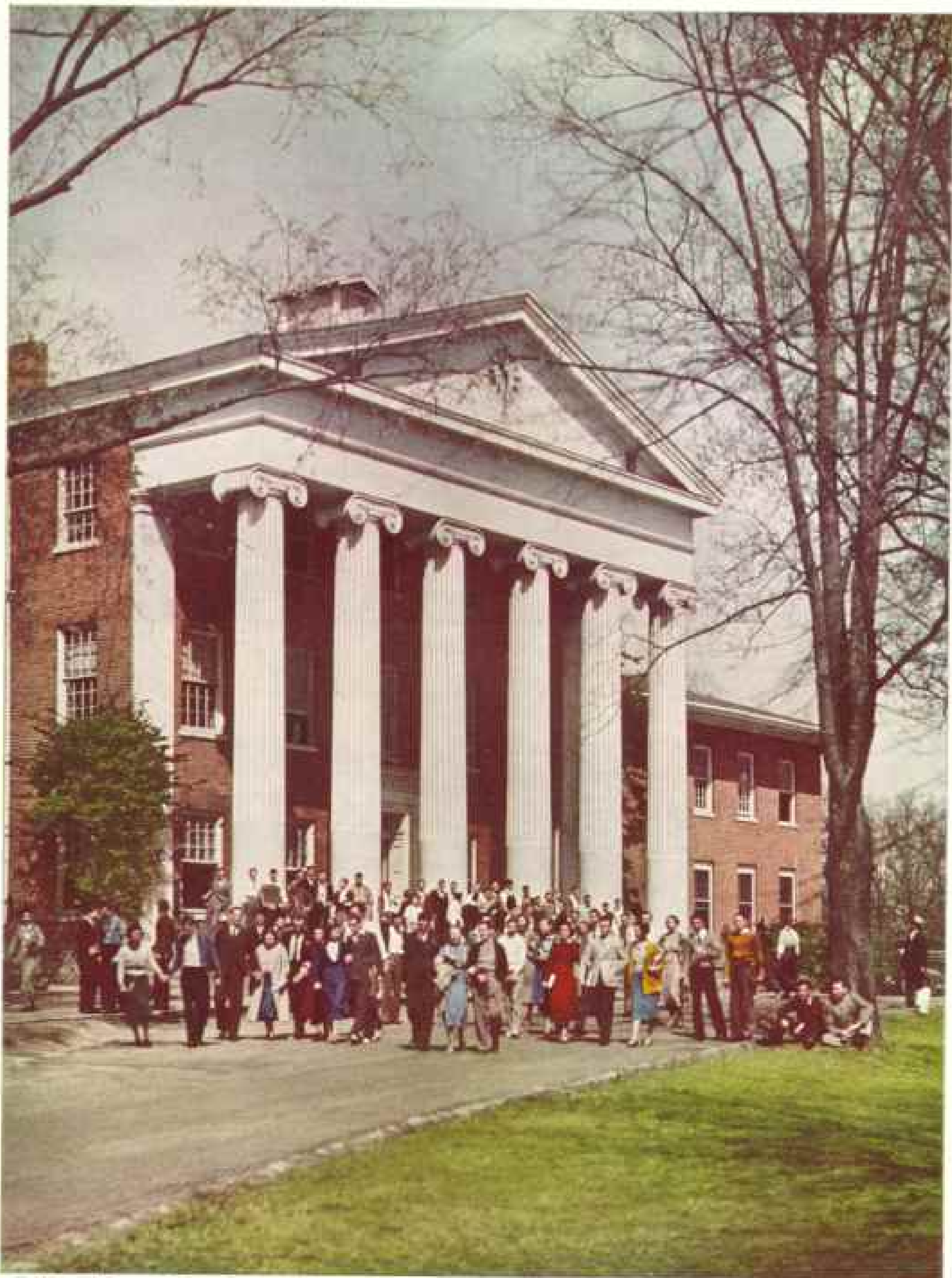
Pew ends are carved in designs recalling early days when woodsmen members made their own pews, hauled them to church, and set them up themselves.

Laurel is in the northeast corner of the piney woods, which stretch over through Columbia, northward toward Jackson, and coastward almost to Gulfport. This land boomed with yellow pine prosperity, waned with the decimation of that natural resource, and rehabilitated itself by sheer human resourcefulness.

From the Piedmont of the Carolinas and Georgia in the decade of 1815 migrated settlers who brought no slaves. Often they had little else than their oxen, hound dogs, and rifles to shoot deer and guard their stock from wildcats. They planted patches of corn and potatoes on river bottoms and home-raised a few pigs, cows, and chickens.

In their secluded clearings these pioneers peeled logs for cabins with batten doors and windows. They made their own sugar, tanned leather in wooden troughs, manufactured soap from wood-ash lye, molded their own candles, carved plowstocks from trees

## MAGNOLIA STATE MOSAIC



© National Geographic Society

Dufaycolor Photograph by J. Baylor Roberts

### "CHANGE CLASSES" RINGS THE "OLE MISS" LYCEUM BELL

Fathers and grandfathers of these students have trooped across the University campus to this clear chime. Here, before the War, planters' sons came with slaves and riding horses. Women were admitted in 1882; their dormitories are called "coops." Framed is the first diploma, awarded in 1851, found by a Federal soldier, taken north, and later returned here. "Gentlemen don't haze" is one rule; tradition requires that everybody speak to everybody in passing on campus.



THREE CONFEDERATE VETERANS ATTEND THEIR 72D DECORATION DAY CEREMONY

At Friendship Cemetery, Columbus, the first exercises were held in 1866 in honor of more than a thousand soldiers buried here. The observance takes place annually on April 26, under the auspices of the U. D. C. chapter named for Stephen D. Lee, native son who fired the first shot at Fort Sumter.



© National Geographic Society

Fairy Photographs by J. Baylor Roberts

LORD AND LADY FAUNTILERoy PLAY AMONG MONTEIGNE'S AZALEAS

These Natchez gardens also are famed for their roses and japonicas; the home for its wrought-iron balustrades, French hand-blocked wallpaper, mosaic floors, Venetian chandeliers, and Portuguese vases.

MAGNOLIA STATE MOSAIC



PILGRIMAGE-WEEK "FOX HUNTERS" PAUSE FOR REFRESHMENTS AT MELROSE

This ante-bellum Natchez mansion was built of brick burned on the plantation and heart cypress felled near by. Its large rooms contain art objects collected around the world (Plate XIII). These players took part in a tableau showing hunters welcoming home a soldier (center) from the Mexican War.



© National Geographic Society

Finlay Photographs by J. Daylor Roberts

MAGEE CLUBWOMEN HAVE MADE THEIR BAZAARS FAMED FOR QUILTS AND AFGHANS. This mid-State town has a unique shrine, the pioneer cabin of the tanner who made wagonloads of shoes for the Confederate Army. Later he turned out civilian boots; red-topped ones for wear on Sundays.



© National Geographic Society

Dufaycolor Photograph by J. Baylar Roberts

**"WHAT HOLDS UP THE SPIRAL STAIRCASE?"**

That is the question most frequently asked by visitors to Auburn, ancestral home of the Duncans, preserved as a family memorial in City Park, Natchez. Lofty Corinthian columns, wide front gallery, and fan-shaped lights over the entrance are other features.



Friday Photograph by J. Baylar Roberts

**DAUGHTER OF THE PIERCE CHOCTAWS IS A DOLLMAKER**

Her ancestors, and yellow fever, were two malignant enemies of early French and Spanish settlers along the coast. Now Uncle Sam sends tribal children to this Pearl River School, and others, where they learn doll-making, basketry, and rug weaving along with the "three R's."



© National Geographic Society

Daycolor Photograph by J. Taylor Roberts

**COTTON WAS THE CURRENCY THAT BUILT AND FURNISHED SUCH LUXURIOUS HOMES IN THE GOLDEN AGE OF SATCHEL**

At Melrose is preserved the green and gold drawing room of the fabulous forties (Plate XI). Sofas and chairs are in Old English style; the curtains are French lace. Over each window are gold cornices and brackets to match the tieback draperies of brocatel. The mantel is black marble, imported from Italy. Partly hidden by the young lady pouring tea is a "chaperone's bench," two chairs joined by a backless seat on which the chaperone sat between the young lovers who occupied the end places. The rear chandelier of French gilt bronze originally burned whale oil.



WIGGINS SHIFTS FROM PINK TO PICKLES

A color pattern is made of onions, red peppers, and cucumbers. Seat of Stone County, which boasts that it never had a slaveholder, this town is in the heart of the famed piney woods. It floated logs down to Gulfport until mills gorged all the timber hereabouts. Now it looks to new industries.



© National Geographic Society

Dufaycolor Photographs by J. Baylor Roberts

A SILK MILL THRIVES IN A COTTON STATE

A Hattiesburg maid removes the raw fiber, which has been wound on spools, to spindles for weaving. Experts say they can tell from the natural silk colors the part of Japan whence it came.

## MAGNOLIA STATE MOSAIC



### WISTARIA ALL BUT ENVELOPS A VETERAN OAK

Houses raised on stilts, to prevent dampness and increase air circulation, are common on the coast. "I wish I had the bicycle concession here," remarked a visitor, as he noted the hundreds who cycle to work and pedal "just for the ride" along Biloxi's streets.



© National Geographic Society

Finlay Photographs by J. Baylor Roberts

### RAILROADS WILL PASS THESE BERRIES 1,200 MILES—AND MORE

In 1870 a farmer shipped several crates to Chicago and the agent wired back: "Your berries sold \$12 a crate. Ship no more. Too far." Now daily, in season, refrigerator carloads leave Marion.





© National Geographic Society

Dufaycolor Photograph by J. Daylor Roberts

HEELING TO A GENTLE BREEZE UNDER SUNNY SKIES—IT'S GREAT TO BE ALIVE!

Sailing is an everyday and big Sunday sport off Biloxi. Yachting in southern waters had its beginnings at Pass Christian in 1849. Now the Biloxi Yacht Club is the Cowes of Dixie, where, commencing July 4, long-distance races finish in front of the clubhouse, which stands out over the water on pilings. A week of steady sailing includes scores of events, with craft ranging from baby catboats to pretentious schooner yachts.

and harrow teeth from wooden pegs, and built their "tarpole" wagons—so called because the center poles were greased with tar to make it easier for the oxen to drag them.

Always there was a patch of potatoes and tobacco.

One traveler, relating the rough but ready hospitality of a woodsman's home, tells how at mealtime meats were garnished with potatoes, coffee was flavored with potato juice, side dishes of potatoes were served, and for dessert there was potato pie. At nightfall all retired to cots matted with potato vines, and, next morning, when he had a sore throat he was treated with a potato poultice moistened with vinegar.

The party departed, their pockets stuffed with potato chips!

#### THE "FREE STATE OF JONES"

Jones County, of which Laurel is the seat, still is referred to as the Free State of Jones because it voted not to secede from the Union in the sixties. Some of its citizens protested fighting what they called a "planters' war," and for four years they harried the Confederate troops by a local guerrilla campaign.

In the seventies came the lumbering and logging boom. An old-timer summed up the area's economic history in a sentence: "Grandpap was a sheep man, pappy was a farmer, I am a sawmill hand."

When the timber was cut, "dead towns" began to appear. You encounter a few there still with sagging sawmills, homes crumbling from neglect, and empty stores which seem sightless with their window-panes gone.

Farmers now flock back to abandoned acres and dig up stumps to feed insatiable naval stores plants. Saplings are hauled in by thousands of cords for the chemical miracle of making rock-hard composition board.

In Laurel a genius of restless mind, apprentice of Edison and engineer, was impressed by sawmill discards of slabs, edgings, and sawdust, and by useless trees on marginal lands. He fed waste wood chips into a metal "gun" made from a piece of shafting, heated the sealed-up mixture by gasoline torches, "exploded" it by dislocating a pin with a hammer blow, and compressed the fiber in an old letter press, "just to see what would happen."

What ultimately happened was the vast Masonite plant which now employs a thou-

sand men, buys 500 cords of peeled young pine every day from hundreds of Jones County farmers, and ships out a million square feet (which is nearly 23 acres) of knotless "wood board" every 24 hours.

#### EXPLODING WOOD BY STEAM

That first steel gun, which they now keep in a safe, fired an industrial shot which is seen, if not heard, around the world—in grainless fronts of Tokyo shops, in kitchens of jungle Malay posts, in a new office building near Milan, in Park Avenue penthouse billiard tables, in ocean steamship corridors, in Hollywood movie sets, and in speedboat hulls of many harbors.

Now ceaseless streams of chips flow all through the 4-shift, 24-hour day into nine perfected "guns," steam is shot into firing chambers, the guns are discharged by releasing the valves, and the chips explode into a flannel-like mass of fluffy fiber.

After a "cyclone" separates fibers from steam the downy blanket of reddish brown creeps along by wire conveyer where suction boxes and roll presses squeeze out the water. Cutters even the edges and trimmers snip off 12-foot lengths.

In chrome-plated hydraulic presses which exert about 500 pounds to the square inch, these pieces are squeezed and dried into hardwood boards, with tough fiber intact, bound by the natural wood cement.

When I asked what these boards are used for, the inventor handed me a close-printed list of seven pages, arranged alphabetically from acoustical panels and auto trailers to wardrobes and waste baskets.

Other farm and forest products are bought by Laurel plants from farmers a hundred miles or more away—sweet potatoes for its big starch factory, sugar cane for its syrup-blending plant, vegetables and fruits for its canning company, clay for a bentonite plant, pine stumps for its turpentine distillery.

#### COLUMBIA—INDUSTRIAL LABORATORY

Driving southwest again, from Laurel, we visited Columbia, municipal experiment laboratory for Governor Hugh White's ambitious and already successful program to balance the State's rich agriculture with industry.

Columbia grew around the White lumber mills, but when the area's timber was cut off, this city, like others, faced disintegration until Citizen White, long before



Photograph by Anthony V. Ragusin

#### BEAUVOIR, NEAR BILONI, IS THE MOUNT VERNON OF THE CONFEDERACY

The last home of Jefferson Davis has a literal "beautiful view," looking out among oaks, cedars, and magnolias to the sea wall of the Gulf of Mexico. Here the South's wartime President wrote *The Rise and Fall of the Confederacy*, his wife copying the final manuscript in longhand. The estate now is a State-supported home for Confederate veterans and their families (page 317).

he thought of politics, evolved a diversified industrial program for his home town.

We mistook a garment factory for a high school, what with its landscaped approach, modern brick construction, and many windows. Inside we saw 360 bolts of cloth, each 85 yards long, piled on a table where an operator guided an electric blade, shuttling 3,600 times a minute, cutting 181,440 parts for 8,640 shirts.

Mere man must have become fashion conscious at bedtime, for here were 70 pajama styles to supply his sleeping sartorial whims.

This one plant employs 780 people; adjacent to it are parked daily from 320 to 350 cars which employees drive to town from a radius of 25 miles. More than half the 720 women here are high-school graduates.

Across the street, in another lighted and ventilated factory, nearly a hundred workers were engaged in making 2,500 dozen pairs of men's socks a week.

Changing disks on a pattern drum regulates any of several hundred designs of stripes or clocking. The most surprising

sight is the rows of aluminum boarding forms, to shape the socks, which look like the cross section of a gym class with the athletes' legs aloft for their daily exercises.

Summer sleep is disturbed at sunrise in Columbia—but nobody minds—by trucks, autos, carts, wagons, and an occasional ox team, clattering into town with loads of tomatoes, peas, sweet corn, beets, broccoli, beans, and turnip greens, according to season. These are bound for a canning factory, which sometimes loads four freight cars a day. Here as many as 60,000 cans of string beans have been put up in 24 hours.

#### COUGH SYRUP FROM PINE STUMPS

Utilization of stumps at plants in Columbia, and other places, is a Machine Age drama of how invention has rehabilitated waste acres. Crops carpet fields after farmers get paid for the stumps they pull up and haul to town.

There the huge hulks are whisked into a "hog" which chips them, and the chips are poured into a shredder which grinds them to ricelike fineness.

Chutes feed this "sawdust" into extrac-



Photograph by Gulf Photo-Service

#### GOLFERS ADD THEIR SCORES NEAR WHERE COLONISTS SOUGHT TO FOUND AN EMPIRE

Here at Ocean Springs, shaded by magnificent live oaks and overlooking Biloxi Bay, Iberville made the first European settlement in the lower Mississippi Valley. Soon the fortified village was removed across the estuary to the site of present-day Biloxi, which then became the capital of the vast American domain of Louis XIV—"the country of Louisiana, the seas, harbors, ports, bays adjacent, and all nations, peoples, provinces, towns, cities, villages, mines, minerals, fisheries, streams and rivers within the extent of said Louisiana . . . from the mouth of the Ohio, along the Mississippi, and the rivers which discharge themselves therein from its source to the Gulf of Mexico."

tors where live steam is shot in to vaporize volatile oils in the wood.

Steam then discharged, containing vaporized oils, is vented through condensers. The oil-and-water solution from the condensers goes to separators where the oils are floated off to storage tanks.

At that stage the oil contains 80 per cent turpentine and 20 per cent pine oil. Separation of these is effected by distillation.

Into the wood residue left in the extractors a solvent is pumped and, under high temperature and high pressure, a liquid emerges containing rosin. That which remains fires furnaces to "boil" more stumps.

There are many more stages than these in the intricate chemical processes which the engineer compared to "killing a cat for the fur, feeding the cat to catfish in a pond, catching the catfish and feeding it to the kittens."

One marvels at the story of the dirty stumps, with yellow-pine timbers long ago chopped for some village church or yacht's

deck, which now yield turpentine for lithography and shoe polish; pine oil for insect spray and cough syrup, synthetic camphor, soaps, and flotation in mines; and rosin to finish paper, remove hair from hogs, dress belts, and stiffen linoleums.

#### TUNG TREES AND PICAYUNE

Still heading south, we drove from Columbia to Poplarville and Picayune, mile after mile fragrant with Satsuma orange blossoms, and field after field creamy and dubonnet with the bloom of new tung trees.

Picayune, the town that was named for a New Orleans newspaper, in addition to established industries is tying its faith to a tung tree boom (page 295). Residents are endowing their alma maters and other institutions with tung tree acres.

#### THE COASTAL CORWEB OF BAYOUS

As distinctive geographically as the Delta are the coastal counties of Mississippi's southern "panhandle" where five river sys-



VACHEL LINDSAY STARTED HOLDING POETRY CLASSES IN FRIENDSHIP OAK

"I was a sapling when Columbus sailed into the Caribbean, and had begun to bear acorns when Ponce de Leon reached Florida," wrote Robert H. Davis in tribute to this tree patriarch at Gulf Park College, Gulfport. "I saw many a pirate ship on this coast, when they put in for water and supplies. Lafite and Blackbeard dropped anchor hereabouts during my time. When Captain Kidd was hanged in London in 1701 for his American buccaneering, I had been right where you see me now for more than 300 years. How time flies!"

tems—the Pascagoula, Biloxi, Wolf, Jordan, and Pearl—and numberless seagoing bayous empty into the Gulf along a frontage of less than 75 miles.

Each of these rivers is extraordinary for its spiderweb of tributaries. For one example, Creole Bayou, a small tributary of the Pascagoula, has seven tributaries of its own. A sportsman may start fishing Creole Bayou Monday morning, cast every day of the entire week in new water, and on Sunday night be only four miles from his Monday starting point.

Mississippi's coastal area is adjacent to Nature's famous hatchery, the Louisiana marshes, fertile spawning grounds of both crustacean and fish life. Hence countless tons of crabs, shrimp, and small fish are

poured annually into Mississippi Sound and make their instinctive way up the various river basins to tidewater limits.

Through incredible miles of rivers and bayous, fishermen angle for bass, bairfish, crappies and perch, bluegills and sea trout.

Chandeleur Islands might well be considered the Mississippi coast's most valuable piece of real estate, even though they are part of Louisiana. For this broken sand strip, 23 miles long, runs north and south, at right angles to the State's offshore islands, and thus makes Chandeleur Sound a happy "grazing ground" for migratory fish.

Lanes of fish migration are as clearly marked as beaten forest paths or steamship routes. Wintering off the great banks of Yucatán Peninsula, enormous schools of



"BUILD ME STRAIGHT, O WORTHY MASTER!  
STAUNCH AND STRONG, A GOODLY VESSEL."

Further along in *The Building of the Ship*, Longfellow mentions timber brought "from Pascagoula's sunny bay," where an old-time boatbuilder explains his model to youngsters. For generations Pascagoula men have made from Old World models their forefathers brought here the sturdy smacks that cross the Gulf to fish in Mexican waters (page 318). In the background are the skeleton forms of a shrimp trawler (left) and a deep-sea fishing smack.

kingfish, Spanish mackerel, lemon fish, crevalle, bonito, dolphin, tarpon, and others funnel north in the spring to the Mississippi coast through the inviting Chandeleur Sound corridor.

Trace the 7-fathom line along the Gulf coast and you mark off the shallow salt-water "dinner table" serving the rich daily meals that detain these migratory fish along Mississippi's shores for the long sport fishing season from May to early November.

#### SPANISH MOSS AND THE SPANISH TRAIL

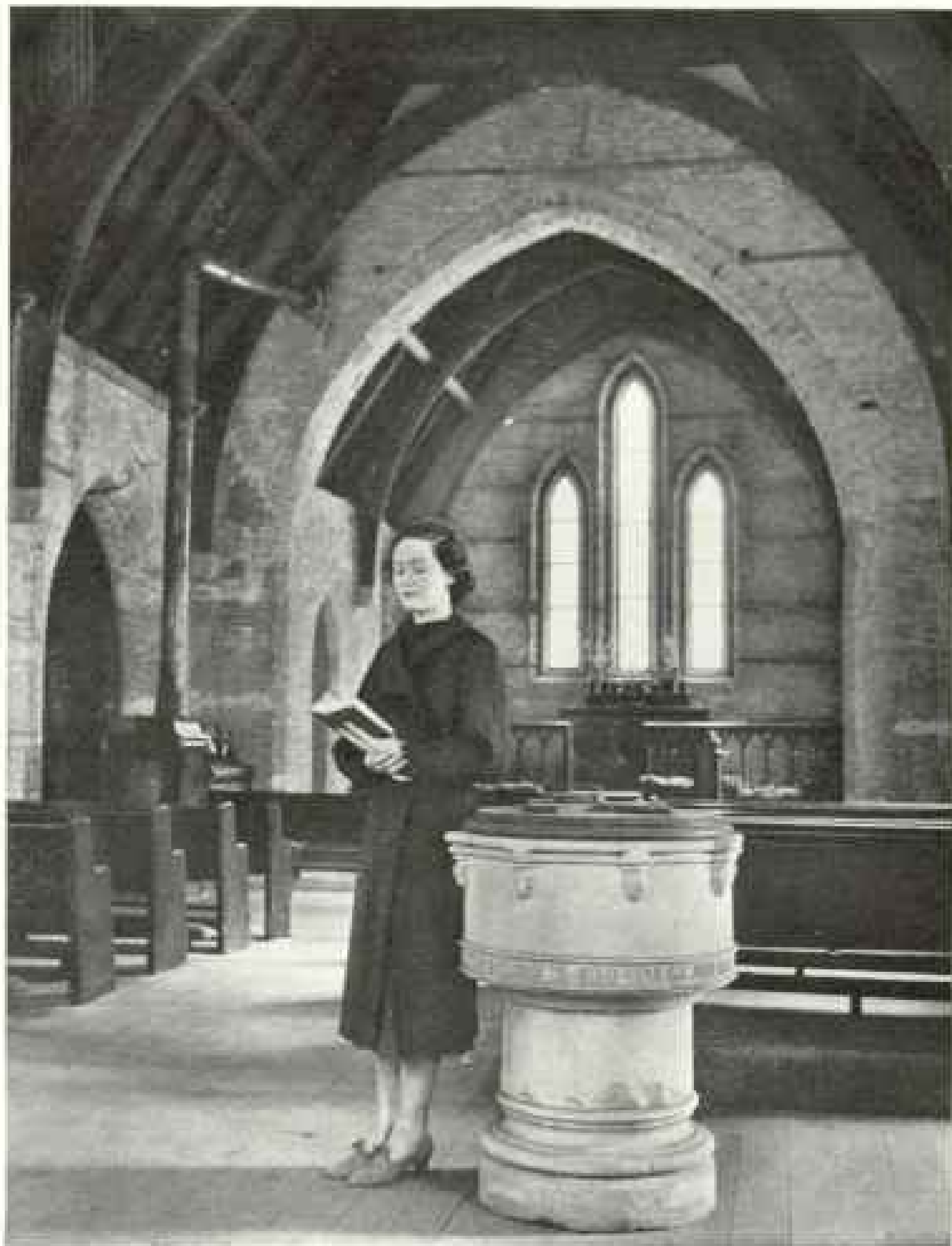
Eastward along the coastwise Spanish trail, marked by Spanish moss weeping from ancient oaks, we traversed one of the State's most scenic and historic drives.

From Bay St. Louis through Pass Chris-

tian, Gulfport, Biloxi, and Pascagoula, there are constant reminders that here were the oldest white settlements in the lower Mississippi Valley, glimpses of serene ante-bellum homes, of bobbing fishing boats, oyster dredges and shrimp fishermen, beach bathers, and restful watering places that do not obtrude merry-go-rounds or chute-the-chutes.

#### A BIRD LOVER'S EDEN

On few 60-mile drives can the bird lover identify so many varieties. For this shore of tree thickets, sandy beach, and marshes, along with the chain of offshore islands, is the neck of a migration bottle through which birds converge fanwise from wide expanses of the United States and Canada to radiate



A "LITTLE GOTHIC GEM," THEY CALL THIS OLD PLANTATION CHAPEL.

The timbers were hewn from surrounding groves; the helcks hand-wrought by slaves; the altar, bishop's chair, and railing were brought to Mansdale from England. The baptismal font was made from one piece of stone. When THE GEOGRAPHIC'S photographer asked this great-granddaughter of the builder to pose and she hesitated, he thought she was bashful. After the pictures were taken, she apologized: "May I be excused now? I really am supposed to be in bed recovering from the measles."

again over broad areas of their South American seasonal homes.

Gulls, terns, and brown pelicans rear their young in Louisiana and Alabama and feed in the Mississippi Sound. These and the black skimmer (locally, the shear-water), both the royal and Caspian terns, and the laughing gull are seen all spring and summer long.

The more northern gulls—herring, ring-billed, and Bonaparte's—arrive during winter months. Flocks of shore birds in-

clude 35 species of sandpipers and plovers and often contain hundreds of individuals. The light plumage of the Cuban snowy plover blends with the sand, so that often only a movement denotes its presence.

Hardier Nature lovers who penetrate the salt marshes may come upon the Louisiana clapper rail and Howell's seaside sparrow, which have a very narrow range; the least bittern and many kinds of herons, notably the stately egret, multiplying again after nearly being exterminated by plume hunters.

In the piney woods are the pine warblers and the brown-headed nuthatch; that southern songster, Bachman's sparrow; and the red-cockaded woodpecker, which

smears the open-

ing of its nest cavity, dug in a living pine, with a patch of pitch.

"OYSTER MA-A-N FROM PASS CHRISTI-A-AN!"

Cotton fields and factories seem remote, indeed, as one idles along the sea-wall road of Pass Christian. Yachts and yawls ride the waters and, landward, honeysuckle, wild cherries, roses, and trumpet vines climb the fences of white cottages.

Down these streets once came the ox-team caravans, six and eight yokes long,

bearing hides and venison, furs, honey, gophers (land burrowing tortoises), and penders (peanuts).

The quiet of this resort, with its summer homes of up-State and New Orleans business men, is broken only by the throb of oyster-boat engines and the street cries of "Oyster ma-a-n from Pass Christi-a-an."

Gulfport, lying at the apex of the deep-water V of the pass between Cat and Ship islands, is essentially a farm and forest products port (page 296). Yellow pine still is shipped, but now, in addition, we saw crossties and piling consigned to South America, rosin to Liverpool and Hamburg, cotton to England and Italy, composition board to Oaxaca, and coals to Newcastle in the form of fish to Massachusetts.

From this young city's neat bungalows, with infant palms and newly planted shade trees, through up-to-date colonies of tourist cabins and trailer parking lots, one arrives suddenly plump into the mellow past and French traces of venerable Biloxi.

#### BILOXI ONCE CAPITAL OF HALF THE UNITED STATES

Here is the Plymouth Rock, the Jamestown, of the deep South—the city that once was capital of a region that reached from what now is Yellowstone National Park to the site of present-day Pittsburgh. Its romantic annals run far off the main tracks of American history; the names of its heroes seem strange to eastern ears.

Imperious Hernando de Soto, who marched a magnificent army through the wilderness to the river he called the Rio Grande de la Florida, and René Robert Cavelier, Sieur de la Salle, who toiled down the Mississippi and laid spacious claim to its whole watershed for Louis XIV, are known at least for cars that bear their names.

Other founders also came down from Canada or direct from Europe, not from the Atlantic coast Colonies.

There was Tonti of the "iron hand," La Salle's loyal companion, whom the Indians regarded as a miracle man when his artificial member cracked down on their recalcitrant skulls.

Thrilling were the deep-sea and bayou adventures of the tactful Pierre le Moyne, Sieur d'Iberville, who found Ship Island with the help of a pirate guide, made friends with the gentle Biloxi Indians, and named the settlement for that friendly tribe.

Most gallant of all, perhaps, was Jean

Baptiste le Moyne, Sieur de Bienville, who took the helm of the remote and sickly colony when he was only 22 years old, gave nearly forty years of his life to the French settlements, and founded Mobile and New Orleans.

France, Spain, and England; territorial Louisiana, Georgia, and West Florida—all were sovereign here, at times (Plate I).

"One reason so many lawyers came here," an elder citizen explained, "was because land titles along parts of the coast involved 22 different tenures, even including recent claims of the State of Georgia."

They still serve you French coffee in bed in the morning in Biloxi. Venders call colorful "soup bunches"—carrots, beans, tomatoes, and various greens—all made up in proper proportion for a favorite Provençal vegetable soup. Home gardens grow okra for the famed gumbo. Redfish, court bouillon, and shrimp jambalaya may precede a strictly indigenous mint julep.

All along the miles of Biloxi water front wooden piers stretch like prone skeletons far out into the surf, with bathing pavilions at their seaward ends where swimmers may put on their suits, in modest English fashion, before they take to the water.

French and Dalmatian fishermen man the shrimp and oyster boats, and their daughters work in the canneries which ship their stock to our Middle West and inland Mexico. The Blessing of the Fleet is an ancient Norman custom which makes a colorful August ceremony.

On still, dark nights the velvety beach is lighted by hundreds of eerie flares that smoke like the frost-time smudge pots in the tomato fields of Crystal Springs. These are the torches of giggers, who spear flounders, a flat-bodied fish with both eyes on one side of its head, which swims in the shore waters and burrows into the sand (p. 301).

#### THE MOUNT VERNON OF THE SOUTH

Most revered of many historic places near Biloxi is Beauvoir, Mount Vernon of the Confederacy, the postwar home of Jefferson Davis (page 312). Built in the planter manner, it sits high above a ground basement, with floor-to-ceiling windows, a broad gallery, and wide central hall. The original builder of the fifties is said to have pulled its cypress from the Louisiana swamps and carried the logs as far as Lake Pontchartrain by canals.

On the front lawn is a statue to the pet dog of the Confederate leader's daughter,





FORT MASSACHUSETTS AND A LIGHTHOUSE ARE LANDMARKS OF SHIP ISLAND

Campfires of Indians were superseded by those of the earliest French colonists in 1699. Later, the English encamped here during the search for pirate Laffite. The fort was designed by Jefferson Davis when he was Secretary of War, in the fifties, and fortified by President Lincoln's order during the War. It was named for the first Federal warship to land after hostilities began. The American Legion now preserves it. At Ship Island, on a foggy January day in 1721, anchored the good ship *La Baleine*, with nearly a hundred seasick and voyage-weary Paris maidens, the "casquette girls" sent out to marry colonists. Their name was derived from the casquettes, or chests, which contained their dowries—two coats, two shirts, six headdresses, and other apparel.

who forsook her northern suitor to be her father's companion.

Would you delve deeper into lotus land?

Drive on then to Pascagoula, which was "unperturbed by the American Revolution, by the creation of the United States Government, even by the War between the States."

Be prepared to believe that its river really "sings"—a monotone song, they say, like the humming of myriad bees in flight—and leave it to the geologists to settle whether the "song" is generated by grating of sand on slate bottom, by escaping natural gas, or by a queer species of fish.

#### BOATBUILDERS AND BAGMAKERS

They build the luggers at Pascagoula, still fashioned after models brought from France and Spain, that make the long Gulf crossing to Campeche Bank for tons of red snappers (page 315).

At Moss Point a huge factory produces white paper from yellow pine; another makes paper into bags for shoppers in far-distant cities. Experts fashion fish lures and decoys. Jackson County growers ship from here the papershell pecans and other varieties they developed.

Yet, circled by sterile pine ridges, cupped in a flat bowl of marshy bayous, its traffic impeded by a toll bridge, Pascagoula seems sequestered from affairs that trouble men elsewhere—from Spanish revolution, sit-

down strikes, resettlement projects, or Supreme Court debates.

A woman was hanging out the week's wash at the 219-year-old Spanish fort, with its walls of oyster shells bound by moss and mortar masonry. Grass grew high in a historic cemetery with its horizontal slabs, foreign language epitaphs, and rusty wrought-iron crosses.

#### THE WEATHER AND THE JONESES

Pascagoula is busy, but never restless. Its old families are bound to their soil by generations of interrelated ancestors.

"It looks like rain today," ventured a stranger.

"Mebbe," replied a citizen.

"Fine weather we've been having."

"So-so."

"Do you know the Jones family?"

"Can't say I do."

"Well, I'm sorry. I've been looking for a cousin of mine—"

"Oh, you a cousin of the Joneses, stranger? Come right in and rest a mite, and I'll take you up there. Why didn't you say you were the Joneses' cousin in the first place? Mighty glad to meet you. And, yes, it *does* look like rain today."

Machines have come to Mississippi. But there still is time to go fishing, to attend political rallies and "protracted meetin's," to "go visiting" for days at a time, and to know all your cousins.

# CROSSROADS OF THE CARIBBEAN

BY LAURENCE SANFORD CRITCHELL

*With Illustrations from Photographs by Edwin L. Wisherd*

WE came to Trinidad an hour before dawn, when Venezuela, to the west, was a half-imagined blur, remote and fancied in the dark.

An indecisive wind smelled of some forest where vegetation beneath the trees was rotting from endless lack of sun. In the empty darkness our ship reduced its speed; felt its way through the vague channels of the Bocas (page 343).

Occasionally, when some cove held back the air, we detected a faint humid odor of old water.

"That's a river smell," said the resident. "The Orinoco empties into the sea at the other side of the Gulf of Paria."

His match flared in the gloom; a sudden line of white deck-rails loomed out and vanished.

"Have you ever seen a tropical river? The water has a color—well, it's hard to say; it looks somewhat like deep-brown iron rust."

In the growing half-light I could see the channel more clearly. The hill-faces lifted out of the water into a jagged dark heave and towered around our ship, the illusion of their height lending a sense of over-balance. Below us a tidal current swept to the Caribbean. Its self-made waves slapped with an odd, contrary sound against the steel.

"I see lights behind us," I remarked, "three of them."

The resident frowned a moment. "I thought they were houses," he said, at length. "Some of the people in Port-of-Spain have homes here on the Bocas. But those are ships."

## SHIPS OF MANY FLAGS

He chuckled into the wind.

"You'd be surprised how many ships come to Trinidad," he rambled on. "They say about five thousand a year. Really, Trinidad is important in its way—a sort of midwife to the Caribbean.

"Rusty old freighters loaded with cargo come here and leave their freight to be stored on wharves. Afterwards another freighter ambles along, picks it up, and carts it away to Africa, or Asia, or North America—or to places like Ciudad Bolivar,

200 miles up the Orinoco, or Maracaibo, where the bay is too shallow for the large boats.

"If someone in Rio wanted to send an automobile to Capetown the automobile would probably come to Trinidad and stay here until a boat for South Africa made its regular stop."

The morning light grew stronger. Trinidad lay quietly on the port bow: a silent, tree-covered island, not mountainous, but confusedly hilly.

Faint houses along the shore and the single white road, empty in the dawn, gave it the unassuming appearance of a countryside in northern New York. Only the smell—the unforgettable rank smell of the jungle—and the derisive shrieks of the sea birds proved otherwise.

"Port-of-Spain is ahead there," the resident pointed. "You can just about see it."

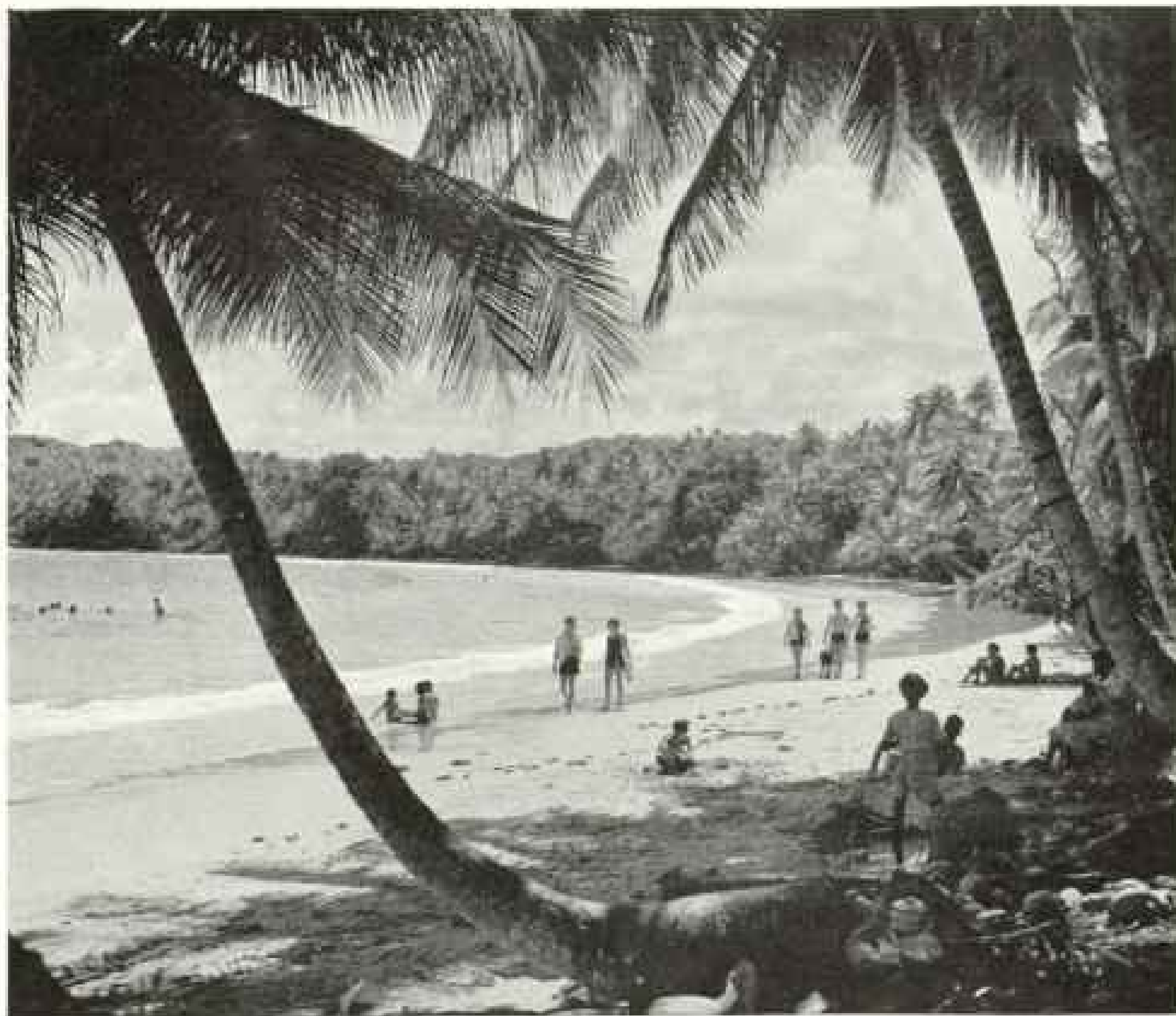
In the quiet wind a flat-bottomed boat came out of the dawn, two natives pushing it forward with their long poles. They walked in unison, silent, padding over and over in the same track like donkeys enslaved to a treadmill.

"That's a cargo boat," nodded my companion. "You see, the harbor is shallow. The Government is dredging a channel to the wharves, but many ships still have to anchor about two miles from shore. They unload the cargo into those boats. It's rather inconvenient. You and I have to go ashore by tender."

"I usually enjoy it, though," he chuckled again. "Ever since Columbus discovered Trinidad, people coming here have been going ashore in small boats."

But there were no gasoline engines in those days, I reflected, as we clattered down the gangplank onto the heaving and faintly gurgling tender.

Columbus discovered the island in 1498, on his third voyage to the New World. In a letter to Ferdinand and Isabella, he explains why it was named "Trinity": "A sailor went up to the main-top to look out and to the westward saw three mountains near one another." These peaks, locally known as the Three Sisters, officially are Trinity Hills (map, page 321).



GLEAMING SANDS AND LIVELY SURF ATTRACT BATHERS TO BALANDRA BAY

The northeast trade wind, sweeping in from across the Atlantic, sends blue-green rollers, and sometimes crashing breakers, high on the beach. Cocos Bay, south of here, is lined with a belt of palms half a mile wide. The trees grew from coconuts washed ashore from a wrecked ship. The sandy beach along much of the eastern coast of Trinidad is so firm that automobiles use it as a highway.

Sailing along the island's southern coast, the explorer saw lands "as lovely and as green as the orchards of Valencia in March." After crossing the Gulf of Paria, he turned westward along the coast of what is now Venezuela. This shore he termed "the most lovely in the world."

Convinced that the "earthly paradise" of the ancient philosophers lay somewhere in these newly discovered regions, the Admiral later petitioned his sovereigns for authority to explore further, but his proposed expedition was never carried out.

#### SOUTH AMERICA—"JUST ANOTHER ISLAND"

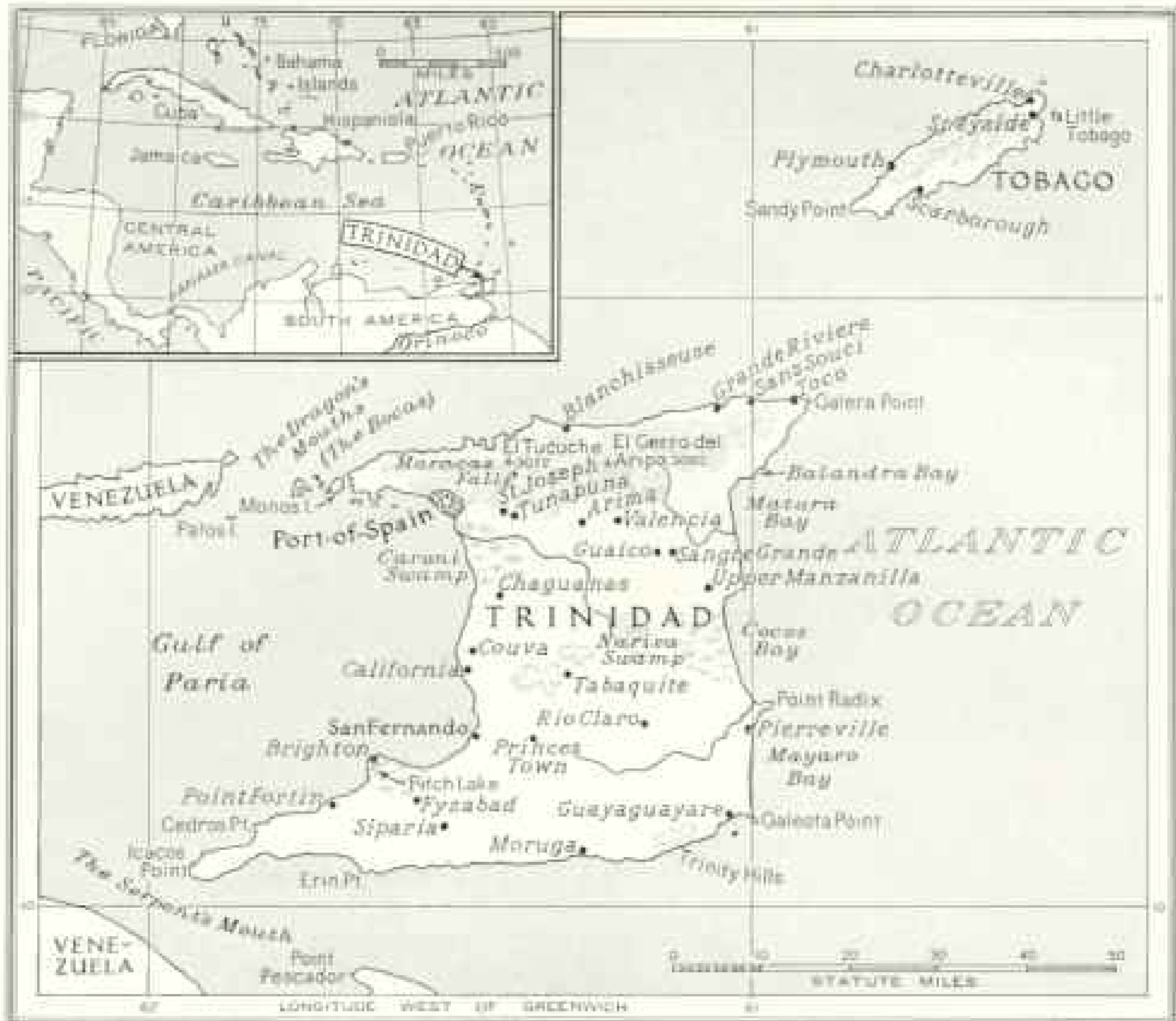
Across the gulf, dimly, Columbus saw the hills of the South American Continent rolling away in recurrent waves. Dismissing them as another island, he set around for home.

In 1595 Sir Walter Raleigh came to Trinidad, on his way to El Dorado, which had been located beyond question in the upper regions of the Orinoco. Being of a military mind, and knowing the danger of a hostile city at his rear, he burned the Spanish capital.

He tarried in the Gulf of Paria to calk his ships with pitch from the famous Pitch Lake (page 323).

The records of early Spanish government following Raleigh's visit show a curious attention to clothes.

It is noted that the city fathers owned but one pair of knee breeches among them (suggesting odd social difficulties), while some colonists were so poor that they could go to Mass only once a year, and then only in borrowed garments! This humble and human touch attracted the historians who



Drawn by Newman Bumstead

TRINIDAD IS A "CHIP OFF THE OLD BLOCK" OF SOUTH AMERICA.

Animals and plants in this southernmost corner of the West Indies are akin to those of Venezuela, whose nearest shore is visible from the island. Tobago, governed as a ward of the united colony of Trinidad and Tobago, is nicknamed "Robinson Crusoe's Island." DeLoe obtained local color for his book from a published description of this typical isle of the tropics. His hero's adventures were based on Alexander Selkirk's experiences on the islands of Juan Fernández in the South Pacific.

followed: they mentioned but little more of the Spanish colonizers.

Another arrival, Sir Ralph Abercromby, sailed to Port-of-Spain in 1797 and demanded that Don José María Chacón, the Spanish governor, surrender the island.

Chacón was a humane man, out of touch with his times. Sensible of the bloodshed which was certain to result from any conflict with Abercromby's superior force he turned Trinidad over to the English. There and then the island settled into its niche, became steadfast, loyal, and serene.

Ranking next to Jamaica in size among the British West Indies, Trinidad has nearly twice the area of the State of Rhode Island.

The Colony of Trinidad and Tobago has a population estimated (in 1935) at more

than 439,000. More than 1,000 miles of good roads and 123 miles of Government railways help trade and travel.

ENIGMATIC PORT-OF-SPAIN

Perched on the bow of a tender you see the capital from the humble viewpoint of the early visitors.

Port-of-Spain today is rather enigmatic. Unlike most cities of the world, it has no established personality, no tangible formula of atmosphere that one can grasp and hold aloft with triumph.

It is a tropical metropolis of about 75,000 people, with some of the finest hotels in the West Indies.

In all hotels the beds—huge beds, canopied with impressive but rarely used mosquito netting—are made twice a day, for



"KEEP TO THE LEFT" IS THE RULE FOR BICYCLES AND CARS

Parking is permitted on only one side of crowded Frederick Street in Port-of-Spain. At noon all cars are moved to the opposite curb so that they may be in the shade. On the sunny side, pedestrians walk beneath low awnings or canopies suspended from overhanging balconies. The author, next to the car in the foreground, adjusts his camera for a "shot" of the capital's shopping center.

there is an hour of siesta when everyone is expected to muss them up. Tea is a ceremony, almost Japanese in its circumstance.

You dine on plantains that are oversized bananas; on bread-fruit, tasting rather like a potato; on mangoes, with the enervating carelessness of the East in their fruit; on *mamonos*, incredible oddities which are sucked for their taste, not their juice, and are scarcely worth eating (Plate IV). All these are stabilized by the reassuring dishes of the northern continent.

On the streets behind the Savannah in the hot afternoons one imagines the mood is Spanish, broiling in its own juice at siesta hour. Marine Square, tree-choked, could be continental were it not a little British, and might become more British in the absence of the West Indies (page 340).

It is hard to say that Port-of-Spain is sleepy or active, lovely or dull, or that one looks back on it from a distance with any definite feeling. It is a city of bicycles pedaled by natives, and houses inhabited by various Caribbean peoples, as if the natives had been pushed to this bottleneck of the sea by force of weight above. And bicycles or houses lead to no conclusion.

Some of the British residents rise at sunup while the air is cool to walk the circle of that vast space of meadow, Queen's Park Savannah.

It is a long walk. But mornings in the Tropics are a compensation for the day: the English in white linen, the East Indians in white cotton, young girls and boys playing—all clatter under the trees while the air is cool and the world good. It will not be the same at noon.



PITCH LAKE DISGORGES A TREE TRUNK THAT MAY BE 3,000 YEARS OLD

The superintendent of the asphalt works, with his sons and daughter, inspects the ancient stump which comes to the surface every now and then, only to be swallowed again by the lake (page 335). The Biblical warning "He that toucheth pitch shall be defiled therewith" does not hold good here. Where the asphalt is soft it may be pulled out and handled like tuff without staining the fingers.



"LOOK! HE'S TAKING OUR PICTURE!"

Glancing up to see *The Geographic's* photographer aim his camera, this East Indian girl was startled, but her companion seemed totally unimpressed. A dozen or more heavy silver bracelets encircle her wrists, and a bright piece of jewelry glitters on the side of her nose (Color Plate VII). The girls need no park benches when they stop to rest in Marine Square, Port-of-Spain.



OVER "RED HOUSE," TRINIDAD'S GOVERNMENT BUILDING, WAVES THE UNION JACK

Headquarters of the Governor and Executive Council, who administer the Colony of Trinidad and Tobago, is this arcaded building whose nickname refers to the brilliant color of its exterior. Helmeted native policemen stand at attention at a corner of Woodford Square. A troop of Light Horse serves as the Governor's mounted escort on State occasions such as the visit of the Duke and Duchess of Kent in 1935.

You meet with a yellow-breasted bird in the park that interrupts you by seeming to speak French. "Qu'est-ce qu'il dit? Qu'est-ce qu'il dit?" he asks interminably. "What did he say? What did he say?" But the bird (the Derby flycatcher) never waits for an answer, hopping off to ask his empty little question of someone else.

#### A LITERAL OPEN HOUSE

I stopped at Government House one afternoon to visit the aide. We had tea on the veranda.

"Why is the house so open?" I asked, waving at the doors and windows. "Don't you ever have a burglar?"

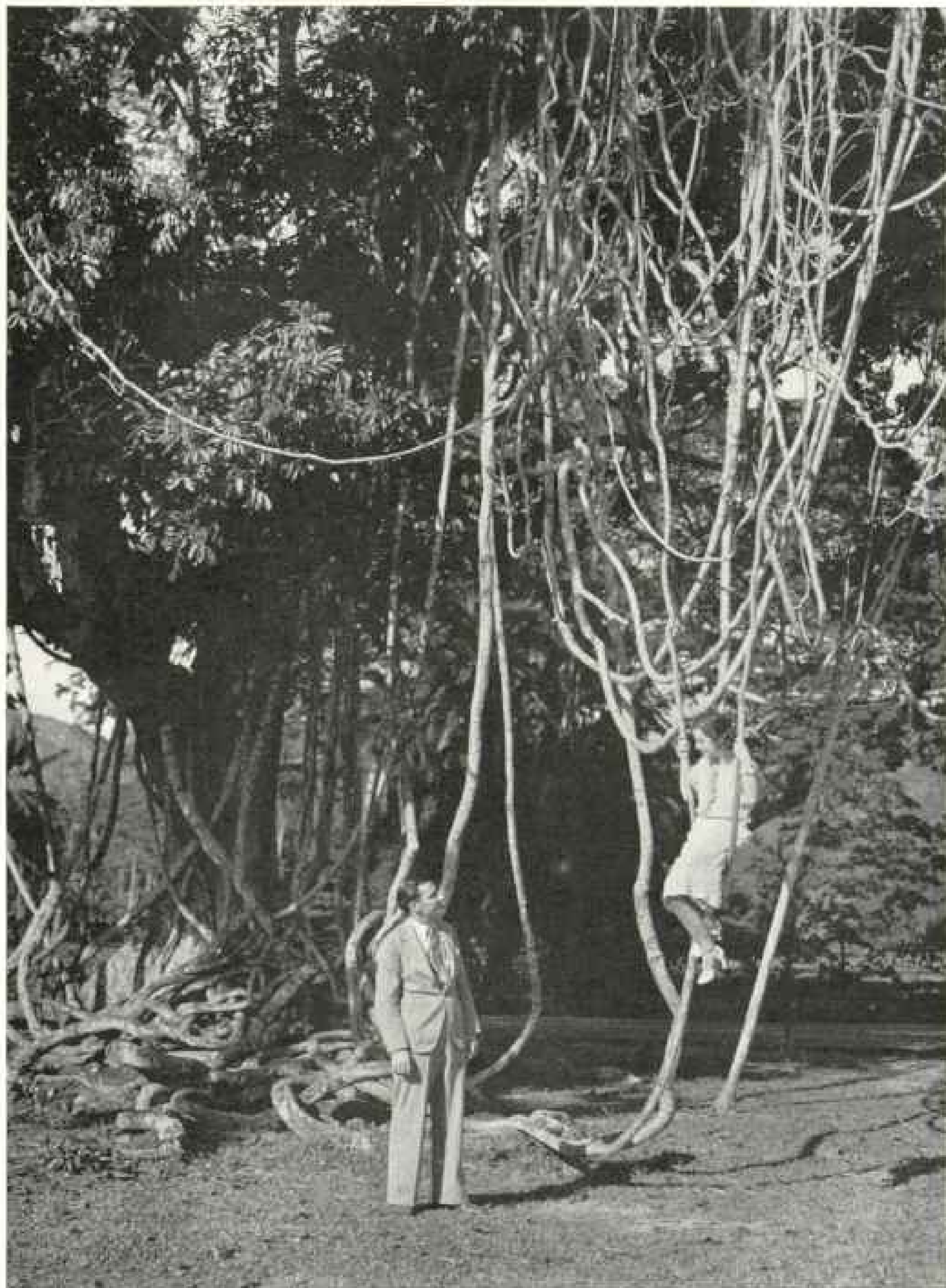
"We have not had one yet," he said. "We keep the place open to get the air. The wind here in Trinidad is cool so long as you're out of the sun. So far as intruders go, the status of Governor seems to be so firmly fixed and unapproachable to these native people that even the idea of

entering the grounds gives them considerable awe. West Indians have a good respect."

I had noticed how smartly the native policemen in Port-of-Spain controlled the traffic. Given a post of some authority, they dropped the more instinctive attitude of compliance with old bondages. They had expected no such power as that which was granted them, and in their effort to prove worthy of it, and to retain it, they seek to imitate the qualities of the British officials. It is a heartening sight.

"I'll tell you about the West Indians' respect for power," continued the aide. "When the Duke and Duchess of Kent came to visit Trinidad in 1935, we had a lawn party here in the grounds of Government House (page 337 and Plate III).

"We invited about 1,500 people. The grounds could accommodate that number, but very few more. So we had the problem of keeping the remainder of the curious



FOR "SWING" FANS; THIS ODD PLANT PROVIDES PLENTY OF ROPE

Like a wriggling mass of giant tree snakes, the cordlike stems of *Anodendron paniculatum* drape themselves around a tree, forming natural swings. The woody plant, native of Asia, is one of the largest Banas known. This one, imported from Malaya, belongs to the Royal Botanic Gardens and stands on the lawn in front of Government House (Plates III and VI). Here tropical plants from all over the world are collected.



populace from breaking in. The gardens are public, you know, and technically any citizen of Trinidad may demand the right to enter.

"We finally posted a number of Royal Guards around the boundaries of the house. They were ordered to frown sternly, but also were instructed not to stop any native who wished to enter. The frowns turned the trick. Although each guard was spaced about ten feet from the other, the entire island populace stood back respectfully and watched from outside the line."

"The only creatures who have no respect for law are the animals and birds," he chuckled. "We have trouble keeping bats out of the Governor's house. We are annoyed by the lightning bugs. Somehow when you see those little insects flying around your mosquito net at night you get a fearful notion that they can set the affair on fire."

#### WATER FRONT TO THE WORLD

The aide gave me a letter of introduction to the harbor master. There was not a great deal that a harbor master could do: the wharves, the water front, the loud-tongued chaos, had no fences around them, and anyone, even without a letter, could explore quite freely.

Trinidad, superficially, seems the reverse of an ant heap, for its activity shows best at the surface, the veneer of the water front.

You stand by the cranes where cargo is fed into the maws of omnivorous tenders and come to the conclusion that the island is crudely modern.

Back in the interior, however, on a forest-silent road you say with equal certainty that commerce at the surface boils by applied heat, not by inner force, and that all the rest of Trinidad is apathetic. Then you find you are wrong in either conclusion. Trinidad faces you every way.

The coconut is one of the faces. Out of the palm groves, mile after mile of them, come millions of coconuts a year.

"We turn many of them into copra," said a plantation owner as we followed a path through the Manzanilla grove.

"Just how is copra handled?" I asked, listening to a distant rattle of wind through the high leaves.

"Copra, as you know, is the dried broken meat of the coconut. We cut each nut into sections and let the sections dry in the sun to prevent putrefaction. Afterwards

we ship most of the dried meat away to factories that manufacture coconut oil for margarine, soap, and other products."

"What about cacao?" I asked. I had seen the vast cacao forests on the hills back of Upper Manzanilla.

"Cacao forests?" He was puzzled momentarily. "Oh, you mean those big trees. Those aren't cacao; they're called *immortelle*, and we plant them at spaced intervals to shade the cacao. Cacao grows usually as a low tree (page 341).

"Before this drying process begins," he explained, "we take the beans from the pods and put them into vats, where the surrounding pulp is removed by fermentation."

He showed me trays of cacao beans drying in the sun. A strong odor of fermentation rose from them, mingled with a chocolate smell.

"Cacao has fallen in value these days," said the plantation owner. "But in 1935 we exported more than two and a half million dollars' worth."

#### EAST INDIANS WORK IN WEST INDIAN FIELDS

In some regions of the island I saw East Indians working in the flooded fuzzy-green areas of rice fields, their legs bare, their heads shielded under big hats, their whole aspect suggestive of the Orient.

But rice was rare. Mile after mile of sugar cane rolled down from the mountains, pale-green and high. Water buffaloes work in these fields at cutting times.

Once I happened on a group of women who were chopping stalks into small sections (page 336).

"They plant these," said my driver. "After a while another sugar cane grows out of each section. They get about five new sugar canes out of each old stalk."

The cane workers wield their machetes with consummate skill. They are predominantly East Indians. Trinidad is crowded with East Indians; about a third of its population belongs to that race.

After slavery was abolished in the island, they were brought over from India between 1845 and 1917, under a system of indenture, to work on the plantations. After their period of service was ended, they were either given free passage back to India or allowed to remain. Many stayed.

I had seen their temples clinging to the hills of the island. Since these orientals

TROPIC COLOR IN TRINIDAD

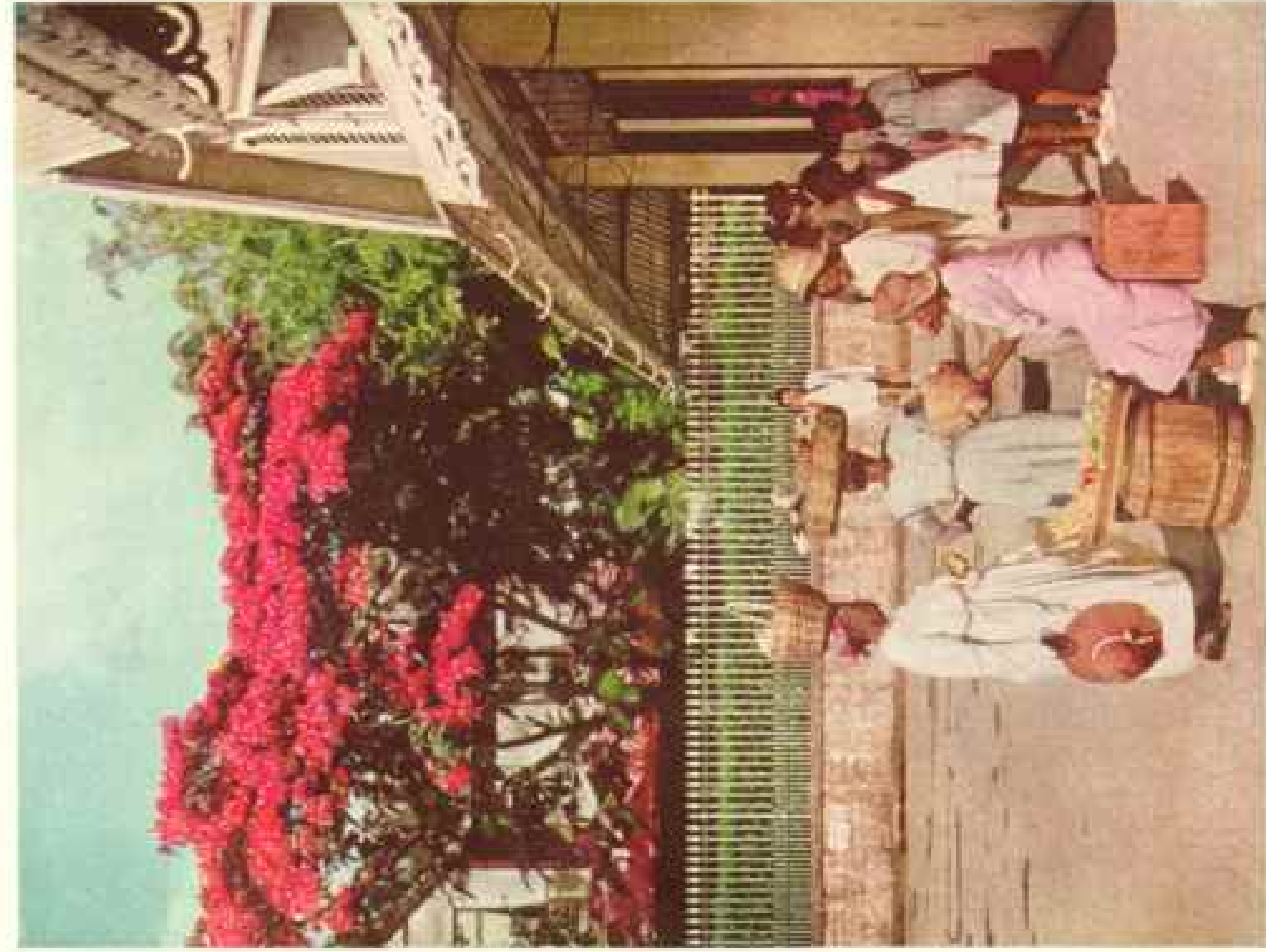


© National Geographic Society

Finlay Photograph by Edwin L. Witheril

AMERICAN MOVIES ADD ZEST TO LIFE IN THE TROPICS

"India Speaks" should have particular appeal in Trinidad, for though this British island in the West Indies is half a world away from the Orient, its population and that of near-by Tobago include some 137,000 East Indians, originally imported to work on the plantations (Plates II, IV, V, and VII). The majority of the inhabitants, however, are of African descent. Sometimes natives spend an entire holiday going from one Port-of-Spain theater to another, seeing all the shows in town. To these boys buying peanuts, the names of Hollywood stars are thoroughly familiar.



© National Geographic Society

"BUT I DON'T NEED ANY MANGOES TODAY!"

Native women twine rags about their heads to help balance the baskets and ease the loads of chickens, fruits, and vegetables that they carry along the streets of Port-of-Spain. Well named is the tree, a flamboyant (Plate VIII).



Finlay Photographs by Edwin L. Wheeler

MYSTIC CEREMONIES AT A HINDU TEMPLE NEAR ST. JOSEPH

One half-naked attendant pounds a plate-like brass drum, another pipes a flute, and a third reads boisterously from a worn manuscript. They will not explain the ceremony, but will perform it for a shilling or two.



© National Geographic Society

A SUNDAY EVENING CROWD GATHERS IN THE GOVERNMENT HOUSE GARDENS TO HEAR THE CONSTABULARY BAND

Finlay Photograph by Edwin L. Wheeler

Police do more than keep order in Trinidad. Musicians of the force give concerts in the parks and gardens of Port-of-Spain and outlying towns. From the balcony of the Governor's residence, the photographer took this picture as he waited for the band to arrive at the gardens, always open to the public (Plate V1). In the distance is a cricket match. English, French, Spanish, and Portuguese help make up the island's white population.



THESE WIDE-EYED MACAWS WILL NEVER TELL THEIR OWNER'S SECRETS.

They belong to the parrot tribe, but they do not talk. The aged East Indian, a merchant at St. James, imported his pets from South America. Among the birds that thrive on Trinidad are tanagers, flycatchers, and those feathered jewels from which the island takes the name "Land of the Hummingbird."



© National Geographic Society

Field Photographs by Edwin L. Wisland

FRUITS OF THE TROPICS ABUNDANT ON TRINIDAD

This East Indian girl's display includes eggplant, squash, mangoes, and peppers. Breadfruit trees, brought to the West Indies from the South Sea islands by Captain Bligh and others many years ago, provide nutritious fruit that may be roasted, boiled, or made into soup.

## TROPIC COLOR IN TRINIDAD



HE PREFERS TRINIDAD'S HARMLESS WATER BOAS TO INDIA'S POISONOUS COBRAS.

Hindu mystics in Trinidad still practice the magic of the Far East, though it has been 20 years since an indentured East Indian was brought here for plantation labor. This charmer caught his snakes in the island's swamps. The bushmaster and fer-de-lance are known here, but rarely seen.



© National Geographic Society

Finlay Photographs by Edwin L. Wisner

### HUMBLE SUPPLIANTS PETITION A HINDU DEITY

Attendants at this Tunapuna temple will not explain the drawing; so each visitor carries away his own interpretation. Were Columbus to anchor here today, he would find the oriental type of people he was seeking when he discovered the island, for the spell of India hovers over Trinidad (Plate 1).



© National Geographic Society

**BLOSSOMING BIGNONIA CROWNS AN OLD IRON GATE**

Trinidad has only two seasons, a wet and a dry. Each brings forth a maze of luxuriant vegetation that ranges from moss to tree ferns and palms. The island's proximity to Venezuela enables birds, bats, and insects to migrate readily to and from the mainland.



Finlay Photographs by Edwin L. Wheeler

**GOVERNMENT HOUSE GROUNDS ARE A PLANT LOVER'S PARADISE**

Evergreen branches like ostrich plumes shoot out from spindly Araucaria trees. From bushy booffee, or wallaba trees (right), roofing shingles and telegraph poles are made. Zinnias brighten the foreground; just beyond grows a hibiscus with green and white leaves.



© National Geographic Society

**AN EAST INDIAN LASS ROASTS HER CORN IN THE HUSB**  
 When it is done to your liking, over the pot of glowing charcoal, she strips off the green covering. Like most girls of her nationality in Trinidad, she wears a nosepiece and has a score of bracelets on each arm.



Finlay Photographs by Edwin L. Wisner

**STUDY IN SEPIA: A NATIVE WOMAN OF PORT-OF-SPAIN**  
 She wears a modified French costume, familiar in Martinique but seldom seen in Trinidad, and borrows a bit of Hindi style by donning silver bracelets and earrings.





THE 'FLAMBOYANT' IS A LIVING FLAME

Strangely, few trees native to the island have attractive blossoms. Hence, most of those that flower profusely, including the flamboyant, have been introduced from other parts of the world. One of the most striking, the immortal, was imported to provide shade on cocoa plantations.



© National Geographic Society

Finlay Photographs by Edwin L. Wislizen

WANT TO RENT A GAS LAMP, A FLAG, OR AN ICE CREAM FREEZER?

Apparently all are regarded as "necessaries" if you are planning to arrange a dance (see sign). Customers may find almost anything inside this Port-of-Spain general store—or outside on the walk. The proprietor and his family live upstairs.

arrived, generations had passed, yet the evidence of their faith existed, pathetic, perhaps, in its struggle to maintain itself without the spur of higher religious officials.

Little brown men dressed in their common robes went through the motions. A congregation listened with an Eastern respect and the laziness of the tropical West.

Outside of the enclosure a flamboyant tree would rest its branches against the wall: the deep throaty laughter of the West Indian negro echoed occasionally in the services (Plate II).

Twenty thousand of the East Indians in Trinidad are Mohammedans. Their temples are barer, less decorated than the Hindu temples, but their fervor is strong: they have no show windows for passing visitors. You remove your shoes to enter, but they give you no slippers, as do the guardians of the mosques in the East. You tread in a sensitive fashion across mats and carpets, and squat down listening to someone chant from the Koran.

The book is their proudest possession. The temple has been built around it, as if it were the book that mattered, not the words, while the old priest who reads it feels with a trembling and humble finger down the page.

#### A TOO-CLOSE SHAVE

East Indians throng Port-of-Spain. They crowd the streets and markets with a lusty carelessness; they regard work but little, and seem to subsist, almost miraculously, without it. They stride on their way with easy carriage, rather a lordliness, and incessant amusement.

And they laugh at themselves, wholeheartedly. I remember seeing one East Indian having his hair cut, or rather (although unwittingly) having it shaved. Absorbed in conversation with someone standing in the doorway, he was unaware that the barber was half asleep at his work: it was near siesta time. Not until the patron had risen, clapped on his hat, and found it upheld only by his ears, was he conscious of what had happened.

A flood of terrible abuse descended on the barber. It continued unabated until finally, screaming aloud his misfortune, the bald victim emerged onto the street where he called on the passers-by to witness his misery. Heads popped from windows, men stepped to the doors of their stores, even the donkey carts paused.

Everyone thought it was funny, very funny. The victim stormed away, shaking his fists at the heavens.

But after a while he came to a silent alley, where he turned aside to contemplate himself. His big hand explored the stubble that stuck out on top. After a moment a smile spread upon his face. He grinned. He put both hands to his head and chuckled. In a moment, hands still on his head, he started to roar.

#### THE WORLD'S "HOTTEST LAKE"

Beyond the sugar canes were oil fields where aluminum tanks and high steel towers halted, in a more effective manner than the rice fields, any encroachment by sugar cane. Agriculture ended.

Everywhere about the roadways and the homes of the workers a smell of gasoline hung about the air. When the wind stirred the gasoline mingled argumentatively with an odor of hot leaves.

"Trinidad became in 1929 the largest oil-producer in the British Empire," said the manager of the Pitch Lake enterprise. "A very imposing statement. I like to think that Britain, in wartime, would depend on us to supply her warships with fuel."

He showed me around Pitch Lake, while his sons and daughter accompanied us, as if, until a stranger came, they had not visited the place (page 323).

"We took a hundred thousand tons of asphalt out in one year," he remarked. "Sometimes it's more than that—and yet the lake shows little sign of its loss."

"If we dig a hole five feet deep today, tomorrow the hole is filled up again. Nothing we do to it seems to make much difference. They tell me that the surface has gone down a few inches in the last decade or so, and that sooner or later the lake will be exhausted. Not while I'm alive, though."

We strode onto the lake. It was firm and slightly rough, formed into bulges, as if bubbles that rose from below had been held underneath by the weight of the man-trodden surface. In the oily pools of water around the crevices a number of fish were living, and a rather lonely frog jumped out to look at us as we passed.

"This is one of the hottest places on earth," the manager continued. "The asphalt absorbs the heat of the sun and emits it again, so that the men work here in a sort of earthly inferno."



GIGGLING FRIENDS WATCH AN INDIAN GIRL CUT SUGAR CANE FOR PLANTING

With her broad-bladed machete she chops the upper joints of the stalks into small pieces, which will be planted to produce new canes (page 326). These workers, on a plantation near Couva, are descendants of immigrants brought to Trinidad from Calcutta between 1845 and 1917.

He picked up a chunk in his hands. "The pitch alters its shape gradually," he said. "In the old days when they made the mistake of shipping it in the holds of ships without any packing, just dumping the carloads, they often found when they got to their destination that the entire mass had fused together again. Then they would have to dig it out. Now we refine it in the factory and barrel it ourselves."

There is a special wharf, so that ships which come to Trinidad for pitch need not wait in Port-of-Spain.

"The lake sinks a little under my feet," I observed. He nodded.

"We have to move the railway tracks every few days," he explained. "Otherwise they sink into the ground and disappear. But contrarily the lake has the habit of disgoring pieces of odd things that fell into it hundreds of years ago. That

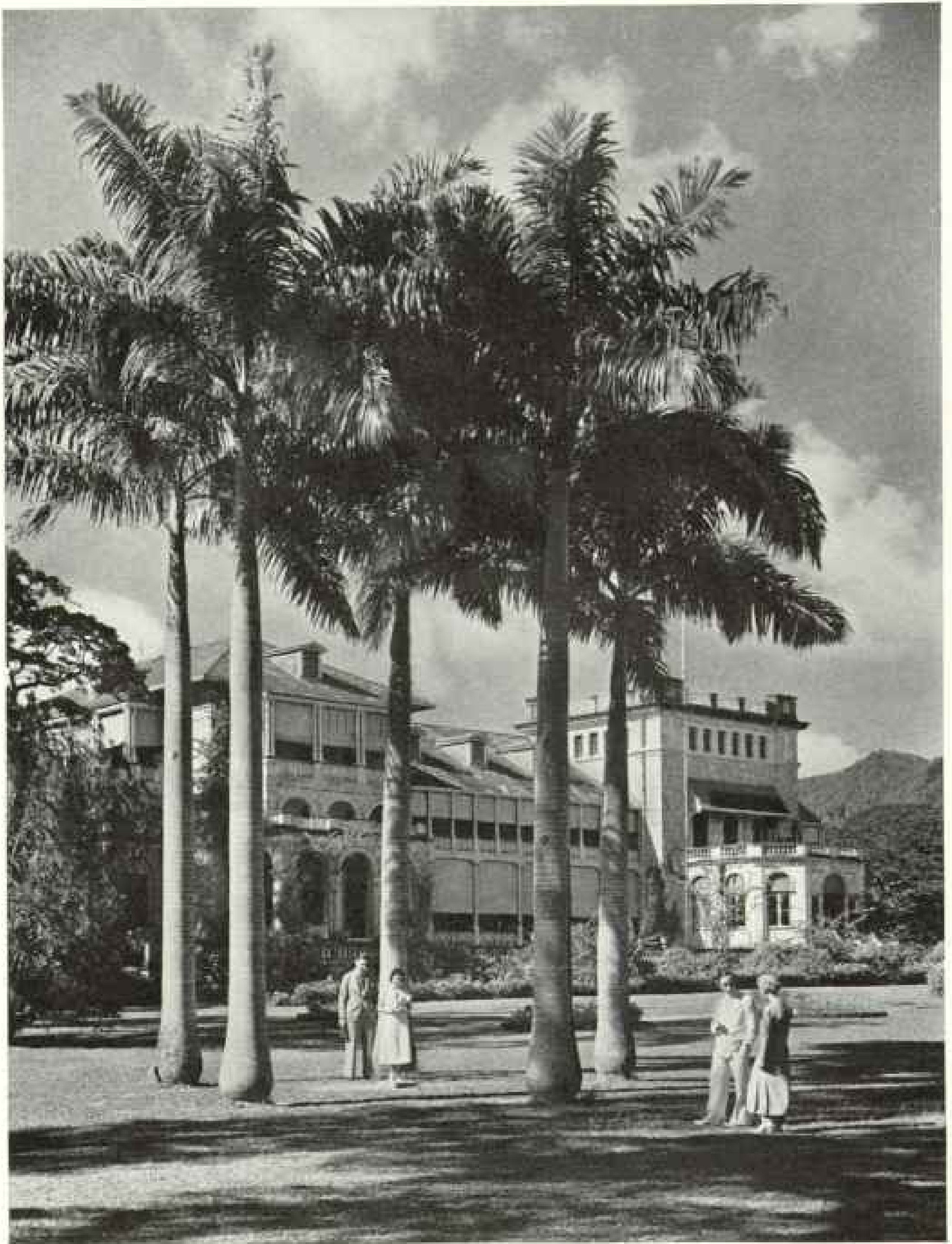
trunk of a tree over there has been estimated as three thousand years old. It comes up every now and then and sinks again."

#### LAST OF THE HIGH FORESTS

Pitch Lake is on the southern shore of the Gulf of Paria. If you draw a straight line diagonally in the opposite direction you would cross the sugar-cane regions again and come to the High Forests.

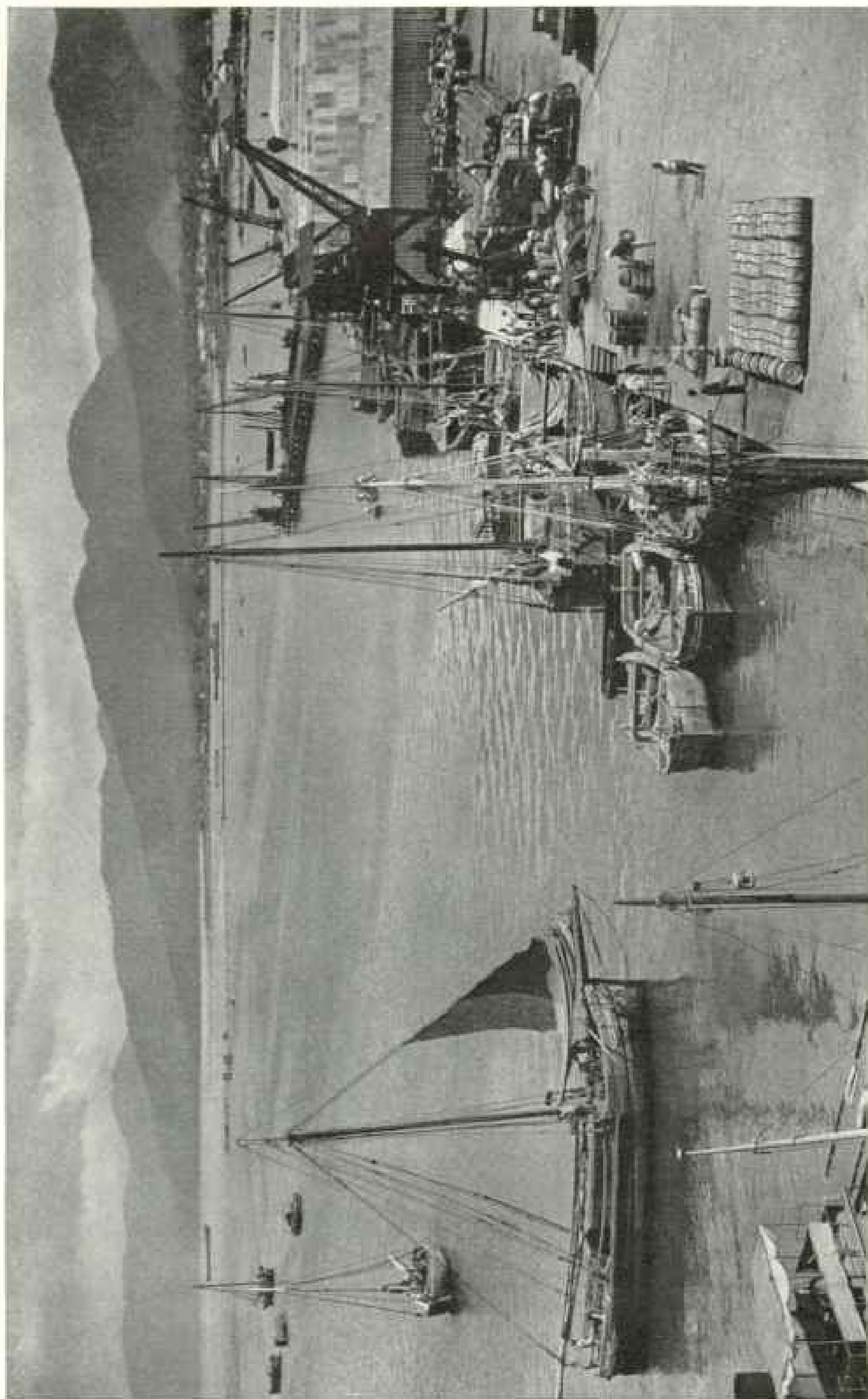
The High Forests are equatorial jungle. Very little comes out of this jungle that has important commercial value.

It covers only a small portion of Trinidad, for enterprise has pushed it back, hacked at it for succeeding years, until the original trees have dwindled miserably to the region around Toco on the northeastern coast, the most primitive district of the island.



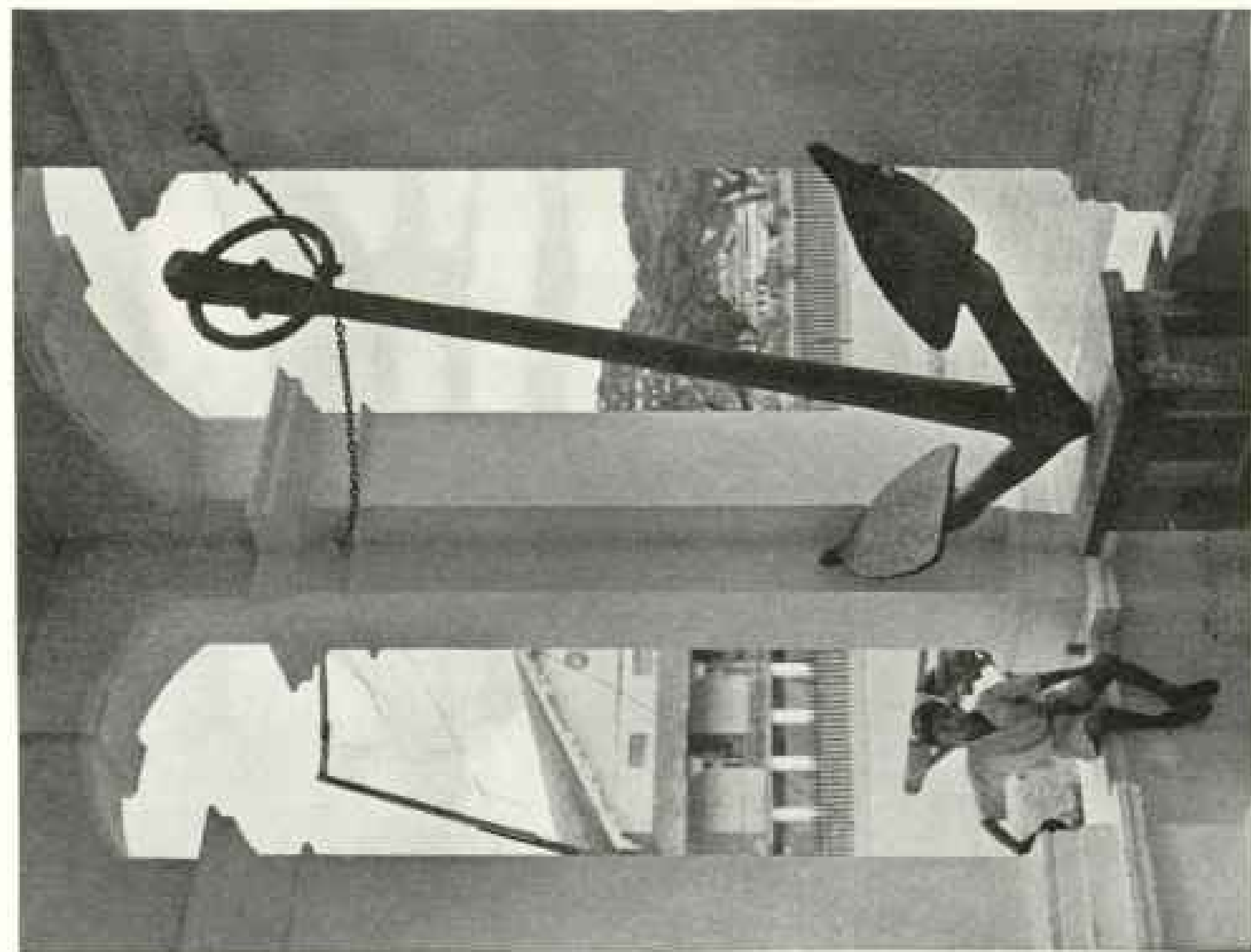
A PET OF ROYALTY LIES BURIED BENEATH THESE PALMS

The inscription on top of the small slab in front of Government House reads: "Here lies 'Digger' a wallaby belonging to H. R. H. the Prince of Wales which died at Government House, Trinidad, 18 September, 1920, on the way from Australia to England, in His Majesty's ship 'Renown'." The limestone building, nestling in the foothills beside the Royal Botanic Gardens, has been the residence of successive Governors since 1875.



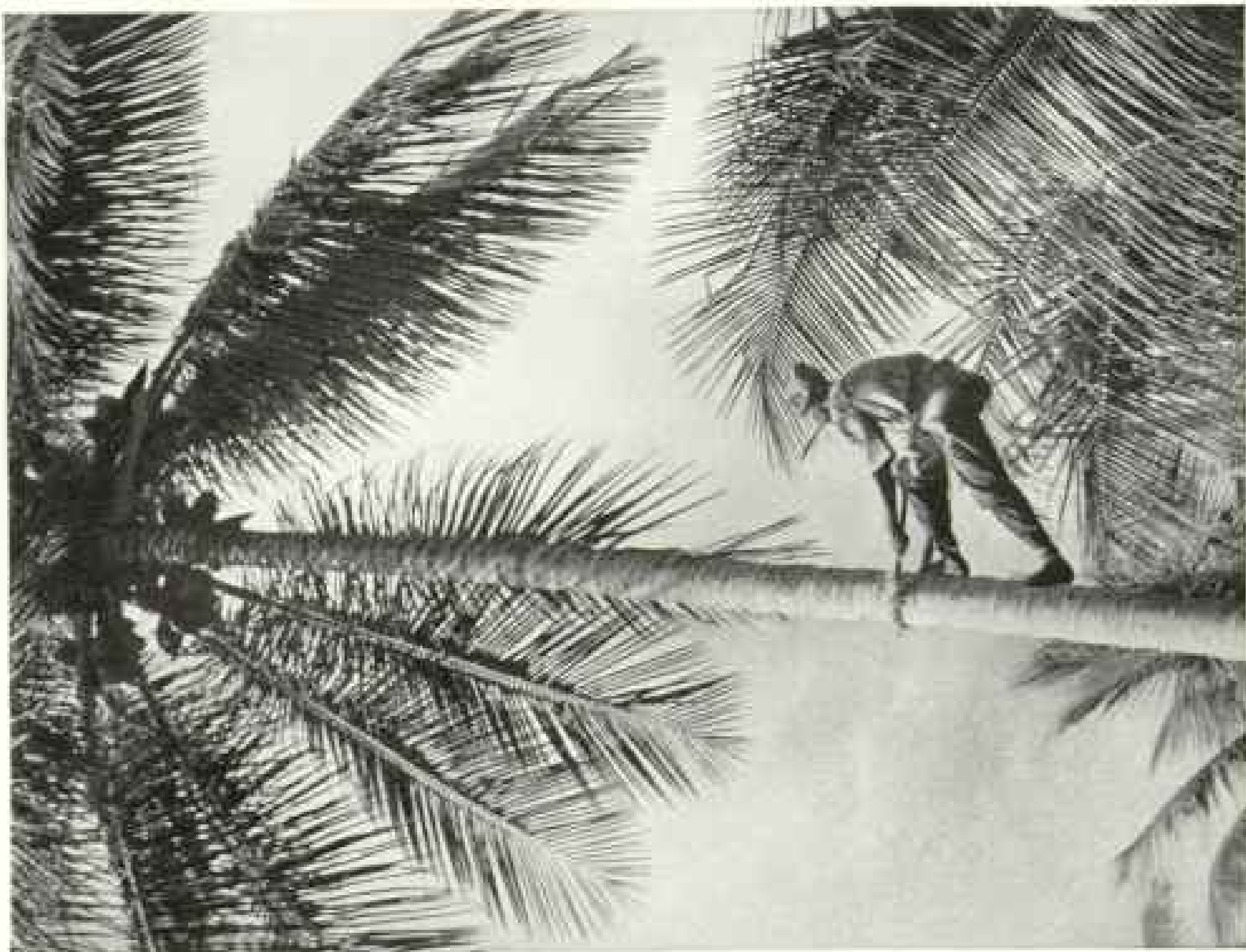
**BUSY LIGHTERS BUSTLE BETWEEN SHIP AND SHORE WITH PASSENGERS AND CARGO AT PORT-OF-SPAIN**

Vessels of some 27 lines, flying the flags of eight countries, make regular calls at this Singapore of the Caribbean. Clipper ships of Pan American Airways zoom down to the water here en route from Miami to South America. For centuries large craft have had to anchor in the roadstead, off to the left, but today the harbor is being deepened and pile drivers are at work on new wharves, such as the one jutting into the water beyond the row of lighters.



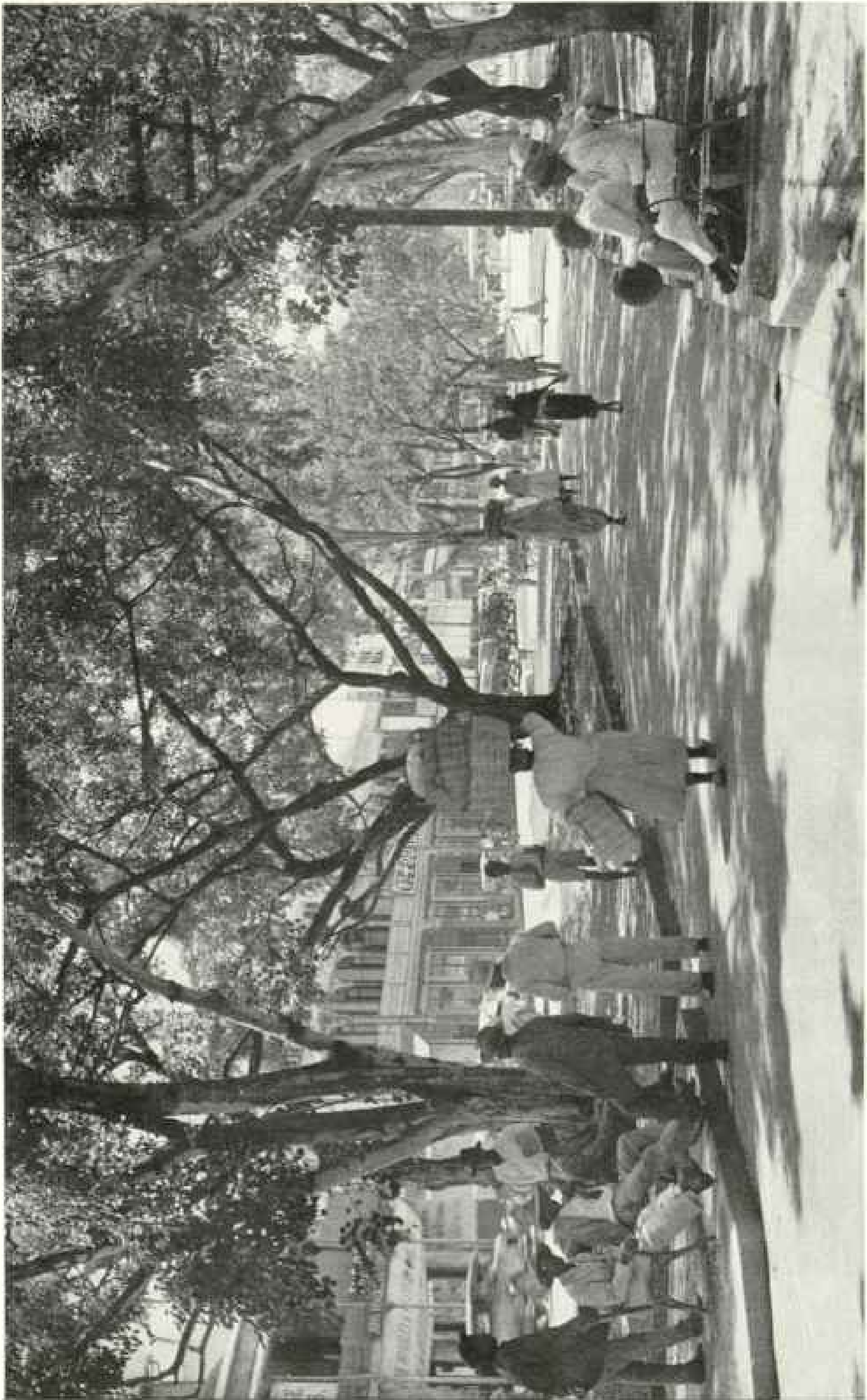
DR. COLUMBUS LOSE THIS ANCHOR 439 YEARS AGO

Recovered from the sea off Icaos Point in 1877, it has been declared by some antiquarians to be an authentic relic of one of the explorer's ships. It won a Gold Medal at the Chicago World's Fair in 1893 and was shown at the British Empire Exhibition of 1924-25. Now it adorns the front of the Royal Victoria Institute in Port-of-Spain.



KNIFE IN MOUTH, A HUMAN MONKEY CLIMBS FOR COCONUTS

With a rope around his waist, the native walks flat-footed to the top of the lofty palm, where he will knock off the ripe nuts with his machete. Trinidad ships more than a million coconuts annually to the United States, and exports large quantities of copra to England and other countries, where the dried coconut meat is made into soap and butter substitutes (page 326).



IT'S ALWAYS SIESTA TIME FOR SOMEBODY IN SHADY MARINE SQUARE.

Native men loll on cool benches and tell stories as they watch women trudge past with skyscraper burdens on their heads. Marine Square is no "square" but a wide boulevard cutting through the heart of Port-of-Spain's business district, where internationally known banks and commercial houses have their headquarters. On the opposite side of the street, beyond the big motor bus, is the United States Consulate.



**THE LITTLE PIG GOES TO MARKET—ON A LEASH**

Farther down the street a woman carries a big bundle on the usual luggage rack of the tropics—the human head. Here on the outskirts of Port-of-Spain is St. James's Barracks, headquarters of the Colony's armed forces.



© Publishers' Photo Service

**CHOCOLATE FOR YOUR CANDY COMES FROM SUCH A TREE**

Inside the big pods on the cacao tree are the small, almond-shaped beans from which cocoa is made. Trinidad produces one of the best grades of cocoa. About half the crop is shipped to the United States (pages 326 and 339).





HE'S HAVING A DRINK, NOT PLAYING A FAT SAXOPHONE

When the photographer and his companion said they were thirsty, after pushing their car out of the mud on the way to Maracas Falls, their native helper slashed two sections of bamboo with his machete. He then disappeared down the mountainside and returned with cool water.



THE PROUD CAPTOR'S SMILE RIVAL'S THE BAT'S BROAD WINGSPREAD

The flying mammal is *Artibeus cinereus*, a fruit-eater. Related species are common all through the tropics. Trinidad has vampire bats that have been known to attack animals in the fields.



INTO THE DRAGON'S MOUTHS STEAMS A SHIP LEAVING TRINIDAD

Columbus, sailing out of the Gulf of Paria, named its northern exit Bocas del Dragón (the Dragon's Mouths). Four channels lead through the jaws of the mythical monster. The narrow Boca de Monos passes between Trinidad (right) and Monos (Monkeys) Island. Rising sheer from the blue water is a solitary rock, Madame Téteron's Tooth. Legend has it that Madame Téteron, a local landowner, made a wager with the Devil and, when she scoffed at her bad luck in losing, her only surviving tooth fell out of her mouth into the strait!

You can find the jungle there if you go soon enough, for eventually the High Forests will meet up with commercial enterprises, and then the jungle will be pushed off into the sea.

Darwin and Charles Kingsley, Humboldt and Schomburgk and Bates, whose pens were aided by a knowledge of natural science, have told of the jungle; in the face of them no one less equipped should speak. I am satisfied to have seen.

Unless you have stood in some empty clearing and watched the vines shivering up to a gloom where the sky should be; unless you have heard the vague, distant sound of leaves muttering, and a crash where some unknown animal scurries through the roots, and smelled the mingled fragrance of flowers and dead things, of wood and old water; most of all, unless you have felt the indefinable creeping sensation of unseen live things, moving, like insects, with vague waving stealth, you have only the poorest conception of the High Forest.

A solitary road leads through them to

the north shore and Toco. In Kingsley's day a man was forced to go on horseback along rain-rutted native paths.

#### ROADS OF OTHER DAYS

L. O. Inness in his *Reminiscences of Old Trinidad* described their condition:

"The manner of keeping them in repair was to fill up the ruts and holes with quantities of megass\* during the dry season, over which the cane carts ran merrily to the mill-yard; but when the rains began, these megass-filled holes became dangerous quagmires, into which mules, horses, and even carts sometimes disappeared."

He wrote further of "a rider who was carefully picking his way along a country road when he saw a good-looking hat lying in the mud which he thought was worth retrieving, so he leaned over and lifted it with the crook of the hunter when, what was his astonishment to see the head of a man, who abjured him in mournful tones:

\* Megass, or bagasse, is the residue of the sugarcane after the juice has been extracted.



Photograph by Jacob Gayot

"DUTCH PRINCESS," INTERISLAND SCHOONER, WAITS FOR CARGO AT PORT-OF-SPAIN

This trading vessel carries goods destined for Tobago and other near-by isles. Other schooners and a steamship lie at anchor farther out in the roadstead. Government steamers sail three times a week from Port-of-Spain to Scarborough (map, page 121), occasionally putting in at isolated Tobago ports to pick up special cargoes of cacao, coconuts, limes, and other tropical fruits. Trinidad's capital is the meetingplace for many Caribbean cruise ships—French, Scandinavian, German, as well as those out of New York.

"For the Lord's sake, go and get assistance, there is a mule under me."

The region is somber. And the road to Galera Point runs along a coast line torn with pitted gray rocks that catch the long waves out of Africa and smash them willy-nilly in a white fury. Habitations are sparse. The Toco section remains today as the Caribbean islands must have looked when the colonizers arrived, dangerous and remote, guarded by the sea.

IGUANAS AND THATCHED HUTS

Iguanas crawl through the rocks. A few sea birds which have strayed from the better hunting grounds of the Gulf skim at the edge of suicide. Man is represented by his thatched huts, a trade-mark of the primitive.

And every evening a white lighthouse at the northeastern point blinks solemnly at the sea.

Unlike the other islands, you cannot grasp Trinidad by its four corners and fold it up into any bundle that a person can measure and define.

WEST INDIES ARE MINIATURES OF MANY LANDS AND PEOPLES

Barbados is a calm British pilot fish, absorbed in sugar cane. Curaçao is scarcely more than a town set on rock, punishing the empty land by its devotion to oil. Jamaica is natural; the towns are overwhelmed by mountains, jungle, sea; nothing can overcome its vehement beauty. Haiti is African; Antigua is the American West; Martinique is a beautiful hodge-podge, like an Eastern bazaar.

In Trinidad there is something of all of them.

The Crossroads island is one of those lands which has lost a personality of its own to assume the character of the earth.

# PLATINUM IN THE WORLD'S WORK

BY LONNELLE DAVISON

**I**F YOU were to ask a bride what her platinum wedding ring has in common with armament races, she probably would stare at you in bewilderment.

Yet the same metal that goes into her marital badge also is an important element in the manufacture of munitions. It serves the armament maker in fine fuse wire for torpedoes and shells; indirectly, it acts as chemical agent in the production of nitric and sulphuric acids, used together in making explosives.

A seldom-told tale of the World War concerns the dangerous and difficult mission of a young American engineer in Russia, who, just before the United States entered the conflict in 1917, undertook to transport nearly a ton of platinum from Petrograd (now Leningrad) to Washington.

Crossing the Atlantic was too uncertain. So, armed with a courier's pass, he set out, with his boxes of treasure, marked "Embassy documents," to make the long trek across Siberia to Vladivostok and thence over the Pacific.

With travel complicated by the Russian Revolution, he outwitted secret agents and bandit raids. Time and again he met peril, delay, and disappointment as he rode in trains jammed with fretting, sweating humanity. But the platinum came through!

Because of its versatility, platinum "is all things to all people." Unseen, it may do duty for the housewife as a contact point in her telephone (page 348). In a gleaming necklace it may compliment the throat of a theatrical star. The chemist, melting substances at high temperatures in a platinum crucible, finds still other uses for the metal—as do doctors, dentists, photographers, and inventors. It even describes a type of Hollywood blonde!

## WHEN PLATINUM WAS COINED

Several nations have considered platinum coinage, made patterns and trial pieces, and then abandoned the scheme.

Russia, in 1828, encouraged by rich platinum discoveries in the Ural Mountains, issued three-, six- and twelve-ruble pieces, amounting to some \$3,500,000 (page 357).

Then, because platinum's resistance to melting made it hard to mint, and, more important, because of fluctuation in its commodity price, the practice was discontinued.

Yet, valuable as platinum is now considered, its practical career has been brief.

"Unripe gold," Colombian Indians once called it. Prospecting for gold, they used to toss white grains of platinum back into the rivers—"to ripen" into the yellow metal!

In Tsarist Russia, over a century ago, a silversmith was hanged because he substituted platinum for silver.

## A JUVENILE AMONG PRECIOUS METALS

People now living can remember when platinum jewelry was a novelty. Long before platinum was used in legitimate coinage, this metal was circulated as money—but gilded and in counterfeit of gold.

"Throw it into the sea. Bury it," fumed the Spanish Government when racketeers of the day began palming off the new white substance from South America for good gold doubloons.

"I have even seen United States gold pieces counterfeited in platinum," said a coin collector.

Crude platinum ingots, too, were sold for gold in early times. Counterfeiters operating in a certain South American port were hanged from the yardarms of their own ship when Dutch buyers learned of their trickery.

Indeed, so lightly regarded was the metal that it was discarded as waste in gold refining, although later there often was strenuous effort to get it back.

At Quibdo, Colombia, for example, men literally mined their town for platinum lost in gold-recovery processes. The Government hired laborers to dig the streets, and householders worked their own property.

One man destroyed his entire house, finding enough precious metal to buy a new one, with a small fortune to boot.

Only recently, therefore, has platinum come into wide use. In verse and fiction it is the gold rush or silver bonanza that grips imagination. Few realize that platinum, too, lures men to drag tropical rivers and thaw frozen northlands, and, still more provocative, to conjure it, genielike, out of intricate chemical processes.

True, 2,000 years ago, Ecuadorian chieftains wore nose rings and rude, shining spangles of this metal.



Photograph by J. Baylor Roberts

WELDING A PLATINUM STRIP, THE JEWELER FASHIONS A SETTING FOR STAR SAPPHIRES

With the artist's design before him, he makes a combination brooch and clip pins, to be set with the two star sapphires shown in the small tray. Dark glasses shield his eyes from the glare as he applies the gas torch to the platinum, holding the metal in tweezers which lock so that the piece will not slip out.

But, somehow, the world forgot. It remained for modern science and industry, plus war needs and a feminine taste for pale jewelry, to awaken its sleeping potentialities.

PRODUCT OF LABORATORY MAGIC

It was the man in the laboratory who put platinum on the world's economic map.

Remembering the excitement that swept San Francisco when gold was discovered and the sensation of the Comstock Silver Lode, the arrival in England of the first crude Colombian platinum, in 1741, may seem a little dull.

Not so to chemists and physicists of the time. Quietly they set to work deciphering the mysteries of this stuff that one of them called "white gold, or the seventh metal."

It was not an entirely unknown quantity. Back in the 16th century a queer infusible metal had been observed in Mexico and what is now Panama. Later Don Antonio de Ulloa had mentioned *platina* (little silver), described in his account of South American adventures as "a stone of such

resistance that it cannot easily be broken by a blow on a steel anvil."

Its resistance to scientific analysis was also great. Years passed before it was learned that platinum, like other metals, could be melted if made hot enough.

In the 18th century someone rolled a bit of the metal into foil and drew it into wire—a great feat then, and the first faltering step toward present-day achievement, when one troy ounce of platinum can be stretched into a virtually invisible wire nearly 11,000 miles long, enough to go nearly halfway around the earth at the Equator.

SPANISH KING AIDS CHEMIST

The first crude platinum crucible appeared, pointing to its wide use for the laboratory. But it was late in the 1700's before they knew how to make a workable solid-platinum ingot, a necessary preliminary to the widespread modern industry. The first bar is credited to Chabaneau, French chemist working for Charles III of Spain, who received a patent for his discovery in 1783.



Photograph by Willard E. Culver

#### FROM EARTH'S FAR PLACES COME RARE NUGGETS

The Russian lump, exhibited at the Smithsonian Institution in Washington, D. C., weighs one and a quarter pounds; the South American nugget (largest ever found there) one and a half pounds; while the little piece of alloy from Australia tips the scales at one and a quarter troy ounces. Prospectors seek platinum and its allied metals in placer deposits—sand and gravel washed down from platinum-bearing rocks—or in lode or rock form like the deposits of South Africa. The pale metals also are recovered chemically as by-products of other minerals, such as the copper-nickel ores of Canada.

Chabaneau's biographer says that the King himself, a dabbler in science, used to visit the scientist's workshop and help with experiments. Once Chabaneau, in a rage at the apparent inconsistency of platinum ore, threw precious solutions, apparatus and all out of the window, vowing never to touch the stuff again.

Finally, however, success! And to demonstrate the amazing weight of this metal in pure form, he played a little joke.

Placing the shiny four-inch cube on a table, he asked a friend to raise it. The man could not. "You have fastened it down," he said. But Chabaneau lifted it—a weight of about 50 pounds.

Chabaneau's friend would have been still more astonished could he have followed the career of this metal into the future.

For platinum itself, science was to discover, does not stand alone. It belongs to a family of six allied metals, each with its own peculiar and valuable properties for art and industry. It was platinum's com-

ination with these other metals that caused the "inconsistencies" which upset Chabaneau's calculations.

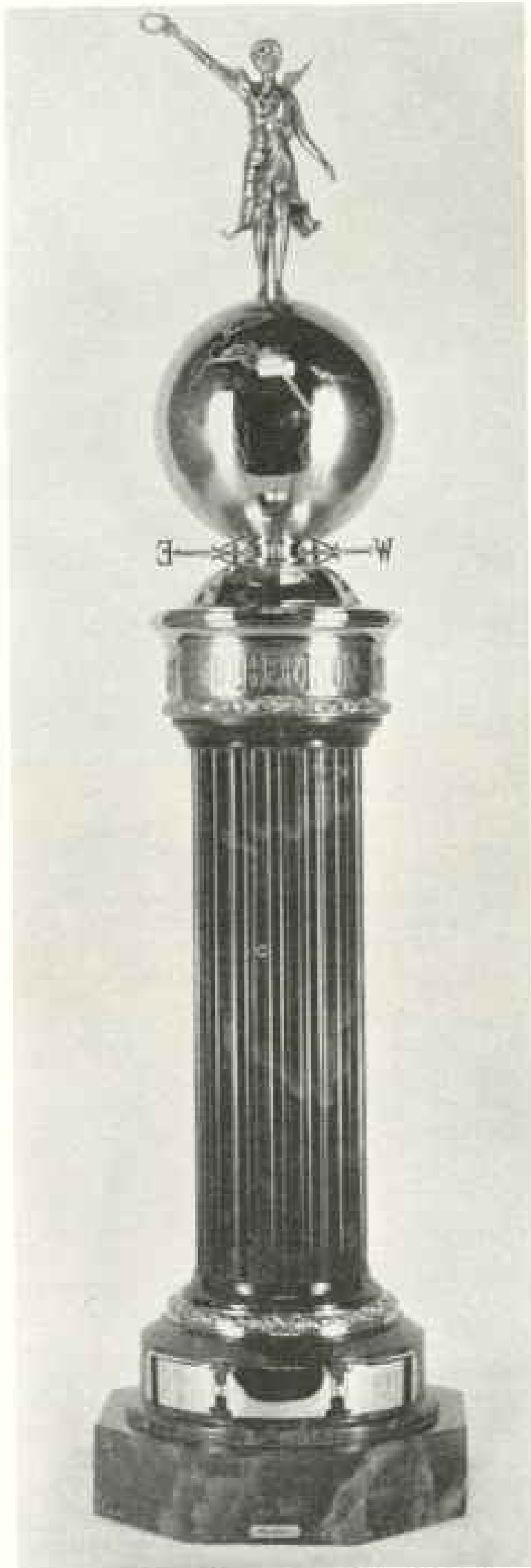
Other chemists, too, found experiments contradictory. Sometimes the platinum substance would become strangely brittle; again, to their surprise, it would "burn" (depending, as we know now, on how it was alloyed).

At last, however, the group stood clear. And as palladium, rhodium, osmium, iridium, and ruthenium appeared in addition to platinum, like rabbits out of the empty hat of a vaudeville magician, infant industries reached for the shining boon.

#### IN AIRPLANES AND FOUNTAIN PENS

Fifty years ago we had no radio communication, no X ray, no transcontinental or oceanic telephone, to name but a few man-made miracles in which the platinum metals play a small but vital part.

In airplanes now platinum is standard contact metal for high-tension magnetos.



Photograph from William H. Baldwin

"GRAND SLAM" FOR THE WORLD'S BEST BRIDGE PLAYERS IS THIS PLATINUM GLOBE WITH A WEATHER VANE BENEATH

Fountain pens became practical when an alloy of two of the platinum group was found to make a wear- and acid-resisting point. Because a form of platinum reduced to powder ignites alcohol vapor in the presence of air, certain kinds of cigarette and cigar lighters are possible.

A farmer who may be indifferent to platinum bracelets can still appreciate platinum's agency as a catalyst in making synthetic nitrates for fertilizer.

In your electric refrigerator and thermostat heat-control unit a thin strip of metal changes shape as temperature rises or falls, making or breaking electrical contact and thus starting or shutting off the motor. Since platinum offers high resistance to hot electric sparks, it is particularly useful here for contact points.

From obsolete telephone equipment thousands of ounces of platinum, palladium and gold are salvaged annually—minute quantities from each piece. After the metal has been put through special processes, back into service it goes in the form of more contact points. Platinum and palladium are important factors in radio and long-distance telephony.

Dentists use a large proportion of our annual supply in alloys for bridgework, foil, and fillings (page 350). And when you are sick the doctor may puncture you with an iridio-platinum-tipped hypodermic needle. War surgeons find many practical uses for these metals. One World War flyer has 17 bone replacements of platinum.

After the World War, with prices skyrocketing, science gradually found substitutes for the metal in certain fields. Yet, for many purposes, platinum still is unique. In the modern rayon industry, where liquid cellulose is forced through hair-fine holes in platinum-alloy spinnerettes, it is especially useful.

Photographic papers use platinum, as do submarine detectors and earthquake recorders. In commercial blasting miles of platinum-iridium in fuse wire annually hurry into oblivion.

Because they give high reflection and do not tarnish, palladium and rhodium are applied in the form of outer plating to reflectors used in connection with theatrical lighting and motion-picture projection. Much of our costume jewelry has been "flushed" with rhodium, this plate being easily applied and retaining luster.

Years ago, highly polished palladium,

cheapest metal of the platinum family, was used by the German Navy on searchlight reflectors. Today rhodium provides a permanent, nontarnishing surface for the all-metal reflectors in the 60-inch searchlights employed by the United States Army and Navy.

Indirectly, the platinum group even plays a part in the production of steel, foodstuffs, textiles, cement, leather, oil.

Science's gift to industry!

#### THE HANDMAID OF CHEMISTRY

But industry, in turn, balances accounts. Without quantity manufacture of heat and acid-resisting equipment such as platinum and its alloys afford the laboratory, the tremendous progress of chemistry in the last hundred years would not have been possible.

Platinum utensils, able to withstand white heat necessary for analysis, have helped geologists determine the composition of rocks, and chemists to make many alloys.

For absolute accuracy, the National Bureau of Standards in Washington, D. C., as well as similar institutions abroad, uses weights of 90 per cent platinum and 10 per cent iridium—their untarnishable nature insuring constancy (page 359).

Again, in electric-furnace apparatus, and in measuring extremely high temperatures, platinum serves the scientist. With it operations may reach a temperature up to 5,000 degrees Fahrenheit.

A continuous circle here; but not one to cause economic pain!



Photograph from William H. Baldwin

#### CINDERELLA'S SLIPPERS MAY NOW BE MADE OF PALLADIUM

From this metal, one of the six belonging to the platinum group, comes a white "leaf," produced by the beating process long familiar in gold leaf. Used here as a coating for the slippers, palladium leaf, gleaming and nontarnishable, may embellish anything from a hotel room to a lady's vanity case or the lettering on your desk dictionary.

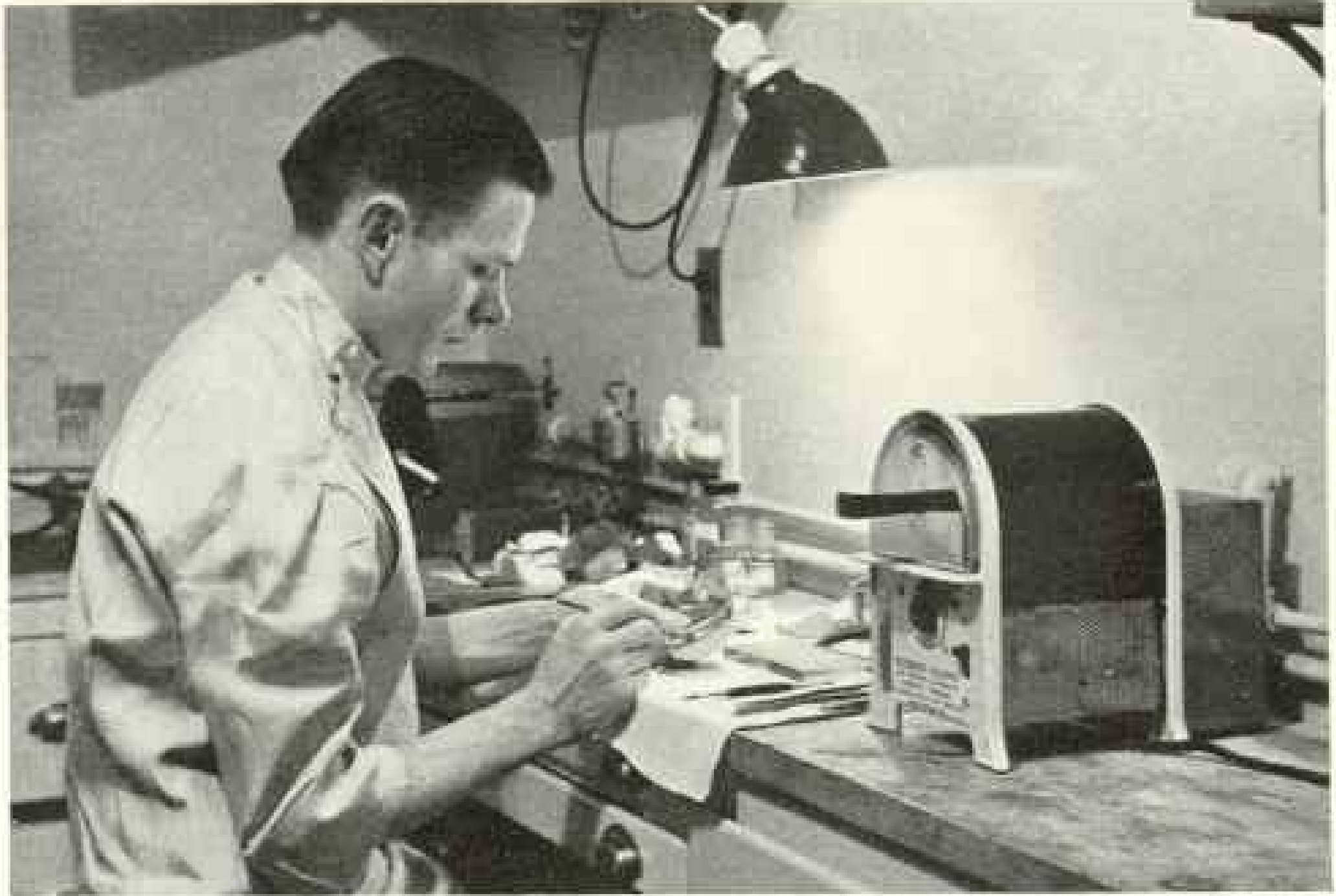
Fantastic now the thought of that South Seas merchant who cursed his luck on receiving payment in platinum "debased" bars that he could "neither dispose of, nor find any means of refining."

#### FROM BULLETS TO JEWEL CASES

Incredible, too, that a metal prominent now in jewelry cases the world over should have been used in remote Siberia for hunting-bullets, just as gold bullets were used in old North Carolina.

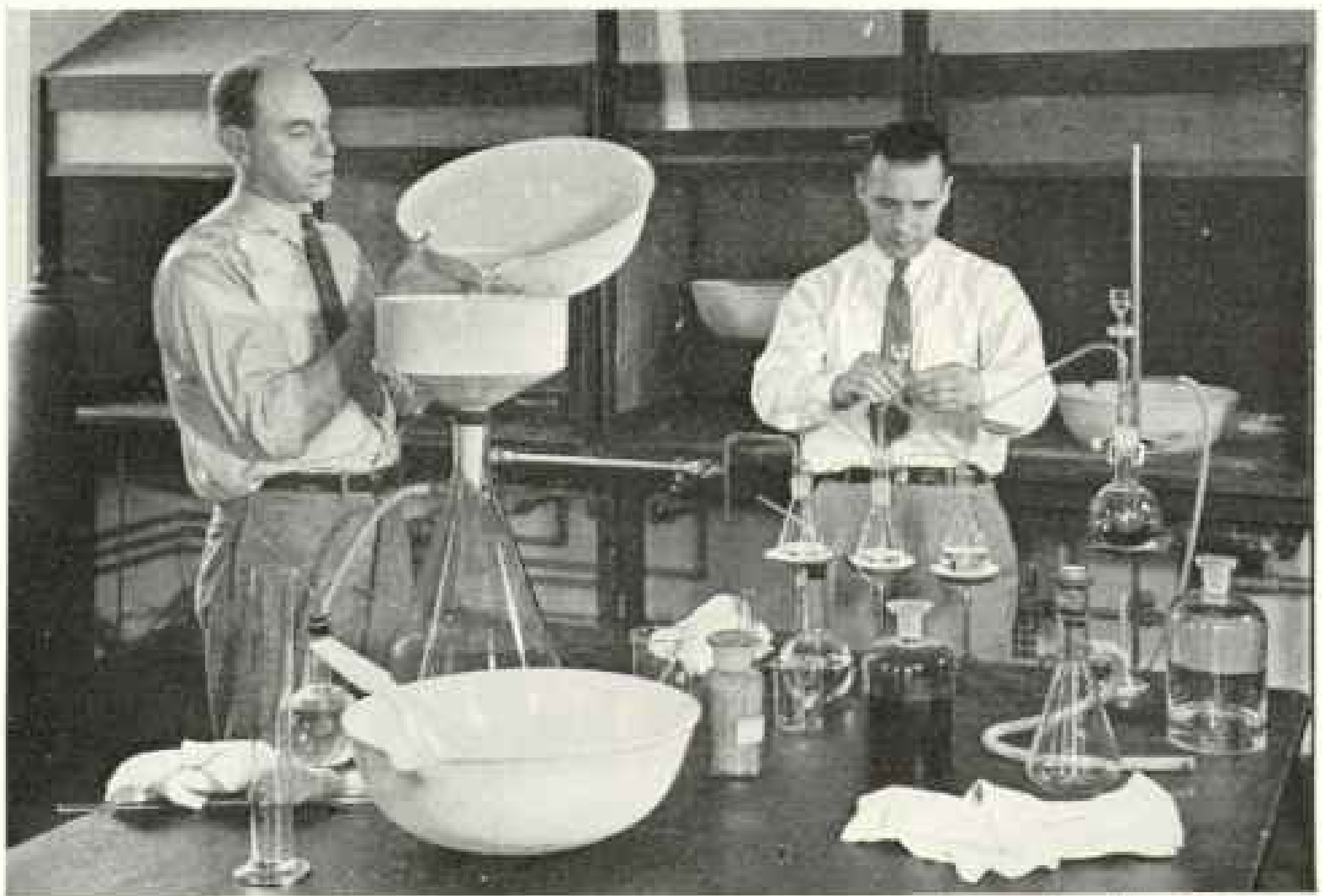
But platinum was not always in the luxury brackets. The crude metal sold for as little as 34 to 41 cents an ounce in





TO MAKE ARTIFICIAL TEETH, THIS DENTIST USES PLATINUM

He applies a platinum-foil matrix to a plaster cast on which the set will be built. In the small furnace (right), forms into which gold and platinum alloys will be poured, are heated to about 1,300 degrees Fahrenheit, platinum itself being able to withstand heat up to 3,000 degrees.



Photographs by Willard R. Culver

SCIENTISTS "PAN" THE METAL SEXTET AT A LABORATORY IN WASHINGTON

At the right is the apparatus of the National Bureau of Standards for analyzing various platinum metals, here separating first osmium and then ruthenium from other group metals. A filtering process (left) is one of the steps in making high-purity platinum. The finished product is used for laboratory equipment because it is durable and resists chemicals and high temperatures.



Photograph courtesy George Washington Bicentennial Commission

#### THE FIRST PLATINUM MEDAL STRUCK BY THE UNITED STATES GOVERNMENT

Impressed at the Philadelphia Federal Mint in 1932, this medal (shown here in obverse and reverse) was presented during the George Washington Bicentennial celebration to Herbert Hoover, then President of the United States. The following year, Canada established the annual award of a platinum medal for special service to the Dominion's mineral industries. Another medal, presented by the Geological Society of London to encourage mineral research, is made of palladium and appropriately carries the head of the metal's discoverer, William Hyde Wollaston.

the early 1800's, in contrast with that all-time high, after the World War, of more than \$150 an ounce.

It was then, apparently because of its scarcity and high price, that a fickle public reached for platinum jewelry. Wedding bands, cuff links, pencils, knives, cigarette cases, settings for jewels—all turned pale to meet the demand.

#### JEWELRY OF MANY INCARNATIONS

Platinum, like gold, may be used over and over again. To the melting pots of metalworks goes a never-ending stream of old objects to be made into new.

Thus the platinum in your latest diamond setting, bracelet, or necklace may once have known a Spanish snuffbox, a Russian drinking cup, an English sulphuric-acid plant, or a German sword guard—even, within the realm of possibility, a nose ring or bracelet from some ancient South American civilization (page 345).

One tribute to platinum's indestructibility may be seen in the South Africa House in London, where platinum characters imprinted on two gold plaques by a recently invented process tell posterity what the late King George V said and what the High Commissioner replied when the House was opened.

If "written in water" implies impermanence, this record (proof against decay, bacterial infection, and neglect) should make "written in platinum" the last word in staying quality.

For a world bridge tournament, platinum trophies were awarded (page 348). A George Washington Bicentennial medal presented to President Hoover was struck in this metal (above). At the Century of Progress in Chicago, visitors saw an all-platinum after-dinner coffee set and a platinum dresser set (page 358).

Challenging other metal leaf is "beaten palladium," recently found practicable for the decorative arts.

For murals, ceilings, furniture, as well as for exterior building decoration and in the sign-gilding industry, this white leaf offers contrast in color. And a little goes a long way; 35 square feet of palladium, to be cut into 500 sheets for a "book," weighs less than a quarter of an ounce.

#### THE EARTH'S SHARE OF PLATINUM

Like silver and gold, platinum has had its rushes and speculative booms—and its depressions.

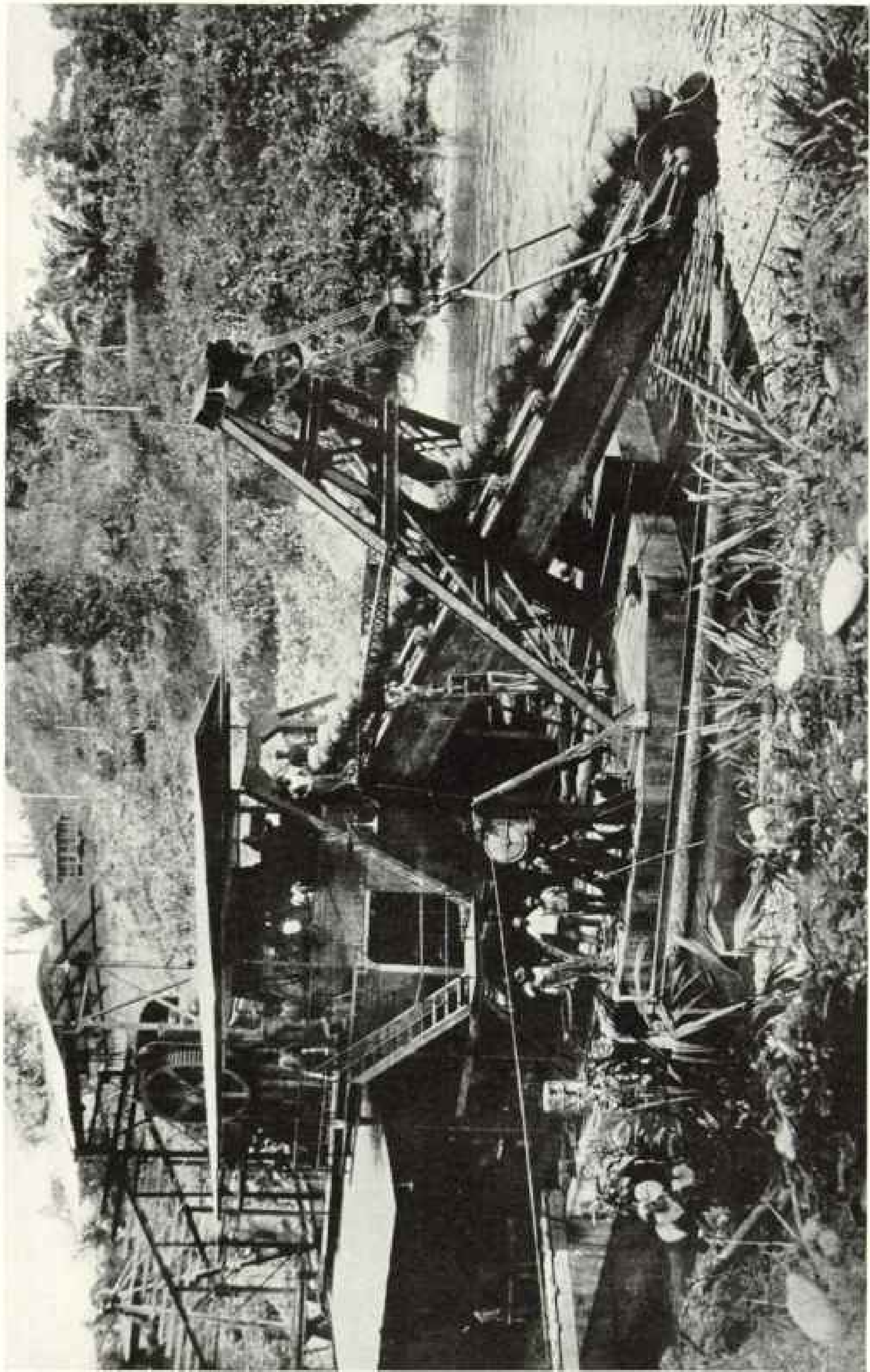
Small finds, scattered over the globe, add their bit to ever-changing problems of adjustment between scarcity and surplus.



Photograph from Eschta Galloway

NOT LAUNDRY, BUT PLATINUM, IS WASHED IN CRUDE PANS BY COLOMBIAN WOMEN ALONG THE SHORES OF SAN JUAN RIVER

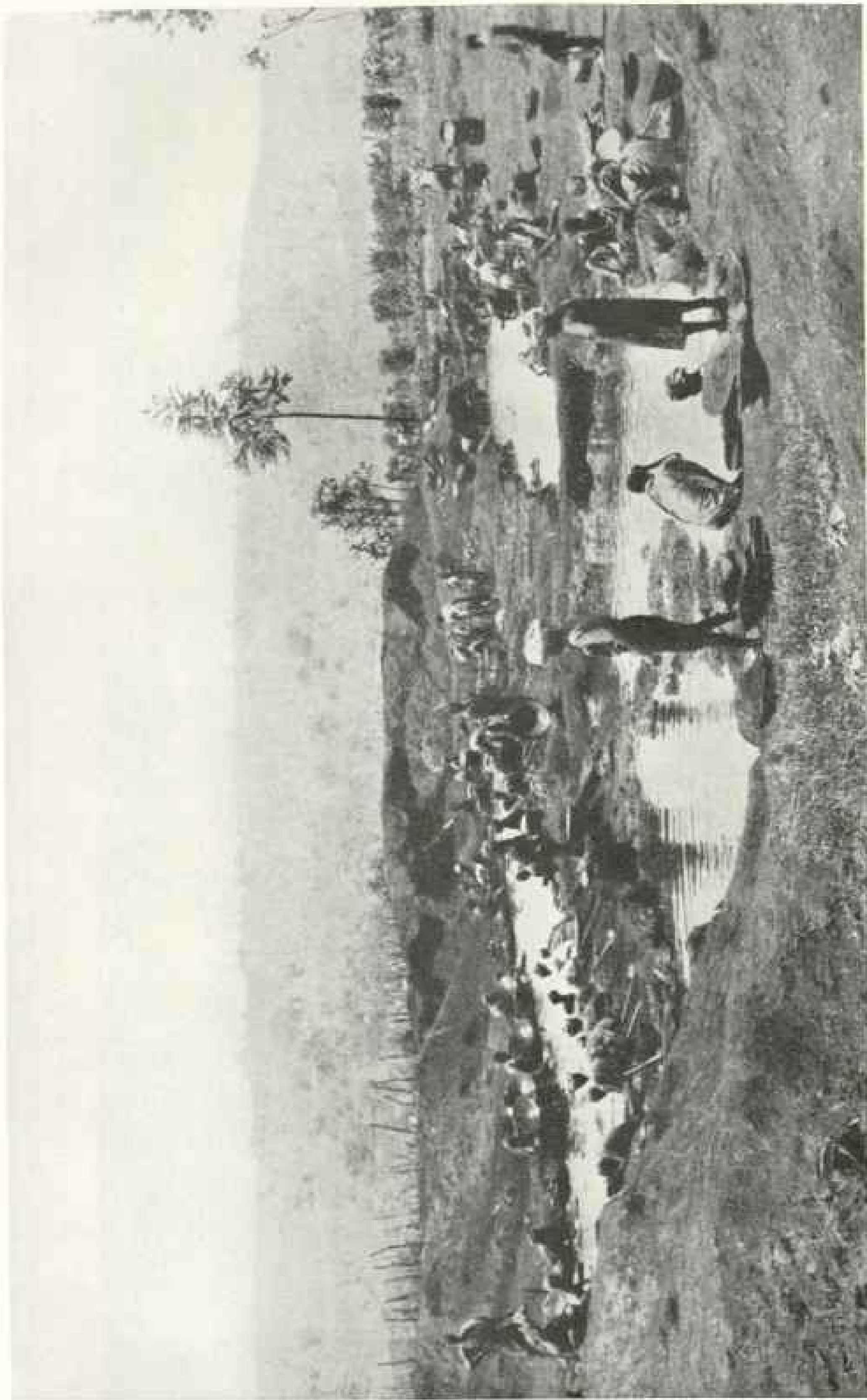
This simple placer method of separating precious metal from sand has not changed here since the Conquistadores came. Platinum's value was unknown in those days; Taking millions of dollars worth of gold from Colombian streams for Spanish invaders, natives threw platinum back into the water as "unripened" gold (page 343). Because counterfeiters filled the pale metal and passed it as gold in the form of coins and ingots, platinum was for a time refused entry into Spain and Portugal.



Photograph from Ewing Gallery

**A MONSTER DREDGE GNAWS AT A COLOMBIAN RIVER BED TO GET METAL FOR WEDDING RINGS AND LABORATORY CRUCIBLES**

Getting out chunks of pay dirt from the San Juan River at Andagoyá, the machine passes them through a sluicing apparatus that separates the heavier bits of platinum from sand and gravel. Down river, in contrast to this American concession's mass production, natives pan platinum in the simplest of hand utensils (page 357).



Photograph by Hans Meier

ETHIOPIANS PAN THE "SEVENTH METAL" IN MUD HOLES 150 MILES WEST OF ADDIS ABABA

Using the same primitive hand method by which forty-niners panned Lady Luck along gold-bearing streams of California, natives here at Yubdo wash platinum-holding sand in shallow wooden basins. Grains of the white metal, heavier than the sand, sift to the bottom as the basin is shaken. The accidental discovery of an Italian explorer-adventurer, this site in Wallega Province was an Italian concession before Mussolini's conquest of Ethiopia.



Photograph from William H. Baldwin

#### A STREAM OF LIQUID PLATINUM TRICKLES INTO THE MOLD

From his boxlike electric furnace the operator at a New Jersey refinery pours white-hot metal into a receptacle, where it will harden into an ingot. A temperature of more than 3,000 degrees Fahrenheit is necessary to melt platinum. Osmium has an even higher melting point—some 5,000 degrees.



Photograph courtesy Jewelers Technical Advice Co.

#### A TECHNICIAN MELTS PLATINUM WITH A BLOWTORCH

When the metal reaches white heat the operator will hammer it square on her anvil. From the finished ingot will be made bars, rods, sheets, strips or wire. Crude or native platinum is usually found mixed with one or more of the five other metals of the platinum group (page 347).



Photograph by Hans Mori

IT'S "HANDS UP" AS ETHIOPIANS ARE SEARCHED AFTER A DAY'S WORK

Like diamond miners and workers with precious metals everywhere, these laborers of Yubdo have no chance to "hold out" on their employers. Ethiopia has long courted platinum among her natural resources, but only recently has much effort been made to exploit it.

A few years back, when platinum fields were discovered in northern Alberta, Canada, nearly every available man in the region made for the "diggin's."

A de luxe rush, writers called this short but enthusiastic stampede, because parlor cars and comfortable river steamers made the trip easy for sourdough and greenhorn.

A PLATINUM RUSH IN SOUTH AFRICA

In South Africa, on the Johannesburg stock exchange in 1925, platinum madness took its place beside diamond frenzies and gold fevers. Everybody was buying or wanted to buy shares in the unexpected platinum rock deposits.

"Lode deposits in the Bushveld Complex alone," wrote one commentator, "probably contain in the aggregate more platinum than all the rest of the earth's crust accessible to man."

Yet later this industry came practically to a standstill because of the low prices then prevailing for platinum.

Some years ago the course of native life in a deserted plain at Yubdo, Ethiopia, took a new turn when an Italian explorer and prospector discovered there platinum-bearing sands (page 354).

Fringing the edge of shallow ponds, whole villages of rough-thatched huts sprang up. Men and women stooped to wash the sands in crude wooden basins, a primitive method still used in many places.

In Colombia such hand methods were employed when Conquistadores first saw platinum. They still are, along with giant dredges operated by foreign concessionaires.

COLOMBIA LONG THOUGHT THE ONLY SOURCE

For years Colombia was believed to be platinum's only source. Then, in 1819, as the world began to buy more platinum, came news of huge finds in the Ural Mountains of Russia.

By 1840, twenty-one platinum mines had been opened. Here was enough to supply

90-odd per cent of the world's market, until the World War and the Russian Revolution for a time halted activities. Accumulated stocks could not hold up. Once more platinum users worried, but needlessly.

Two important new sources came suddenly to light, a wealth of platinum metals mixed with copper-nickel ores of Canada, and in large rock deposits of South Africa. Or, as one British platinum house naively put it, these opportune finds came "with the good luck which so consistently favours this country."

Individually, however, prospectors make few lucky hauls. Big platinum nuggets, such as excite gold hunters, are rare. The 21-pound nugget discovered in Russia in 1843 is the largest the world has known; today it is worth about \$12,800. But few others compare.

A shining heap of all platinum yet recovered, it is estimated, would weigh little more than 580 tons, or less than half the weight of the gold produced in 1936. Canada, Russia, Colombia, and the Union of South Africa furnish the bulk of our platinum needs and for a time controlled the industry through an international company.

Other countries, including Spain, Panama, Brazil, Australia, and Japan, as well as Alaska and some of our own States, also yield the metal; but most of these deposits are so minute as barely to warrant the cost of extraction.

#### WRESTING PLATINUM FROM NATURE

From many placers only a few grains of crude platinum are recovered from each cubic yard of material treated.

To supply a metal-hungry world, however, even such tiny amounts are worth the effort. Worth, too, hardship in primitive country and struggle against hostile nature.

To work along mosquito-ridden South American rivers, platinum companies have built sanitary camps and provided modern scientific treatment for fever cases. They have done giants' work, too, in cutting away thick underbrush about these camps. No longer are whole dredging crews stricken with disease.

However, there are still plenty of mechanical and other difficulties in the jungle to tax the ingenuity of engineers; it is no small feat to transport a monster dredge through some of the platinum country.

Yet operations go on with ever-widening



Photograph courtesy American Numismatic Society  
PLATINUM MONEY ONCE CIRCULATED  
IN THE LAND OF THE TSARS

In three-, six-, and twelve-ruble pieces, nearly a million and a half of such coins were struck between 1828 and 1845, when platinum was plentiful in Russia and its general usefulness undreamed of. Nicholas I finally discontinued the coinage, redeeming platinum pieces in gold or silver (345).

scope. In Colombia, dredges with a yearly capacity of more than four million cubic yards are used. Sections of rivers are leased to foreign concessionaires whose activities provide work for hundreds of natives and bring swarms of traders.





#### PRECIOUS WHITE METAL INVADES THE BOUDOIR

The first "solid" platinum dresser set made, this comb, brush and mirror were exhibited at the Century of Progress in Chicago, together with an after-dinner coffee service of the same metal, and a large platinum and crystal trophy. Usually alloyed to give it strength, this modern metal has a curious range of usefulness—from brooches to lightning rod tips, from refrigerator contact points to ptosis crutches (wires attached to spectacles to support drooping eyelids).

Riding small steamers up the San Juan, passengers meet strange contrasts.

First a dredge, insatiably scooping up mammoth mouthfuls of sand, gravel, and water, to pass through screens and over riffle boards.

Then, just around the next bend, brown diving girls tie heavy stones to their bodies before sinking to river bottom in search of platinum-bearing sands (page 352). Some dive without stones, working fast at depths from six to 12 feet. Emerging with as much gravel as they can carry, they give it to men waiting along the banks to wash in shallow basins.

Heavy dredging machinery, at which natives stare curiously, now travels up many a remote river. To Ethiopia, where platinum has long been known to occur with gold placers, French and other syndicates in the last decade shipped modern appa-

ratus for the recovery of deposits found in tributaries of the Blue Nile (page 354). Platinum, it is said, along with gold, copper, and land producing cotton and coffee, is a possible source of tempting income in Haile Selassie's former domain.

#### DREDGES AND PEASANTS EXTRACT ORE

Along meandering rivers of the vast Union of Soviet Socialist Republics, quantities of platinum are annually extracted by modern electrically equipped dredges, to which peasants working by hand add a considerable amount. Even in 1914, twenty-five big dredges were operating there, though for some time after the World War and Revolution most of those which escaped being smashed lay idle.

Five such monster robots were made in the United States and shipped to Lenin-grad in 1925-26. In pieces they went over



Photograph courtesy National Bureau of Standards

#### PLATINUM INSURES YOU AGAINST SHORT MEASURE IN SILK OR POTATOES

Alloyed with iridium, platinum is used in world capitals for standards of weights and measures. "Fidelity materialized," this metal does not tarnish nor corrode. Shown here at the National Bureau of Standards in Washington, D. C., are the kilogram weights and meter bars by which standards of national accuracy are maintained. Glass bells, looking like hot cake covers, protect the weights from dust or scratches, while chamois-lined tongs in the hand of the scientist on the right, and on the shelf to the left, insure "kid-glove" handling.

the Transsiberian Railroad to the foothills of the Urals and thence through the mountains on specially constructed rails.

It was even necessary to build dams on two of the smaller rivers to get enough water to start several of the dredges.

Since it happened that the November day in 1927 when the first of the dredges went into operation at Visimo Shaitanski Zavod was also the 10th anniversary of the celebration of the Revolution, the Soviets made an official occasion of it.

To the strains of the local band, the district soviet manager carefully cut the red banner tied about the bucket line and digging ladder. Representatives of the Supreme Council from Moscow gave official blessing. Heads of various workers' organizations spoke, and finally—in accord with the formal invitations issued for this

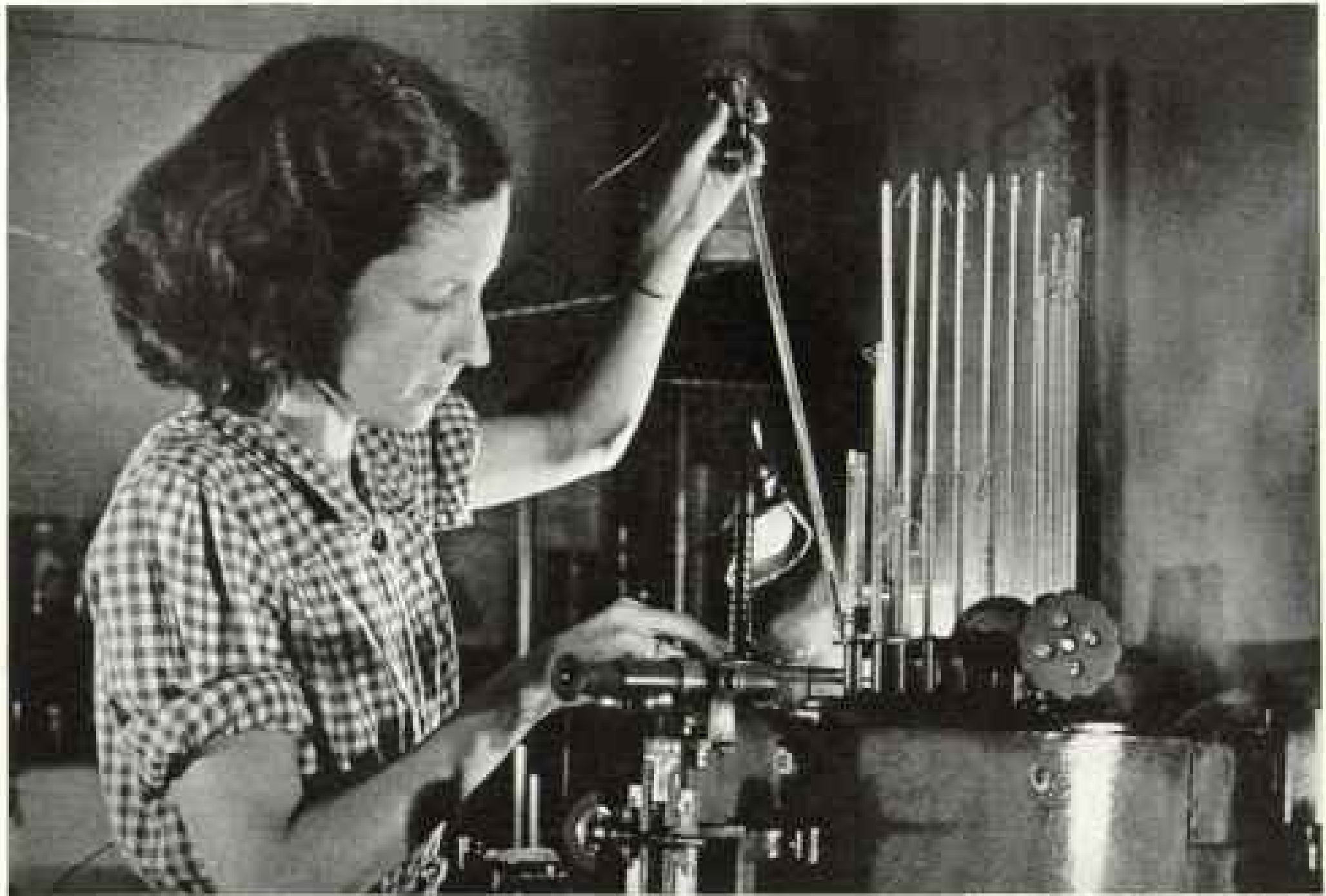
"triumphal start of electric dredge No. 11"—all forgathered "for a glass of tea at the School of Industry."

"These dredges must have been successful," reasoned the San Francisco company which sold them, "because we have heard so little of them since."

#### CANADA'S OUTPUT A BY-PRODUCT

It's a far cry from tropical diving girls to government-operated dredges, or to far north miners thawing frozen ground with wood fires; but not so far as between simple hand methods of platinum recovery and modern chemical magic.

For example, practically all of Canada's large platinum-metals output is obtained as a by-product in the treatment of copper-nickel ores in the Sudbury district of Ontario.



Photograph by J. Bayler Roberts

#### PLATINUM HELPS MYRIAD MOTORISTS GET MORE MILES PER GALLON

The glass spears, that look like oversize birthday candles, are thermometers sent to the National Bureau of Standards by a petroleum manufacturer who wishes to make sure they are accurate enough to use in his refinery. Placing them in a vat of hot oil, the young woman looks through the telescope (center) to read the temperature recorded by each tube. She then compares the reading with the correct temperature as registered by the master thermometer in her left hand. Instead of mercury, the testing instrument has a coil of platinum in the lower end. The metal's resistance to a current of electricity (passed through it from the wire at the top) varies according to the heat of the oil in which it is immersed. Thus, by measuring the coil's resistance, the operator can compute the exact temperature of the liquid.

Minute as are the particles of the precious metals so recovered, the volume of copper-nickel production has put Canada in the front rank of world platinum producers.

Imagine this metallurgical process an industrial symphony—a blend of crunching, pulverizing machinery, roaring furnaces at white heat, and busy electrolytic refineries.

Thus the treasure hunt goes on. There are still vast regions in China and other countries where platinum may be stored. Eventually we may even gouge the metal from the depths of the earth.

Some geologists speculate that platinum may be a fairly common element far beneath the outer crust of our globe, along with iron and other heavy metals, thus helping to account for the high density of the earth's core.

In support of this theory is the observed fact that platinum is found in meteorites,

and that known deposits are deep-seated in the earth's crust.

For the present, however, according to mining experts, adequate supplies are assured from skin-deep exploitation; only future needs and future methods can write this inside story.

Looking back to the humble beginnings of platinum, you sense at once its theme—The Song of Science.

Not a Cortez here with his "disease of the heart which is cured by gold," or a Scipio parading the streets of Rome with silver from ravaged Spain, but men such as Wollaston, Faraday, and Edison, armed with talent and curiosity.

Outdoing the alchemist of old, they have conjured a precious metal out of baser elements of the earth, making of it what they willed—a tool in the hands of industry, peace offering in lovers' quarrel, death's agent on the battlefield.

# NATURE'S MOST DRAMATIC SPECTACLE

BY S. A. MITCHELL.

*Scientific Leader, National Geographic Society-U. S. Navy Eclipse Expedition, 1937 \**

*With Illustrations from Photographs by Richard H. Stewart*

LIKE a hungry small boy sitting down to Thanksgiving dinner, an astronomer at a total eclipse of the sun is there to get all he can while he has the chance. The boy is determined to stuff himself with as much turkey as possible while it lasts, and the astronomer is eager to gather in all the knowledge of the sun that he can during the brief few minutes of favorable conditions created by a total eclipse.

A real "eclipse feast" on June 8, 1937, was the happy lot of the National Geographic Society-United States Navy Expedition to Canton Island, far out in the mid-Pacific (maps, pages 364, 380).

To digest this "Thanksgiving dinner of knowledge" and prepare its complete results will take many months, but I can give National Geographic Society members at least a preliminary report of what we learned and why we were anxious to travel to a place 6,500 miles from home to see the sun eclipsed for only 213 seconds.

## A LITERAL "CHANCE OF A LIFETIME"

A total eclipse of the sun takes place about once every three years in some part of the earth accessible enough for astronomers to view it, and even then clouds or rain may blot out the sight and render a long journey and large expense futile.

Why not study the sun at home, where it may be seen any day? Because some of the most important features of the sun can be observed only during an eclipse, when the moon shuts off the glare of the sun's light, or can be seen best at that time.

Scientists starting out for an eclipse are truly "grasping the chance of a lifetime," because the average eclipse lasts only about three minutes. Therefore an astronomer, with the best possible luck, cannot expect more than one hour's total time for observing eclipses in his entire life!

No wonder then that astronomers are willing to gamble on the chance of bad weather and travel half around the world, risking disappointment, as has often happened, or like Father Stephen Perry, leader of a British expedition to Cayenne, French Guiana, in 1889, to carry on even when

taken suddenly ill, and knowing death is near.

With observations successfully completed the stricken scientist called for three cheers, saying, "I can't cheer myself, but I'll wave my helmet!"

Our own expedition, fortunately, was marred by neither illness nor accident, but we did defy the gods of bad luck enough to arrive at our island on May 13, and set up camp on shore with 13 scientists and officers and 13 sailor assistants!

But thirteen must have been our lucky number. The skies over the island were clear and free of haze throughout the total phase of the eclipse, and our observations were made under conditions practically ideal, which rarely have been excelled in eclipse history.

Astronomers do not travel to a desert island, as we did, or to some other remote part of the world, merely to be spectators at the gorgeous spectacle of an eclipse of the sun. More than one scientist has traversed vast distances to observe an eclipse, knowing all the time that he would not see it himself, because while it goes on he must remain shut up in a dark room to operate his apparatus.

The scientists of our own expedition, busily working their instruments most of the time, had a chance to look at the eclipse only for a few seconds of the total duration of three and one-half minutes.

Why make photographs and other observations of the eclipsed sun?

One striking answer is the fact that, as a direct result of observing eclipses, we

\* Herein the National Geographic Society presents to members a preliminary report of the highly successful eclipse expedition jointly sponsored by their Society and the U. S. Navy. Dr. S. A. Mitchell, the scientific leader, is Director of the Leander McCormick Observatory, University of Virginia, and President of the Commission on Eclipses of the International Astronomical Union. Captain J. F. Hellweg, U. S. N., commanding the Navy detachment (page 377), is Superintendent of the U. S. Naval Observatory, Washington, D. C. "A brilliant success, far beyond our most extravagant expectations, has attended our venture," was Dr. Mitchell's preliminary bulletin to The Society's headquarters. It will require many months for complete study of all the expedition's findings.



TO THE "CANTONESE" CRUSOES THE U. S. S. "AVOCET" WAS A SILENT SYMBOL OF GETTING BACK HOME.

The Navy seaplane tender, which brought the Expedition from Honolulu to this desert isle, found a good anchorage off the mouth of the lagoon. The tidal current had piled up two humps of coral sand on the ocean bottom, which enabled the skipper to locate shallow water (page 381). Some of the crew stayed aboard the ship; others were assigned to help the scientists.

actually know more about the distribution of gases in the atmosphere of the sun, 93,000,000 miles away, than we know of the earth's atmosphere only 20 miles above our heads.

#### ECLIPSES HELP SET WORLD'S WATCHES

A second answer perhaps comes closer home.

The alarm clocks that awaken us in the morning are set by radio time signals from the U. S. Naval Observatory, and owe at least part of their accuracy to observations during eclipses of the sun.

Only during an eclipse can scientists make certain checkups on the movements of the sun, moon, and earth, in relation to one another and the stars, which relation forms the basis of our whole time system,

Our expedition "checked up on the solar system" again during this eclipse.

This is done by noting the exact times of the four "contacts," that is, first, when the edges of the sun and moon appear to touch, and the moon begins to move across in front of the sun; second, when the sun disappears behind the moon (beginning of totality); third, when the sun begins to emerge (end of totality); and fourth, when the sun emerges completely (page 363).

The contacts were timed visually by Captain J. F. Hellweg, Superintendent of the Naval Observatory, who was in charge of the Navy's participation in the expedition. Mr. John E. Willis, also of the Naval Observatory, timed them photographically.

These data will be extremely useful to

the Naval Observatory in its time calculations, as well as in predicting future eclipses.

#### SUN AIDS RADIO RECEPTION AND BALLOON FLIGHTS INTO STRATOSPHERE

The sun not only helps tell time, but even makes possible the transmission over long distances of the radio signals that bring the time to us. Scientists now believe that ultraviolet light from the sun produces the ionosphere, or radio-reflecting layer high in the air, which keeps radio signals from being lost in space, and enables them to travel around the earth.

Experiments were made to determine whether the transmission of radio signals would be affected by the eclipse, which data would give us additional knowledge about the different parts of the radio-reflecting layer. Results of these experiments are now being studied.

During an eclipse of 1868, astronomers found on the sun traces of a new chemical element, previously unknown. What good is it, one may ask, to discover something on the sun, 93,000,000 miles away?

This new element was helium, and 27 years later, in 1895, it was recognized on earth. Today it carries our dirigibles and balloons \* safely through the skies and is used in treating divers to prevent the dread "bends."

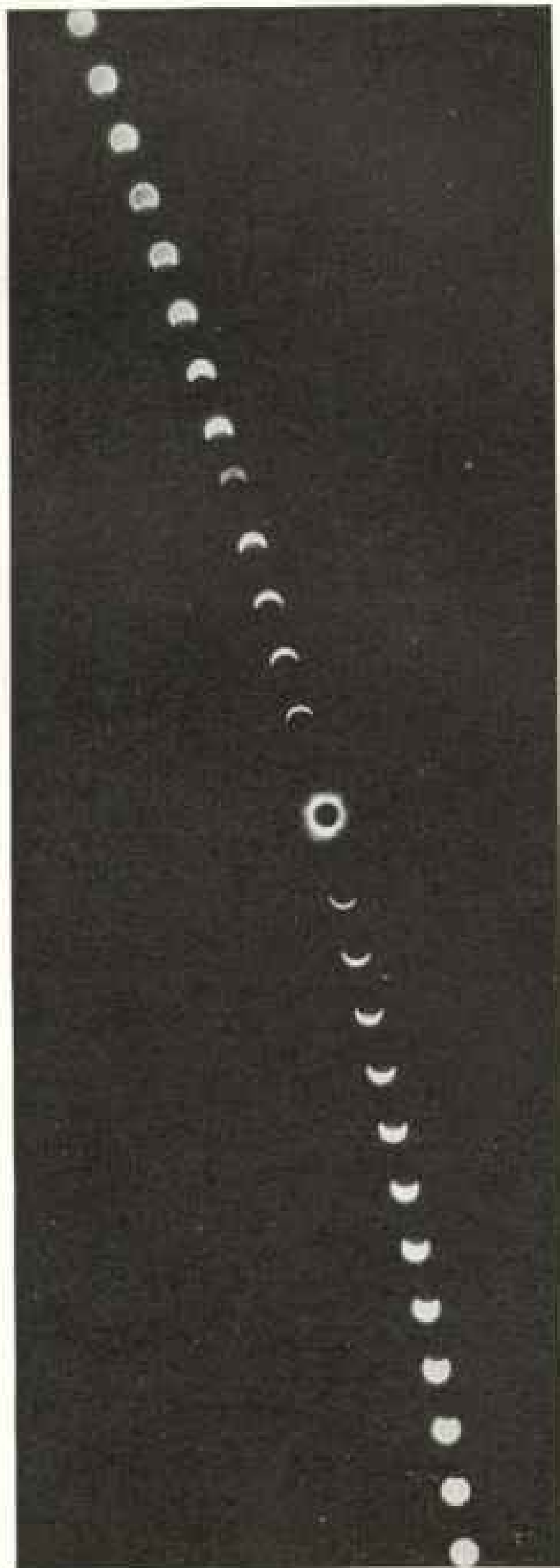
Possibilities from the study of the sun are almost limitless, even though it is really an old and not very important sample of the vast family of stars. For the sun actually is a star, and a very ancient star at that, one of the class of stars called by astronomers "yellow dwarfs."

It enjoyed its flaming youth eons ago, passed its prime billions of years back, and is now slowly cooling, heading toward inevitable death, though that time, luckily for us, is still uncounted millions of years away.

#### "MOTHER SUN" AND "BABY EARTH"

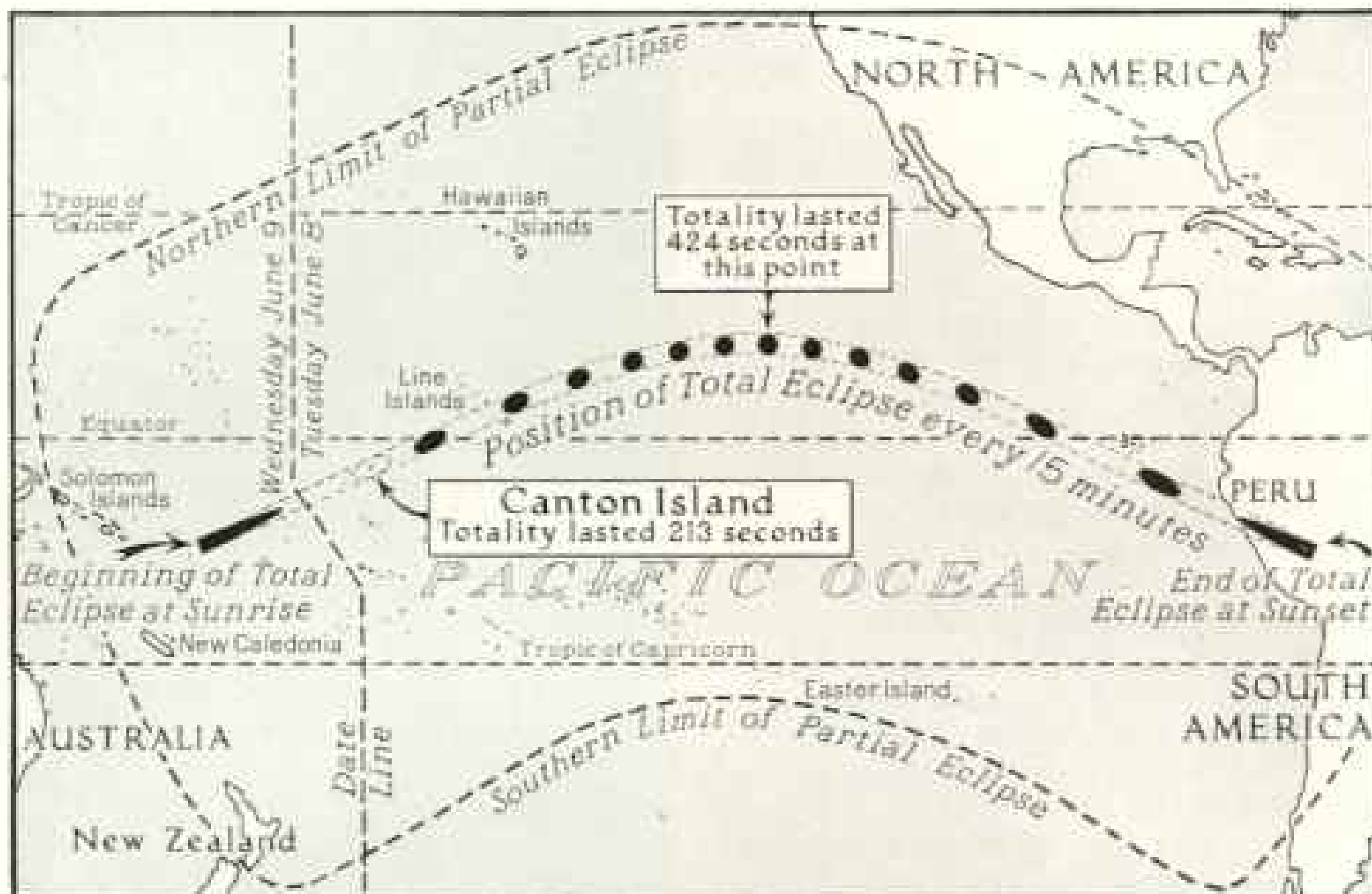
We speak of "Mother Earth," but more properly we should speak of "Mother Sun." For from her body our own earth was born, according to one widely accepted theory, long ago when the gravitational attraction

\* Helium, a noninflammable gas, made it possible to carry out in complete safety the National Geographic Society-U. S. Army Air Corps stratosphere flight of November 11, 1935, which attained a new altitude record of 72,395 feet and accomplished important scientific observations.



ECLIPSE PRINTS IN THE SKIES OF TIME.

Exposures made every five minutes for more than two hours show how the eclipse progressed (from bottom to top). The moon gradually moved across the sun, then covered it completely, with the corona flashing into view (center), then slowly uncovered the sun again.



Drawn by Newman Hornstead

THE ECLIPSE OF 1937 WAS THE LONGEST SINCE 699 A. D. AT THE CENTER OF ITS 8,800-MILE PATH

The duration, boon to astronomers, was because the sun and moon were far apart and the moon relatively close to the earth, and also because the path lay near the Equator. Unfortunately, the maximum duration, 7 minutes, 4 seconds, was 1,200 miles from land. On Canton Island it lasted 3 minutes, 33 seconds, the previous working time which culminated months of laborious preparation. Black spots along the eclipse path show how the shape of the shadow varied as it traveled for 3 hours and 21 minutes from a point about 1,500 miles northeast of Australia to Peru. Within the large area enclosed by the heavy dotted line a partial eclipse was visible, with the moon moving part way over the sun and then retreating. The next eclipse of comparable duration will be June 20, 1955.

of another star, passing close, pulled a long streamer of matter out from the sun until it was detached, cooled, and broke up to form the planets.

Like a true mother still, the sun makes possible all life that exists on earth. It gives us light, the heat that sustains us, the wind that cools us, and long ago manufactured even the coal that today warms us in winter and runs our factories.

Without the sun there would be no flowers, no grass, no crops to feed us, no animal life, not even man himself. If the sun were blotted out for a single month we should all be frozen to death. Even the air would freeze and fall in a final mighty blizzard.

Moreover, without that invisible "apron string" of gravitation, 93,000,000 miles long, which ties us safely to Mother Sun, we would long ago have gone hurtling off into the depths of space, doomed to an end that no man knows.

Because it is the only star near enough to give us a chance to study it "close up," the sun can teach us much about the countless other stars which probably we will never see except as pin points of light.

There is every reason, then, to learn all we can about the sun. We can scarcely agree with the schoolboy's naïve statement that the moon is a more important body than the sun because it gives us light at night when it is dark and we need its light, whereas the sun shines in the daytime when it is light and we could possibly get along very well without it!

#### CHASING AN 8,800-MILE SHADOW

Every so often, as the moon moves around the earth, it comes directly between the earth and the sun. Then its round shadow falls upon the earth, and those within the area covered by the shadow see the sun in total eclipse.

This year, on June 8, the moon came into



THREADING A NEEDLE IS EASY COMPARED TO THE INFINITE CARE IT TAKES TO PLACE ECLIPSE INSTRUMENTS

Sighting through a surveyor's transit, to insure that his apparatus is pointed with hairbreadth precision, is Dr. S. A. Mitchell, scientific leader of the expedition. Days of exacting work were required to make perfect adjustments of his three spectrographs, mute detectives of solar atoms (369).

such a position that its shadow, about 150 miles wide, swept 8,800 miles across the Pacific Ocean, from a point northeast of Australia to the mainland of Peru (p. 364).

Because of the time of the year, relative distance of the sun and moon from the earth, and nearness of the eclipse path to the Equator, the duration of darkness at the middle of the path of this eclipse was the longest in any eclipse in 1,238 years.

#### SUN'S LIGHT CUT OFF MORE THAN 7 MINUTES IN MID-PACIFIC

At the middle point, about 1,800 miles southwest of Los Angeles, in the Pacific, the moon blotted out the sun's light for 7 minutes and 4 seconds, longer than it had been shut off by any eclipse since 699 A. D., the year after Carthage was utterly destroyed.

Of course all the astronomers in the world would have liked to go to that point to observe the eclipse, during the long dimming of the sun.

But unfortunately there is no land there; no land, in fact, within 1,200 miles of the place in any direction. Modern instruments with which an eclipse is observed must be

mounted on solid concrete on solid ground.

Moreover, as though Nature were playing a gigantic joke to tease the astronomers, it developed that there was almost no land at all throughout the entire 8,800 miles of the eclipse shadow's path across the Pacific.

Far toward the western end of the path were Canton and Enderbury Islands, part of the Phoenix Group,\* and far to the east the shadow just before sunset would touch the mainland of Peru.

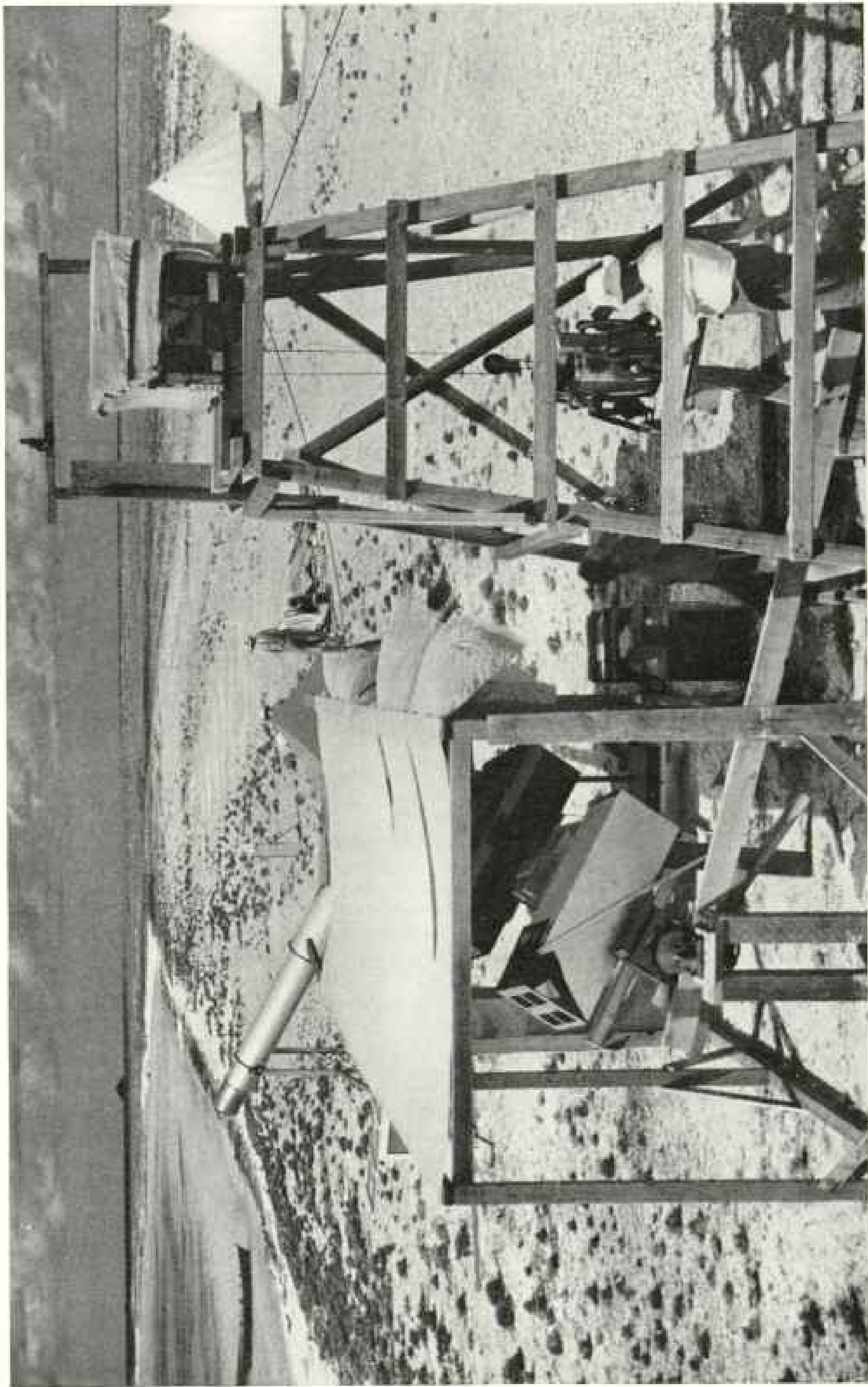
At these points the duration of the eclipse would be much shorter than at the middle of the path, but still long enough to make it well worth observing.

We chose the islands, remote and little-known as they were, because there the sun would be fairly high in the sky during the eclipse, 22 degrees, while in Peru it would be almost set at eclipse time.

The Chief of Naval Operations, Admiral William D. Leahy, arranged for us to be taken to the islands by the Navy seaplane tender, *Avocet* (page 362).

\* Other islands in the Phoenix Group were in the path, but too far from its center for satisfactory observations.





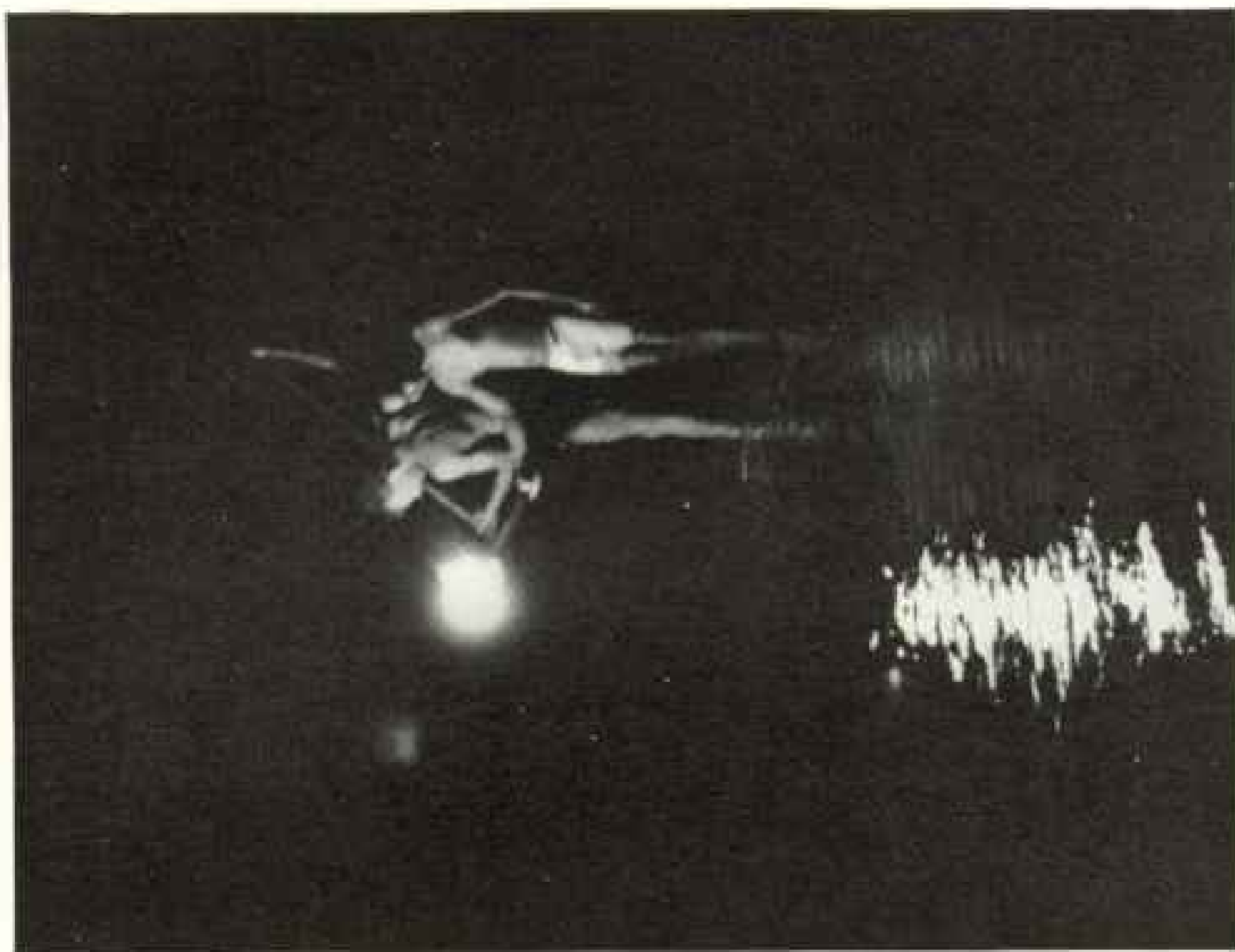
LIKE A BATTERY OF WEIRD ARTILLERY, ECLIPSE INSTRUMENTS ARE AIMED AT THE SUN

Under the canopy, left foreground, the long box with the four black squares on its end is the first "polaroid camera" used successfully at a solar eclipse (pages 370, 371, 372). It was operated by Dr. F. K. Richtmyer, of Cornell University (right, under tower). On top of the tower is his "driving clock," which kept his instruments constantly pointed at the sun as the earth whirled on its way during the eclipse. The clock was run by a weight, shown hanging under the tower, improvised by Dr. Richtmyer out of old iron from a wrecked ship on the island. In left background is the cannonlike camera of Dr. Irvine C. Gardner of the National Bureau of Standards (page 375).



A PERT FRIGATE BIRD SNATCHES A TWIG FROM DR. MITCHELL.

This is good practice for its future occupation, stealing fish or squid from boobies and terns. Big as it is, the youngster is not old enough to fly from the nest. These feathered pirates, common on Canton Island, are known also as man-o'-war birds (page 390).



CHARLIE AND JACOB SHOW A FLAKE FOR FISHING.

Their kerosene torch lures prey toward them in a shallow part of the lagoon. Once, while angling with a spear, Charlie barely escaped from a big blanket fish, dread denizen of these waters (page 387). The two Hawaiian boys were taken aboard the *Avocet* in Honolulu.



YOU SQUINT AT A STAR TO "GET THE RANGE" ON AN ECLIPSE

To avoid wasting precious seconds in adjusting their cameras after contact begins, astronomers focus on the stars night after night ahead of time. Here the Reverend Paul A. McNally, S.J., is looking through an eyepiece at a more distant star to train his cameras on our closest star, the sun. During the eclipse he spent his time exposing photographic plates. Everybody on Canton Island saw more of the eclipse than the astronomers; the latter were busy with their recording apparatus. Two members of the *Avocet's* crew are watching how it is done.

Her commander, Lieut. T. B. Williamson, and his officers and men were most valuable members of the expedition, and the cooperation of the Navy was in every way efficient and helpful.

After finding that Enderbury Island lacked a safe anchorage, we proceeded to Canton Island, 43 miles away, which proved to be ideal for our purpose, although the eclipse there was 30 seconds shorter than on Enderbury.

#### THE MASSIVE SUN COULD HOLD A MILLION EARTHS

Our program for observing the eclipse was very extensive; in fact, one of the most complete ever undertaken by any one expedition.

Along the shore of the quiet lagoon we set up our delicately poised instruments, puny tools indeed for probing into the secrets of the sun's tremendous inferno (page 385).

The sun is a huge ball of superheated gases, large enough to contain a million planets the size of the earth. Its surface is hotter than the fiercest blast furnace, thousands of degrees Fahrenheit, and its interior temperature probably rises to millions of degrees. It has an atmosphere surrounding it, somewhat as the air or atmosphere surrounds our earth, but of course very different from our own atmosphere.

This atmosphere of the sun is known as the chromosphere, because of its reddish color. It is cooler than the sun, but only

as hot water is cooler than boiling water.

It is believed to be all or most of the materials of which the sun is composed, seething in the form of superheated vapor, and changed into that form by the terrific heat of the sun proper.

All elements known to exist on the sun also exist on earth.

High above the general level of the chromosphere, which is thousands of miles thick, enormous flamelike clouds of hot, rosy-red hydrogen gas, called prominences, shoot up, some moving as much as 100 miles a second.

Some of them have been seen to extend out from the sun as much as 200,000 miles, nearly as far as from the earth to the moon. Even the smaller ones could easily engulf the entire earth were they near enough.

We could see with the naked eye two enormous red prominences during this eclipse, one near the lower edge of the sun and one near its top (page 373). Many more not readily visible to the eye were recorded on our photographs. They are now being measured and studied.

Still farther out around the sun is the mysterious corona, a glorious halo of pearly white light extending millions of miles out into space, forming the most spectacular feature of a total eclipse of the sun. It surrounds the sun at all times, yet can be seen only during a total eclipse because at other times the sun's bright light blots it out.

#### FLAUNTING A STREAMER FIVE MILLION MILES LONG

In the first few hundred thousand miles outward in any direction from the sun the corona is of roughly equal depth, but from it, in all directions, long pointed streamers like the spines of a sea urchin extend much farther out.

The corona is like the halo that you see around a street lamp on a foggy night. The fog halo is the lamp light scattered by fog particles. The corona's light is believed to be sunlight scattered by vast numbers of inconceivably small particles floating in space around the sun.

This year we saw the corona almost circular in outline out to a distance of nearly a million miles from the sun.\* Farther out beyond the sun this year's corona had many long streamers, those extending east and west being longer than those north and

south. The longest streamer recorded on our photographs so far developed was 5,000,000 miles in length.

The chromosphere, the prominences, the corona—all of them vast and awe-inspiring—are the things we study chiefly during an eclipse of the sun. But, strangely enough, it is not their vastness that interests us most, but the structure and behavior of the tiny atoms of which they are composed.

Locked up in the sun's atoms are the secrets of the sun, and though atoms are so small that several hundred million of them could be laid side by side in one inch of space, we can learn a great deal about them even from 93,000,000 miles away.

#### "FINGERPRINTS" OF DISTANT ATOMS

The wonderful instrument that makes this possible is the spectrograph, which searches out the secrets of atoms across vast distances, and writes them down for all to read.

Point a spectrograph at the sun. The sun's light enters, is broken up into its spectrum of different colors or wave lengths like a rainbow, and is focused on a photographic plate.

In each of the colors of the rainbow thousands of lines appear, like a ladder with rungs close together. This long ladder of light is photographed, and the lines or rungs are as good as a written message for those who can read them (pp. 365, 375).

They tell what kinds of materials exist on the sun, in what quantities, how hot they are, to what pressure they are subjected, and whether they are solids or gases.

Each chemical element has an unchangeable identifying set of "finger-prints"—its spectrum lines—that can be seen with the spectrograph.

When a substance in the sun is heated to greater temperature, placed under greater or less pressure, or undergoes some other change, the tiny electrons inside its atoms are excited and rush about. This activity changes the wave length of the vibrations of light that are constantly coming from the atoms of the substance.

Then these changed wave lengths appear in the spectrograph as new lines, or old lines shifted in position or changed in other ways. They tell the astronomer exactly what has been going on.

\* The diameter of the sun is about 865,000 miles.



Photographs by E. K. Richtmyer

THESE PICTURES WILL HELP REVEAL THE NATURE OF THE SUN'S CORONA

They were taken through screens of "polaroid," the new material that cuts down the glare of automobile headlights. In the upper picture there is a minimum of light along a line from upper left to lower right; and below, a minimum in the horizontal direction. This results from absorption, by the polaroid screens, of the light that is polarized, or vibrating in these directions. From these photographs the percentage of polarized coronal light at various distances out from the sun can be measured; thus may be disclosed the nature of corona material. The longest streamers of the corona in the lower picture extend out 5,000,000 miles.

With the spectrograph he does not take photographs of the eclipse as a whole. Instead he allows the light from the chromosphere, the prominences, or the corona, to enter and be split up into its thousands of lines.

Then he photographs these lines, and so gains enough material to keep him busy for months, or even years afterward, decoding the messages the lines contain.

#### A FAR-DISTANT LABORATORY

Thanks to the spectrograph, the scientist can use the sun's vast laboratory for studying atoms almost as easily as his own workshop, and from this study has come vastly improved understanding of the structure and behavior of atoms.

But he can get much of his evidence only at eclipses, years apart, and then he can hunt only for a very short time.

He is something like a boy trying to follow a ball game by quick looks through a hole in the fence at the rare intervals when the policeman's back is turned.

Why study atoms? Because everything is made of atoms, from the human body to the most distant stars. By artificially changing atoms, one element actually can be transmuted into another (though so far on a very small scale), a partial realization of the old alchemists' dream of transmuting base metals into gold.

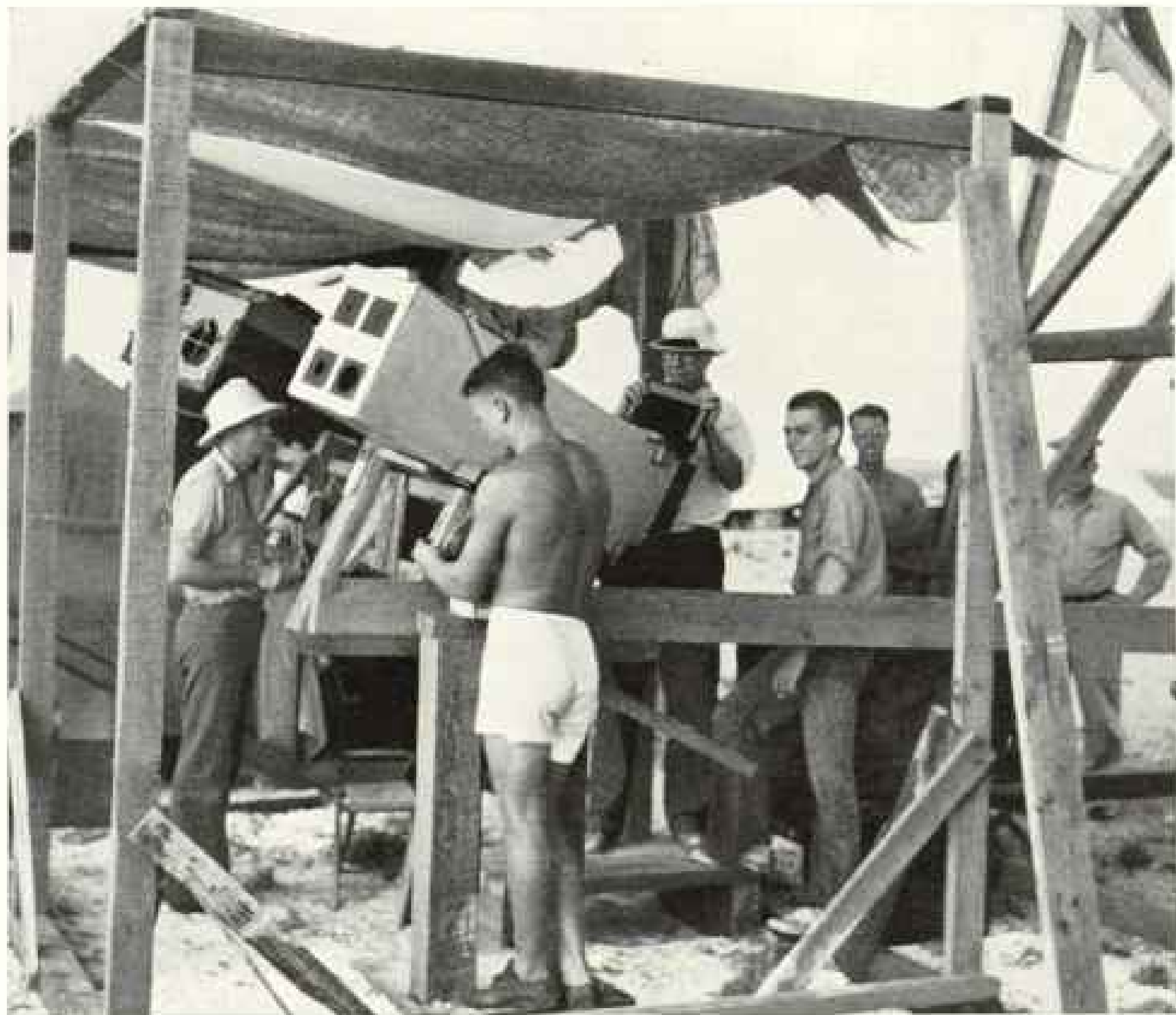
A very quick glance of only a few seconds is all the chance that astronomers have for one of their most important tasks during an eclipse—photographing the spectrum lines of the chromosphere, or sun's atmosphere. These lines tell what materials exist there, and their temperature, pressure, and general behavior, all-important for the understanding of solar secrets.

At the time of an eclipse astronomers have an opportunity to learn what is going on in the chromosphere because then they can photograph its spectrum lines without undue complications from the light of the sun itself.

#### THE CHROMOSPHERE'S "BIG MOMENT"

Ordinarily, when the sun is not eclipsed, its light shines through the chromosphere, and some of it is absorbed by the chromosphere.

But during an eclipse, for a few brief seconds, the chromosphere gets a chance to shine forth with its own glory alone. Then the lines of its spectrum can truly reveal



AN ECLIPSE "GUN CREW" TRAINS FOR THE BIG BARRAGE

"Drill, drill, drill," was the day and night routine to prevent lost time and motion for the 215 seconds of the eclipse. Since an astronomer can hope for only an hour's observation time in his whole life, he can't afford to make mistakes (page 361). Dr. Richtmyer (center with hat) here rehearses putting a plate in his "polaroid camera" (page 370), while sailor assistants from the *Arcoet* stand by. This camera took four pictures simultaneously through the four square black openings on its front. The awning kept off the tropical sun.

what is happening to the gases within it.

The chromosphere's "big moment" comes just after the main disk of the sun is covered by the advancing moon. For some three or four seconds then, the moon shuts off the light of the sun proper, and the light of the chromosphere shines alone as a thin, bright, red crescent along the edge of the moon.

Then the moon advances, and the chromosphere, too, is covered. It is a case of "now you see it, now you don't."

The astronomer must be ready at just the right instant to open his shutter and quickly photograph the lines of the chromosphere's spectrum. Again, at the end of the eclipse, the chromosphere shines briefly in the same way.

The lines registered by the chromo-

sphere's light are known as the flash spectrum (page 375). This is because, ordinarily, the spectrum of light from the sun has dark lines on a bright background, known as the Fraunhofer lines, for their discoverer, but at the moment when the advancing moon covers the sun during an eclipse the spectrum suddenly changes to bright lines on a dark background.

Photographing the flash spectrum is generally considered the most difficult feat, not only in observing eclipses, but in photographing all light spectra.

These lines show the kinds of materials existing in the chromosphere, but, more important still, they reveal also the heights to which these elements, all in vaporized form, are shot up above the sun's hot sur-

face, and this can be learned only during an eclipse.

These heights indicate how the different elements are affected by the great heat and pressure conditions on the sun, and this also has added to scientists' understanding of the behavior of atoms.

Our expedition had five spectrographs carefully focused to catch the fleeting flash spectrum.

The apparatus of Dr. Theodore Dunham, Jr., of Mount Wilson Observatory, specially built for this occasion, was the most elaborate ever tried at an eclipse. Assisting him was Mr. Charles G. Thompson, President of the Foundation for Astrophysical Research (page 374).

The Reverend Paul A. McNally, S.J., Director of Georgetown College Observatory, used a spectrograph that previously had been carried on the National Geographic Society-Army Air Corps stratosphere flight in 1935.

I had three spectrographs, belonging to the Mount Wilson Observatory, the U. S. Naval Observatory, and the Allegheny Observatory. During the eclipse I was assisted in operating them by Lieutenant Williamson, the commander of the *Avocet*, and Chief Quartermaster Hancock.

We were successful in catching the chromosphere's quick flash, and the code messages contained in its spectrum lines are now being studied (page 375).

The sun's corona, so thin and tenuous that the stars easily can be seen through it, and comets can pass through it undamaged, also is a target for the spectrograph.

After shooting the flash spectrum, our five spectrographs were trained on the corona during the three and one-half minutes that it was visible during the eclipse, to catch the messages of its spectrum lines.

#### NEW LINES DISCOVERED IN CORONA'S SPECTRUM

Dr. Dunham already has reported that he has found some new lines of unknown origin in the blue region of the corona's spectrum. Whether they come from a new element or a known element in an unfamiliar state, we do not yet know.

Also we again found the lines of our old and mysterious friend coronium still present in the corona.

Coronium probably is a familiar element so changed by heat or other conditions on the sun that it is unrecognizable. It was

first seen in the corona in 1869. The "code messages" from the corona, like those from the chromosphere, will need many more months of study.

When someone invented a new material called "polaroid," which reduces the glare of automobile headlights, he probably never expected that it would help tell us what the sun's corona is made of. Yet such is the case.

The corona's light is thought to be scattered sunlight, and all scattered light is partially polarized. Ordinary light waves vibrate in all directions as does a taut piece of string when it is plucked, but "polarized" light waves vibrate in only one direction, as would the string if it were lying in a narrow groove and therefore could move only up and down.

If you can measure the percentage of light that is polarized—the percentage that vibrates in only one direction—it will help you to understand the nature of the particles that scatter the light.

Some astronomers believe that the long, spikelike streamers of the corona may have something to do with sunspots. The streamers are most numerous when there are the most spots.

#### THE FIRST "POLAROID CAMERA"

Measuring the polarization of the streamers helps tell us in what direction the streamers are pointing. If we can learn their direction, we can then try to determine whether sunspots existed on the sun under the bases of the streamers at the time of the eclipse. If so, it might mean that the spots supplied the forces that extended the streamers so far outward.

The polarization measurements were made by Dr. F. K. Richtmyer, of Cornell University, with the first "polaroid camera" ever successfully used at an eclipse of the sun. He photographed the corona through disks of "polaroid," which registered the percentage of polarization of the corona's light on his plates (pages 366, 370, 371).

His photographs show for the first time that the percentage of polarization of the light of the corona and of its streamers increases outward from the sun, which is a new and important aid to better understanding of the nature of the corona.

The variation of the brightness of the corona outward from the sun is a clue to its density or thickness, and the corona's total



Photograph by Irvine C. Gardner

"MOTHER SUN" ARRAYS HERSELF IN MILLION-MILE STREAMERS, AND CHANGES THEIR STYLE EVERY YEAR

Only during a total eclipse can this pearly-white corona around the sun be seen; at other times the sun's light blots it out. On the lower left edge of the moon's black disk is a prominence, a flame-like cloud of hot hydrogen gas, rosy-red, which extends 50,000 miles or more above the surface of the sun. Here the corona appears flat; actually its streamers extend out in all directions. This year the expedition found in it traces of what may be a new chemical element, or a known element in an unfamiliar state (see page 372). This photograph was taken with ten seconds exposure. Longer exposures show the corona extending out some 5,000,000 miles (page 370).

light or candle power is a key to the amount of matter that exists in it. Dr. Richtmyer measured these with delicate, light-sensitive "targets."

First readings of his records indicate that the total light of the corona in this eclipse, as in most previous eclipses, was about equal to one-half that of the full moon or about one millionth the light of the noon-day sun.

Styles in coronas, like styles in ladies' dresses, change from year to year.

One year it may be long streamers extending out on both sides of the sun's equator, with short, stubby ones at the poles. Other years the corona may be roughly star-shaped, or almost round.

But, unlike ladies' fashions, styles in coronas repeat themselves about every 11 years, and we have reason to believe that this is because the "style arbiter" of the corona is the same mysterious power that causes the numbers of sunspots to increase and decrease over the same period.





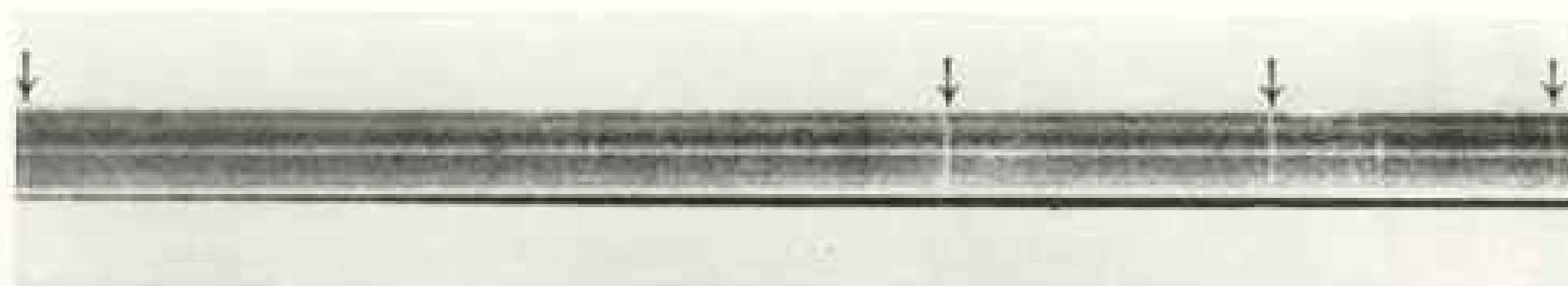
NO MOVIE STARS EVER REHEARSED MORE HOURS FOR THEIR 3½ BIG MINUTES!

Helping Dr. Gardner insert photographic plates in the 14-foot aluminum camera is Richard H. Stewart, National Geographic Society staff photographer (left). The camera is set up on its globe-trotting packing case, where warnings in English, German, and Russian recall its part in the National Geographic Society-National Bureau of Standards Eclipse Expedition of 1936, led by Dr. Gardner.



BURNING MIDNIGHT LANTERN OIL TO STUDY THE MORNING SUN

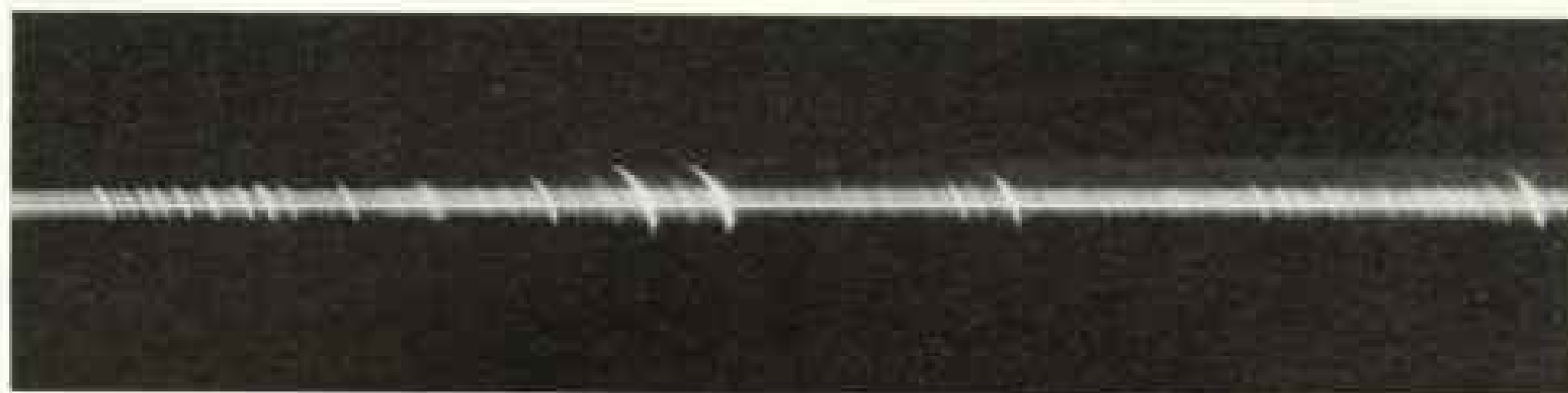
Dr. Theodore Dunham, Jr. (left), and Charles G. Thompson, who assisted him during the eclipse, take nocturnal notes while checking their two coelostats. These machines have mirrors turned by a mechanical device so that they point continuously at the sun and focus an image of it into the spectrograph. Thus they need not keep the big spectrograph itself pointed at the sun.



Photograph by Theodore Dunham, Jr.

**"SOMETHING NEW ON THE SUN" IS THE BULLETIN OF THESE MARKINGS**

The faint white lines marked by the arrows were registered by light from the sun's corona during the eclipse in the spectrograph of Dr. Theodore Dunham, Jr. (page 374). Their origin is yet an unsolved mystery, but they represent the "signature" either of a new chemical element previously unknown or of a known element in a state unfamiliar to scientists (page 369). The new lines are in the blue region of the corona's spectrum.



Photograph from Mount Wilson Observatory

**WHAT'S DOING ON THE SUN? THIS "CODE MESSAGE" TELLS YOU**

The elusive flash spectrum of the sun lasts only a few seconds during an eclipse (page 371). The tiny arcs are registered on the photographic plate by light from the chromosphere, or atmosphere of the sun, just after the advancing moon has covered the main body. The arcs of light tell astronomers how high above the sun the vapors of various chemical elements are rising, some of them shooting up 8,000 miles or more. Thus the solar detectives deduce how various substances are affected by great heat and other conditions which cannot be duplicated on earth.

For this and other reasons it is important to make as many photographs as possible of the corona and also of those hot hydrogen clouds, the prominences, during an eclipse.

Our expedition made many pictures of both, in black and white and in color, with long and short exposures.

**NATURAL COLOR PHOTOGRAPHS TAKEN**

Mr. Willis took twelve fine pictures of the corona. Dr. McNally made six photographs to record the extent of the corona, and the variation of the intensity of its light outward from the sun. He also made natural color photographs, using three different processes, and took a series of six pictures with six different color filters and emulsions sensitive to various colors, from which he hopes to reconstruct the appearance of the corona in colors.

When photographing the sun's corona in the past, it has been next to impossible to make an exposure long enough to register the faint light of the thin outer ends of the streamers without overexposing the brighter parts of the corona nearer the sun,

and the prominences, and thus losing important details.

So this year Dr. Irvine C. Gardner, of the National Bureau of Standards, tried something new in eclipse photography, a process which was designed to equalize the amount of light reaching his plates from different parts of the corona, thus making it possible to photograph both the long, faint outer streamers and the prominences near the sun with good definition.

He also photographed the eclipse on "color separation plates," which record the red, yellow, and blue ranges of color separately. These plates carried their own filters, greatly improving their definition. Later he will try to combine the different plates to give an accurate color picture of the eclipse. He also made natural color photographs by two different processes.

**AN OIL PAINTING AT ONE "SITTING"**

To make an oil painting of an eclipse, with the subject giving only one "sitting," and that but three and one-half minutes long, might seem like an impossible undertaking, but it was accomplished by Mr.



"OLD GLORY," IN NEW STAINLESS STEEL, ADORNS THE MONUMENT UNVEILED  
MEMORIAL DAY

George Hicks broadcasts a description of the ceremony as Captain Hellweg lifts a cloth American Flag from the marker which commemorates the Expedition's stay on Canton Island. The small disk in the monument, near Dr. Mitchell (left), is the seal of the National Geographic Society. Behind Captain Hellweg is Dr. McNally's battery of cameras.

Charles Bittinger, of Washington, D. C., our artist.

Motion pictures of the entire eclipse, from the time when the moon first began to cover the sun, throughout totality and until the sun was again uncovered, were made by Mr. Richard H. Stewart, staff photographer of The National Geographic Society.

No report of our expedition would be complete without mention of the three representatives of the National Broadcasting Company.

Mr. M. S. Adams and Mr. Walter Brown, radio engineers, made possible what was probably the first series of radio broadcasts from a desert island in history, and, better still, enabled us to hear on our lonely island the voices of the "folks at home" (pages 392, 393).

Mr. George Hicks, our announcer, did a splendid job of describing the eclipse to the American radio audience (page 394).

Dr. Herman A. Gross, our Navy surgeon, had few patients, but made himself

useful in many other ways. Chief Boatswain H. S. Bogan, of the *Avocet*, in charge of loading and unloading our instruments, performed extremely valuable service.

We greatly regretted that Dr. Heber D. Curtis, of Allegheny Observatory, who was originally scheduled to be a member of the expedition, was prevented by illness from being with us.

To the following may I express the appreciation of the expedition for instruments and materials loaned, manufactured or supplied, for services rendered, and for other valuable aid:

Mount Wilson Observatory; Allegheny Observatory; the U. S. Navy and the Naval Observatory; Eastman Kodak Company; Dr. C. W. Gartlein, of Cornell University; Mr. William P. Roth, President, Matson Navigation Company; the Weston Electrical Instrument Corporation; National Bureau of Standards; Folmer Graflex Corporation; the Bausch and Lomb Optical Company; the Carrier Corporation, and the Serval Company.

# ECLIPSE ADVENTURES ON A DESERT ISLE

BY CAPT. J. F. HELLWEG, U. S. N.

*Commanding U. S. Navy Detachment, Eclipse Expedition, 1937*

THAT all-important day, May 6, of our sailing from the Hawaiian Islands for the National Geographic Society-United States Navy Eclipse Expedition, toward which our efforts had been bent for more than two months, dawned hot and still. A tropical rain the night before had made everything muggy and heavy; the clouds still hung threateningly over the tops of the mountains around Honolulu.

As we hurried through town in our little car, not much was said. Each was busy with his own thoughts, checking over for the hundredth time all details to insure that none of our eleven tons of scientific equipment, ranging from huge telescopic cameras to tiny stop watches, had been overlooked in the rush of the last two weeks.

Each knew he had done his best during those hectic days, from the moment we arrived in Honolulu and started moving the expedition's freight even before we had located our hotel rooms. Yet each of us was tormented by the same unspoken questions: Would everything work? Had we overlooked any detail?

The scientific party, led by Dr. S. A. Mitchell, had arrived on the *Mariposa* on May 3, and had been busy checking their equipment and procuring last-minute supplies, such as flashlight batteries and sun helmets. For months previously they had been working feverishly to prepare the delicate apparatus that would record the scientific data of the eclipse (page 361).

Suddenly we made out the *Avocet*, a Navy seaplane tender assigned to the expedition, lying snugly alongside her dock on the water front. Her undisturbed, peaceful air, her smart appearance, her very evident readiness to go, cheered us tremendously. Her gear and equipment were stowed and lashed as only seamen can do it; everything was trim and taut. We were ready.

As the time for our departure approached, the crowd was hurrying down converging streets toward the dock. The Governor of the Islands and his staff arrived, followed almost immediately by Admiral Murfin, from Pearl Harbor.

Ladies carried fragrant leis. The Royal Hawaiian Band was already in its place outboard of the gangway, cars began to

gather on the dock, and the National Broadcasting Company experts were busy rigging their portable equipment.

Abruptly conversation ceased, a clear strong voice was speaking. The broadcast was on. Music by the band, addresses by Governor Joseph B. Poindexter, Admiral Orin G. Murfin, and the members of the expedition followed.

Again the soft Hawaiian music, a few last earnest goodbyes, and then a sharp "All on board." "Stand by your lines."

The gangway was hauled on board, the crowd on the dock separated into small groups, and those without any duties lined the rail.

"Let go, aft."

"Slow astern, hard right."

"Let go, forward."

And with that, our eclipse adventure had begun.

## OFF, ON COURSE 207

The *Avocet* slowly turned and headed for the open sea. The crowd on the dock grew smaller and smaller, their faces became blurred, the handkerchief-waving groups melted together, three long blasts on the *Avocet's* whistle, and Lieut. Williamson, our skipper, said quietly, "We're on course 207, sir, our course for Enderbury." \*

Seven days later, still on course 207, after a remarkable run, we sighted, in the early morning light, palm trees, creamy surf, and then the dazzling white sand of a low-lying tropical isle.

But meanwhile there were many interesting happenings on board ship.

The second night out, at dinner, Dr. Herman A. Gross, Navy surgeon, and I were spinning yarns about China.

"Captain, do you remember that big mail buoy just outside of Chinwangtao?"

"Why, yes, doctor, but I never put any letters in it. I always felt that those Chinese pirates stole half of the letters."

Someone interrupted with "Captain, what does a mail buoy look like? What are they for?"

"Oh, down here, they are big yellow buoys with large, blue M's painted on their

\* See page 380, and *The Map of the Pacific Ocean*, published as a supplement to *THE NATIONAL GEOGRAPHIC MAGAZINE* for December, 1936.



NEPTUNE'S AIDES DUCK A LANDLUBBER AS THEY CROSS THE EQUATOR

The "polliwog," about to be initiated according to old sea custom, is tossed into the canvas tank, where two husky "shellbacks" (men who have crossed the Line before) will see to it that he experiences salt water. Neptunus Rex, with long beard and trident, supervises the ceremony with his court, which includes the Royal Baby, seated at the right. Scientists and naval officers who had not passed the Equator before were initiated along with the humblest gobs. Even Jerry, the ship's dog, was given a ducking, and emerged a full-fledged but thoroughly disgusted shellback.

sides, just like the Matson Line's ship stacks. You put your letters in the buoy, and the next ship picks them up."

The doctor abruptly changed the subject. Nothing further was said about the mail buoy, but late into the night members of the expedition were busily writing letters and asking what kind of stamps had to be used on mail buoy letters.

I believe it was the next afternoon before someone became suspicious and letter writing ceased.

#### TROPICAL SQUALLS AND STARS

Everybody quickly fell into the routine of shipboard life. The *Avocet* proved an excellent ship, riding the long, following seas like a duck. All hands ate their heads off, and, much to the cook's disappointment, no one missed his mess. After several days, the cook complained, "I can't save a thing; they all eat like horses."

We passed through the usual number of tropical showers, some were real rain squalls; but, between squalls, the sun came out hotter than ever.

Every morning early, I had the boatswain's mate hook up the fire hose and hit me with it at about five feet. I could never convince the others of the stimulating effect of that salt-water shower delivered with a fire hose and plenty of pressure.

Life on board was easygoing and peaceful; all hands tried to keep occupied. After dinner every night, the card players got under way; others went on the bridge to look at the ever beautiful panorama. Tropical stars from the dark deck of a ship at sea are one of nature's most inspiring sights.

On May 10, we had our first radio broadcast (pages 392, 393, 394).

At sunset on the eleventh, the ship was hailed by an unusual-looking individual who announced himself as Davy Jones, a



HIGH IN A PALM TREE SITS A RED-FOOTED BOOBY, NOISY ISLAND NATIVE

The screeching of these birds ruined many a scientist's sleep as they flew over the camp on moonlight nights. This booby is resting, not nesting, in one of the few coconut palms on Canton Island. The New Zealand eclipse party planted a thousand coconuts here (page 391).

minister from the court of Neptune. He delivered a "summons extraordinary, subpoena mandatorium" from the Royal Court of the Raging Main to each of the landlubbers on board, requiring their presence the following day before the court of Neptunus Rex (page 378).

Separate charges were preferred against each one. Everyone on board was subpoenaed except about 17 old shellbacks who had crossed the Equator before. They were heartily greeted as old friends by Davy Jones.

May 12 was hot and clear. Neptune's party came on board early and held court. The court, festivities, initiations, and duckings progressed systematically until all the polliwogs, or landlubbers, had been duly initiated into the guild.

After Neptune and his court had been photographed by The Geographic's expert sharpshooter, they bade the Captain good-bye and left the ship. The rest of the day was spent by the recently initiated in re-

moving traces of the ceremony. Those whose love-locks had been snipped off regarded themselves in mirrors rather ruefully.

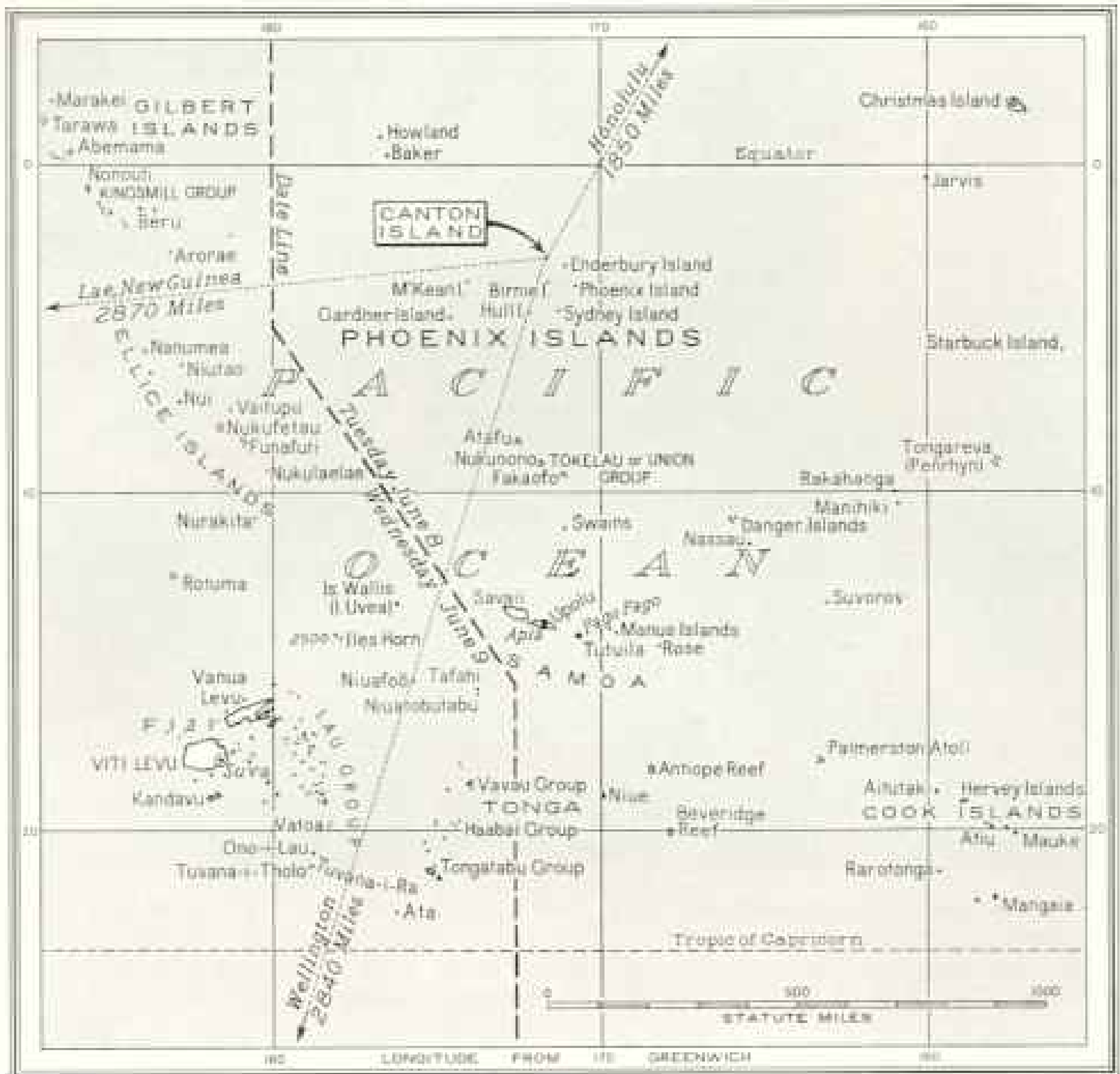
Our genial artist, "Michelangelo" (Charles Bittinger), prepared to engross the diplomas for all the new shellbacks.

That night the captain reported that he would have to slow down to make the island in daylight. Accordingly we slowed to eight knots until daylight when we speeded up to ten.

#### THE THRILL OF A CORAL ISLE

Soon we had Enderbury Island close aboard on our port bow (map, page 380).

That first view can never be forgotten by any of us—a very small, low isle with its few palm trees bent by the wind, its snow-white coral beach smothered in foamy breakers that rolled in continuously from nowhere and broke themselves with a loud roar on its shining shore. It was surrounded by crystal-clear water of the purest jade, in



Drawn by Newman Bumstead

#### REMOTE CANTON ISLAND HAD ITS BRIEF DAY IN THE DARKENED SUN

Less than 200 miles south of the Equator, Canton is one of the eight tiny islands of the Phoenix Group. To the northwest is Howland Island, which was the objective of Amelia Earhart's flight from Lae, New Guinea, on her way around the world. The Phoenix Islands and others near by were included in the U. S. Navy's search for Miss Earhart and her navigator, Frederick J. Noonan. The Phoenix land patches are all of coral formation, rising only 20 to 30 feet above sea level.

turn bordered by the most dazzling blue, extending right out to the ship's side.

Above it, thousands and thousands of birds—black birds with blood-red balloons hanging from their necks, white birds, brown birds, all kinds of birds, all colors—wheeled around and around in their never-ending aerial parade.

The spell was broken by the racket of the winch lowering the motor sailing launch over the side. Quickly the boatswain shoved off, and stood in close to the outer line of breakers. To us, he seemed always about to be caught in the breakers. We

could see the men heaving the lead, seeking anchorage, and, with apparent disappointment, standing farther down the shore line to try it again.

The launch rapidly signaled, "No bottom at 35." We acknowledged, and the captain turned to me with, "It certainly does *not* look good to me."

On and on, for more than two hours, the motor launch skirted the reef. Once she signaled, "Twenty-five fathoms, hard, irregular bottom." Before she had moved a boat's length, she again signaled "No bottom at 35."



#### HEAVING THE LEAD NEAR THE ENTRANCE TO CANTON'S BLUE LAGOON

Sailors from the *Avocet* measure the depth of water in search of an anchorage. The ocean bottom dropped off so steeply around the island that only outside the entrance to the central lagoon, where currents had built a "delta," could the ship find a place shallow enough to drop her "mud hook." The entrance to the haven, showing in the background, is about 150 yards wide. Within, the water was quiet and supplies were easily landed on the inner shore. The Expedition camp (page 385) was set up to the right of the passage.

Such a bottom was plainly impossible, so I advised Lieut. Williamson to recall his boat and to proceed to Canton Island. If that proved worse we would have to consider further what could best be done.

Two and a half hours later we sighted a number of apparently disconnected humps on our starboard bow. They gradually grew together and we found ourselves skirting an island, very narrow, very white, and with the bluest blue water on the other side extending off to the horizon.

#### AN IDYLIC LAGOON

Canton, or Mary Island, is a large atoll. Its lagoon is a beautiful stretch of glass-smooth, deep-blue water. The surrounding rim is nowhere very wide and sometimes very narrow.

On the sea side, in never-ending march, the breakers pounded their way with an incessant roar, throwing skyward high plumes of pure white.

At the salient points jutting out into the sea, those imposing breakers extended far

offshore. I counted as many as six and seven at once, all racing madly after each other and crashing on the beach.

#### FINDING THE HUMPS

From his wealth of experience, the boatswain said, "We'll find a good anchorage, Captain, right off the mouth of that lagoon.

"Wherever you have a big lagoon repeatedly discharging through a narrow entrance, the tides sweep the coral sand in and out and always pile it up in two humps, on either side of the entrance. All you got to do is find the humps; we'll find 'em."

And the boatswain was right. We located an excellent anchorage just to the southward of the southern entrance to the lagoon.

The captain anchored in ten fathoms with 60 fathoms of chain. Everything looked fine. The tide was running strong ebb, and there were large slicks on the water, indicating swirling water below.

We immediately sent the motorboat ashore to examine conditions in the lagoon. In the meantime, we were all curiously





ISLAND BIRDS GET "MIKE FRIGHT" DURING A BROADCAST

The announcer (right) and an assistant hold a feathered native up to the microphone, while two others await their turn to address an invisible audience thousands of miles away. Charlie, the Hawaiian boy, is in charge of a frigate bird (page 390). The hooded man at the left grasps the wings of a blue-faced booby.

looking over the side, examining the bottom which, although ten fathoms down, was clearly visible.

The fishermen immediately broke out their lines. In a very short time, fish of all colors and all sizes were being hauled in rapidly. They snapped at anything.

The "Padre" (Dr. McNally) hauled in a beauty only to see a shark snap off all but the head when it was practically alongside. The largest fish caught that night weighed almost 50 pounds. Chowder was assured!

Soon the motorboat returned with enthusiastic reports of conditions on shore. The boatswain, who apparently had something up his sleeve for every possible contingency, had even brought a float along. This was towed ashore the next morning and converted into an excellent dock. On it we were able to land even our heaviest apparatus.

Those who went ashore with the boatswain must have run along the beach like

school children picking up shells, for they all came back loaded with them—all kinds, from the most delicately colored rose tints to the beautiful marble whites, metallic blues, and queer-looking mixtures. The shapes were as varied as the coloring.

#### ADrift FOR A NIGHT

But before we were to see the shore again and step foot on it we were to take another cruise, but only for overnight.

Apparently we had anchored where the slope of the bottom was very steep. The anchor was evidently lying on a submarine hillside and the 60 fathoms of chain slid down the hill below the anchor.

Every time we tugged at the chain, the anchor slid a little farther down the hill. Finally away it went with a bang, and we were adrift with our anchor hanging down under us at the end of 60 fathoms of chain, and no bottom.

We were perfectly safe, as the steady

trade wind was blowing us rapidly off shore. We picked up our anchor and drifted all night, and that ended the thirteenth.

The next morning, bright and early, we steamed back to our island. This time we stood farther in toward the reef, and put the motor-sailer over to sound ahead of the ship and to examine the bottom through a water glass. The men selected a spot in seven fathoms which they buoyed after examining all around that locality.

The *Asocet* dropped her anchor alongside the anchorage buoy, and there we remained. Engines were secured, repairs and overhaul were started, and all preparations for the return trip to Honolulu were begun.

In the meantime, the ship's company was busy rigging out boats, casting off lashings on boxes and equipment, breaking out the afterhold and getting everything ready for a quick transfer to the beach. The first boat ashore took a full load of lumber and the float.

By the time the second boat was loaded and had reached the lagoon the boatswain had constructed his dock and the equipment could be passed over the side to the dock and skidded on rails clear of the beach.

By early afternoon we had landed seven boatloads of equipment and were ready to begin construction of the camp.

Flares such as you see along automobile roads under repair were carried ashore and placed along the beach on high points so that the ship could watch her anchorage during the night. It was astonishing how large those flares looked in the black darkness.

The ship was riding easily, with no strain on the chain at any time. The sea on the lee side of the big atoll was smooth, but down beyond the first point, we could see the surf running high and pounding itself to pieces on the headland.

#### SOUTH SEA FISH STORIES

It was so smooth near the ship that even the little dinghy, an 18-foot boat, was manned and out rowing around trying to catch fish. Everybody was fish-crazy. There were almost as many lines over the side during the rest periods as confetti over the side of a departing Matson liner at Honolulu.

Everybody chipped into a pool and a fishing contest was started, with daily and final prizes for the largest fish caught.

Before nightfall one man had landed a 37-pound ulua (cravellé jack), one of the best food fishes in these waters. They run from one to four feet long, and weigh from ten to fifty pounds.

By dinner time, everybody was tired and we were willing to return on board and turn in. But not the fishermen. Oh, no! They fished long into the night. My last conscious act was sitting up suddenly when I heard someone near by yell, "Hold him, hold him! What did you let him get away for?"

Saturday morning all hands were up bright and early. The supplies and gear continued to flow steadily, boatload after boatload, toward the beach.

We were lucky to have an experienced sergeant of the Marine Corps with us to take charge of the camp. The rapidity with which our tent village grew was astonishing. Before we fully realized it, all tents were up, all cots were rigged, mattresses, pillows, and mosquito nets (which were never used) were in place.

Meanwhile, others were rigging our big mess tent and our galley. The carpentering gang was busily sawing and hammering our one main structure together.

Our dock presented the appearance of a very busy river landing (page 385). All we needed were a couple of stores, a church, and a tavern to complete the picture. Groups of men, each knowing exactly what they had to do, were rapidly separating and distributing boxes received ashore.

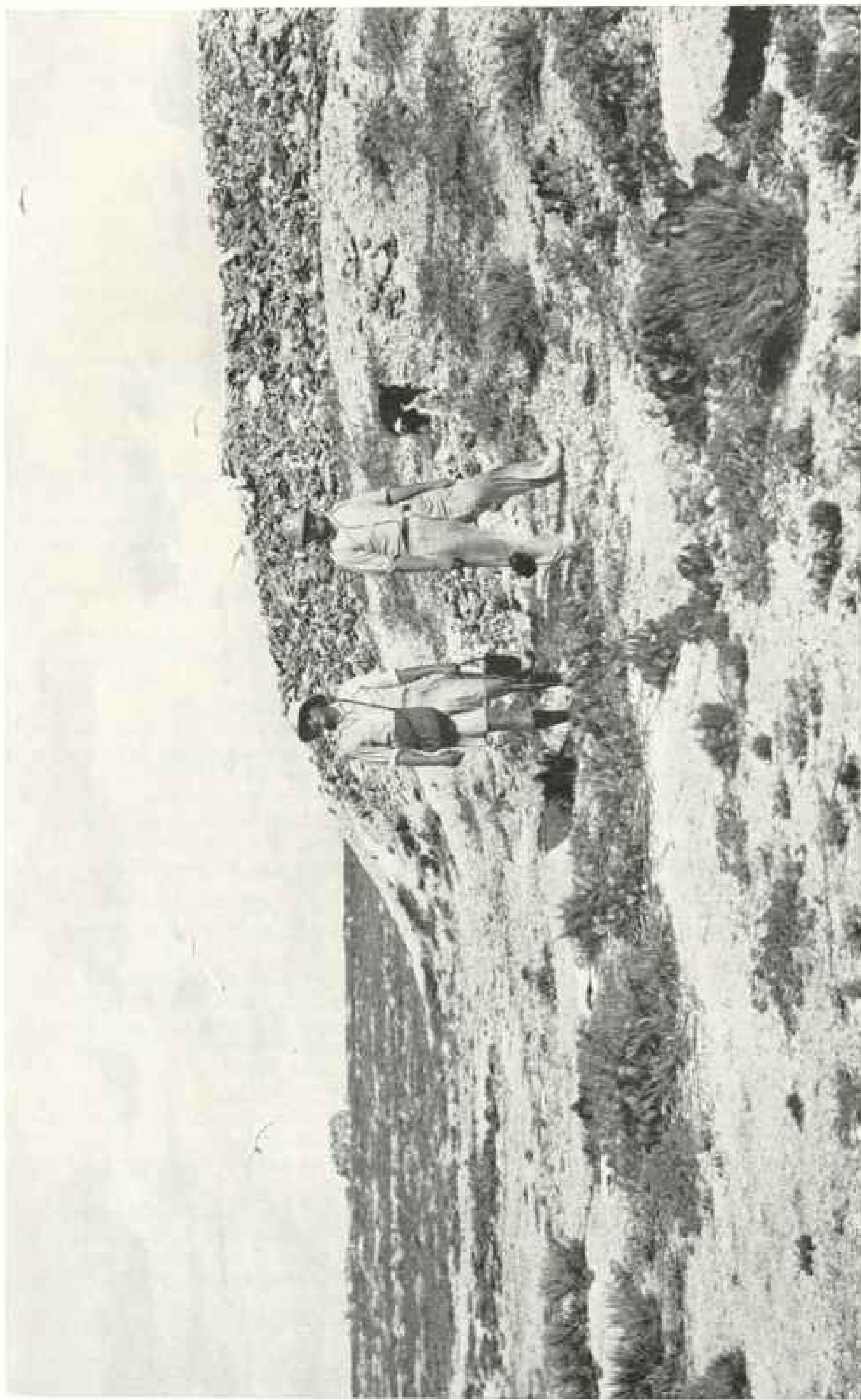
#### "TOWN HALL" AND "RADIO CITY"

Supplies were rushed to the mess shack, building material to the site of our "town hall," radio equipment to the local "Radio City," and personal effects to the proper tents. All hands appeared to be working under full pressure—what the bluejackets would call "a four-boiler run."

By nightfall the entire framework of our town hall was erected, and some of the siding was already on.

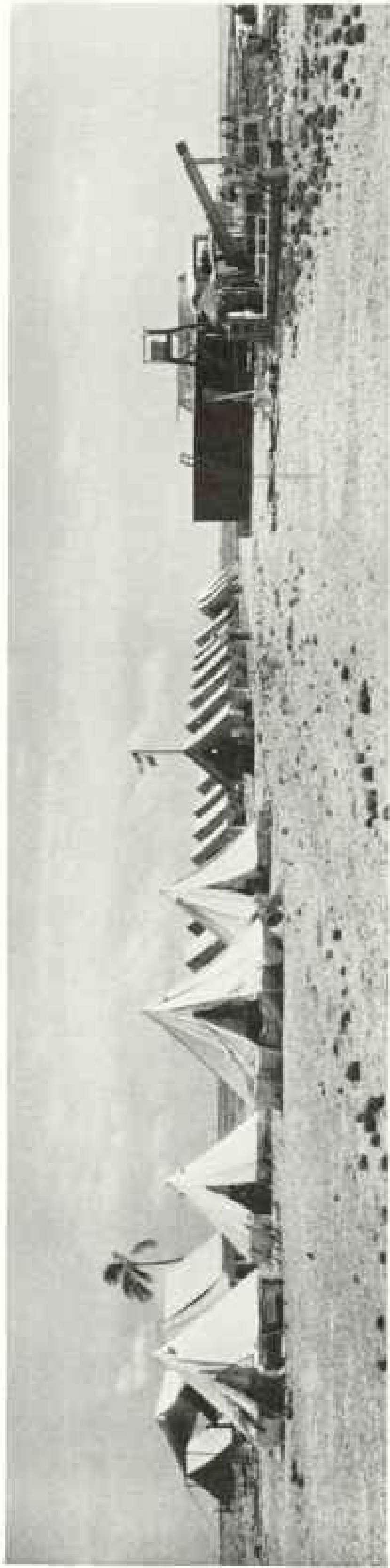
That building was 37 feet long by 14 feet wide, with a head space of 10 feet. It contained two photographic darkrooms, eight by eight, side by side. The inboard one was lined with two thicknesses of a special insulating material to help maintain the proper temperature.

Outside we mounted an air-cooling unit. Dr. Theodore Dunham and Mr. Thompson had brought from Honolulu.



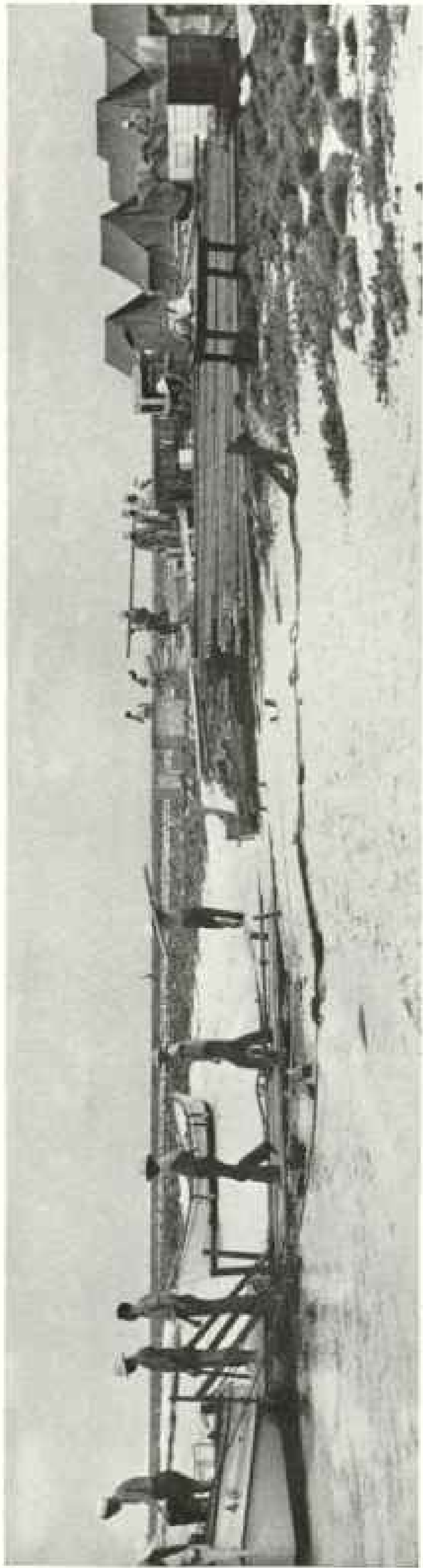
BIRDS WERE SO THICK ON ENDERBURY THAT THERE HARDLY WOULD HAVE BEEN ROOM FOR THE EXPEDITION

Although it proved impossible to land the Expedition at Enderbury Island, a small exploring party returned there after camp was established on Canton Island. Captain J. F. Hellweg (left) and a companion, with Jerry, the *Avocet's* little dog mascot (right), are standing in front of one of the many piles of rock that cover the island. In the left background is one of several ruined stone houses believed to have been built by guano collectors who formerly lived here.



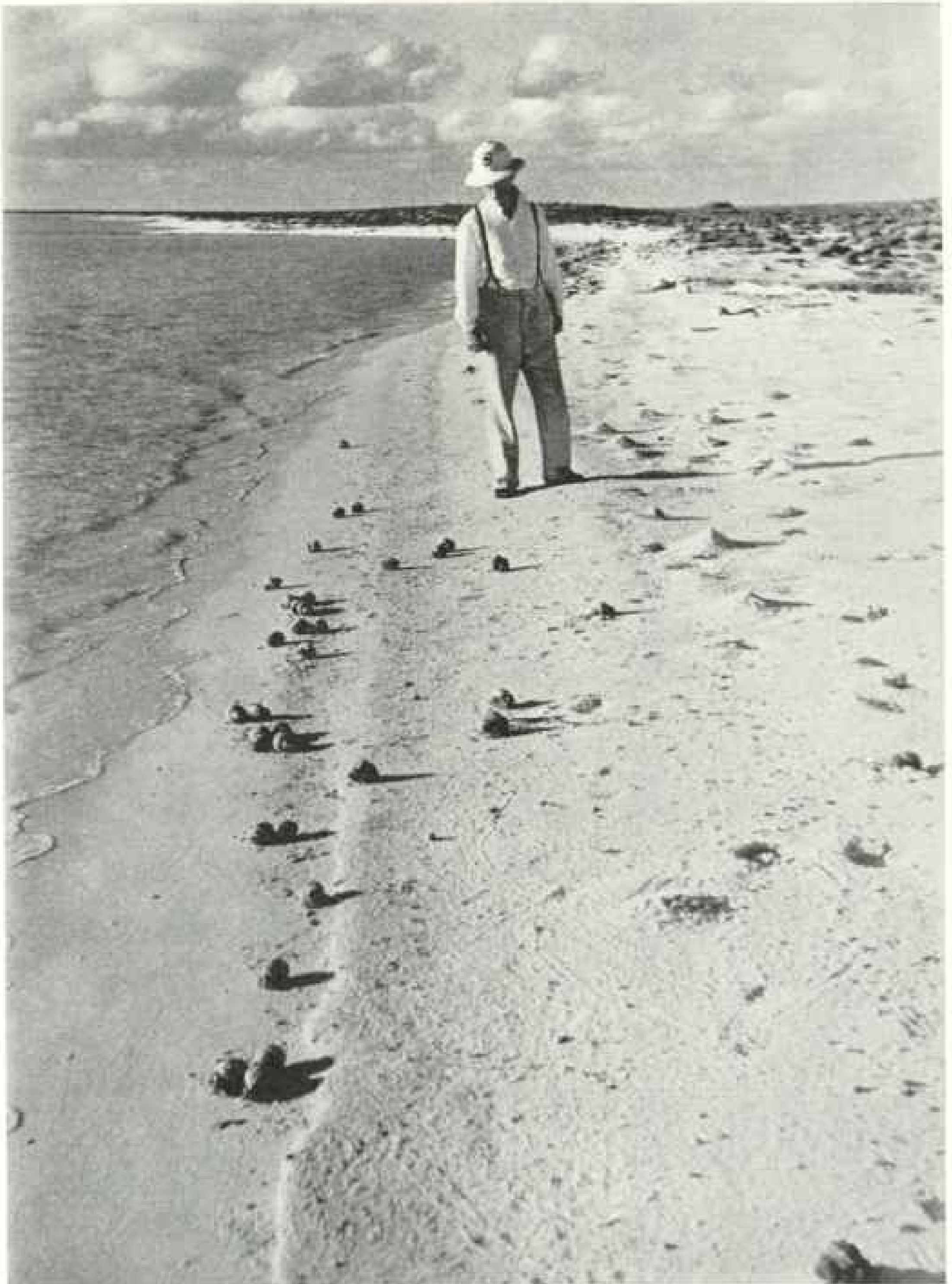
THE ECLIPSE CAMP BROUGHT BRIEF LIFE AND BUSTLE TO A WIND-SWEEPED DESERT ISLAND

This general view of the camp is looking north. At the extreme left is the mess tent. In the left foreground are the tents occupied by the National Geographic Society-U. S. Navy Expedition. The United States flag, and the National Geographic Society's flag just below it, are flying on the pole in the center. The large structure is the wooden photographic darkroom built by the Expedition. Its roof was painted white to reflect the sun's rays, reducing its interior temperature by several degrees. Next to it is the long row of instruments mounted to point eastward out over the lagoon in the center of Canton Island. Dr. Gardner's camera, known as "Big Bertha," is at the extreme right. The "street" between the instruments and tents was called "Broadway," that between the two rows of tents was "Fifth Avenue."



LIKE A BOOM TOWN, THE EXPEDITION'S TENT CITY SPREADS OVER THE SAND, BEHIND A BUSTLING WATER FRONT

The first launch sent ashore from the *Albatross* built the little landing, using a float that had been brought from Honolulu and some timbers from a sailing vessel wrecked here years before. In the quiet lagoon all supplies, including the heavy scientific equipment, were safely unloaded from the boats. The pile of lumber on the beach was used to construct the darkroom.



Photograph by Irvine C. Gardner

CANTON'S HERMIT CRABS START OFF FOR THEIR DAILY THIEVING

Biggest nuisance, but also biggest clowns, were the ludicrous hermit crabs that swarmed on the island. Charles Bittinger, the expedition's artist, watches the creatures on their daily morning march from the water's edge to camp where they would drag away small objects, edible or not. Soap was their favorite plunder. One made off with a pair of Dr. Richtmyer's socks, and he never saw them again!

The building was planned to be on the exact azimuth Dr. Dunham needed for his spectroscopic work.

Next to Dr. Dunham's half-ton machine we mounted Dr. Gardner's generator. All the rest of the building was given over to the complicated rigging required by Dr. Dunham's special apparatus.

After the structure was completed, it was entirely covered with tar paper. Then the sides subjected to the morning sun and the roof were painted white by our radio announcer (George Hicks). Richard H. Stewart, National Geographic Society photographer, was one of the hardest working and most competent carpenters.

By the time this was all finished Dr. Gardner had planned and had built a cement mixer and measuring gadget which saved much time. Forms were made, and concrete was mixed and poured.

By nightfall the camp began to take on an appearance of permanency.

Just before dinner we all went down to the lagoon wharf and dived into the crystal depths. At first it felt queer to swim around with so many kinds of fish near by, all staring at us with their big popeyes.

Once in the water it was hard to get out. But somebody yelled "Shark!" and there was a wild scramble for the beach.

When everybody was in water not over ten inches deep we all looked for the shark, which was well offshore, cruising up and down near a coral patch, and occasionally showing his fin.

The boatswain gave me a pair of water goggles with which I could see perfectly under water.

#### SWIMMING AMID FISH AND CORAL

Swimming around with them on, face in the water, I could scan all the wonderfully beautiful sights below—the white coral sand, the outcroppings of coral, odd and grotesque in shape and infinite in variety. Some of the formations were as delicate as fine lace.

In and around them all were the hundreds of gaily colored fish. They were not disturbed by our nearness, but went about their business, paying us scant attention.

Occasionally curious ones swam toward us, looked us over with their funny eyes, and then swam away, apparently disappointed. But let a big fish appear, and, with lightning rapidity, the others vanished as if by magic.

Swimming with goggles spoiled me for regular swimming. I carried mine around my neck all the time. A hundred times I wished that I could let everyone in the world see the wonderful and beautiful things in the lagoon.

It gave me a very strange feeling, being way down there with gaudy parrot fish, a vivid green; a brilliant silverfish, with one half of the body a gorgeous gold; the little bluefish, looking just like the beautiful bluebirds you see in the spring; or the dignified ulua, metallic blue on the back and silver gray underneath; together with dozens and dozens of all kinds and colors of fish playing hide-and-seek around the big coral heads which looked like enormous cauliflower flowers.

And then we would see a long, dark shape slowly working its way toward us and we would scramble into shallow water.

#### A "BIG FELLER" APPROACHES

One evening, Hicks, a surf boy, and I, were playing around a big coral patch, watching the latest color scheme in gaudy fish. I had just veered toward shore when Hicks yelled. Turning quickly, I saw, not one black fin, but what looked like two large white ones.

Charlie, the surf boy, had just gone under with his spear. Suddenly the big blanket fish (sting ray), for that is what it was, darted forward, its dangerous tail sweeping by.

Hicks and I were practically out of the water. Charlie couldn't make it. I saw him throw himself backwards under water like a crab, and draw back his spear to plunge it in the big fellow if it turned on him. It was all over in a few seconds. But when Charlie came out he was laughing, chattering, and looking scared all at once.

He kept repeating "Big feller, big feller," with his eyes wide and frightened. Then he told us that he feared the huge rays more than anything else in the water.

Several of these large rays were hooked, but the combined strength of all hands near by never was equal to landing one; a harpoon was needed. One night the men hauled one up close to the beach in the entrance, but with a single jerk he straightened out a big hook especially made on board and was off seaward at full speed.

Sunday morning, our first Sunday on shore, with the early sun shining through the low-hanging clouds, and the gentle mur-



Photograph by Irvine C. Gardner

NOT A PILE OF SEA SHELLS, BUT HERMIT CRABS EATING COCONUT

The discarded shells of snail-like mollusks are worn as armor by these crabs, with little but the legs protruding. Like turtles, they curl up inside the shell when attacked. This group swarmed around a split-open coconut like dogs around a butcher's wagon.

mur of the water on the beach, Father McNally was holding divine worship. The men were kneeling on the white sand, facing the east with the sun illuminating their faces. I never saw a more beautiful service.

Day by day good weather continued. Our camp life ran smoothly.

Busy as the proverbial bees were the scientists, some of whom, even in the three weeks before the eclipse, barely had time to do all that was necessary to adjust their delicate instruments. Up with the sun, breakfast soon after daylight—we were keeping daylight-saving time—work until noon, lunch, then maybe a brief rest, but usually steady work all afternoon, then a brief swim before supper.

Even after dark the scientists often continued working, focusing their instruments on the full moon or the stars in preparation for the eclipse.

One group played bridge in the mess tent every night. Sometimes I went rat shooting. The fishermen would go down to the entrance to the lagoon, and try to catch a big one in the racing current.

We erected a flagpole near my tent and every morning the National colors, with

the National Geographic Society's flag beneath, were hoisted (page 385).

After the camp and the concrete foundations for the instruments were completed, we began the long and tedious task of mounting, testing, and adjusting the many pieces of scientific apparatus.

A scientist on a desert island is in much the same fix as Robinson Crusoe. If he has forgotten a screwdriver or some nuts and bolts he can't run down to the five-and-ten for them. He must do without, or rig up a substitute from materials at hand.

Dr. Richtmyer needed a heavier weight for his driving clock, so he made it out of old rusty iron from a ship that had been wrecked on the island.

A SHIP OFFERS TO "RESCUE"  
THE EXPEDITION

It was decided to make a day's survey of Enderbury to get first-hand information about that island. Accordingly, certain members of the staff accompanied me on board the *Avocet* the night of May 23, as we were to make an early (2 a. m.) start.

About 10 p. m. we made out a steamer's lights to the westward.



A SCIENTIFIC "PIED PIPER" LURES RATS TO THEIR DOOM

Poisoned meal, not music, is the rodent exterminator used by Charles G. Thompson, President of the Foundation for Astrophysical Research. The rats, which probably came ashore from a wrecked ship, were such a nuisance that the photographer had to move his bed atop the darkroom so they would not keep him awake. The animals probably live on birds' eggs and young birds, but it is a mystery how they get water to drink.

Abruptly she turned and headed in toward the island. Soon she was close enough to signal and announced that she was the *S. S. Niagara*, of the Canadian Australasian Line, en route from Suva to Honolulu.

Seeing the flares on a desert island, she had stood in to learn if we needed anything. When she first saw the flares she could not see the ship's lights at anchor close inshore, and probably thought our range flares were signals for help.

A fine example of what sailors call "good sea manners!"

We thanked the captain and he turned and went back on his course.

The next morning at daylight we were close aboard on the lee side of Enderbury Island.

Lieut. Williamson and I went ashore in the surfboat. Fortunately the surf was not heavy, so we made it without difficulty. The next boat brought Dr. McNally, Mr. Stewart, Mr. Hicks, and Mr. Brown.

We divided into two parties, the captain, Hicks, and McNally taking the south-

ern half of the island; Stewart, Brown, and I taking the northern half.

The island was barren and extremely rough, its surface covered with loose, irregularly shaped bits of coral, looking as if an army of giants had amused themselves by piling them in long, high ridges (p. 384).

As we walked, the loose surface kept slipping and sliding. Progress was slow and difficult.

About the whole was an exaggerated odor of a chicken yard; overhead was a constant and curious bird parade. Some flew so close that they seemed to be trying to peer under our hat brims to see who the intruders were.

#### THE ADVENTURES OF JERRY

Jerry, the *Avocet's* mascot, remained with our party. The birds were even more curious about the little black dog than about us.

After hours of laborious travel, we started back by way of the beach. Even though that route was longer, we preferred it to crossing the ridges of loose coral again.





Photograph by Irvine C. Ginnier

#### THE MAN-O'-WAR BIRD'S THROAT SWELLS WITH AFFECTION

The male carries under his chin a pouch of brilliant turkey red which during the mating season he inflates with air to the size of a toy balloon. The feathers are dark brown. The man-o'-war bird, sometimes called the frigate bird, lives largely by snatching fish caught by other birds (367). Sometimes hundreds of the "man-o'-wars" could be seen riding almost motionless, with wings outspread, on the trade wind currents above Canton Island.

Upon reaching the surfboat, which was high and dry, the men reported that the tide had dropped away so suddenly they had been caught.

Waiting until the southern party returned, we began the tedious task of rolling the boat down to the water. Using a piece of driftwood about five inches in diameter, we gradually moved it out toward the breakers.

Handling a boat in breakers at low tide is always more dangerous than at high. When we were about halfway out, we wound the boat end for end so that we need not further jeopardize things by having to turn it about while we were rowing.

Little Jerry followed all our movements anxiously. Just when we reached shallow water, the tide changed abruptly and began rolling in very fast.

It took all hands to hang on to the gunwale and keep the boat from being capsized. Suddenly I looked back and there was poor Jerry halfway ashore, shaking

like a leaf, and with his whole soul in his pleading eyes. Turning back quickly I ran toward him. As I approached, the little fellow crouched down trembling.

I slung my binoculars over one shoulder and my bag over the other to free my hands. Then I hoisted him on my shoulder to hold him securely, leaving one arm free to balance myself in the surf.

Jerry hooked his little nails into my back to help hang on. As I worked my way out toward the boat, I patted him and tried to reassure him.

By the time I reached the boat, which was bucking like a horse with each breaker, I saw a mean-looking fin just outboard. So we hung on and waited.

Before the next big breaker came in, the fin had disappeared, and we tried it again. By this time we had four men in the boat and they had oars rigged out to start as soon as we could all jump in.

Just then a big breaker picked up the boat and rolled it toward me. Tossing Jerry into it, and scrambling forward,

I made it easily, as the gunwale was low on my side.

Seeing a pair of hands clutching the opposite gunwale, I helped haul the boatswain's mate over, and then, yelling to the men to give way hard, rigged out the long steering oar which the boatswain's mate grasped and used with all his strength.

Before the next breaker reached us we were out beyond the coral heads and soon were clear of the breakers.

The ship had stood in very close to shore and we were soon alongside and all hands climbed on board. One of the men forward passed Jerry on board. As soon as he hit the deck he raced up and down like mad for a couple of turns.

Ever since then, when he sees me he gives me a friendly lick, and when I have time to pet him he thanks me as plainly as a little dog can.

#### THE "WELLINGTON" BRINGS TELESCOPES AND COCONUTS

H. M. S. *Wellington* arrived May 26, and landed the New Zealand eclipse party (page 394). They found our dock and our two-wheel truck helpful for handling their instruments and equipment. The truck was particularly useful for transporting about a thousand coconuts they had brought for planting on a large area to the southward of our camp.

The two expeditions quickly became friendly. The officers of the *Wellington* entertained the members of both scientific parties and officers of the *Avocet* aboard their ship, and later the scientists of both expeditions entertained each other on shore. A field day ashore for the enlisted men of the two ships was a complete success.

Our resourceful doctor helped them improvise a stove from scrap material and constructed an odd but efficient smoke-stack from empty cans and roofing nails.

When we built our monument and mounted the two stainless-steel American flags, it was the doctor who mixed some fine finishing concrete and smoothed and shaped our monument into a really handsome structure (page 376).

On Decoration Day we unveiled the monument with appropriate ceremonies.

Now that the critical day drew near, the weather, which had been perfect, began to act uncertainly. One night the whole camp was nearly blown away. For several days and nights we had daily storms. An-

other night the *Wellington* dragged badly.

And then the weather seemed satisfied for a while and behaved itself. But we were all anxiously watching the eastern sky every morning at eclipse time, and we were not encouraged.

The day before eclipse found us worried. The pessimists said we might as well pack up and save time. The optimists thought everything would be all right. The rest of us hoped for the best.

On eclipse morning no one could sleep. I was up at 3 a. m., looking at the weather. At four o'clock it began to blow, and the whole eastern sky was overcast with heavy, dark nimbus clouds. We anxiously watched them and were delighted to see them swing to the southward.

At daylight, the cloud formation had changed completely, and there was a good percentage of clear sky.

And then the sunrise! It was particularly beautiful; were I an artist I would have tried to catch it to cherish forever.

The zero hour approached. The launch from the *Avocet* landed a large party on the dock. They went to their assigned stations. Everybody made his final tests and adjustments. Dunham and Thompson had worked throughout the night.

The doctor came to my tent and together we made arrangements for the visual work. A dozen times I looked at the watch, set to Greenwich time.

#### "ONE MINUTE TO GO!"

Previously I had carefully made three comparisons and recorded them in our eclipse record book. While waiting I caught myself mentally counting. And then the doctor said, very quietly, "Only about one minute to go."

That first contact, when the moon begins to cover the sun, is always a heart-breaker. I have seen Dr. Robertson, who has calculated at least a hundred eclipses, walking faster and faster until he was almost dog-trotting, just before the first contact, and then suddenly stop, jerk off his hat, and rub his hand slowly over his head as the observer marked it exactly on time.

So it was with us. We knew it was going to happen, it had to happen, and yet we both felt strained. To my question, "How much longer, Doctor?" there was no answer. After a pause a quiet, "She's coming on, Captain," and then, "Mark."



Photograph by Carl Markwith

"HELLO, DADDY! THIS IS KEITH"

The son of John E. Willis, of the U. S. Naval Observatory, broadcasts in Washington, D. C., to his father on distant Canton Island. At the table is Mrs. Richard H. Stewart, wife of the Expedition photographer. She and her two daughters went on the air, telling Stewart, 6,500 miles away, to swim in the lagoon if he must, but to look out for sharks.

As if his "Mark" had been communicated by some secret means to the moon, an infinitely small notch appeared on the edge of the sun high up on the right side.

I found my body relaxed; it suddenly dawned on me that I had been as tense and taut as a wire line.

Hurrying across to the boxing arena which we had filled with white sand, and around which we had stationed eight blue-jackets with stop watches to note and time the shadow bands, I gave them some last-minute instructions.

Dr. Mitchell quietly made the rounds, inquiring of each man whether all preparations were complete, then turned to his own apparatus with his three groups of assistants.

Slowly, steadily, the black shadow descended across the face of the sun.

Darkness came on, and it seemed that night should fall, yet I knew night couldn't be falling at that time of day. This queer darkness was confusing. It did not look like the growing darkness of approaching night, partly because the shadows did not grow longer as they do with the setting sun.

A hush spread over the whole place, no birds were in the air where, a short time before, there had been hundreds. All sound seemed to fade out. It grew darker. The tension was painful.

Yet with the suspense went a wonderful feeling of exaltation that suffused every man in camp. Long weeks of uncertainty were over. At last we were sure that no clouds could possibly interfere with our observations of the eclipse.

"Thirty seconds to go."

I wondered whether everybody else was cool and collected, or had buck fever as I had. I wished the doctor would stop scuffing his feet on the coral.

"Special signal, Richtmyer, 16 seconds to go."

Dr. Richtmyer sprang into instant action. Dr. Dunham was timing his movements exactly with Richtmyer's. An error might blow all the latter's lights and ruin his entire project. Our portable generator was standing up perfectly under this severe tax and we all prayed that there would be no mishaps.

"Ten seconds to go."



STANDING ROOM ONLY AT "RADIO CITY" TO HEAR MESSAGES FROM HOME

On the outside, listening in, are members of the Expedition who could not crowd into the tent. It was about 3 p. m. here on Canton Island, while in Washington, D. C., where the men's relatives were talking to them through the microphone, it was about nine o'clock at night.

Dunham and Thompson were burning with intensity as they performed each act with meticulous care.

"Stand by!"

The gorgeous Baily's beads\* were appearing. The darkness was almost complete. Stars were beginning to twinkle.

"Doctor, did you press that key?"

"Mark."

#### A SPECTACLE OF SUBLIME BEAUTY

"One, Two, Three, Four," was sounding all over the site through National Broadcasting Company loud-speakers.

I was speechless at the sublime beauty of the whole spectacle. Those magnificent prominences, with a coloring impossible for humans to copy! The ethereal delicacy of the far-flung corona, its pearly illumination extending out into space millions and millions of miles!

The counting of the precious seconds measuring the period of totality was going steadily on—"121, 122"—and I knew the doctor would keep on counting till I gave him the signal that totality had ended.

\* Baily's beads are formed by sunlight shining between the mountains on the advancing edge of the moon.

Suddenly the doctor kicked my leg. It startled me. What had I done? Had I forgotten something? I was in a panic. And then I saw him frantically pointing under the table.

Looking down, I saw his motion-picture camera. He had asked me to take some pictures just after the one hundred and twentieth second.

I stooped, caught the camera, jumped up, and pointed it toward the beautiful corona. I pressed the key down and heard the hum of the camera making an indelible record of the sublime spectacle.

"130, 131."

I guess that's enough for the doctor. Down went the camera, and again the intent watching. George Hicks' rich voice could be heard above the counting, describing in glowing and gifted words the wonderful beauty of this celestial extravaganza.

Suddenly I forgot my surroundings. The bare nakedness of our camp faded out, and I was in an enormous, high-vaulted cathedral, with everything mammoth and beautiful. Indescribably sweet music filled the air. I wanted to swallow, but couldn't.



"THE WEATHER IS PERFECT, AND WE'RE ALL AS HAPPY AS CLAMS!"

From the roof of the Expedition's photographic darkroom, the good news that clouds will not interfere with the eclipse is flashed to the world by George Hicks (right), National Broadcasting Company announcer with the Expedition. The assistant is ready with a flashlight so that Mr. Hicks can see his notes during the darkness of total eclipse. In the background, right, is the Expedition ship, U. S. S. *Atocet*, and at left H. M. S. *Wellington*, which brought the New Zealand party to Canton Island (page 391).

My eyes started.

"155, 156."

I could see Father McNally moving with the regularity of a machine, timing each movement to the continuous count. I could see mentally the feverish activity of each instrument. Hicks' melodious voice went on and on. I wondered how he could think of all the things he said. His talk had to be extemporaneous; he had never seen an eclipse before.

"207, 208, 209."

"End of totality!"

And then the overwhelming beauty of the Baily's beads, the magnificent ring setting, and the glory of the sun as it

burst forth, dissipating the weird darkness.

The birds immediately took the air, daytime noises began again, the bareness of our camp was thrust upon us with all its nakedness.

The eclipse of 1937 was over.

Then came the celebration! For half an hour nobody did anything but walk around and feel happy. The scientists acted like college boys whose team has just won a football game!

With a good job done, we suddenly realized that now we could go home. Packing began at a furious rate. Thirty hours later the *Atocet* weighed anchor, and we watched Canton Island disappear into the sunset.

#### INDEX FOR JANUARY-JUNE, 1937, VOLUME READY

Index for Volume LXXI (January-June, 1937) of the NATIONAL GEOGRAPHIC MAGAZINE will be mailed upon request to members who bind their copies as works of reference.

# NATIONAL GEOGRAPHIC SOCIETY

GEOGRAPHIC ADMINISTRATION BUILDINGS

SIXTEENTH AND M STREETS NORTHWEST, WASHINGTON, D. C.

GILBERT GROSVENOR, President

ROBERT V. FLEMING, Treasurer

HERBERT A. POOLE, Assistant Treasurer

LYMAN J. BRIGGS, Chairman; ALEXANDER WETMORE, Vice Chairman, Committee on Research

JOHN OLIVER LA GORCE, Vice-President

GEORGE W. HUTCHISON, Secretary

THOMAS W. MCKNEW, Assistant Secretary

## EXECUTIVE STAFF OF THE NATIONAL GEOGRAPHIC MAGAZINE

GILBERT GROSVENOR, Editor

JOHN OLIVER LA GORCE, Associate Editor

J. R. HILDEBRAND  
Assistant Editor

MELVILLE BELL GROSVENOR  
Assistant Editor

McFALL KERHEV  
Chief of School Service

LEO A. BORAH  
Editorial Staff

FREDERICK SIMPICH  
Assistant Editor

ALBERT H. BUMSTEAD  
Chief Cartographer

E. JOHN LONG  
Editorial Staff

FRANKLIN L. FISHER  
Chief Illustrations Division

MAYNARD OWEN WILLIAMS  
Chief Foreign Editorial Staff

CHARLES MARTIN  
Chief Photographic Laboratory

LEONARD C. ROY  
Editorial Staff

## BOARD OF TRUSTEES

ROBERT V. FLEMING  
President and Chairman of the  
Board, Riggs National Bank

WALTER S. GIFFORD  
President American Telephone and  
Telegraph Co.

DAVID FAIRCHILD  
Special Agricultural Explorer, U. S.  
Department of Agriculture

C. HART MERRIAM  
Member National Academy of  
Sciences

LYMAN J. BRIGGS  
Director National Bureau of  
Standards

GEORGE R. PUTNAM  
Commissioner of Lighthouses,  
Retired

THEODORE W. NOYES  
Editor of The Evening Star

GEORGE W. HUTCHISON  
Secretary National Geographic  
Society

CHARLES EVANS HUGHES  
Chief Justice of the United States

WILLIAM V. PRATT  
Rear Admiral U. S. Navy, Retired

RAYMOND S. PATTON  
Rear Admiral, Director, U. S. Coast  
and Geodetic Survey

ALEXANDER WETMORE  
Assistant Secretary, Smithsonian  
Institution

GILBERT GROSVENOR  
Editor of National Geographic  
Magazine

J. HOWARD GORE  
Prof. Emeritus Mathematics, The  
George Washington University

ELISHA HANSON  
Lawyer and Naturalist

JOHN J. PERSHING  
General of the Armies of the  
United States

GEORGE OTIS SMITH  
Formerly Director U. S. Geological  
Survey

O. H. TUTTMANN  
Formerly Superintendent U. S.  
Coast and Geodetic Survey

JOHN OLIVER LA GORCE  
Associate Editor of the National  
Geographic Magazine

CHARLES G. DAWES  
Formerly Vice-President of the  
United States

GEORGE SHIRAS, Jr.  
Formerly Member U. S. Con-  
gress, Faunal Naturalist and  
Wild-Game Photographer

OSCAR WESTOVER  
Major General, Chief, U. S. Army  
Air Corps

CHARLES F. KETTERING  
President, General Motors Research  
Corporation

## ORGANIZED FOR "THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE"

To carry out the purposes for which it was founded forty-nine 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 smoking, 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.

The Society cooperated with Dr. William Beebe in a deep-sea exploration of undersea life off Bermuda, during which a world record depth of 3,028 feet was attained August 15, 1934, enabling observations of hitherto unknown submarine creatures.

The Society also had the honor of subscribing a substantial sum to the expedition of Admiral Peary, who discovered the North Pole, and contributed \$100,000 to Admiral Byrd's Antarctic Expeditions.

The Society granted \$25,000, and in addition \$15,000 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 in the Giant Forest of Sequoia National Park 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.

On November 11, 1935, in a flight sponsored jointly by the National Geographic Society and the U. S. Army Air Corps, the world's largest balloon, *Explorer II*, ascended to an officially recognized altitude record of 72,395 feet. Capt. Albert W. Stevens and Capt. Orvil A. Anderson took aloft in the gondola nearly a ton of scientific instruments, and obtained results of extraordinary value.

THE ISLANDS OF

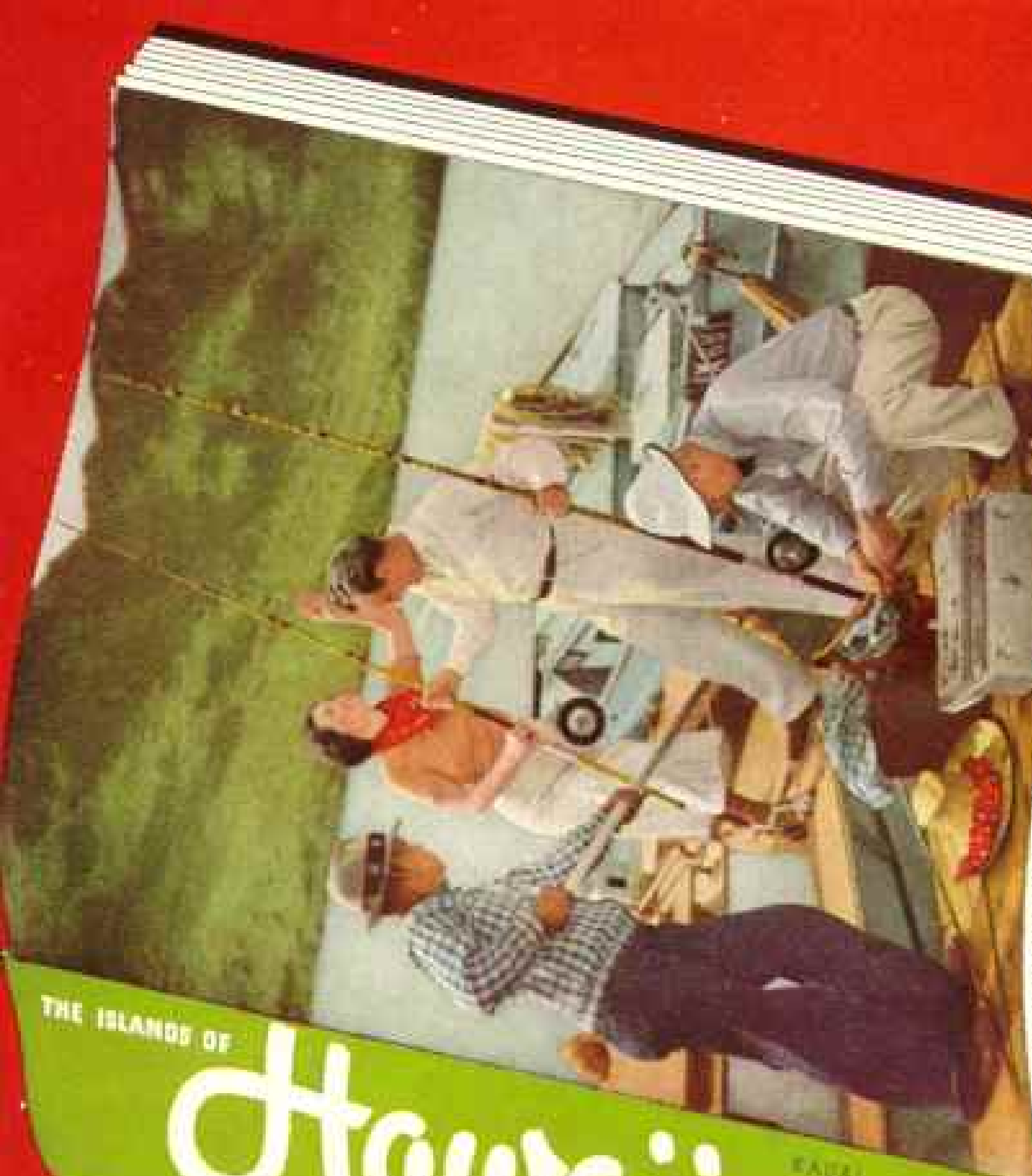
# Hawaii



Tasting cool, fresh fingers of pineapple on a plantation near Hanalei.

Autumn in the South Seas! Sunlit surf spraying liquid silver on Waikiki, Vivid flowers tinting the hills with flame. Laughter giving lili to mellow music. The smart world at play, where play is part of life. \*\* The tug of sport is irresistible. Volcano-trails and fern-forest roads call beauty-seeking motorists. Magnificent hotels invite inspiring gaiety. Shopp that herald the most exciting news in fashions. (Wait until you come for your wardrobe.) And no matter what you do, a clear blue sky's your canopy!

The leaves of adventure are yours to turn at will. Neither passport nor passport is required. But you'll learn to say "Aloha!" and to make that lovely word a symbol of unequalled hospitality... Hawaii's unique contribution to the life and language of her own United States. \*\* A gay, smart ocean crossing from Los Angeles, San Francisco or Vancouver, B.C. A swift air passage of less than a day on giant new Clippers.



Tasting lines for deep-sea fishing at Nawiliwili, Isle of Kauai.

Booklets "Nearby Hawaii" and "Tourfax" free from Travel Agents or Hawaii Tourist Bureau, 203 Market Street, San Francisco, Calif.; 242 Petroleum Securities Bldg., Los Angeles, Calif.

This Bureau, with headquarters at 765 Bishop Street, in Honolulu, is a non-profit organization, maintained by THE PEOPLE OF HAWAII in enable you to obtain accurate information on any subject concerning the entire Territory of Hawaii, U.S.A.



Lower New York from above the clouds at 11,500 feet altitude



*Keeps your  
engine clean*

## *Clouds, too, are* **DISTILLED!**

Here is an oil that keeps your engine clean because it, like clouds, is *distilled*. Every drop has first been vaporized, then condensed into pure, rich oil.

Hot-weather driving does not induce carbon to build up in an engine lubricated with Havoline. Modern motors *need* this oil, made modern by the age-old principle — *distilling*.

BUY HAYOLINE, *the distilled oil that keeps your engine clean*, from any Texaco Dealer.

Indian Refining Company, Indianapolis. Affiliated with The Texas Company.



# A TRUE STORY *BY* ZANE GREY

**HE WAS RIDING ON  
DYNAMITE AND  
NEVER KNEW IT UNTIL...**



**ZANE GREY**  
*Famous Author of Popular  
Western Thrillers*

**"This Close Shave," says  
Zane Grey, "Should Make  
Every Motorist Think Twice  
Before Gambling on Tires"**

NOTHING suited Edward Zachary of Hartford, Connecticut, better than to open the throttle and "get away from it all." Not that he was a reckless driver. On the contrary, he was plenty strict when it came to observing traffic rules. But there is one motoring mishap that the best of drivers cannot forecast. And it caught Mr. Zachary completely off guard.

### **BANG! Then What?**

He was whizzing along the Northford Road at a good clip when BANG! Quicker than a Texas Ranger could draw a gun, the right front tire blew out. An uncontrollable drag yanked the car smack alongside of a guard-rail. Flying wheels mowed down fence posts. Seconds seemed hours before the wildest ride Mr. Zachary ever had came to a sudden halt.

### **A Special Goodrich Tire**

The cards may be stacked against you when you gamble on tires. Today's faster driving conditions call for a *special* tire. The Goodrich Safety Silvertown is just that kind of a tire. It's the *only* tire with the Life-Saver Golden Ply. This life-saving invention is a layer of *special* rubber and full-floating cords, scientifically treated to



resist the internal tire heat that causes many of today's high-speed blow-outs. By resisting this heat *inside* the tires, these Golden Ply Silvertowns give you, and everyone that rides with you, *real* protection against those dangerous high-speed blow-outs.

Edward Zachary has no desire to go through the mental anguish of another blow-out. From now on you'll find his car equipped with Silvertowns. For your own peace of mind—for the protection of your family and friends make *your next set of tires* Golden Ply Silvertowns. You pay no price premium for these life-saving tires and you'll find them on sale at Goodrich Silvertown Stores and Goodrich dealers everywhere.

*Zane Grey*

**HEAT CAUSES BLOW-OUTS.  
PROTECT YOURSELF  
AGAINST THOSE  
BLOW-OUTS WITH THIS  
HEAT-RESISTING  
GOLDEN PLY**



# Goodrich SAFETY Silvertown

With Life-Saver Golden Ply Blow-Out Protection

Today  
the Curtain Rises  
ON THE PEN OF  
HIGHEST PEDIGREE...



## A New and SUPERLATIVE Model of the Revolutionary Vacumatic

PARKER'S SPEEDLINE MAJOR and MAXIMA, \$8.75 and \$10

Attend Original Showing September 1 to October 1—  
Start Fall Earning or Learning on a New High Plane

*New Speedline Shape  
with enlarged  
Ink Capacity  
Self-governed Flow  
33% more Gold  
and of course  
Parker's smoothly  
laminated Pearl  
and Jet Style*

TODAY there takes place at all good pen counters the curtain-raising on the king of all pens—the new Parker Speedline-Vacumatic, in three sizes.

A conquering Pen is this, because it never starts anything that it cannot finish.

For example, it gives continuous year-round mileage if you merely fill it 3 or 4 times from one birthday to the next. Eight or ten fast seconds does the trick.

When held to the light its transparent laminations show the ink level at all times. Hence you can refill at any odd moment, so it won't run dry.

A wholly original and exclusive Style—shimmering Pearl and Jet—now with new, restful Speedline shape, smartly laminated.

Not merely a 1938 style, but also a 1938 mechanism! And every Parker Vacumatic is GUARANTEED mechanically perfect, with no coddling asked or expected.

By all means see this pedigreed Beauty at once at any good store selling pens. The Parker Pen Company, Janesville, Wisconsin.

Makers of Parker Quink, the amazing new ink that cleans a pen as it writes. 15¢, 25¢, and up at any store selling ink.



HOLDS 102% MORE INK  
THAN OUR FAMOUS DUETTO

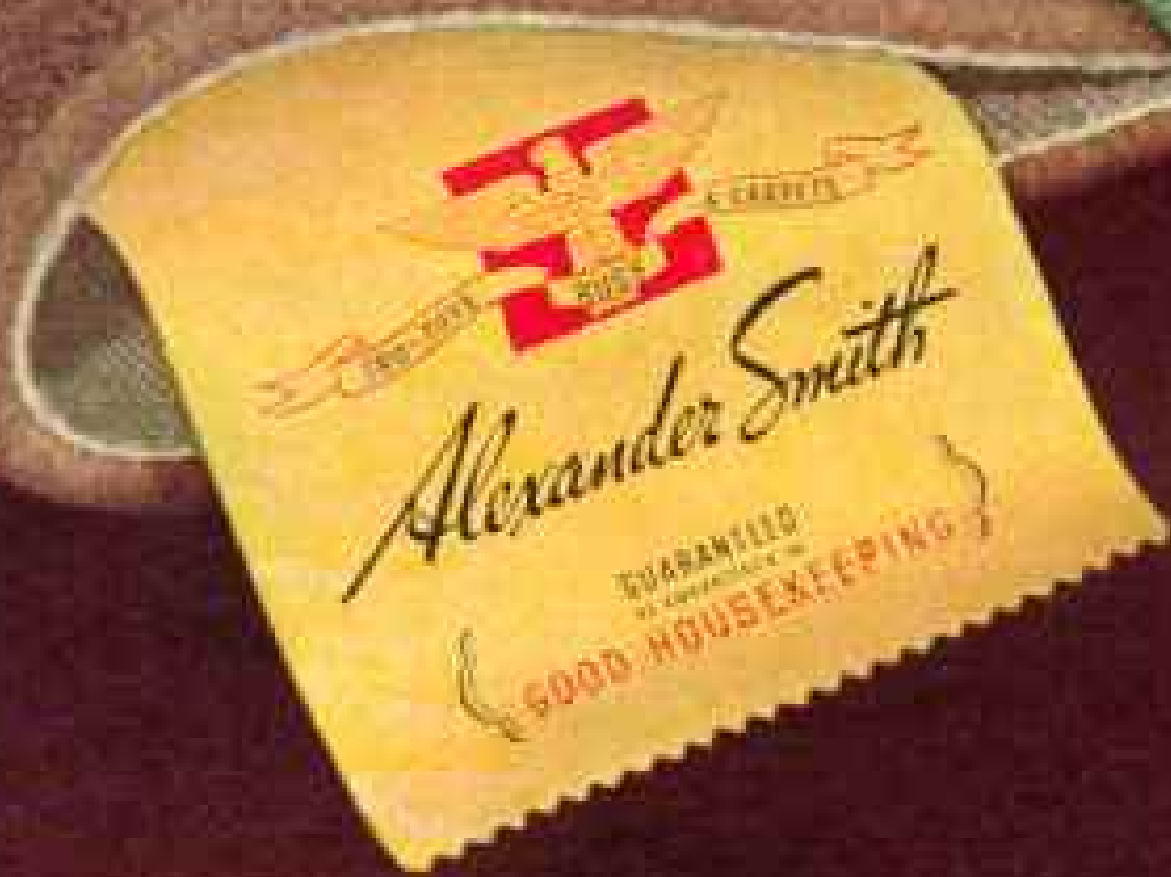
Parker <sup>\$7.50</sup>  
8.75  
10

Speedline VACUMATIC

GUARANTEED MECHANICALLY PERFECT

Junior or Junorette, \$5 - Standard or Slender Standard, \$7.50  
Speedline Major, \$8.75 - Speedline Maxima or Senior Maxima, \$10  
Pencils to match, \$2.50, \$3.50, \$3.75 and \$5

NEW *Alexander Smith*  
TRU-TONE CARPETS



"Nearly Right" Won't Do in *Carpet Colors*

If you are the least bit particular about color, a safe rule in buying broadloom carpet is to go to a good store and ask to see Alexander Smith Broadlooms. These are TRU-TONE colors, with just that subtle difference in shade that style authenticity demands. Look for the gold label with the Good Housekeeping Guaranty. For free Tru-Tone Carpet Book, write Alexander Smith Division, W. & J. Sloane Wholesale, 295 Fifth Avenue, New York, N.Y.

# Willard Batteries Give Protection to Millions



**"I Know Willards Cost Less to Own . . . and through a score of years they never have failed me.."**

"There's a lad in this town who is alive today only because I was able to get to him quickly. One bitter cold night I received a 'phone call from a frightened mother . . . could I come at once?

"I had come in tired and left my car standing outside. I stepped on the starter—and if you're one of the millions of Willard owners, you know the answer. I got an immediate start—reached my patient in time

to give the emergency treatment that unquestionably saved the lad's life.

"Even if they cost a lot more than other batteries—and they don't—I'd still insist on a Willard. And in addition Willards' extra long life and freedom from frequent recharging make them actually *cost less to own.*"

Car owners buy more Willards than any other brand because they want the greater safety in the emergencies—the quicker starts and the longer battery life that Willards provide. No matter where you live, you'll find one of Willard's 42,000 expert dealers. Protect yourself and your family—buy a Willard.

**WILLARD STORAGE BATTERY CO.**

Cleveland • Los Angeles • Toronto, Canada

# Willards



# Cost Less To Own

**Because they last longer . . . Crank faster . . . Don't let you down!**



**STOP**  
WASHING DISHES!



The G-E Dishwasher does your entire dishwashing job for about a penny a day! All the dishes, pots, and pans are hygienically cleaned in water hotter than human hands could endure. They are dried by their own heat. No unsanitary dish-cloth, no breakage. You can have the G-E Dishwasher installed as part of the General Electric Sink—or as a separate cabinet.

**STOP**  
SAVING GARBAGE!



Dispose of food wastes right at the sink! Farings, scraps, etc., go down the drain into the G-E Disposall, where they are reduced to a pulp and flushed away. No odors—no clogged pipes! The G-E Disposall comes as part of the G-E Electric Sink—or can be separately installed in your present sink.

### New General Electric Sink Ends The Two Most Distasteful Kitchen Tasks

HOUSEWORK now becomes easier for both women with servants and those without help. Two tedious kitchen tasks are gone! The new General Electric Sink "does the dishes" and disposes of garbage mechanically.

#### Protects China from Breakage

Stack the dishes in the dishwasher trays—turn a switch—and quickly the job is finished! The G-E Dishwasher cleans and dries itself. Your dishes are safe from chipping and handling.

Down the sink into the Disposall go all food wastes—to be *instantly* disposed of!

The G-E Electric Sink brings you dishwashing and disposal services at small cost. Visit your dealer's, or write for information. General Electric Co., Specialty Appliance Sales Division, Sec. DR9, Nela Park, Cleveland.



**GENERAL  ELECTRIC SINK**

WITH DISHWASHER  AND DISPOSALL 



## Every boy's father (*and mother*) should know this

**S**TART your boy shaving with a Schick Shaver. It will clean off the first tender down and, though he grows up to have the toughest beard, he will always shave quickly and closely.

His skin will never become calloused with the scar-tissue that inevitably follows blade-shaving. Never will he cut, nick or scrape his face, for there are *no blades* in the Schick Shaver. No moving part touches the skin.

The gentle, massaging action of the Schick induces the flow of blood to the skin, helping it to keep healthy and reducing the danger of infection to a minimum.

**It will cost him less to shave**

We do not know any cheaper way to shave through the years than with the

Schick Shaver. (Schick Shavers made five years ago have been used every day and are still shaving perfectly.)

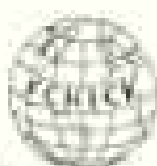
There are no blades to buy, to sharpen or replace—no brush, soap, cream, powder or lotions.

The Schick Shaver can be used in total darkness, by invalids in bed, in rough weather at sea and under many conditions that would make it impossible to use a razor.

**Buy one for your boy and yourself**

Go to an authorized Schick dealer. Ask him to demonstrate the shaver to you and explain why your boy can shave well the first day but it may take you a little longer to get *your* face in condition for a very close and quick shave.

SCHICK DRY SHAVERS, INC., STAMFORD, CONN. Western Distributor: Edison, Inc., San Francisco  
In Canada: Henry Birks & Sons, Ltd., and other leading stores  
In England: 271 Regent Street, London, W. 1

**SCHICK**  **SHAVERS**

# The big fellow helps us all



**H**ERE you see one of the most modern freight locomotives used by American railroads.

It develops 6,500 horsepower. It can haul freight 70 miles an hour. It can highball a string of loaded box cars more than a mile long.

That the railroads are using such mighty engines is a good thing for everyone.

Take shippers, for instance. Rates are directly affected by the number of cars which modern locomotives can pull. If trains were as short as they were thirty-six years ago it would add more than three quarters of a billion dollars to the annual freight bill, based on 1936 traffic.

Or take wages. The railroads' ability to meet present-day pay rolls depends on low cost operation—and the length of the modern freight trains largely determines such costs.

Or take safety. Longer trains reduce the chance of grade crossing accidents and collisions, because the more trains you have on a track, the more chance of accidents. As a federal court

Pictured here is a famous engine of seventy years ago. When freight depended on such motive power, rates were three times as high and wages were only a fraction of what they are today.



recently said, "The frequency of train and train-service accidents is directly related to the number of train units operated."

Everyone knows the great safety record of the railroads today. And during the period from 1923 to 1936, when the length and speed of trains showed a striking increase, the frequency of train accidents of all sorts decreased 58.5 per cent, and head-on and rear-end collisions decreased 64 per cent.

Here in plain terms is the great story of how the railroads keep abreast of the times.

American railroad rates are the lowest in the world; American railroad wages the highest.

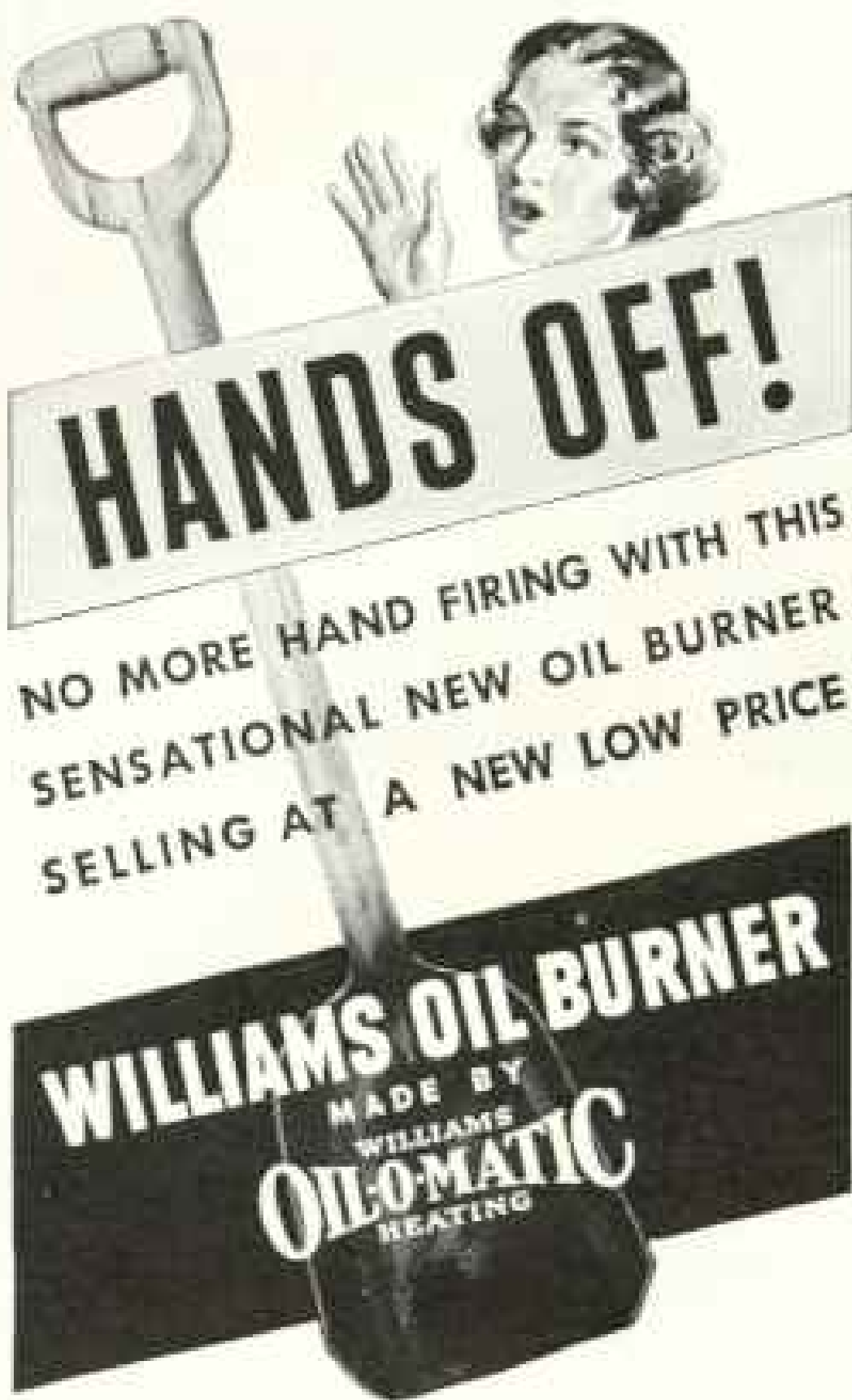
For that, give a good part of the credit to the "big fellow" and the long modern trains he pulls.

Here's a book that tells a story of interest to agriculture, industry, commerce and the average American. For your copy, write Association of American Railroads, Transportation Building, Washington, D. C.

ASSOCIATION OF  
**AMERICAN RAILROADS**

WASHINGTON, D. C.





**HANDS OFF!**  
 NO MORE HAND FIRING WITH THIS  
 SENSATIONAL NEW OIL BURNER  
 SELLING AT A NEW LOW PRICE

**WILLIAMS OIL BURNER**  
 MADE BY  
 WILLIAMS  
**OIL-O-MATIC**  
 HEATING

**D**O you want automatic oil heat in your home? Of course you do! For who wants to continue the drudgery of coal shoveling, ash hauling, grate shaking—or to endure the inefficiency of an old oil burner. You won't have to any more—for Oil-O-Matic now offers you the Williams Oil Burner—a great new product—selling far below any comparable burner. Engineers say it is a marvel.

Why wait? Here's oil heat at a price you can afford! See your Oil-O-Matic dealer today!

**BUILDERS ATTENTION!** *It will pay you to investigate this great oil burner. See it!*

**STUDY THESE GREAT FEATURES!**

- ★ Fully Automatic
- ★ High Pressure continuous spark—no radio interference
- ★ 1/10 h.p. motor—very low current consumption
- ★ Two-stage pump with automatic safety shut-off—uniform pressure—constant flame
- ★ Exclusive anti-carbon nozzle
- ★ Burns low cost No. 3 fuel oil
- ★ Silent as a whisper
- ★ Williams engineered throughout
- ★ Easy payments—12 to 36 months to pay

WILLIAMS OIL-O-MATIC HEATING CORP.  
 Dept. 385, Bloomington, Ill.  
 Please send full facts about your amazingly low priced Williams Oil Burner.

Name.....  
 Address.....  
 City..... State.....



● Fast air-conditioned Streamliner service... only 39¾ hours between Chicago and the Pacific Coast. Five "sailings" each month, each way.

*The Streamliners*

- CITY OF LOS ANGELES
- CITY OF SAN FRANCISCO
- CITY OF PORTLAND

And overnight, every night service between Chicago and Denver on the twin Streamliners "CITY OF DENVER."

**THE FORTY-NINER**

New fast air-conditioned all-Pullman steam train of streamlined design... unique Observation-Lounge... bedroom car with "transverse" beds. Registered Nurse-Stewardess. Five departures each month, each way, Chicago-San Francisco. Extra fare.



Also splendid steam trains providing air-conditioned daily service between Chicago and West Coast.

- LOS ANGELES LIMITED
- SAN FRANCISCO-OVERLAND LIMITED
- THE PORTLAND ROSE
- PACIFIC LIMITED

And, in addition, there is the famous CHALLENGER, Coach and Challenger Sleeping Car train in daily service between Chicago and Los Angeles. Registered Nurse-Stewardess service... low cost meals... and other economical travel innovations.



W. S. BASKING  
 Passenger Traffic Manager  
 Room 551, Union Pacific Railroad  
 Omaha, Neb.





# "YES, DADDY'S SAFE IN BED, TOO!"



IN countless homes, tonight, there are tender thoughts for husbands and fathers away on business. Most of these men travel by Pullman. Because of this, there is the same gratifying sense of security among the loved ones at home as these travelers themselves feel in the snug comfort of their Pullman beds. For they are using the *safest* transportation in the world! There has been not a single fatality—passenger or employe—in a Pullman car in nearly three years! ☞ When you consider that life is not too long, its comforts not too numerous,

its pace frequently wearisome, it is only plain thinking that leads a man to go by Pullman. Clean—Cool—Quiet—Comfortable—here is ease and relaxation, a saving of business time by travel at night, and beyond even these—safety and dependability that banish worry at home. ☞ The cost of Pullman accommodations—which are available throughout the United States and on various lines in Canada and Mexico—is but a fraction of the total fare. Ask your ticket agent for full information, or write THE PULLMAN COMPANY, CHICAGO

Pullman and Rail—The safe way to go and the sure way to get there





## The battery with 9 lives

"Hard to kill as a cat!"

"Like a cat—they always come back!"

That's what motorists say about Prest-O-Lite Batteries.

So we say "the battery with nine lives".

—and these days you need them all.

Starters must start, radios must play, heaters must heat, lights must light—and a dozen other accessories that depend on the battery must work.

So we've made Prest-O-Lite extra big, extra strong, extra long-lived.

For instance, the new Prest-O-Lite HiLevel has a reserve water capacity four times that of normal—far less chance of battery failure due to water. In normal service

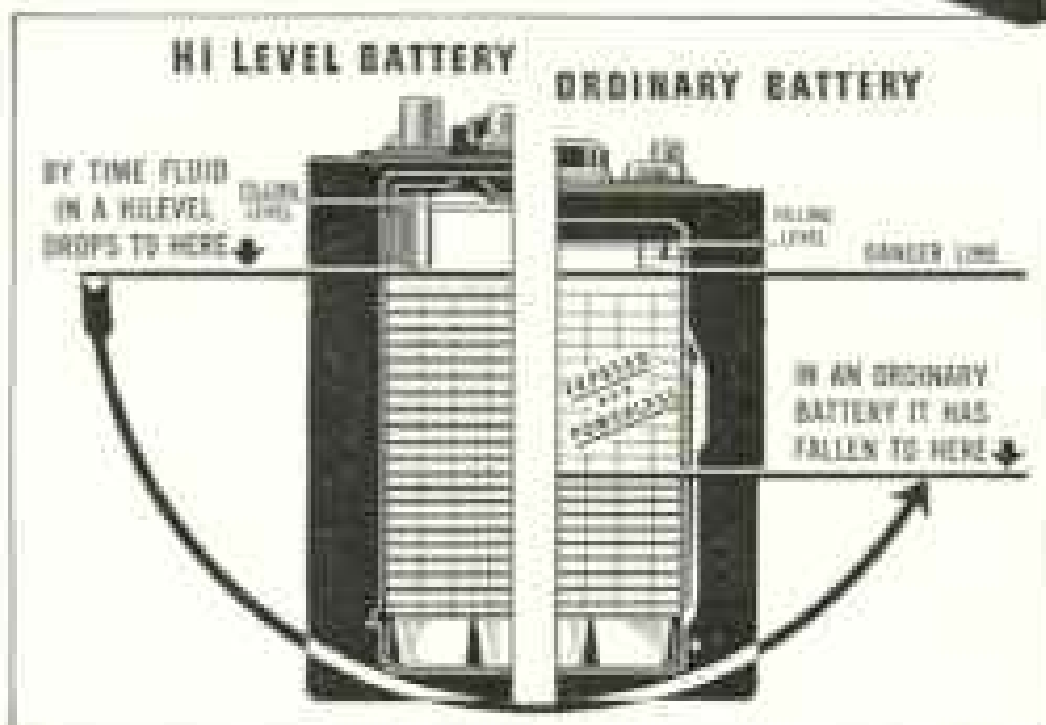
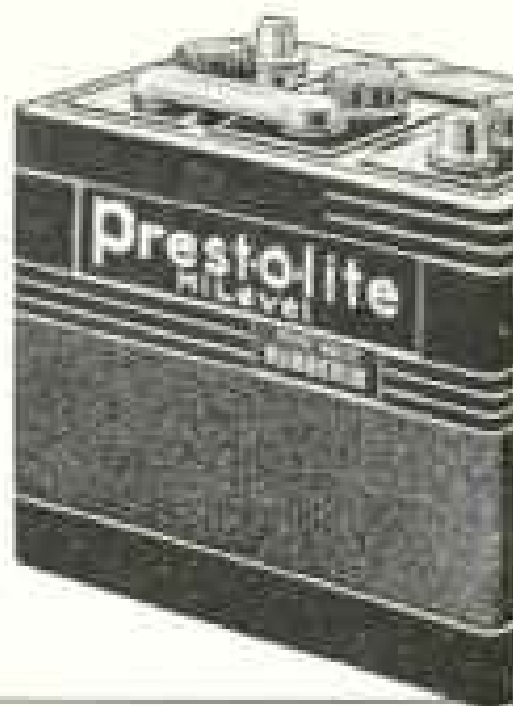
you fill your HiLevel only three times a year! (See diagram below).

That, motorists, is a Battery! All sizes—to fit any car or budget.

See your dealer soon.

—you'll be sure you're right if it's Prest-O-Lite.

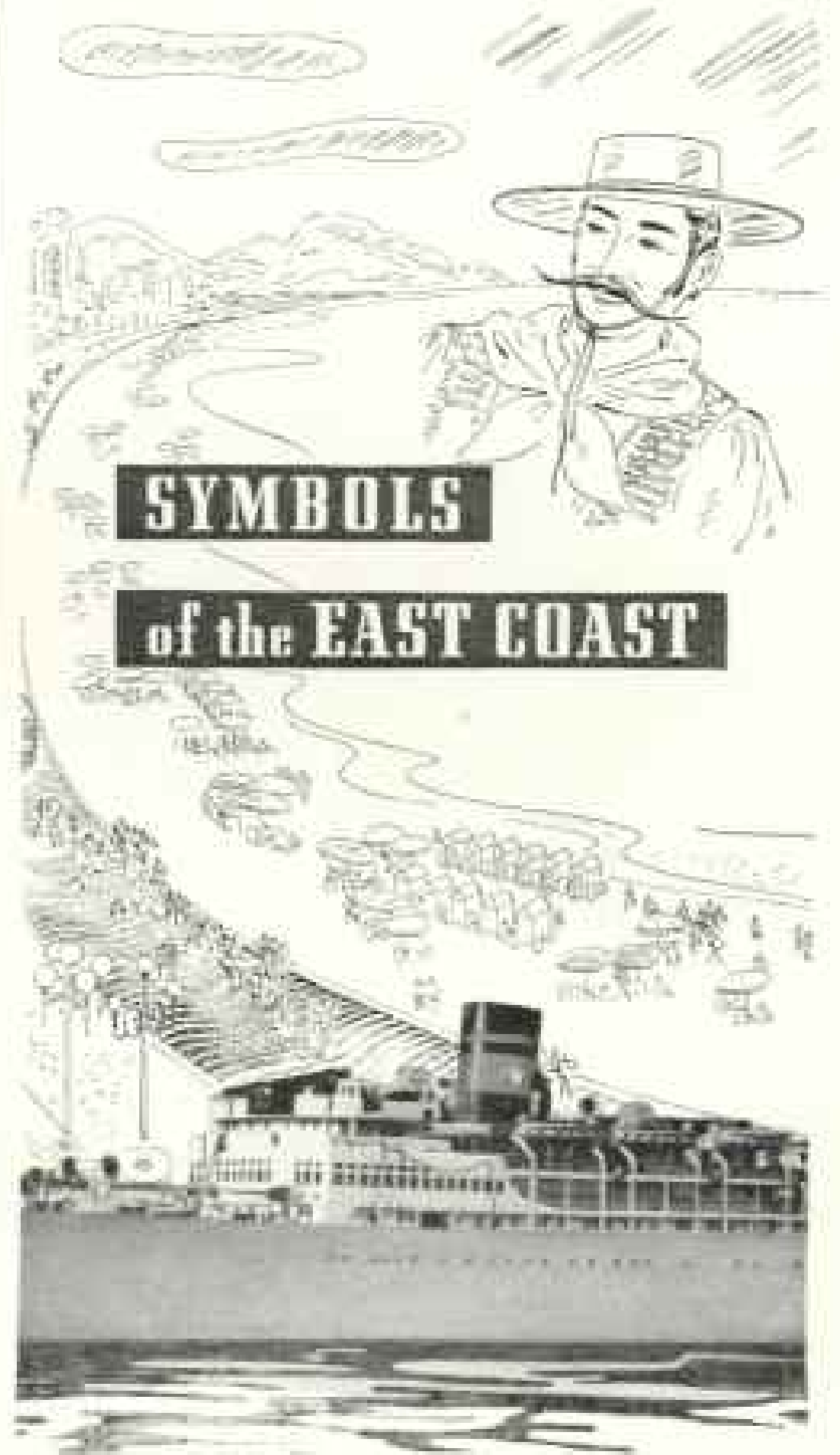
Prest-O-Lite Battery Co., Inc., Indianapolis, Ind.—Oakland, Calif.—Toronto, Can.



# Presto-lite

—built to stand the strain of modern battery drain

"Mention the Geographic—It identifies you."



THE gaucho from the pampas . . . and the famous beach at Uruguay's play-city, Montevideo . . . equally are symbolic of a South American world that is both Old and New. A world that combines the sparkle of Paris with the primitive, vivid color of W. H. Hudson's own "purple land" and "green mansions". Jungle and jockey-club stand within a few hours of each other in this region of amazing contrasts!

Symbolic also is the fleur-de-lis on the Furness Prince funnel. Another cogent reason for choosing the East Coast trip when you visit South America! These brilliant, able, "well-mannered" motorships . . . Southern Prince, Northern Prince, Eastern Prince, Western Prince . . . embody the grace and courtesy, as well as the seamanship, of British marine traditions en route to Rio de Janeiro, Santos, Montevideo, and Buenos Aires.

Sailings every fortnight from New York, with call at Trinidad on return voyage. Reservations and literature at AUTHORIZED TOURIST AGENTS or Furness Prince Line, 31 Whitehall Street, or 634 Fifth Avenue, New York City. Phone BOuling Green 9-7600.

**FURNESS Prince LINE**

*Leads the way to*

**SOUTH AMERICA**

# "IT HAS BROUGHT US AN INSPIRING ADVENTURE IN MUSIC—AND IN LIVING"



LEEDS MITCHELL,  
2340 N. Lakeview  
Avenue, Chicago. No  
organist and, in his  
own words, "not  
much of a pianist,"  
Mr. Mitchell pur-  
chased his Hammond  
Organ in November,  
1935. "It has brought  
me," he says, "a  
richer musical expe-  
rience than I had  
thought possible."



## A concert organ at the price of a fine piano

"NOTHING we have ever owned has given us so much pleasure," writes Leeds Mitchell.

"Our Hammond Organ has brought us a really inspiring adventure in music—and in living, too."

Like many others, Mr. Mitchell has found in the Hammond Organ a fascinating musical experience. To those who play the piano even a little, it offers wholly new opportunities for self-expression—rich new fields of music to explore.

Strings, wood winds, reeds, diapasons—what new loveliness the voices of the organ give to familiar melodies! And today, the full beauty of these tones can be yours, in your own home!

Occupying only a four-foot square,

costing no more than a fine piano, the Hammond provides the exquisite musical range of the concert organ. This remarkable instrument has captivated the world of music, roused the enthusiasm of great artists and composers.

You are invited to give yourself a musical adventure! To hear the Hammond demonstrated, to learn how easily it can be played by anyone with knowledge of the piano, visit one of our dealers. Each one is the leading musical merchant of his community. See your classified directory—or write to The Hammond Organ, 2959 N. Western Avenue, Chicago. In Canada, address Northern Electric Co., Ltd., Montreal.



### FITS IN A FOUR-FOOT SQUARE

Embodying a wholly new principle of organ design, the Hammond originates exquisite organ tones by electrical impulses instead of by pipes or reeds. Easily carried by two men, the Hammond Organ fits into any living room. It is ready to play when connected to an ordinary electric outlet. Maintenance cost is negligible; the Hammond positively cannot get out of tune.



Over 1000 churches  
use the Hammond Organ  
... It is an appropriate  
donation for your church

THE HAMMOND ORGAN \$1250 and up f. o. b. Chicago—slightly higher for large installations

THE HAMMOND IS THE LARGEST-SELLING ORGAN IN THE WORLD

# ITALY



*Where the  
Monuments  
of the Past  
Harmonize with the  
Realization of Modern Times*



In **ROME**, from October, will take place the magnificent **CELEBRATIONS** of the **AUGUSTUS BI-MILLENNIAL**.

Winter and Spring are twins in colorful **NAPLES** and sunradiant **SICILY**. Italy's world-renowned **Art-Cities**, the Smiling Lakes, the Ligurian Riviera offer unforgettable sojourns.

**TOURIST CHECKS AND LETTERS OF CREDIT**

on sale at all

**BANKS AND TRAVEL AGENCIES**

**100 Lire for \$4.75**

**HOTEL AND GASOLINE COUPONS**

**50% to 70% RAILROAD REDUCTIONS**

For Information Apply to

**ITALIAN TOURIST INFORMATION OFFICE**

NEW YORK: Palazzo d'Italia, 626 Fifth Avenue

CHICAGO: 333 North Michigan Avenue

SAN FRANCISCO: 604 Montgomery Street



HOW MANY  
WORLD PORTS  
ARE SERVED BY SHIPS  
FLYING THE ITALIAN FLAG?

*THE ANSWER  
WILL AMAZE YOU!*

**S**TAND before a globe . . . search out the world ports that seem most glamorous, most remote. And even as you trace them on the map, an Italian ship is at the same moment approaching the harbor of—Shanghai, for example—Alexandria—Bombay—Capetown—to mention but a few of the 223 ports served by Italian ships.

Egypt, India, the Orient, the Near East—as well as Australia, South Africa, and the Americas—know and welcome regu-

larly the red, white and green flag of the Italian Marine.

Travelers recognize the superlative seamanship, service and cuisine that the tricolor represents on vessels of the Italian Line, *Lloyd Triestino*, *Adriatica* and *Tirrenia*. And they applaud the speed of the efficient, connecting Italian services that make the voyage from New York to Capetown as short as 19 days . . . Bombay, 16 days . . . Egypt, 9 days . . . Beirut or Haifa, 12 days!

*The leading **TRAVEL AGENTS** in your city are our representatives. Consult them freely—their services are gratis. Or apply 624 Fifth Avenue, New York City or to our nearest office: Philadelphia, Boston, Cleveland, Chicago, San Francisco, Los Angeles, New Orleans, Montreal, Toronto.*



**ITALIAN LINE**

You ask for NEW scenes . . .  
dazzling Autumn color?

*Arkansas*  
HAS ALL THE  
*Answers*



An Ozark Panorama near Mt. Gaylar, on U. S. 71

**I**N HER Ozarks . . . a riot of red and gold; in her prehistoric Ouachitas, mysterious in purple haze; varied with fun galore in this new-found playground region, awaiting your eager coming over Arkansas's modern highways.

Up in this mountain area are crystal streams, wilderness waterfalls, gravel beaches, forest bridle trails, good golf, picnic glens, lofty peaks to climb; storied caverns, Albert Pike Museum with its marvelous glass, Buck Saunder's Firearms Collection, finest in America.

Down delta-way behind Old Man River's levee, see beautiful Lake Chicot . . . fish for bass and crappie . . . drive through cotton plantations . . . hear Negro spirituals . . . trek primeval forests. Then up the hills again to Hot Springs National Park, where thousands bathe to health; only Spa in America with curative waters owned and recommended by Uncle Sam.

With these and many more, Arkansas answers your yearning for new highway adventures . . . for places you've never seen . . . providing stop-over comfort at prices to suit your purse. So, to plan exciting thrills . . . *the vacation life of your life*—just sign and mail this coupon for our irresistible FREE folder. It's a pictured invitation you can't afford to miss.

FREE Folder



\*\*\*\*\*MAIL COUPON TODAY\*\*\*\*\*

ARKANSAS CENTENNIAL, Travel Dept. GS, Little Rock, Ark.  
Please send FREE illustrated FOLDER describing Arkansas.

Name \_\_\_\_\_

Address \_\_\_\_\_

Catch your subject  
unawares



Contax is no larger than your hand, but it holds a world of possibilities in picture-taking. Catches subjects unawares. No lengthy manipulations. Range-finder focuses lens automatically, producing negatives with life-like detail. Film transports automatically; you rapidly shoot one picture after another before your subject "escapes." Choice of 14 interchangeable Zeiss lenses. Sold by leading dealers. Write for Contax Booklet.

**Contax** CANDID  
CAMERA

CARL ZEISS, INC., Dept. CT-2-9, 485 Fifth Ave., New York  
728 So. Hill Street, Los Angeles

**Featherweight ZEISS Binoculars**

## How Can a Family Man Retire?

You can protect your family and still provide a retirement income for yourself with the John Hancock Selective Security plan. Many family men are using this contract to do these two jobs at once. Send the coupon for details.

*John Hancock*  
LIFE INSURANCE COMPANY  
OF BOSTON, MASSACHUSETTS

Department N9, 197 Clarendon Street, Boston, Mass.

Please send me your booklet describing the  
"Selective Security Policy."

Name \_\_\_\_\_

Street and No. \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_



**"READY FOR SCHOOL"  
This Government Plan is  
a Practical Way to Meet  
Expenses when he is  
READY FOR COLLEGE**

Financing of your children's college days is comparatively easy if you begin while they are young. The Regular Purchase Plan of United States Savings Bonds offers a safe and convenient way to add 33 1/3% to the funds you can set aside out of current income for this purpose.

For example—if the parents of an eight-year old boy invest \$75 each month in Savings Bonds for a period of 4 years, beginning when he is eighteen and ready for college, they will receive a Government check each month for \$100 during the usual 4-year course. Other parents are investing \$3,000 in Savings Bonds now and will have \$4,000 in ten years.

The Regular Purchase Plan applies equally well to savings for: RETIREMENT; CASH ESTATE; CARE OF DEPENDENTS; TRAVEL AND RECREATION.

You may start today by selecting the bonds that fit your income from coupon below.

# UNITED STATES SAVINGS BONDS

DIRECT OBLIGATIONS OF THE UNITED STATES GOVERNMENT

## HOW TO SAVE SYSTEMATICALLY

To provide funds for the future, select the program best suited to your needs, then buy a bond each month.

If you invest each consecutive month any specific amount shown below

Beginning in 10 years you will receive each month thereafter for as many consecutive months

<b>\$18.75</b> . . . . .	<b>\$25.00</b>
<b>\$37.50</b> . . . . .	<b>\$50.00</b>
<b>\$75.00</b> . . . . .	<b>\$100.00</b>
<b>\$93.75</b> . . . . .	<b>\$125.00</b>
<b>\$187.50</b> . . . . .	<b>\$250.00</b>
<b>\$375.00</b> . . . . .	<b>\$500.00</b>

Savings Bonds are sold on a discount basis. They mature in 10 years from issue date for 1/3 more than their purchase price. They may be redeemed for fixed cash values by the owner at any time after sixty days from issue date.

— FOR SALE AT POST OFFICES AND DIRECT BY MAIL —

## TO ORDER BY MAIL

TREASURER OF THE UNITED STATES, N-09, Washington, D. C.

- Please send me without obligation your Regular Purchase Plan and forms for my consideration and optional use.
- Send me the following bonds for which I enclose check, draft, or money order.

NUMBER		
.....	\$25 U. S. Savings Bonds at	\$18.75 \$ .....
.....	\$50 U. S. Savings Bonds at	\$37.50 \$ .....
.....	\$100 U. S. Savings Bonds at	\$75.00 \$ .....
.....	\$500 U. S. Savings Bonds at	\$375.00 \$ .....
.....	\$1000 U. S. Savings Bonds at	\$750.00 \$ .....
		<b>Total \$</b> .....

It is understood that not more than \$10,000 (tentative value of these bonds listed during each calendar year) (Jan. 1 to Dec. 31) may be held by any one person.

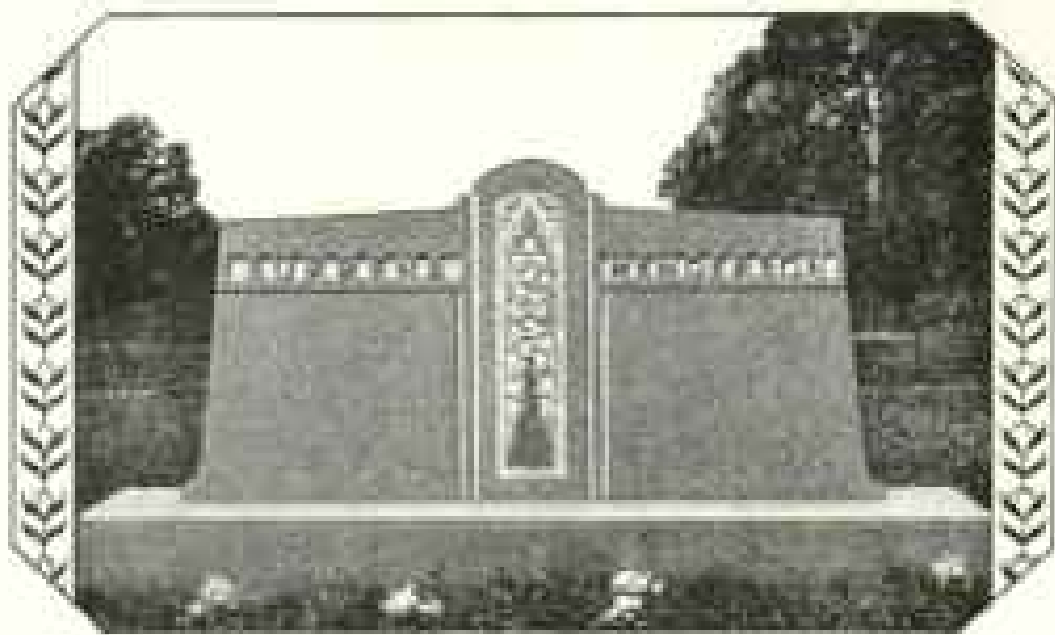
Register in the name of and send to

{ Name (Mr. or Mrs.) Street address City State	_____
	_____
	_____

Make all remittances payable to Treasurer of the United States

# LIKE A FRIEND *that never fails*

Just as the test of friendship is its constancy, so the measure of memorial values is the capacity to bear a message of love and respect, unmarred through the ages.



Rock of Ages Memorials set unusual standards of perfection. Their grace of line and beauty of material and finish assure a LIVING EXPRESSION of the noble sentiments that inspired their creation.

To be certain that your memorial will forever stand with dignity and enhance its cemetery environment, be sure that it bears the famous Rock of Ages carved seal. This proclaims that the material is genuine, even textured blue-gray Rock of Ages Granite; that designs are authentic and dignified; that exclusive finishing processes have contributed to its permanence and beauty. In addition, every memorial so marked carries the maker's Certificate of Everlasting Guarantee, BONDED BY NATIONAL SURETY CORPORATION. Rock of Ages Memorials are sold only by authorized dealers.

## ROCK OF AGES CORPORATION



Dept. D-9, Barre, Vermont

For your protection *EVERY* ROCK OF AGES MEMORIAL BEARS THIS SEAL etched in the stone.

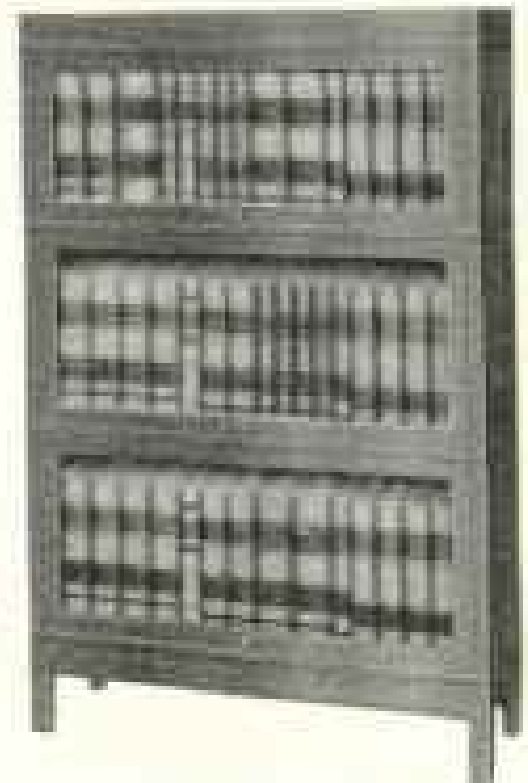
# ROCK OF AGES MEMORIALS

## These Sectional Bookcases Grow As Your Library Grows

These attractive sectional bookcases for home and office are always in good taste. They are carefully designed and finished to harmonize with other furniture . . . protect books from dust and damage . . . permit expansion to meet individual needs.

Select glass doors cushioned with felt lift out and glide over tops of books out of sight. Sections hold about 25 books of average size. Available in several distinctive styles and finishes.

Sold by leading furniture, office equipment and department stores. Dealers are invited to write for catalog and prices.



**Universal Bookcase**  
Strongly built, inexpensive and serviceable. Inside dimensions of book section 32" wide; 10" deep, 9", 11" and 13" high.

**The Globe-Wernicke Co.**  
CINCINNATI



## The YEAR 'ROUND Travel Bargain

This American One Class line gives you more solid travel comfort for your travel dollars—the year 'round. Staterooms are larger than ordinary, all outside on upper decks. All have hot and cold running water, 60% have private baths. Spaciousness and spotless cleanliness everywhere. Fine food, varied menus, and faultless service.

RATE AS SHOWN Weekly Sailings to and from Europe  
**\$105** Weekly from Baltimore or Norfolk to Hamburg and  
ONE WAY London. To Havre alternate weeks enroute. Returning  
**\$200** via Havre or Southampton. See your travel agent, United  
ROUND TRIP States Lines Office or write Passenger Agent, Baltimore

## BALTIMORE MAIL LINE

"Mention the Geographic—It identifies you."



*It's always good going*

on **GOODYEARS**



—BECAUSE **CENTER TRACTION** MEANS SAFETY!

**A**LL roads will be happy roads if you ride on Goodyear Tires. They'll be safe roads, in fair weather or foul, because Goodyears give you the matchless protection of traction in the **CENTER** of the tread!

That is where you need it most—the one place tires must have *grip*. Look what Goodyear builds there—sturdy, deep-cut, sharp-edged diamonds that “bite” and hold on any surface, resist skidding in any direction. *More than 8,000 tests prove this Goodyear center-grip will stop your car quickest!*

All Goodyear Tires, irrespective of price class, give you this skid-defying, quick-stopping margin of safety—because all Goodyears are built to protect our good name. Maintenance records prove that *the cheapest thing on your car is the best tires you can buy*—so buy Goodyears, the world's first-choice for 22 consecutive years.



**MORE PEOPLE RIDE ON GOODYEAR TIRES THAN ON ANY OTHER KIND**



# The National Geographic Directory of Colleges, Schools and Camps



## Girls' Schools

### THE ANNA HEAD SCHOOL

Est. 1897. Accredited College-preparatory and Lower School. Swimming, hockey, riding, tennis, the year-round. Comfortable home and garden in college town. Address **Mary E. Wilson, M.L., L.H.D., Prin., 2540 Channing Way, Berkeley, California.**

**ARLINGTON HALL** JUNIOR COLLEGE and 4-year high school. Strong Academic work. Excellent Music and other Dept. Virginia hills, 15 minutes from White House. Modern buildings, 100-acre wooded campus. All sports—color riding stables. **Carrie N. Sutherland, M.A., Pres., Washington, D. C.**

**BIRMINGHAM** For Girls. Beautifully located in Central Pa. mountains. Accredited college preparation, general courses. Art, music, secretarial. Educational trips, 200 acres for skiing, hockey, tennis, Riding. Gym, pool, 8th year. Catalog. **T. C. Grier, Director, Box 49, Birmingham, Pa.**

**THE BISHOP'S SCHOOL** FOR GIRLS Episcopal. Resident and Day School. Prepares for Eastern and Western Colleges. Intermediate grades. Modern equipment. Art, Music, Dramatics, Outdoor sports. **Caroline S. Cummins, M.A., Vaesser, Headmistress, Box 40, La Jolla, Calif.**

**EDGEWOOD PARK** For young women. College preparatory, advanced courses in liberal and fine arts, secretarial sciences, medical assist., home ec., speech arts, Journalism. All sports—riding. Pool, lake, golf course. Moderate rates. Catalog. **Box N, Briarcliff Manor, N. Y.**

**THE ERSKINE SCHOOL** JUNIOR COLLEGE Courses for Advanced Students. **Miss Euphemia E. McClintock, Director, 111-D Beacon Street, Boston, Mass.**

**HOWARD SEMINARY** Near Boston. 42nd Year. Accredited college preparation. Includes religion. General courses. Junior College. Home ec., secretarial, music, art, dramatics. Sports. Moderate rates. **Miriam Emerson Peters, Headmistress, Box 6, West Bridgewater, Mass.**

**KINGSWOOD—CRANBROOK** GRADES 7-12 post-graduates. College preparatory and general courses. 80 acres on lake near Detroit. Unusual opportunities in arts, handicrafts, sciences. Music, dramatics, sports. **Secretary, 156 Cranbrook Road, Bloomfield Hills, Mich.**

**Lasell JUNIOR COLLEGE** For young women. Ten miles from Boston. Two-year courses for high school graduates. Academic, Home Economics, Secretarial, Merchandising, Art, Music, Expression courses. College preparatory. All sports—riding. Gymnasium, swimming pool, 80 acres. Delightful home life. Catalog. **Guy M. Winslow, Ph.D., President, 123 Woodland Road, Auburndale, Mass.**

**LINDEN HALL** Junior College and School for Girls. Cultural and Vocational. Music, Home Economics, Secretarial Studies. Fine and Commercial Art. Interesting Activities. All sports. Preparatory and General Courses. Beautiful Campus. Riding, Swimming Pool. Moderate Tuition. **F. W. Stengel, D.D., Box 69, Little, Pa.**

**OGONTZ SCHOOL** Junior College courses transferring to various colleges, universities. Through college preparatory, general, elective courses. Secretarial, home-making, dramatics, music, art. Bydal Hall, separate Junior School. **Abby A. Sutherland, Ogontz School P. O., Pa.**

**PENN HALL JR. COLLEGE** ACCREDITED 2-yr. College; 4-yr. Prep. (Girls) School. Part of May at Ocean City. Music, Art, Drama, Home Ec., Lat. Dec., Costume Design, Int. Journalism, Secretarial, Cosmetics, baths. Sports. Riding. Catalog.—**Box W, Chambersburg, Pa.**

**WARRENTON COUNTRY SCHOOL** NEAR Wash- ington. College preparatory, military courses. French the language of the house. Teaches girls how to study, brings them nearer nature, inculcates ideas of order and economy. Mile. **Loa M. Bouffigny, Box N, Warrenton, Va.**

## Colleges for Women

**MARYLAND COLLEGE FOR WOMEN** BACCALAUREUS degrees, certificates. Home Economics, Music, Kindergarten Training, Speech, Secretarial, Fine Arts. Pleasant social life. Sports. Riding. Near Baltimore. Write for Catalog. **Box N, Luthersville, Maryland.**

## Home Study COURSE

### CALVERT SCHOOL

Oversees your child's superior education from Kindergarten to High School. If your child is not near a good school . . . must make up lost time . . . requires individual attention . . . must travel with you . . . not progress faster than his school group . . . He needs Calvert School Home Instruction Courses. Write today for the new Calvert Catalog. See how school has been made easier and happier for more than 50,000 children. **Calvert School Mrs. G. S. Rhoads, Dir. of Home Instruction, 39E Tuscony Road, Baltimore, Md.**

## Vocational

**ALVIENE SCHOOL OF THE THEATRE** 2nd Year. Graduates—Fred Astaire, Lee Tracy, Uva Merkel, Peggy Shannon, Zita Johann, etc. Stage, Screen, Radio. Stock Theatre training. Appearance, N. Y. Debata. Write See'y Landl for Catalog. **68 West 85th St., New York.**

**AMERICAN ACADEMY OF DRAMATIC ARTS** Founded 1911 by Franklin H. Sargent. The foremost institution for dramatic training. **FALL TERM BEGINS OCTOBER 26** Catalog from Secretary, Room 211 Carnegie Hall, New York.

**Miss CONKLIN'S SECRETARIAL SCHOOL** FOUNDED 1896. Secretarial and Executive training. Students from leading Colleges and Schools. Midtown Location. Enrollment for September 14 and October 4. Request booklet. **105 West 40th St., New York.**

**KATHARINE GIBBS SCHOOL** SECRETARIAL. One and Two Year Courses. Special Courses for College Women. Residences in Boston and New York. Catalog. **Assistant Dean, Boston, 90 Marlborough St.; New York, 230 Park Ave.; Providence, 155 Angell St.**

**INSTITUTE OF MUSICAL ART OF THE JULLIARD SCHOOL OF MUSIC** ROBERT HITCHCOCK, Pres.; DANIEL WAGNER, Dean. All branches of music. For students of ability and serious purpose. Catalog. **120 Claremont Ave., New York, N. Y.**

**LEWIS HOTEL TRAINING SCHOOLS** COME to Wash- ington. Qualify in 4 months for well-paid hotel position. Placement Service free of extra charge. New day classes start Oct., Jan. Catalog Free. **Lewis Hotel Training Schools, Div. RPR-1199, Washington, D. C.**

**NATIONAL COLLEGE OF EDUCATION** 1st Year. Young woman educated for teaching in Nursery School, Kindergarten and Elementary Grades. Dormitory. Athletics. Fall term begins Sept. 10. Write! **Edna Dean Baker, Box 72-L, Evanston, Ill.**

**NEW YORK INSTITUTE OF PHOTOGRAPHY** COMMERCIAL, News, Portrait, or Motion Picture Photography. Instruction by noted experts. Personal Attendance or Home Study. Free Booklet. **10 West 33 St. (Dept. 44) New York City.**

**SARGENT COLLEGE OF PHYSICAL EDUCATION** (Physical Therapy) of Boston University. 5th year. 4 years high school required. 4-year course leads to B. S. in Physical Education. Unusual camp instruction. Ask for Catalog. **Ernest Hermann, Dean, 50 Everett St., Cambridge, Mass.**

## Boys' Schools

**ADMIRAL FARRAGUT** PREPARES for college and all Gov't academies. Accredited. **ACADEMY** Seamanship, navigation. Junior School. Moderate rates, no extras. Summer camp. **Rear Admiral S.S. Robison, U.S.N., Ret., Supt., Registrar, Box 1, Toms River, N. J.**

**AUGUSTA MILITARY ACADEMY** COLLEGE preparatory. Modern gym and pool. All sports. Troop of 20 riding and cavalry horses. 400 acres. Graduates in 42 colleges. 2nd year. Reasonable rates. Catalog. **Box 14, Col. T. J. Roller or Maj. C. S. Roller, Jr., Fort Defiance, Va.**

**BLACK FOXE MILITARY INSTITUTE** CALIFORNIA'S outstanding school. Fully accredited. All grades from primary through high school. Small classes, personal instruction. New, complete bldg. All sports under expert coaches. Horsemanship, polo. Catalog. Address **640 No. Wilcox, Los Angeles.**

**BLAIR ACADEMY** EXCELLENT preparation for college. Small classes. Wide choice of sports and student activities. Golf course, Swimming pool. Careful health supervision. 60 miles from New York. Address **Charles H. Broad, Headmaster, Box 17, Blairstown, N. J.**

**THE BOLLES SCHOOL** ACCREDITED — prepares for College Boards or Government Academies. 8th to 12th Grades. Splendidly equipped fireproof buildings, on St. Johns River. Year-round athletics. Military or Naval training. For catalog address **Col. Roger D. Painter, Pres., Jacksonville, Fla.**

**BORDENTOWN MILITARY INSTITUTE** GRADUATES in 30 colleges. Individual attention. Able faculty. College Preparatory, Business, Junior School. Accredited. Summer School. Near Trenton. Founded 1882. Catalog. **Box 659, Bordentown, N. J.**

**CARSON LONG INSTITUTE** Boys' Military School. Educates the whole boy—physically, mentally, morally. How to learn, how to labor, how to live. Prepares for college or business. Character building supreme. Rates \$50.00. Write for catalog. **Box 21, New Bloomfield, Pa.**

**CRANBROOK SCHOOL** DISTINCTIVE endowed boys' school, grades 7-12 and postgraduate course. Music, arts, sciences, athletics, hobbies. Non-military. Single rooms. Near Detroit. For catalog, address **Registrar, 3250 Lone Pine Road, Bloomfield Hills, Michigan.**

**CULVER MILITARY ACADEMY** ON LAKE MAXINKUCKEE—develops the whole boy. Develops interests and aptitudes. Develops initiative and character. College preparatory and Junior College. 8th grade. Polo, boxing, swimming, golf, tennis. Catalog. **99 Pershing Lane, Culver, Ind.**

**FISHBURNE MILITARY SCHOOL** ACCREDITED preparation for colleges. West Point, eng schools. Business courses. Friendly able instructors. Cadet band, orchestra, social events. Outdoor sports year-round. Visitors welcome. 50 days. Catalog. **Col. M. H. Hudgins, Box N-1, Waynesboro, Va.**

**FORK UNION** Honor school. Small classes. Accredited. ROTC. Supervised study. Prepares for college or business. Junior school small boys. Home-mother. Athletics, Swimming. 40th year. Catalog. **Dr. J. J. Wicker, Fork Union Military Academy, Box 101, Fork Union, Va.**

**GREENBRIER MILITARY SCHOOL** 10th Year. Accredited. Preparation for College. Lower School. Modern fireproof building houses all activities. Near White Sulphur. Alt. 2900 feet. All sports. Summer camp. For catalog, write **Col. H. B. Moore, Box N, Lewisburg, W. Va.**

**HOWE SCHOOL** FIVE-COURSE school preparing for college. Exceptional faculty. Individual guidance. Sports. Military. Junior School. 5th year. Moderate rates. **Burrett B. Bouton, M.A., Supt., Ask for Catalog, 997 Academy Place, Howe, Ind.**

**THE HUN SCHOOLS: JUNIOR AND SENIOR** Seven co-operative curriculums from 5th grade to college entrance. Exceptional faculty. All sports. Separate campus for Junior School. **John G. Hun, Ph.D., Headmaster, 112 Stockton St., Princeton, N. J.**



# The National Geographic Directory of Colleges, Schools and Camps



## Boys' Schools

**LAKE FOREST** A NATIONAL college preparatory school for boys. Write for booklet on "The Richards Plan in Education," which is different, grips the boy's interest, is so intensive to hard work, gets unprecedented results. 9th Year. **John Wayne Richards, Hdrmr., Box N, Lake Forest, Ill.**

**MISSOURI MILITARY ACADEMY** 16 years. Inspires boy to best efforts by teaching him to study. R.O.T.C. Small classes. Prepares for college or business. Separate Junior school. Sports. Gymnasium. Write for catalog to **Col. C. R. Strubling, M. M. A., 169-C St., Mexico, Mo.**

**MOSES BROWN SCHOOL** Help and inspiration for each boy, a century-old tradition. Excellent college record. Secluded 20-acre campus. All studies. Pool. Lower School. Endowed. Moderate tuition. **L. Ralston Thomas, Headmaster, 279 Hope St., Providence, R. I.**

*You Are Cordially Invited  
To Visit the  
New York Military Academy  
where  
350 young gentlemen are educated and trained to become  
future leaders of America.  
For Catalog, address the Commandant  
CORNWALL-ON-HUDSON  
NEW YORK*

**OXFORD ACADEMY** PREPARATORY to leading colleges. Each student a class. Awake during faculties. Teaches study, concentration. Develops character, initiative. Horsemanship (Horse Hill). Also Lower School. Social life. Summer school. 27th year. **Dr. J. M. Weidberg, Box N-55, Pleasantville, N.J.**

## Boys' Schools

**PAGE MILITARY ACADEMY** A BIG SCHOOL for little boys. Famous both east and west. Every school activity suitable for little boys. Sympathetic care, modern equipment. Modified military training. Summer camp. Catalog. **Maj. R. A. Gibbs, 1251 Cochran Ave., Los Angeles, Calif.**

**PEDDIE** SPECIALIZES in preparing boys for college. 251 graduates in last five years have entered Harvard, Yale, Princeton, and similar colleges. 100 acres. 15 modern buildings. Junior school. All sports for all-golf. Summer session. 2nd year. Catalog. **Wilbur E. Saunders, Box 9-N, Hightstown, N. J.**

**RIVERSIDE** Nation's largest military preparatory school. Boys 10-20. Six months in Blue Ridge Mountains with winter session Hollywood, Florida; Golf course, swimming, tennis, ocean sports, aviation. Catalog. **Col. Sandy Beaver, Box N, Gainesville, Ga.**

**ST. JOHN'S MILITARY ACADEMY** FOR more than 20 years, St. John's has been training boys to make wise choices in life. Thorough instruction, plenty of good times. Accredited preparation for college. All sports. Catalog. **1397 DeKoven Hall, Delafield, Wis.**

**STAUNTON MILITARY ACADEMY** One of America's distinguished military schools. Prepares boys (15-25) for all colleges. Annapolis, West Point. Able faculty, excellent equipment. Junior School. Catalog. **Col. Emory J. Middear, Supt., Box D-9, Noble Sta., Staunton, Va.**

**TODD SCHOOL AND CAMP** For Boys 6 to 18. 6th Year. Accredited. Vitalized Individual College Preparation, and progressive Lower School. 5000. Swimming. Riding. Near Chicago. Teaches how-to-study. Catalog. **Roger Hill, Prin., Box G, Woodstock, Illinois.**

**WESTERN MILITARY ACADEMY** Jr.-Sr. High School. Accredited. 27th year. Group plan of instruction according to scholastic ability. Competitive athletics for all under unique plan. Modern building. For catalog and athletic folder, address **Col. R. L. Jackson, Pres., Box N-9, Alton, Ill.**

## Boys' Schools

### Gulf Coast Military Academy

Right on the Mississippi Gulf Coast. Genial sunshine, salt breezes. Healthful and invigorating climate. Up-to-date equipment, high-class faculty of college graduates. Graduates accredited Eastern Colleges. Athletics, water sports, outdoor activities every day. Military discipline. Junior Unit R. O. T. C. Non-Sectarian. Two departments—Junior, 5 to 14; Senior, 14 years and over. Open year round. Member Association Military Colleges and Schools of U. S. Write for catalog. **GULF COAST MILITARY ACADEMY, ROUTE 10, GULFPORT, MISS.**

*Send Us the Boy and We  
Will Return You the MAN*

"Mention the Geographic—  
It identifies you."

THIS MAGAZINE IS FROM OUR PRESSES

**JUDD & DETWEILER, INC.**  
Master Printers

ECKINGTON PLACE AND FLORIDA AVENUE

WASHINGTON, D. C.

## The Hodgson Camp Cottage . . .

### A PUT-UP JOB THAT STAYS UP!



Practically everything is done for you, before you receive your Hodgson Camp Cottage! Windows and doors are in place. Joints are carefully carpentered. There is no roofing material to lay. You place the sections together and draw them tight with the special Hodgson bolts. Your cottage will stand sturdy and comfortable for generations to come! Easily enlarged at any time.

All Hodgson hardware is rustless. Interiors are lined for beauty and warmth. Cylced-cedar exterior wards off weather and rot. Wind-proof . . . rain-proof . . . snow-proof. \$185 up. Visit our complete exhibits in New York or Boston. Or write for new Catalog GN-81, which also shows year-round homes, garden equipment, kennels, etc. **E. F. Hodgson Co., 1108 Commonwealth Ave., Boston, Mass.; 730 Fifth Ave., New York City.**

● Send today for this FREE book



MISSISSIPPI



• **NATURAL RESOURCES**—

Abundant pure water, minerals, clays, pulpwood, hardwoods, and scores of products of sea and soil essential to varied and aggressive industry.

• **LABOR**—

Friendly, abundant and 99.6 per cent native born, ready to supply industry the type of employees that fair employers need and want.

• **NEW LEGISLATION**—

Enacted to assist, in a co-operative, helpful way, the balancing of agriculture with industry.

• **FRIENDLY COMMUNITIES**—

That look forward with civic pride to an opportunity to assist sound companies seeking new locations.



**Write Today for Your Copy**

of this illustrated booklet, "Mississippi, a Land of Industrial Opportunity." Within its pages you will find the first authentic summary of industrial Mississippi.

**Mississippi Industrial Commission**

A DEPARTMENT OF THE STATE OF MISSISSIPPI  
JACKSON, MISSISSIPPI

**MISSISSIPPI** THE GREAT INDUSTRIAL STATE **INDUSTRIALLY**  
— GOING TO TOWN —



128 Day

**Empress-Britain WORLD CRUISE**

FROM NEW YORK  
JANUARY 8, 1938

The world . . . the *whole* world . . . as you've always wanted to see it . . . Mediterranean ports, Palestine, Egypt, India and the Far East! 108 places . . . 57 days in port. It's the supreme travel experience.

Fares as low as \$2300 (\$18 per day) including exceptional shore programme. See YOUR TRAVEL AGENT or Canadian Pacific: New York, Chicago, Philadelphia, San Francisco, Montreal and 36 other cities in the U. S. and Canada.

*Canadian Pacific*

INDIA



*The Jewelled Wonderland*

Come to this land of jewelled gardens and alabaster temples. Visit the beautiful Vale of Kashmir . . . live in your own houseboat . . . golf, fish and enjoy the glorious climate. First Class travel on the luxurious India Railways System is lower in cost than almost anywhere else in the world. Travel literature, itineraries and details, also information regarding freight, rates and commerce from V. L. Dean, *Resident Manager*, India State Railways Bureau, 38 East 57th Street, New York. Telephone: PLaza 3-5481.

Or consult your travel agent.

"Mention the Geographic—It identifies you."

# The Seeing Eye



## "FREEDOM AND A FRIEND!"

*Guided by the watchful eye and faithful care of dogs trained by The Seeing Eye organization in Morristown, N. J., many blind men and women are today going about freely and safely.*

**M**OST blind persons say the world is kind. Everyone with whom they come in contact wants to help, but only a few of the sightless men and women in this country are able to have Seeing Eye dogs.

Too many people take their own "seeing eyes" for granted. They fail to realize that neglect may lead to blindness. It is estimated that the eyesight of more than half of the 114,000 blind persons in the United States could have been saved by modern medical science had steps been taken in time. Much of the trouble is due to neglect of the eyes during infancy and early childhood. Surely this knowledge should prompt everyone—especially parents—to guard against the tragic waste of human sight.

What are the causes and what are the symptoms of imperfect eyesight?

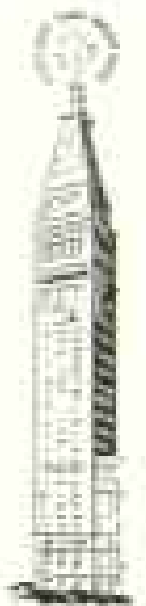
Nearsightedness, farsightedness and astigmatism are the most common causes of eye trouble, which usually can be corrected by glasses. Diseases of the eye, involving permanent impairment of vision, are extremely serious. Sometimes they are the result of unsuspected kidney disease, diabetes or syphilis, and if untreated may eventually lead to blindness. Expert medical care is essential.

Common symptoms of eyestrain may be "diminishing vision," severe, recurring headache, insomnia or dizziness. People may fail to realize the damage done to the eyes by carelessly straining them in dim light. It is harmful to read in bed unless the head and shoulders are propped up, the page well lighted and held below the line of vision. Never use eyewashes, ointments, salves or other remedies unless advised by an eye specialist.

As people grow older there is a gradual lessening of elasticity in the lens of the eye. The muscle does not work as freely as it did formerly. It becomes more and more difficult to read and see close work clearly without corrective glasses.

Testing the eyesight of school children is required by law in most States, but no law compels adults to have their eyes examined regularly. Every grown person should see an eyesight specialist at least once in two years, if he or she would continue to enjoy the blessing of good vision.

We shall be glad to send you, free, the Metropolitan booklet "Care of the Eyes." Simply address Booklet Department 937-N.



## METROPOLITAN LIFE INSURANCE COMPANY

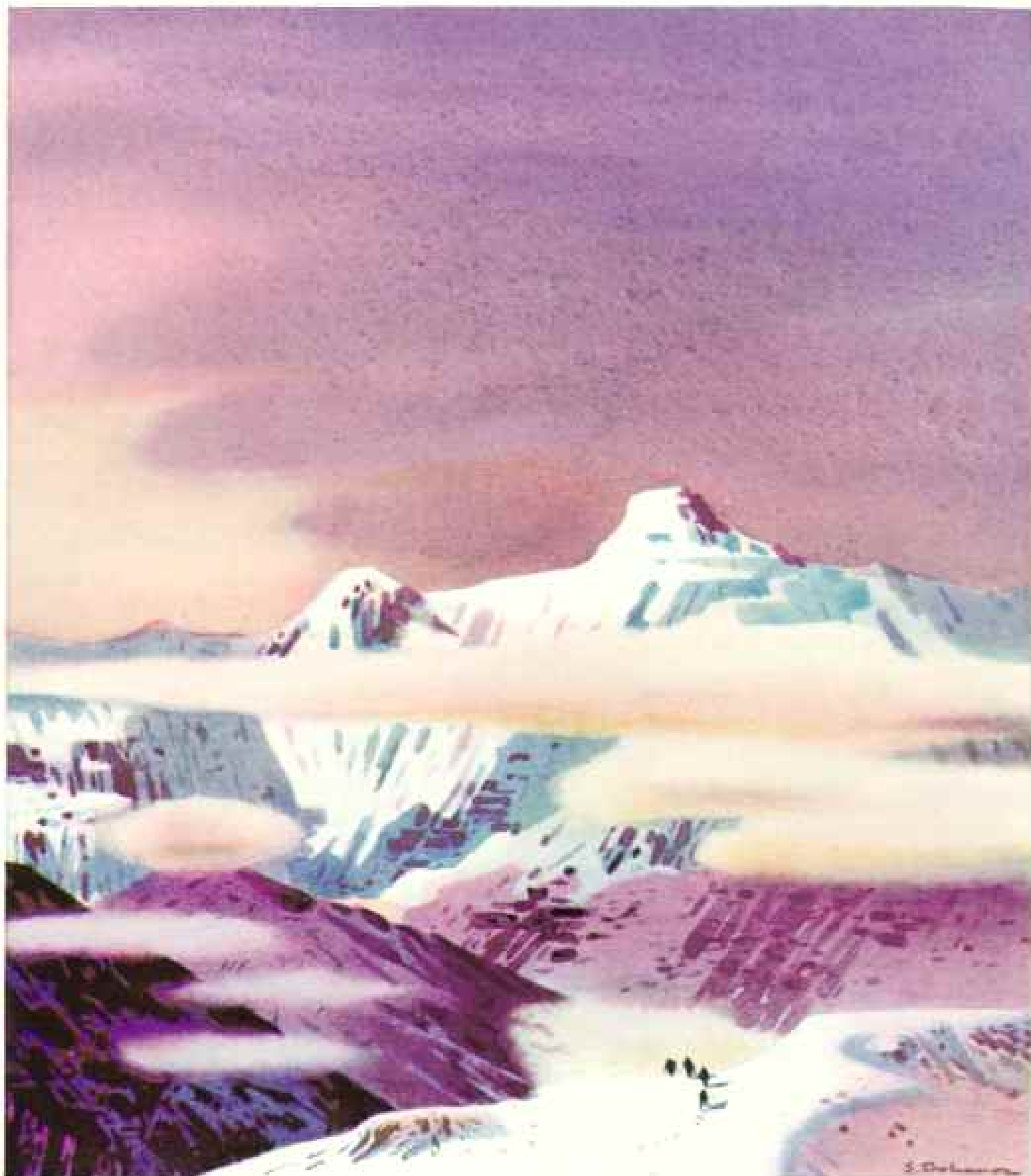
FREDERICK H. ECKER, *Chairman of the Board*

LEROY A. LINCOLN, *President*

ONE MADISON AVENUE, NEW YORK, N. Y.

Copyright, 1917, by Metropolitan Life Insurance Company

"Mention the Geographic—It identifies you."



## NANDA DEVI, THE REMOTE

This great peak in the Garhwal Himalayas is the highest ever climbed by man.

Rising some 25,661 feet in the clouds, near the border between India and Western Tibet, Nanda Devi has been called "the least accessible mountain in the world."

Its conquest, in the face of incredible difficulties and hardships, was accomplished only after the most careful preparations. Every step was planned. Nothing was left to chance.

The man who is striving to reach greater heights in the enjoyment of life will anticipate difficul-

ties and guard against them, if he is wise. He will have the foresight to plan every step. He will eliminate, as far as possible, the risks that block his way.

He will, in short, make full use of all the various forms of insurance, to protect himself, his family, his home, his car, and everything he owns.

Moral: Insure in The Travelers. Life, accident, automobile, burglary, all forms of insurance. The Travelers Insurance Company, The Travelers Indemnity Company, The Travelers Fire Insurance Company, Hartford, Connecticut.



# Pennsylvania

## Autumn's Paradise

When our mountains are gems of red, russet and gold, when our corn's in the shock and the air's like heady wine—close your desk, shake off care, and come to Pennsylvania! Thirty thousand miles of fine highways lift you over the rolling slopes of the Alleghenies and the Poconos, teeming with fish and game—speed you

past miles of spic-and-span countryside, the richest farmlands on earth—carry you through the smiling valleys of the Ohio watershed, the peaceful Susquehanna, the lordly Delaware. Historic Pennsylvania, scenic jewel and land of plenty, home of rare cookery and hospitality, beckons you this Autumn . . . . Come and visit us!



● Write Dept. "A" for an illustrated 4-color road map and touring guide, full of wonder-spots, highways and byways.

HON. GEORGE H. EARLE, *Governor of the State of Pennsylvania*

**PENNSYLVANIA STATE PUBLICITY COMMISSION**

HARRISBURG, PENNSYLVANIA, WARREN VAN DYKE, *Chairman*



THE FAMED MOTOR  
POLICE...YOUR GUIDE  
IN PENNSYLVANIA



# THE Big 450 PACKAGE

300 NOTE SHEETS  
150 ENVELOPES

Printed With Your  
Name and Address

\$1.00  
POST  
PAID



**T**HIS famous note paper is ideal for all informal correspondence. It is correct in every detail. The size is right—6"x7" with envelopes to match. The color is right—plain, snow-white paper of lovely texture. The marking is right—your name and address neatly printed in rich blue ink, the smart and logical way to have your stationery finished. And most important of all, the *quality* is right. The paper from which American Stationery is made has that cleanliness and crispness that is found only in *good* bond paper.

Where else can you get stationery *at any price* better suited to all the "everyday" needs of *all* the members of the family?

Send \$1.00 for a package. (West of Denver, Colo., and in U. S. possessions, \$1.10.) Your package printed and mailed within three days of receipt of order. *Satisfaction guaranteed or your money promptly refunded.*

## Going Away to School?

American Printed Stationery has been a favorite among college men and women for years. If you are getting ready to go back to school better order your package now. Have it with you the first day and get a flying start on your letters, notes, memoranda.



THE AMERICAN STATIONERY COMPANY

300 PARK AVENUE PERU INDIANA



# JACKSON

Capital of  
MISSISSIPPI



## A MODERN CITY . . . . . RICH IN HISTORIC LORE!

A city of interesting contrasts . . . modern . . . yet rich in shrines of a colorful past. Jackson, distribution center of the new South, fully developed natural gas field within the city providing lowest natural gas rates in the United States, rapidly expanding industrially, remains a city of beautiful homes . . . leading the Nation in new home construction. Adequate city planning and economical municipal administration have contributed to its balanced growth. A friendly city . . . extending a whole-hearted welcome to visitors and new citizens . . . come, enjoy its temperate climate . . . thrill to genuine Mississippi hospitality.



### CITY OF JACKSON

WALTER A. SCOTT, Mayor

A. F. HAWKINS  
Commissioner

B. M. TAYLOR  
Commissioner

### MAIL COUPON TODAY

City of Jackson,  
Jackson, Mississippi.

Send details concerning  Industrial Jackson  Jackson as Distribution Center  As an Ideal City  Historic Jackson.

NAME \_\_\_\_\_

STREET \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_

# "Cruise-Voyages"

to—or from—

## CALIFORNIA and MEXICO

The famous "Big 3" . . . the California, Pennsylvania and Virginia . . . largest ships—fastest schedules Coast-to-Coast via Havana, the Panama Canal and Acapulco.



**YOU** travel the "Sunshine Route" on huge, modern liners specially designed for tropical service. Every room is an *outside room*. Dining rooms are *air-conditioned*. Elevators and two outdoor pools on each ship. Service is deft and thoughtful—the food is perfectly grand.

**Between New York and California**, 1st Class from \$225 (\$250 at certain seasons). Tourist Cabin from \$125. **New York—Mexico**, 1st Class from \$195 (\$220 at some seasons). Tourist Cabin from \$105. Reductions on round trip by sea.

Also "**Circle Tours**"—where you travel one way by sea, one way by rail or air. Special combination rates from hometown back to hometown.

**9-17 Day All-Expense Tours** to Havana, Panama, the Caribbean and South America. Folder giving complete details—on request.

**To All Europe**—under the same American management. A sailing every Wednesday at noon on the United States Liners, *Manhattan* and *Washington*, \$181 up, Cabin Class; \$122 up, Tourist Class. Or the friendly *President Harding* and *President Roosevelt* (\$136 up, Cabin Class). Also informal "American One Class" vessels, rates as low as \$105.



Ask your TRAVEL AGENT for complete details about travel on these American ships. He will be glad to help you get utmost value for your money.

## Panama Pacific Line

1 Broadway, New York • 216 N. Michigan Ave., Chicago  
665 Market St., San Francisco • 19 King St., East, Toronto  
*Offices in other principal cities.*



**A** World tour is the supreme travel event of a lifetime. When you go "do it right!"

Modern steamships in their regular pier to pier services, and de luxe American-type hotels throughout the principal World travel routes, now assure comfort, convenience, food and service to meet the most exacting American standards. To secure the utmost in creature comforts, it is no longer necessary to join a crowd of several hundred and follow a fixed routine on a single ship making hurried visits ashore.

In ever increasing numbers, discriminating travelers (over 300 in 1936) are joining James Boring's "Small Party" cruises and tours Round the World because this modern method assures each and every individual of carefree comfort; permits extensive, leisurely, inland travel; and—at moderate rates—provides the best that money can buy.

**GO 'ROUND THE WORLD to see the World and not just to "see the sea"...**

**WINTER PROGRAM—1937-1938**

*For details of these unparalleled itineraries, secure descriptive booklet*

Perfect Climate Route, Sails October 16th westbound, 144 days . . . . . **\$2575**

White Empress Route, westbound November 27th, 135 days . . . . . **\$2575**

Economy Tour eastbound New York January 19th, 82 days. (*Tourist Class Steamer*) . . **\$985**

Flagship Route—The smart eastbound trip at the height of the season. From New York January 15th, 99 days . . . . . **\$2175**

Late Winter World Tour eastbound from N.Y. February 2nd, 105 days . . . . . **\$1975**

All cruises and tours personally conducted by professional travel experts who have been over the ground previously. Rates provide all expenses on ship and shore from home town to home town, including (with the exception of Economy Tour January 19th) upper deck outside First Class cabins without extra charge.

*Secure details today from your local steamship agent or*

**JAMES BORING CO., INC.**  
**655 FIFTH AVENUE, NEW YORK, N. Y.**  
**333 N. Michigan Ave., Chicago, ILL.**

*New, improved*  
**KODAK DUO SIX-20**

(SERIES II)

**NEW FEATURES,** Handy plunger-type shutter release on camera body; bracket for Kodak Pocket Range Finder; new single-finger bed release for easy closing; die-cast metal body, satin-chrome trimmed. But the price remains the same, \$57.50.



**Eastman**  
**"Miniature" that takes**  
**album-size pictures**



ACTUAL SIZE (1 1/4" x 2 1/4")

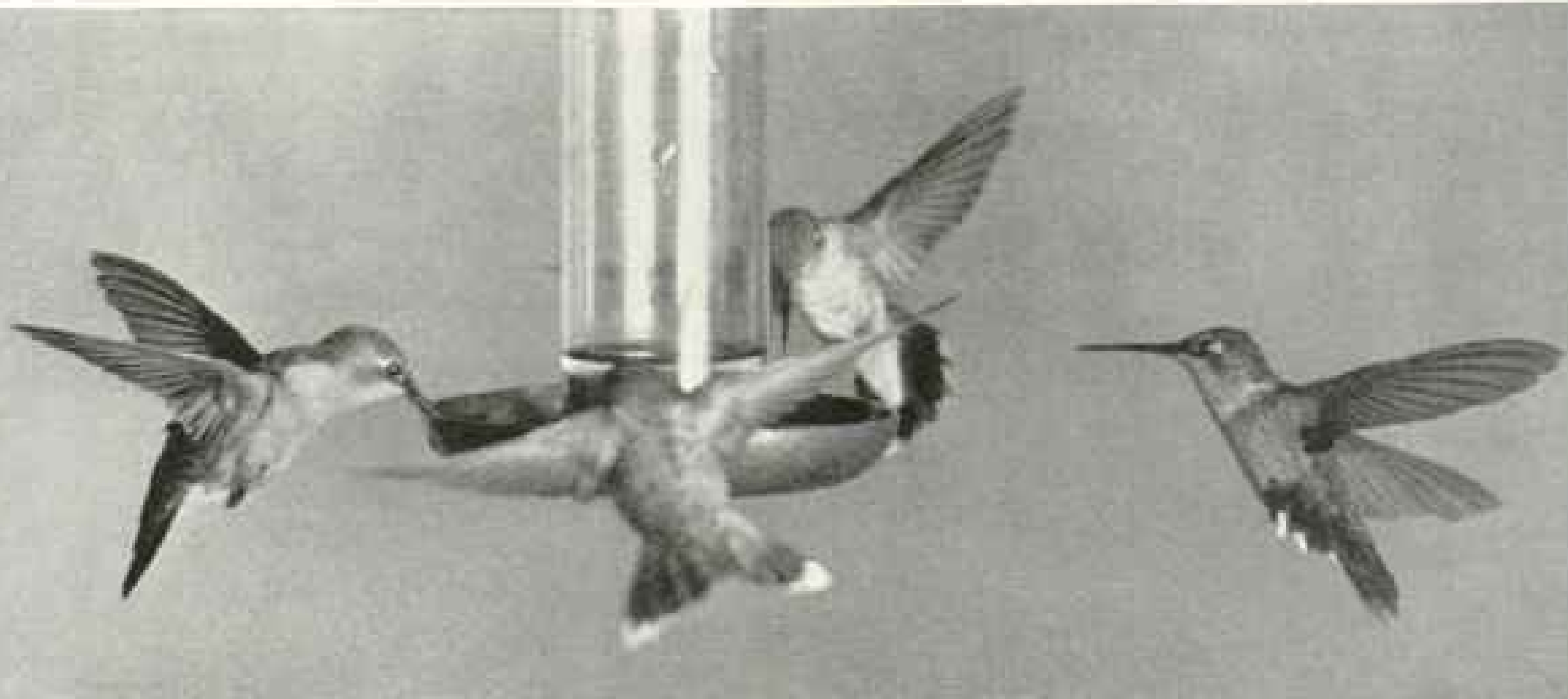
A true "miniature"—compact, speedy, versatile—yet it takes album-size pictures. Lens, Kodak Anastigmat *f*.3.5; shutter, 1/500-second Compur-Rapid. Performs brilliantly in dubious light, under difficult conditions. Makes indoor snaps under Photofloods. New features simplify operation. Price remains \$57.50. At your dealer's . . . Eastman Kodak Co., Rochester, N. Y.

**ONLY EASTMAN MAKES THE KODAK**

"Mention the Geographic—It identifies you."

The National Geographic Society Presents —

THE BOOK OF BIRDS



HUMMINGBIRDS IN FLIGHT. AN INCREDIBLY FAST LENS REVEALS THE INVISIBLE. PHOTOGRAPH BY HAROLD E. EDGERTON ©

A Beautiful Two-Volume Work for Young and Old with 950 Birds Portrayed in FULL COLOR

EDITED by Gilbert Grosvenor and Alexander Wetmore and published by the National Geographic Society, this new, 738-page Book of Birds in two volumes contains an amazing variety of bird-life studies by outstanding authorities, 633 bird biographies, 228 photographs, 17 migration maps, and 204 pages of full-color plates showing 950 birds painted by the distinguished artist-naturalist, Major Allan Brooks.

Few wonders in the realm of natural history compel so much interest and admiration as man's feathered friends. Bringing into the home the many aspects of beauty, mystery, and entertaining fact from the far-flung kingdom of birds, this book is

the first comprehensive work ever published with all major species of birds of the United States and Canada shown in full color.

The fascinating accounts of bird life are based on a lifetime of observations, adventures, and research discoveries, and are the personal narratives of Alexander Wetmore, T. Gilbert Pearson, Arthur A. Allen, Robert Cushman Murphy, Frederick C. Lincoln, and others.

Adding to the permanent reference value of the vivid paintings which illuminate these accounts, biographies set forth the identifying characteristics of each species of bird, its range, breeding habits, and other features of behavior. Six hundred

and thirty-three species and scores of subvarieties are thus described.

The migration maps reveal new developments in the study of bird migration through bird banding.

Following out its purpose to increase and diffuse geographic knowledge, The Society makes this work available for the pleasure and information of outdoor enthusiasts, sportsmen, naturalists, vacationists, students, teachers, and members of all households where young and old find delight in the exciting world of popular science.

The low price of \$5 for this two-volume Book of Birds, postage prepaid in United States and Possessions, is possible only because The Society is not organized for profit, and because the initial cost of engravings and text has been borne by The National Geographic Magazine.

Aside from the priceless contents of its pages, the book itself is an achievement in beauty, a rich addition to any collection of fine works. It is a delightful and useful book to own—ideal to give, to young or old.

Each volume is handsomely bound in green cloth covers, 7x10 1/2 inches, embossed in gold. Further details are given in a descriptive folder available on request. The Book of Birds can be obtained only from the National Geographic Society, Dept. WW, Washington, D. C.

..... \$5 THE SET\* .....

NATIONAL GEOGRAPHIC SOCIETY, Dept. WW, Washington, D. C.

1937

\*\$5 the set, postpaid in U. S. and Possessions; elsewhere, 50c additional. A set consists of two volumes which cannot be purchased separately. To minimize expense, it is requested that remittance accompany order.

Enclosed please find \$\_\_\_\_\_ for which send me \_\_\_\_\_ sets of the new Book of Birds in two volumes.

Name \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_



## SPAN DISTANCE

Leitz craftsmen have had over 85 years experience in the making of the world's

finest microscopes. They are the producers of the precision Leica camera. That is why Leitz Binoculars are the choice of those who demand the finest.

Leitz Binoculars span distance; bringing the minutest detail of far objects clearly and distinctly before you. Available in all types—wide-field binoculars of high light transmission, embracing a large, clear and brilliant field; glasses of great light-gathering power, to pierce the night; glasses of extreme light weight—and a range of magnifications to meet every need.

AN ILLUSTRATED BOOKLET WILL  
BE SENT ON REQUEST. DEPT. 180

## LEITZ BINOCULARS



E. LEITZ, Inc. • 730 Fifth Ave., New York

## Western Electric HEARING AID



### ENDS STRAIN...HELPS YOU HEAR CLEARLY

**H**EAR easily again. You can—as thousands have found—with the Western Electric Audiphone. It was designed by sound-transmission experts at Bell Telephone Laboratories for use with air or bone conduction receiver—whichever helps you most. A dealer, trained in Audiometric testing, will fit you properly.

GRAYBAR ELECTRIC CO., Graybar Bldg., New York

Please send details on Western Electric Audiphone and name of nearest dealer. N-31

Name .....

Address .....

City..... State.....

## X-ER-VAC TREATMENTS

(Alternate VACUUM and PRESSURE)

**REVITALIZE  
INACTIVE  
HAIR CELLS  
BY IMPROVING  
CIRCULATION**

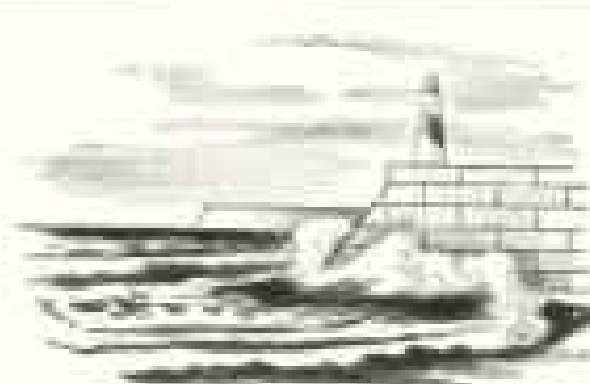


• Licensed for use under the methods of Andre A. Crosta, M. D., Cincinnati, Ohio, and according to U. S. Patent Nos. 2,055,128. Other U. S. Patents Pending.

• The XERVAC, through the action of alternate vacuum and pressure, tends to produce a normal circulation in the deep network of capillaries that feed the hair cells. Under-nourished, inactive hair cells are revitalized by the nourishment supplied by the renewed circulation and normal hair growth is stimulated. Your barber or beauty shop can supply treatments. If you wish to purchase an XERVAC for home use, see your local Crosley radio and refrigerator dealer—or write direct to

**THE CROSLY RADIO CORPORATION**  
Dept. 937-G Cincinnati, Ohio

Copyright 1937, The C. R. Crosta



## BULWARK

Under a fair sky the mighty sea wall may appear to possess a strength far in excess of any reasonable requirements. But when skies darken and furious waves begin to pound, then the wall's reserve strength becomes justified . . . and appreciated. Chartered in 1835, New England Mutual has long served as a staunch bulwark against the forces of fear and destitution in countless American homes.

Write Department Z for our interesting booklet, "The New Way."

## NEW ENGLAND MUTUAL

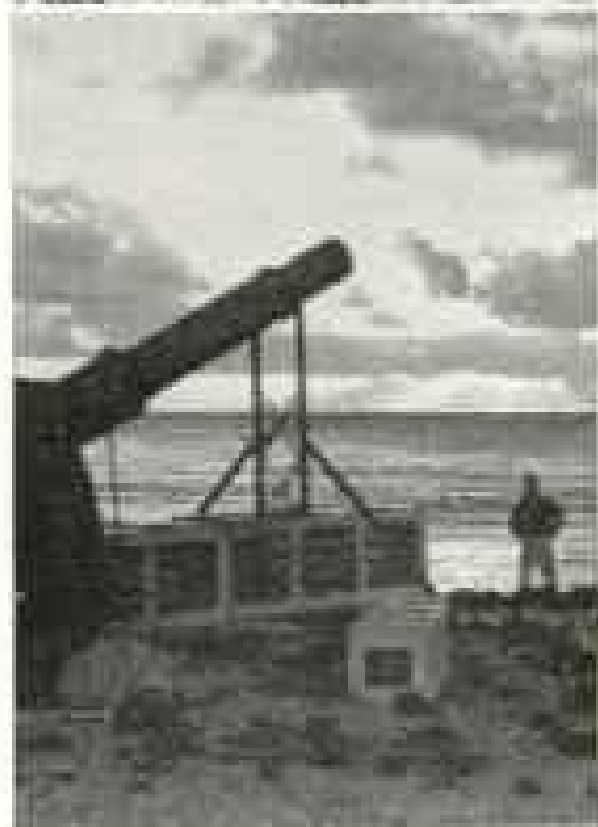
Life Insurance Company of Boston

"Stands for Safety"

# Eclipse Expedition Tells Story of Success



Scenes of the camp life and scientific activity, Canton Island, in mid-Pacific.



**W**ITH this issue of your NATIONAL GEOGRAPHIC MAGAZINE, you receive the first completely illustrated and detailed accounts of the National Geographic Society-U. S. Navy Expedition which successfully photographed and observed the 1937 eclipse of the sun—at its maximum the longest solar eclipse in 1,200 years. ¶ In personal narratives, leaders of the Expedition describe experiences of their solitary encampment on a tiny atoll in the Pacific Ocean, and the preliminary deductions made by scientists from the valuable data obtained. These articles and the Expedition itself are notable examples of the educational and scientific work which The Society has intensively pursued for 49 years. ¶ Among your friends there are many who would like to share with you in The Society's far-reaching activities, and to receive THE GEOGRAPHIC, with its many "first-hand" accounts, its dramatic pictures, and useful map supplements. You can give your friends this opportunity by nominating them for membership—an act of courtesy which involves no financial obligation. The officers of your Society and the friends you nominate will be grateful for your thoughtfulness. On the co-operation of its members depends The Society's growing service to education.

## Nominations for Membership

USE THIS CONVENIENT FORM, OR NOMINATE BY LETTER IF YOU PREFER.

Secretary, National Geographic Society,  
Sixteenth and M Streets, N. W., Washington, D. C.

1937

I nominate for membership in the National Geographic Society:

DUES: Annual membership in U.S., \$3; Canada, \$3.50; abroad, \$4; life membership, \$100. Please make remittances payable to the National Geographic Society. Please remit by check, draft, postal or express order. The membership fee includes annual subscription to THE NATIONAL GEOGRAPHIC MAGAZINE.

(1) Name \_\_\_\_\_

Address \_\_\_\_\_

(Occupation) \_\_\_\_\_

(2) Name \_\_\_\_\_

Address \_\_\_\_\_

(Occupation) \_\_\_\_\_

Name and Address  
of Nominating Member: \_\_\_\_\_

13-271

"TO INCREASE AND DIFFUSE GEOGRAPHIC KNOWLEDGE"

# Warning!

When You Say "Webster's Dictionary"  
You MEAN the MERRIAM-Webster

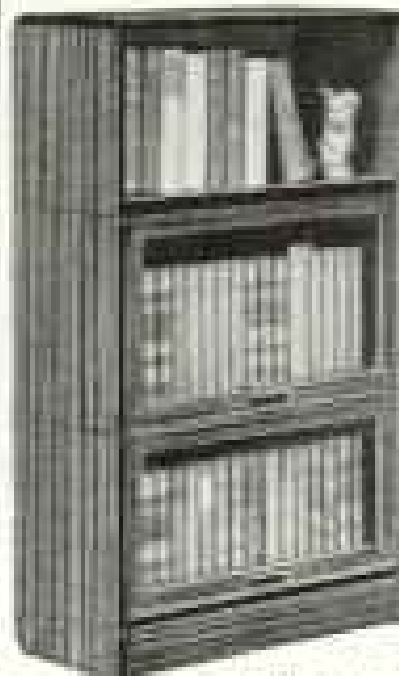


Accept Nothing Less Than  
the "SUPREME Authority"



Look for the Merriam-Webster circular trademark on the cover. The New Second Edition of Webster's New International (unabridged) is 20 years newer, contains 122,000 words more than any similar dictionary. Provides information in all branches of knowledge. The authority in courts, colleges, newspaper offices. Prepared by 207 of the world's foremost experts. 600,000 entries; 3,350 pages, 12,000 terms illustrated. Ask your bookseller, or write for free Illustrated pamphlet.  
G. & C. MERRIAM CO., DEPT. 830, SPRINGFIELD, MASS.

MODERN BOOKCASES for the  
MODEST BUDGET - only



\$12.75  
FOR A  
COMPLETE 3 SECTION  
*Lundstrom*

SECTIONAL BOOKCASE  
DIRECT from FACTORY  
on 30 DAY APPROVAL

The New "Modern American" design. Beautifully finished in light walnut shade with chamfered edges. Write for Catalog No. N-27 showing new and attractive designs, finishes and arrangements at correspondingly LOW Prices.

THE C. J. LUNDSTROM MFG. CO., Little Falls, N.Y.  
Manufacturers of Sectional Bookcases since 1899  
New York Showroom, 120 West 42nd St. (2nd Fl., Wm. 7-4222)

Portable —  
"Fits almost  
any space"

Attractive  
Convenient  
Economical



SECTIONAL IT GROWS WITH YOUR LIBRARY  
ALWAYS COMPLETE - YET NEVER FINISHED

## Champion-International Company

Manufacturers of the paper used in

THE NATIONAL GEOGRAPHIC MAGAZINE  
and other high-grade coated paper

Office-Build

LAWRENCE, MASS.

## Weldon Roberts Erasers

Correct Mistakes in Any Language

310 CORALINE  
Soft Pencil  
Eraser



930  
Ensemble  
Combination Soft  
Ink and Pencil Eraser

Erasers for Every Use — "88 STYLES"



# LAVORIS

There is Genuine Satisfaction  
in Using the Genuine Article

The gargle that thoroughly cleanses mouth and throat

"Mention the Geographic—It identifies you."

*The Most Captivating Treat You'll Ever Eat!*

# JORDAN'S *Genuine* VIRGINIA HAM

*Oven Cooked with Wine*  
**READY TO SERVE**



**NOW** *Shipped direct to you from*  
**JORDAN'S FAMOUS  
OLD VIRGINIA SMOKEHOUSE**

No other ham like this: Only the finest Virginia Hams bear the Jordan brand. They are slowly cured, hickory smoked, and aged for months, then baked with wine, following the time-honored tradition of Old Virginia.

Average Weight 6½ to 8 pounds

Price 90¢ per pound

Shipped Postage Paid East of Rocky Mountains

**FREE:** Generous sample of genuine Jordan's Virginia Bacon, if you enclose check.

Order Now: A limited supply is available each year

**Jordan's Old Virginia Smokehouse**  
P. O. Box 324, Richmond, Va.

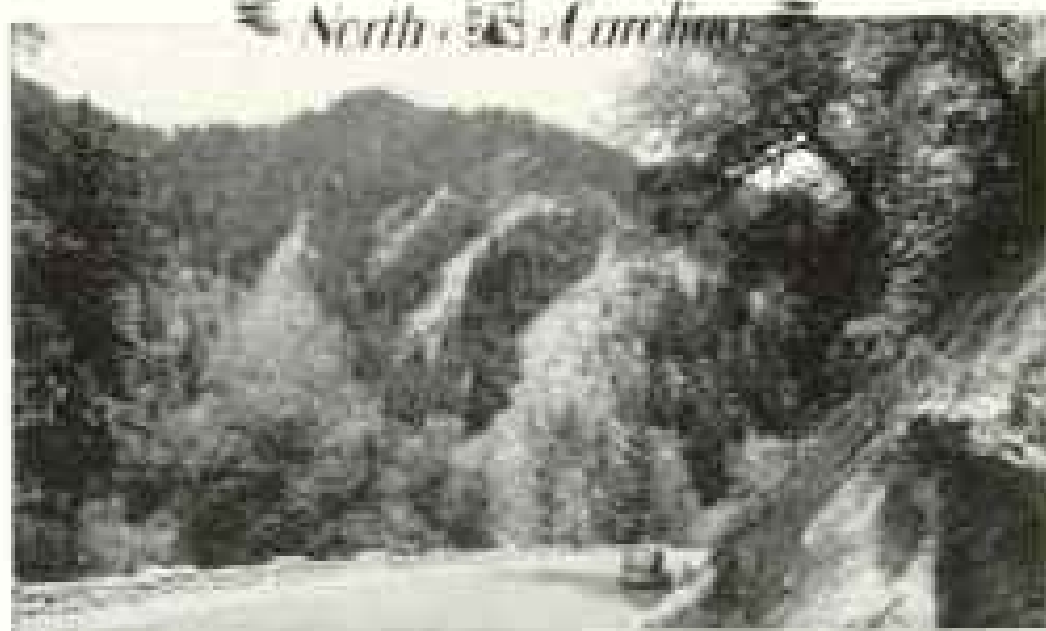
Please send me prepaid

Jordan Virginia Ham      Size about \_\_\_\_\_ lbs.  
 Enclosed check for \$ \_\_\_\_\_       Send C.O.D.

Name \_\_\_\_\_

Address \_\_\_\_\_ State \_\_\_\_\_

## Asheville *North Carolina*



### See **AUTUMN'S COLOR PARADE**

Take an autumn vacation this year in the "Land of the Sky." Mountain lakes and waterfalls seen against the brilliant reds and yellows of Autumn create a picture of breath taking beauty. The great variety of trees and shrubs in this wonder spot makes shades and tones of magnificent colors unrivaled in North America. You can swim, golf, fish, hike, ride or just rest in this ideal vacation-land. Be sure and see the Great Smoky Mountains in their vivid autumn drapes. Asheville is the convenient gateway to the famed "Land of the Sky." For free booklet and detailed information write . . . . .

**CHAMBER OF COMMERCE**

Dept. 20

Asheville, North Carolina

## THE MASTER KEY

TO NATIONAL GEOGRAPHIC MAGAZINES

▼ 1899 to 1936 Inclusive ▼



### NEW CUMULATIVE INDEX

This new Cumulative Index, unlocking the wealth of material in 436 numbers of The National Geographic Magazine—1899 to 1936 inclusive—contains 13,400 references to topical headings, Nature subjects, places, maps, authors, titles, and pictures. Published solely to increase the usefulness and reference value of The Magazine, it is a boon to readers, teachers, students, travelers, editors, writers, artists, and Nature lovers of all ages. 452 pages (7 x 10 inches), including illustrated foreword on the history of The Society and its Magazine by Gilbert Grosvenor. Sold at cost price of \$1, postpaid \$1 in U. S. and Possessions; elsewhere, 25c extra. Bound in brown cloth. . . . . **\$1**

National Geographic Society \_\_\_\_\_ 1937  
Dept. WW, Washington, D. C.

Enclosed please find \$\_\_\_\_\_ for which send me \_\_\_\_\_ copies of the new Cumulative Index to The National Geographic Magazine, 1899-1936, inclusive.

Name \_\_\_\_\_

Address \_\_\_\_\_

**National Geographic Society**

# ORIENT



## BLUE RIBBON SPEED

Canadian Pacific liners hold all records to and from the Orient . . . 10 days direct to Japan by *Empress of Asia* or *Empress of Russia*. Or 3 days more via Honolulu by *Empress of Japan*, fastest liner on the Pacific, or *Empress of Canada*. Sailings from Vancouver and Victoria to Yokohama, Kobe, Nagasaki, Shanghai, Hong Kong, Manila. Or, connect at Honolulu from California ports. Details and rates from YOUR OWN TRAVEL AGENT or Canadian Pacific: New York, Chicago, San Francisco; 38 other cities in the U.S. and Canada.

*Canadian Pacific*

## HOW TO MAKE BRICK OR STUCCO HOMES LOOK LIKE NEW



In your brick or stucco home stained and streaked? Then here's an easy and inexpensive way to give it a new appearance. Paint the exterior with Medusa Portland Cement Paint. This paint, with its Portland cement base, makes a beautiful, permanent, cement-like finish that does not scale, peel or chip off. Can be sprayed or brushed. Comes in white and seven colors.



Use Medusa-Lite, the flat wall finish for interior walls and ceilings. Medusa Floor Coating is unsurpassed for concrete floors. Send the coupon below for free book.

**MEDUSA PRODUCTS CO.**  
1020 Midland Bldg., Cleveland, Ohio.  
Please send free copy of the book "How To Paint Concrete, Stucco, Masonry and Other Surfaces."

Name \_\_\_\_\_ Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_



## Australia's FESTIVE YEAR

SPEND A FASCINATING MONTH  
IN HOME IN AUSTRALIA DURING THE  
**150<sup>th</sup>**  
Birthday Celebrations

Jan. 26 to Apr. 25, 1938

Three months of pagantry and sport in Sydney during her Summer while it's Winter in North America!

Australia's sports will be at their best during the Celebrations, including surfing, swimming, yachting, game and trout-fishing, duck and rifle shooting, golf, tennis, cricket, horse-racing. The Great Empire Athletic Games and the Royal Agricultural Show will be among the major attractions.

Australia is alluring at all seasons and is easily reached by way of glamorous South Sea islands. Costs are low . . . the exchange favorable.

Complete details and literature from Travel Agents or  
**AUSTRALIAN NATIONAL TRAVEL ASSOCIATION**  
[A non-profit Community Organization]

Suite 300B, Hotel Clark, Los Angeles, California

*Australia*



## National GRAFLEX World's Finest Miniature Reflex Camera

Here is the ultimate in picture-making precision! Though "just a handful", the National Graflex gives you many "professional camera" features including genuine Graflex full vision focusing, focal plane shutter, fast F3.5 lens and speeds up to 1/300 second. Yet it is inexpensive to use, making ten 2 1/2" x 2 1/2" pictures from an 8-exposure film. The world's finest miniature reflex camera—and it's American-made! See it at your dealer's.

**FREE!** Send today for my free Graflex Catalog. Paste coupon below on penny post card, if you wish. Fulmer Graflex Corporation, Dept. G-15, Rochester, N. Y., U. S. A.

**FOLMER GRAFLEX CORPORATION**  
DEPT. G-15, ROCHESTER, N. Y., U. S. A.  
Please send me your free catalog of Graflex and Speed Graphic American-made, Prize-Winning Cameras and Accessories.

NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_



**GRAFLEX**  
PRIZE-WINNING CAMERAS



# "Where shall we stay?"

NATIONAL GEOGRAPHIC MAGAZINE'S HOTEL SECTION

## ARKANSAS

### Hot Springs National Park

**Arlington Hotel and Baths.** Arthritis, circulatory ailments. Waters owned and recommended by U. S. Govt. Golf, Fishing. Write for folder.

## CALIFORNIA

### Arrowhead Springs

**Arrowhead Springs Hotel.** Reasonable rates, complete spa, all sports, hot springs. Hotel or honeymoon. 1½ hours Los Angeles. H. S. Ward, Mgr.

### Los Angeles

**The Ambassador.** Twenty-two acre Playground in heart of City. All Sports, Plunge, Beach, Libs. Cleverly Grove for Dancing. European, \$2.00 up.

### Riverside

**The Mission Inn.** In the Old California tradition. Famous collections. All sports. Excellent cuisine. American or European Plan. Write for folder.

## DISTRICT OF COLUMBIA

### Washington

**Francis Scott Key Apartment Hotel.** Small, completely furnished apartments by the day, week, month. Near White House, Cor. 20th and F Sts., N. W.

## ILLINOIS

### Chicago

**La Salle Hotel.** Chicago's newest. Charming, convenient—La Salle at Madison. Ultra modern rooms, and suites. Service—foremost in friendliness.

## MASSACHUSETTS

### Boston

**The Copley-Plaza** faces beautiful Copley Square. Single rooms from \$4.00; double from \$6.00; Suites from \$12.00. Arthur L. Bass, Managing Director.

### Northampton

**Wiggins Old Tavern and Hotel Northampton.** Inn of Colonial Charm. \$2 up. Excellent Food. Authentic Antiques. Early New England.

## MINNESOTA

### Minneapolis

**Curtis Hotel.** Contiguous to Minnesota's 10,000 Lakes region. Largest Hotel in the Northwest. Soft-water baths throughout. Rates \$3 to \$5.

## MISSISSIPPI

### Pass Christian

**Inn By The Sea and Cottages, Pass Christian, Miss.** Always open. On private bathing beach. All sports. Paved roads. Climate ideal. Near New Orleans.

## NEW JERSEY

### Atlantic City

**Chalfonte-Haddon Hall.** On the Atlantic City Boardwalk. 1000 rooms. Ocean Deck. Modern health baths. American and European plans.

### Princeton

**The Princeton Inn.** Facing golf course and Graduate College. Amer. plan. 100 rms. Fireproof. "Hospitality as in days of old." J. Howard Blooms, Mgr.

## NEW YORK

### Albany

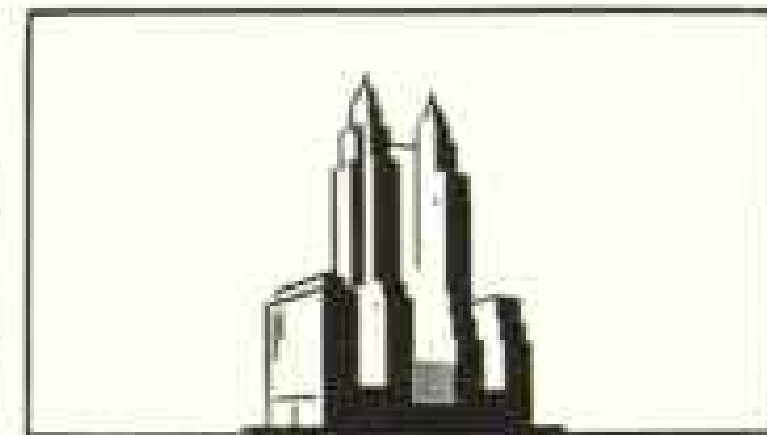
**De Witt Clinton.** A Knott Hotel. New, well appointed. Faces Capitol Park. Splendid meals; attentive service. Come, we'll make you happy.

### New York City

**Barbizon-Plaza.** New skyscraper hotel overlooking Central Park at 4th Ave. Tower rooms from \$1 single, \$2 double. Continental breakfast included.

**The Plaza.** New York. Facing Central Park. Perfection marks every detail of appointments, service and cuisine. Henry A. Root, President.

**Vanderbilt.** World famous. Convenient to business centers, shops, amusements, railroads. \$4 single, \$8 double. Suites, Park Ave. at 34th St.



### The Waldorf-Astoria

Not size, but solicitude for its patrons, makes The Waldorf-Astoria preeminent. The greatness of a hotel is measured, not by its height, but by its heart. Park Avenue, 49th to 54th Streets, New York.

## Watkins Glen



### The Glen Springs

The Nathelski Baths are world famous. The cuisine . . . the golf . . . the magnificent setting high among the Finger Lakes . . . are alike memorable. All the advantages of European Spas—just overnight from New York. Illustrated booklets and rates from Wm. M. Leffingwell, Pres., Watkins Glen, N. Y., or phone our New York office, 300 Fifth Ave., NEdallion 3-6225.

## NORTH CAROLINA

### Asheville

**Battery Park.** Five excellent golf courses. Many scenic places to visit. Entrance Great Smoky National Park. A Knott Hotel. Request folder "D".

## TENNESSEE

### Knoxville

**Andrew Johnson.** Your headquarters when visiting the Great Smokies Park and Norris Dam. Knoxville's newest and largest. 300 rooms with bath.

## WEST VIRGINIA

### White Sulphur Springs

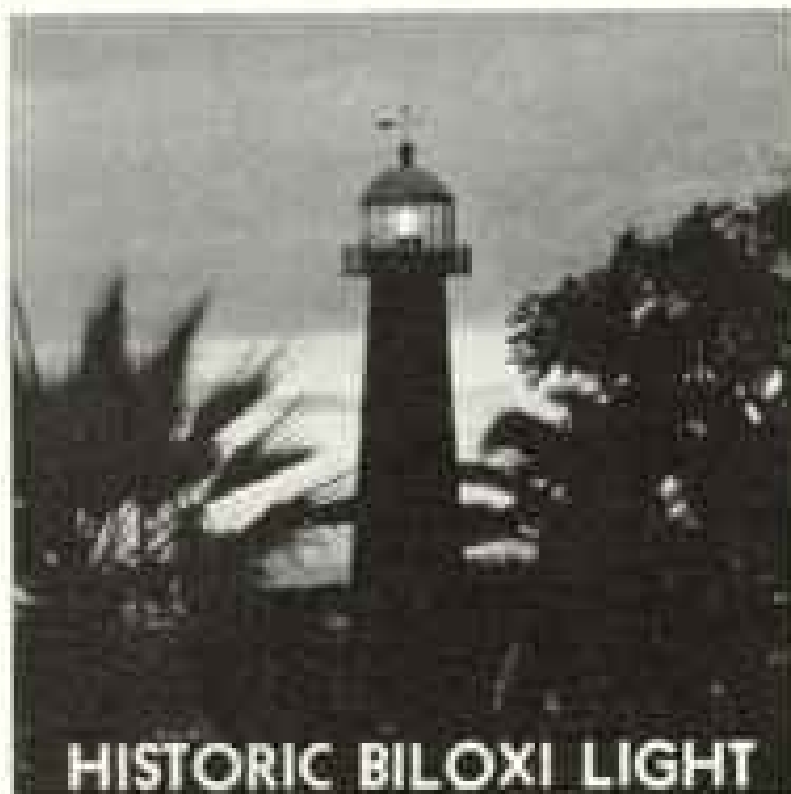
**The Greenbrier and Cottages.** America's world-famous spa and resort. Open all the year 'round. For rates and information apply to L. R. Johnston.

• • •

## Canada

### Montreal

**The Ritz Carlton . . .** Famous for its service, cuisine and distinctive clientele. Location unsurpassed.



HISTORIC BILOXI LIGHT

# BILOXI BECKONS

Located on a peninsula, extending into the Gulf of Mexico, Biloxi, Mississippi, bids you welcome! Founded in 1699, this romantic city was the first capital of the vast Louisiana Province. Many historical points of interest await you in Biloxi, over which seven flags have flown. Largest shrimp and oyster canning center in the world, its picturesque fisheries are worth traveling many miles to see. Biloxi, a year 'round resort for those who seek recreation or rest, with beautiful hotels and other accommodations, enjoys a healthful climate and pure artesian water. Its paved boulevards and toll-free bridges may now be reached over modern highways—a part of Mississippi's new road construction program.

Write for literature and information.

CHAMBER OF COMMERCE . . . BILOXI, MISS.

"Mention the Geographic—It identifies you."

# The WHITE HOUSE

Overlooking the Sparkling Waters of the Gulf of Mexico  
**BILOXI, MISS.**

Ideal headquarters for your vacation is The White House—"The Resort Hotel Complete." Deep sea fishing, sailing, motor boating, tennis, riding, golf the year 'round. AMERICAN PLAN. Excellent cuisine. Every modern comfort. Courteous, interested service at moderate cost. For rates, illustrated folder and full details, write John T. White, Manager.



## TRADITION IN NEW ORLEANS

The St. Charles

points to

### The ST. CHARLES

... where you find Modern Comfort in an Atmosphere of Historic Splendor ... excellent cuisine ... moderate rates. Information about New Orleans on request.

#### OTHER DINKLER HOTELS

- ... the ANNLEY, Atlanta, Ga.
- ... D. HENRY, Greensboro, N. C.
- ... TUTWILER, Birmingham, Ala.
- ... ANDREW JACKSON, Nashville, Tenn.
- ... JEFFERSON DAVIS, Montgomery, Ala.
- ... SAVANNAH, Savannah, Ga.



New Orleans

## DINKLER HOTELS, INCORPORATED

Carling Dinkler, President

3000 ROOMS IN THE SOUTH

## Hotel MARKHAM

ON AMERICA'S RIVIERA

The MISSISSIPPI Gulf Coast



Write for  
 Folder and Rates

GEO. M. WILKINSON, Mgr. + GULFPORT, MISS.

## GULFPORT

MODERN CITY BY THE SEA

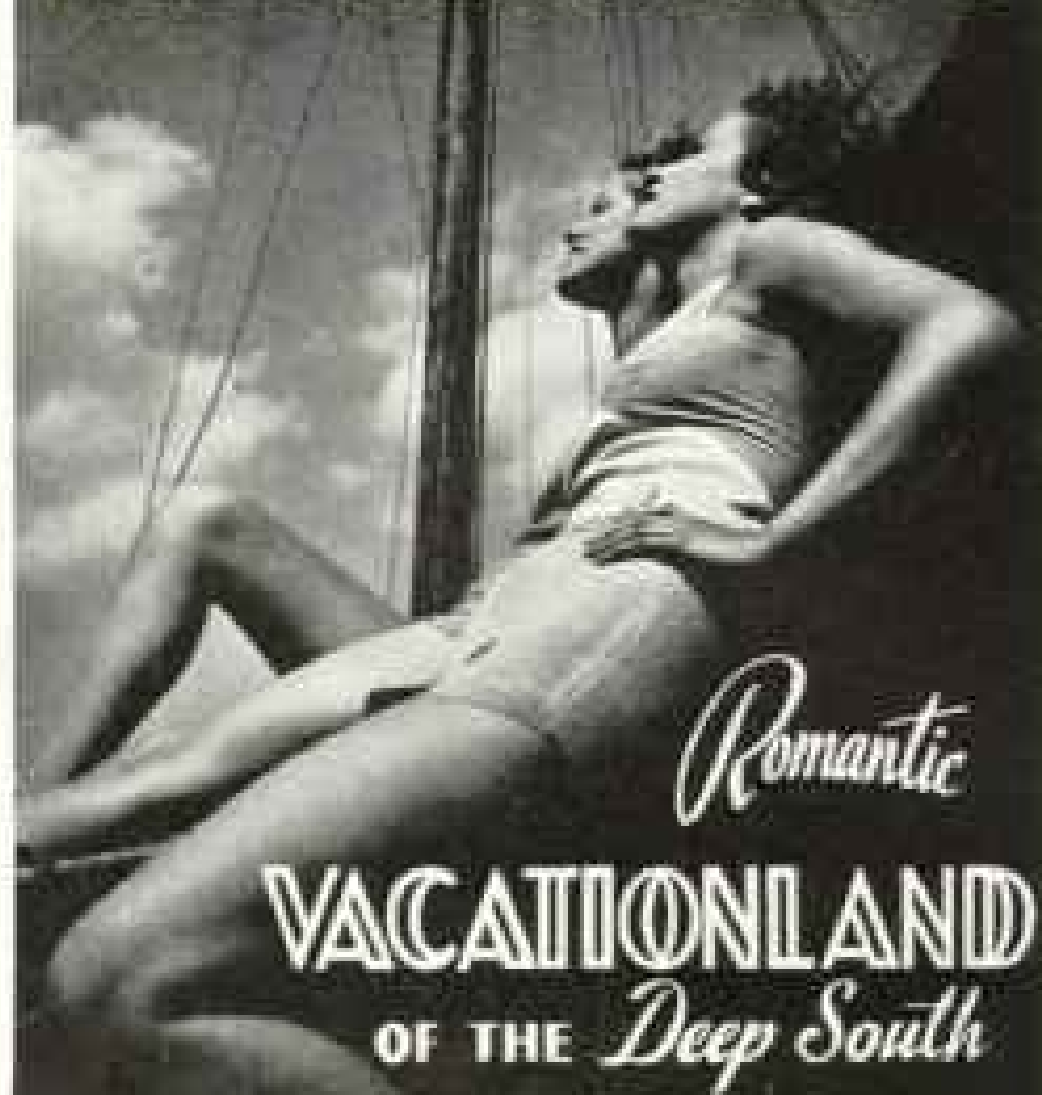


The grand playground of the Mississippi Gulf Coast, \$40,000,000 worth of better you can enjoy, deep sea and beach water. Enjoying the golf courses with almost unlimited golf. The perfect spot for your winter vacation.

## CITY OF GULFPORT MISSISSIPPI

# Magic

# MISSISSIPPI



VACATIONLAND  
 OF THE Deep South

Here in the deepest Southland a vacation of lasting, haunting charm awaits you. An inherently hospitable and friendly people look forward to being your hosts.

With them you'll slip relaxed and comfortable into the hypnotic atmosphere of mellow cosmopolitan Natchez; of heroic and memory exciting Vicksburg; of plantation empires of delta and prairie.

And from the sea will come the call of the Coast, exotic, semi-tropical, an unspoiled vacation paradise of game, fish, surf, and pirate lore.



To make it easy for you to be its guest, Mississippi is nearing completion of a 1700-mile paving program. Mississippi invites you to a vacation you'll never forget.

### Write for Information Today

Mississippi Advertising Commission  
 P. O. Box 443, Jackson, Miss.

Please send information and descriptive literature about Mississippi, vacation land of the Deep South.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_

# A MILLION PEOPLE LIVE IN TELEPHONE CITY



## 775,000 SECURITY OWNERS

Only five cities in the United States have populations exceeding the number of security holders and employees of the Bell System. There is one security holder for every 165 people in this country.

More than half are women. No individual or organization owns as much as 1% of the stock of the A. T. & T.

## 315,000 EMPLOYEES

Anywhere you go in this country you will find an owner of Bell System securities or a Bell telephone employee. The average length of service of Bell System employees is more than ten years.

Nearly a third of the 315,000 employees own Bell System securities.



A fair deal for the public, the employee, and the men and women who have put their money in the industry is just good business



WHAT IT TAKES

TO MAKE

A POUND OF

ALUMINUM



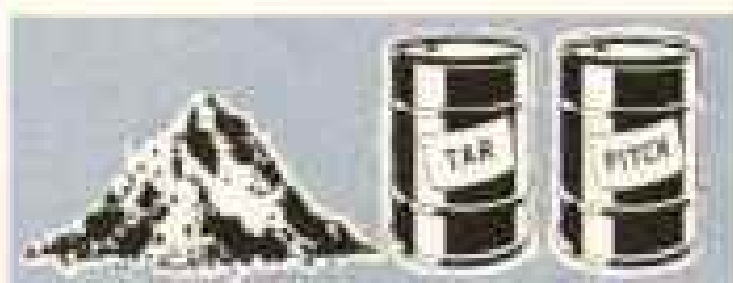
**BAUXITE.** The commonly used ore. It is found in many countries. Ours comes from Arkansas and Dutch Guiana. Aluminum is present, not as metal, but in the form of complicated chemical compounds. All the following raw materials are needed to get the aluminum out:



**SODA ASH AND LIME.** Add water to these, heat the solution and digest the *bauxite* in it. Aluminum compounds dissolve. Impurities are left behind as mud. From the filtered solution, something called *aluminum hydrate* is separated. Heat the *hydrate* to drive out water, and you have *alumina*, a white powder, chemically labelled as aluminum oxide. It sounds simple, but this is really a very technical, expensive process.

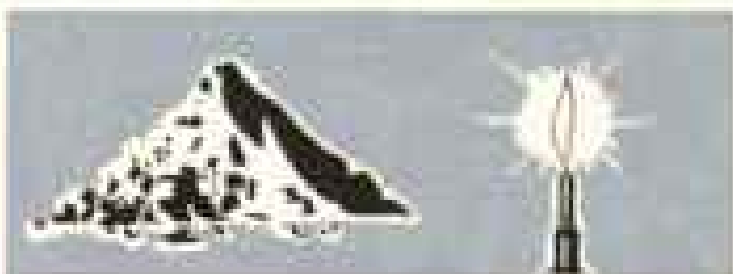


**CRYOLITE.** Translucent "ice-rock," found naturally only in distant Greenland, but also made synthetically. To get the actual metal out of the *alumina*, the powder first has to be dissolved in a bath of molten *cryolite*.



**COKE, TAR AND PITCH.** Metallic aluminum is made in a steel pot thickly lined with *carbon*, which contains the molten bath of *cryolite* and dissolved *alumina*. Carbon blocks are hung in the bath, and a heavy electrical current is passed from the blocks through the bath to the lining of the pot. This current changes the oxide, *alumina*, to the metal, *aluminum*. Carbon blocks and linings are made from *coke, tar and pitch*.

*A total of nine pounds of the foregoing materials are required to make one pound of aluminum. But other things are equally vital:*



**FUEL.** The process of getting *alumina* from *bauxite* uses 22,000 cubic feet of gas, or equivalent coal, for each ton of final metal. Coal also is consumed in baking the carbon blocks used in the reduction pots.



**ELECTRICITY.** Twelve kilowatt-hours of electrical energy must be generated to produce one pound of aluminum. The energy needed for a ton of aluminum would supply the electrical needs of the average home for thirty-five years. That is why we have invested millions in dams, reservoirs and power houses, through which, when running fall, flows enough water to supply the needs of 92 cities the size of New York.



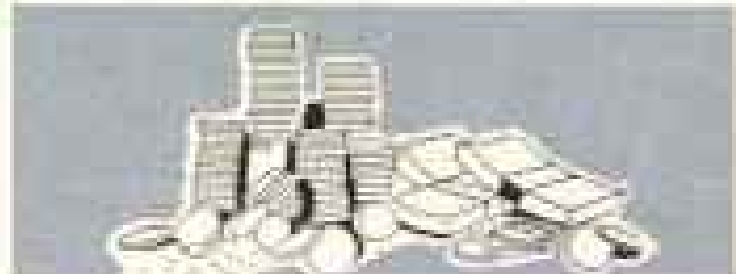
**TRANSPORTATION.** From mine to refinery to reduction plant our aluminum-in-the-making has to be shipped and reshipped to locations where all these raw materials are best available. Our transportation bill, just for getting aluminum made, was more than \$5,000,000 last year.



**LABOR.** Labor is important in every one of these operations. Wages constitute the largest item in the cost of making aluminum.



**SKILL.** Every step of the process must be supervised and co-ordinated by men who "know-how." Hundreds of men in laboratories must continually check not only the raw materials but every pound of metal produced.



**MONEY.** The wherewithal which develops mines, builds and equips the necessary refinery and reduction plants, the dams, reservoirs and power houses, must be available.

*All these are needed to make virgin aluminum, one of the most difficult of all commercial metals to extract from nature. Would you have imagined it?*



ALUMINUM

COMPANY

\* OF \*

AMERICA