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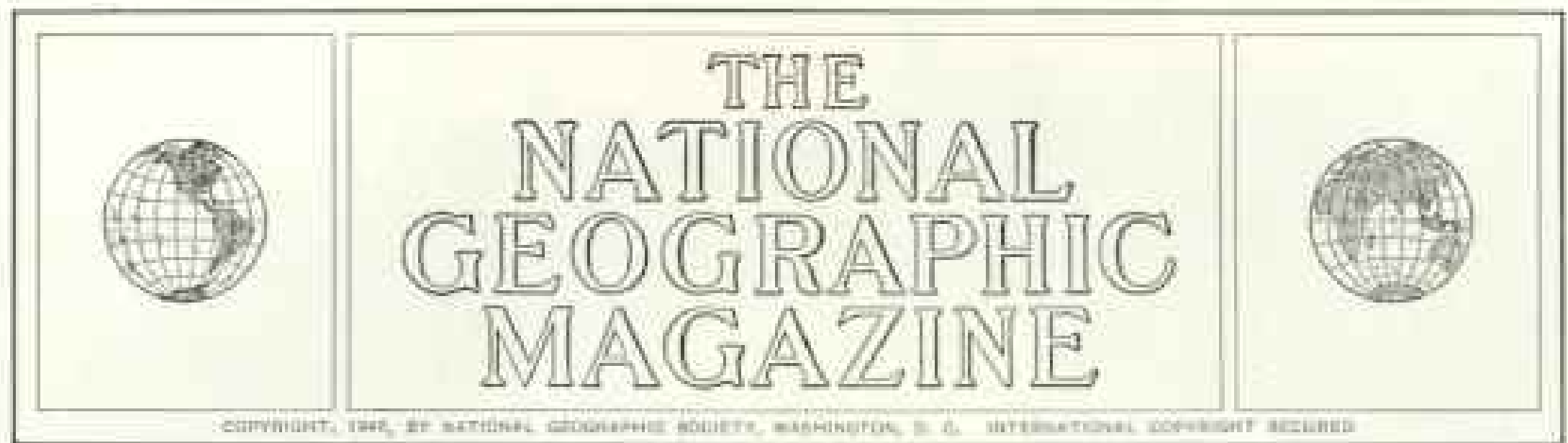
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## Gilbert Islands in the Wake of Battle

BY W. ROBERT MOORE

*Editorial Staff Correspondent in the Pacific*

*With Illustrations from Photographs by the Author*

**W**AR has swept swiftly past the Gilbert Islands\* on the wide Pacific route to Tokyo. The battle wounds of Tarawa and Makin are slowly healing. So much change has already taken place that the men who wrested these resistance points from the Japanese on November 20-24, 1943, would hardly recognize the areas now.

Big bulldozers have leveled many of the stout pillboxes and scooped coral sand into yawning shell holes and bomb craters. Tree stumps have been pushed aside. The few scattered coconut trees that survived the awful rocking blasts and flying steel have put out new green fronds.

Men stationed here now live in thatched houses and canvas tents and enjoy the luxury of electric lights and running-water showers. True, the water in which they bathe and wash their clothes is brackish, but it is purified. No longer do they dip it from fetid wells or coral rock holes.

### Log Stockade an Officers' Club

A thick log stockade that housed Japanese communications has been converted into an officers' club.

The plane in which I came to the Gilberts landed on this tiny pin point of land—Tarawa—in the wee hours of a black night. It was a routine flight, one of the kind which,

\* See "War Finds Its Way to Gilbert Islands," by Sir Arthur Grimble, in the NATIONAL GEOGRAPHIC MAGAZINE, January, 1943.

† See page 135, and maps of "Pacific Ocean and the Bay of Bengal," supplement to the NATIONAL GEOGRAPHIC MAGAZINE for September, 1943; and "Pacific Ocean—with 75 Island Insets," supplement for December, 1936.

with few heroics, operate daily throughout the vast Pacific area, carrying men, materials, and mail to islands hardly known before the war.†

United States bases here in the Gilberts are becoming stops on the entertainment "circuit." But, thus far, they are still a novelty. The night after my arrival everyone sat through a torrential downpour waiting eagerly for a "personal appearance" show to go on. Many of the fellows huddled under dripping ponchos hadn't seen a white woman for more months than they cared to count.

Enough wreckage and scars still remain on Tarawa, however, to keep you from forgetting the awful fury of battle that churned and burned and ripped the island apart a few months ago.

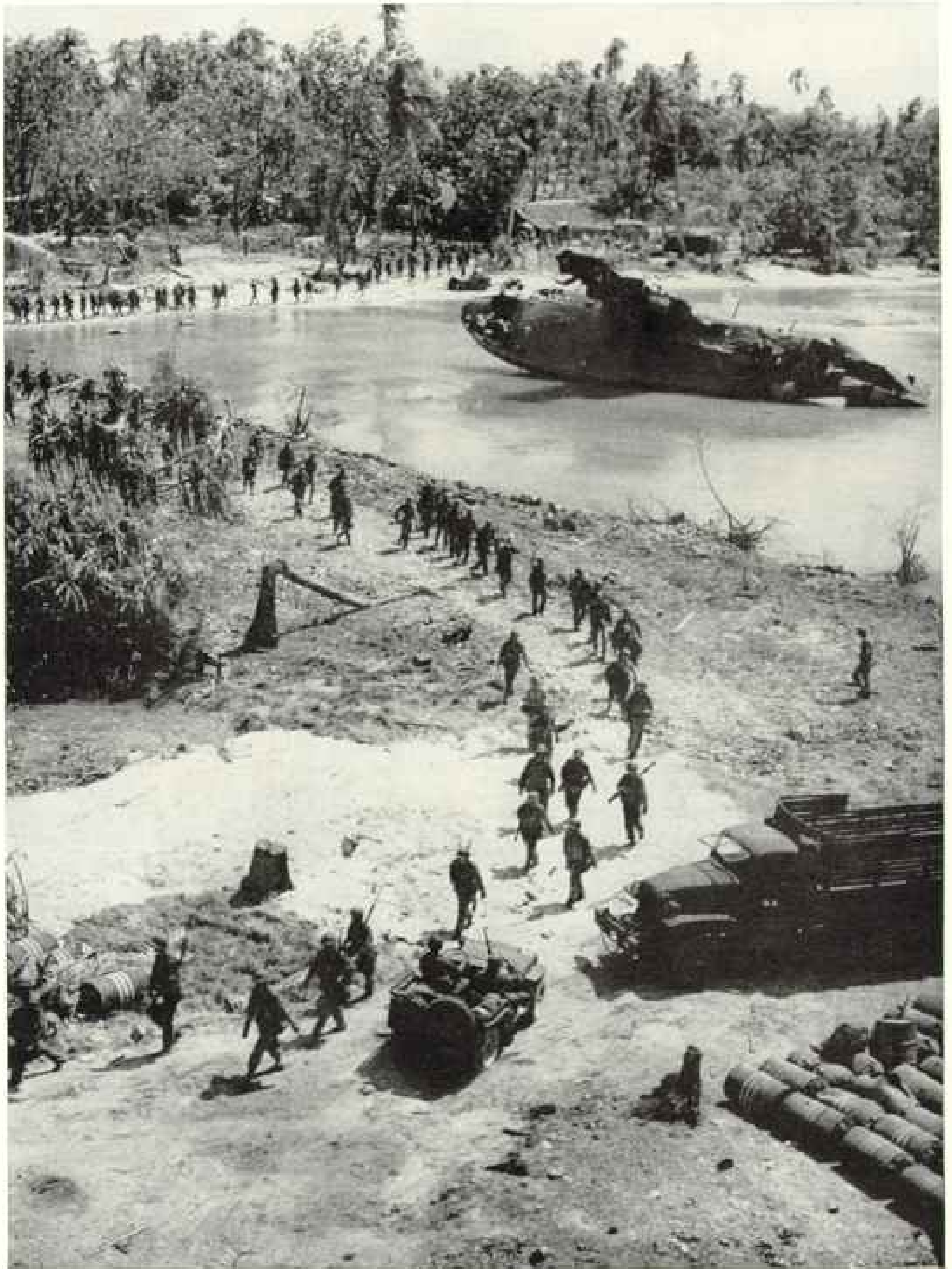
Tiny Betio Island, lying at the southwest corner of Tarawa Atoll, is where the Japanese had concentrated their defenses. It is just over 2 miles long and about 700 yards across at its widest place.

The other islands of the atoll about the wide, deep lagoon are green, green with the massed fronds of coconut trees. Not so Betio.

Probably fewer than a hundred palms remain alive here. The few others left standing are only headless stumps. The island is little more than a naked strip of blinding white coral sand separating sea and sky, so great was the devastation.

Today the American flag flies from the same beheaded palm upon which the first colors were hoisted by the Second Marines after they fought their way ashore (Plate I).

Almost beneath it is one of the several small cemeteries on the island, where stand rows of white crosses above trimly kept mounds of



U. S. Coast Guard, Official

#### Advancing Army Troops Stream Around the Lagoon Shore of Makin

When the Coast Guard cameraman took this photograph, the Japanese had been pushed back to one end of the atoll. In the foreground are barrels of Japanese fuel. Beyond, in the lagoon, is an enemy seaplane, one of several potted like sitting ducks at this seaplane base (page 151).



### Tents and Quonset Huts Cover the Recent Battlefields of Bloody Tarawa

Part of the shell- and bomb-marked surface was leveled to provide an athletic field and open-air theater. The Marines made their first landings on the beach beyond the far tents and along the Japanese pier, extending into the lagoon. At extreme upper left is the stranded Japanese ship used by the enemy as a snipers' nest.

white sand. Here, as at others, has been placed a plaque which reads:

"Here lie Officers and Men of the Second United States Marine Division who fell in action on this atoll November 20-24, 1943.

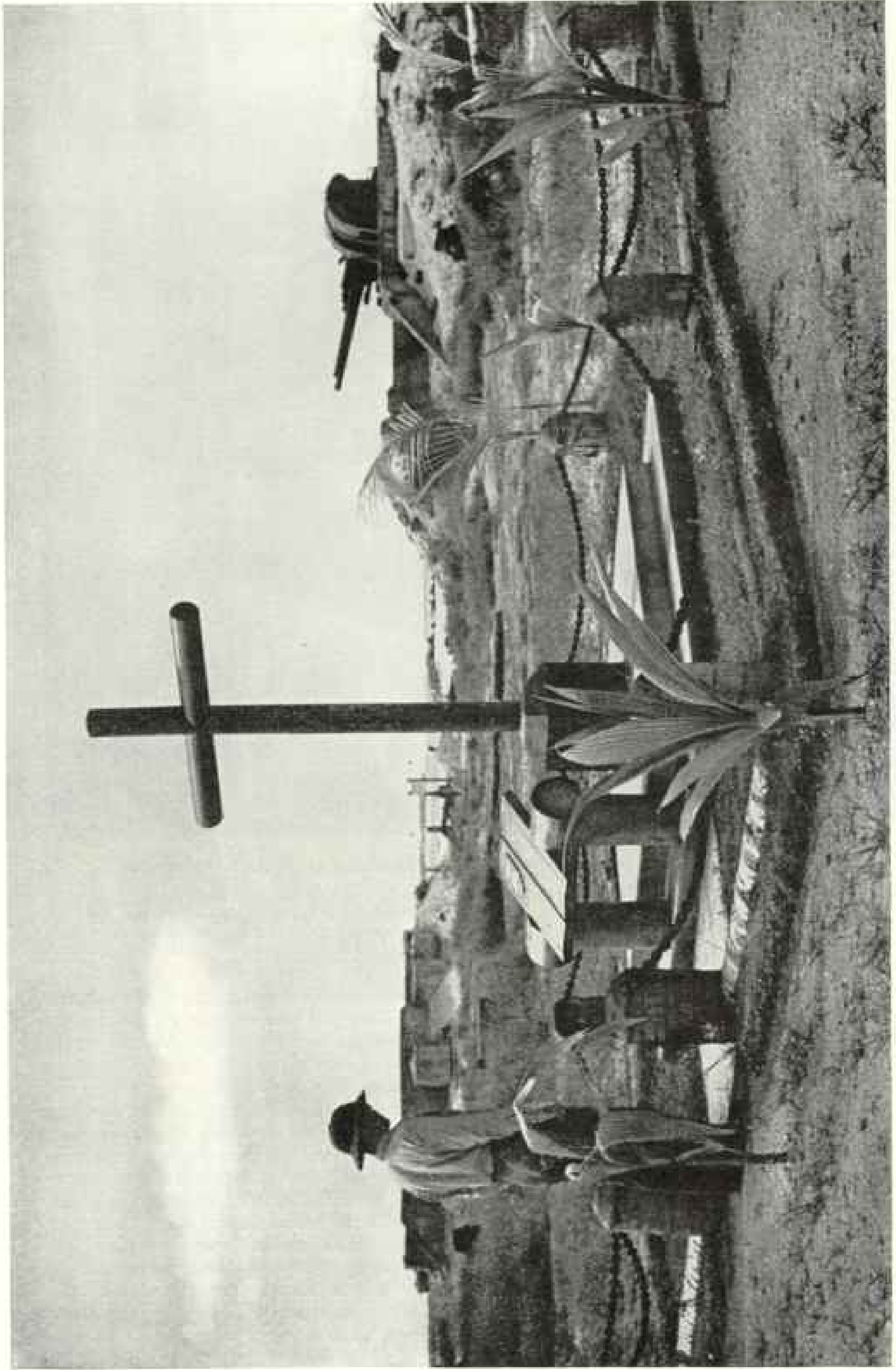
"So there let them rest  
On their sun scoured atoll  
The wind for their watcher  
The waves for their shroud  
Where palm and pandanus  
Shall whisper forever  
A Requiem fitting for  
Heroes so proud."

All around the sea wall are remnants of Japanese positions. Every few yards along its entire perimeter they had set up machine-gun nests, made from coconut logs piled over with sand, which would resist almost anything

except a direct hit or attack by flame thrower and bayonet. These strong points caused heavy damage when our first assault waves stormed the beaches.

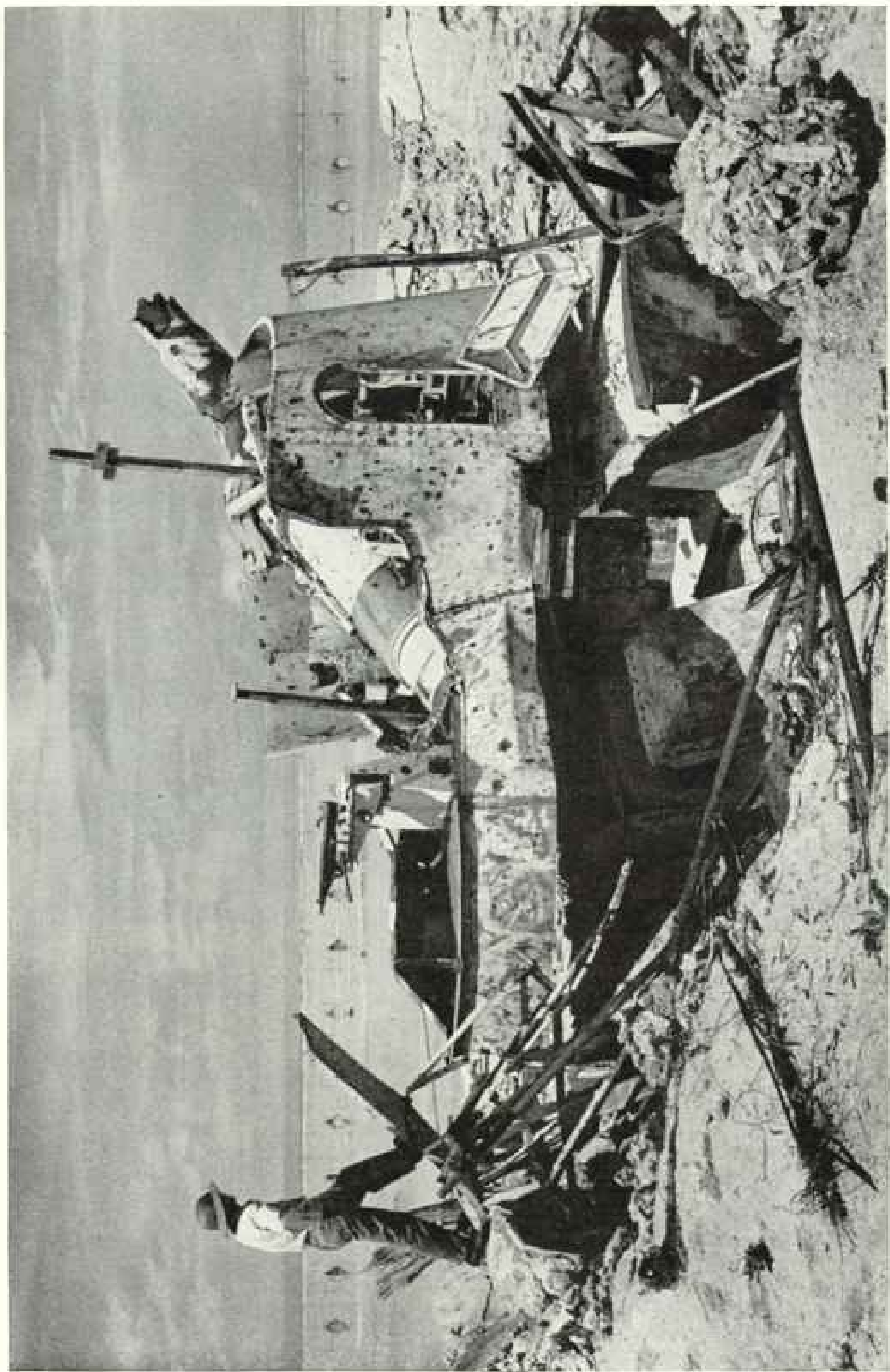
Extending into the lagoon, too, is the old Japanese pier where snipers hid and fired on the Marines as they crossed the coral flats. When the tide is high there is little space beneath this coconut-log structure, yet nearly a month after the battle had ended two Jap stragglers were found hiding there, living on stolen American rations (Plate VII).

This northern beach within the lagoon lies bare for a considerable distance at low tide. Upon it are scattered broken Japanese tanks and some of our own "alligators," or am-tracs, rusting from their daily tidal baths of salt water. Many of the landing barges



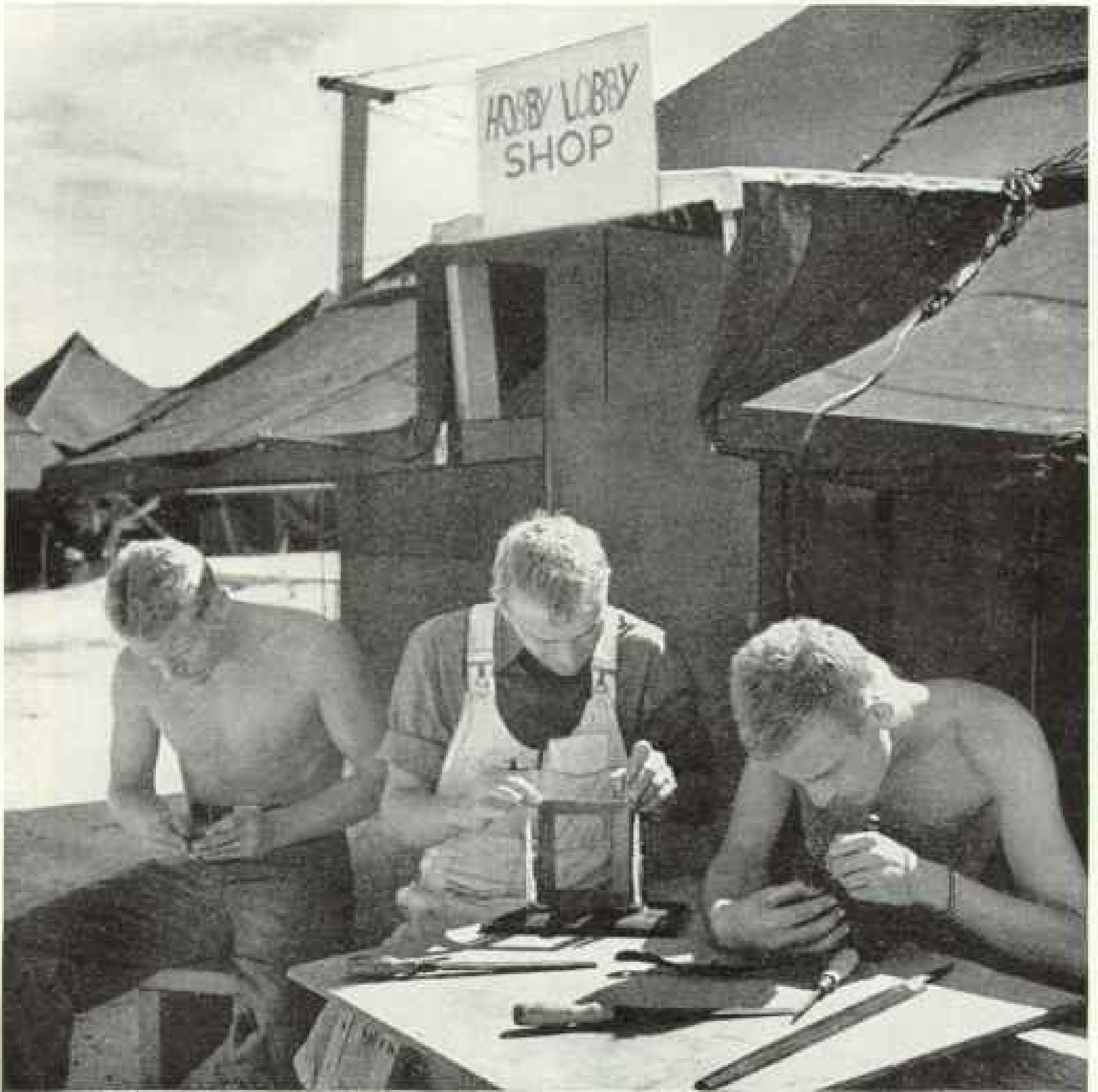
**On the Battle-torn Sands of Tarawa Stands This Memorial to British Subjects Murdered by the Japs**

On October 15, 1942, following a bombing raid on Betio by United States Air Forces, the jittery Japanese shot 22 persons they had captured when the atoll was first occupied. In background neat twin-mount 130-mm. Japanese-designed guns, set up to guard the sea approach. A similar battery stood on the foundation at left.



A Bomb Nipped the Nose of This 8-inch Gun of British Manufacture Set Up by the Japs at Tarawa

A 1,000-pound egg, unloosed from a dive bomber, silenced the big fellow firing on our men and ships. Its barrel is completely broken off. In the water are pyramidal tank traps which the Japanese erected to guard the seaward reef of Betio. Our attack was launched from the lagoon side (page 134).



**"Lobby for Your Hobby If You Will, But Don't Run Off with the Tools!"**

The Seabee Maintenance Unit at Tarawa has set up this tent shop, where its men in off hours can make belt buckles, carve picture frames, devise shell souvenirs, or shine up Japanese trinkets they have found. Tools—not to be taken away—are provided (page 136).

wrecked coming ashore have been dragged up on land and are being reconditioned.

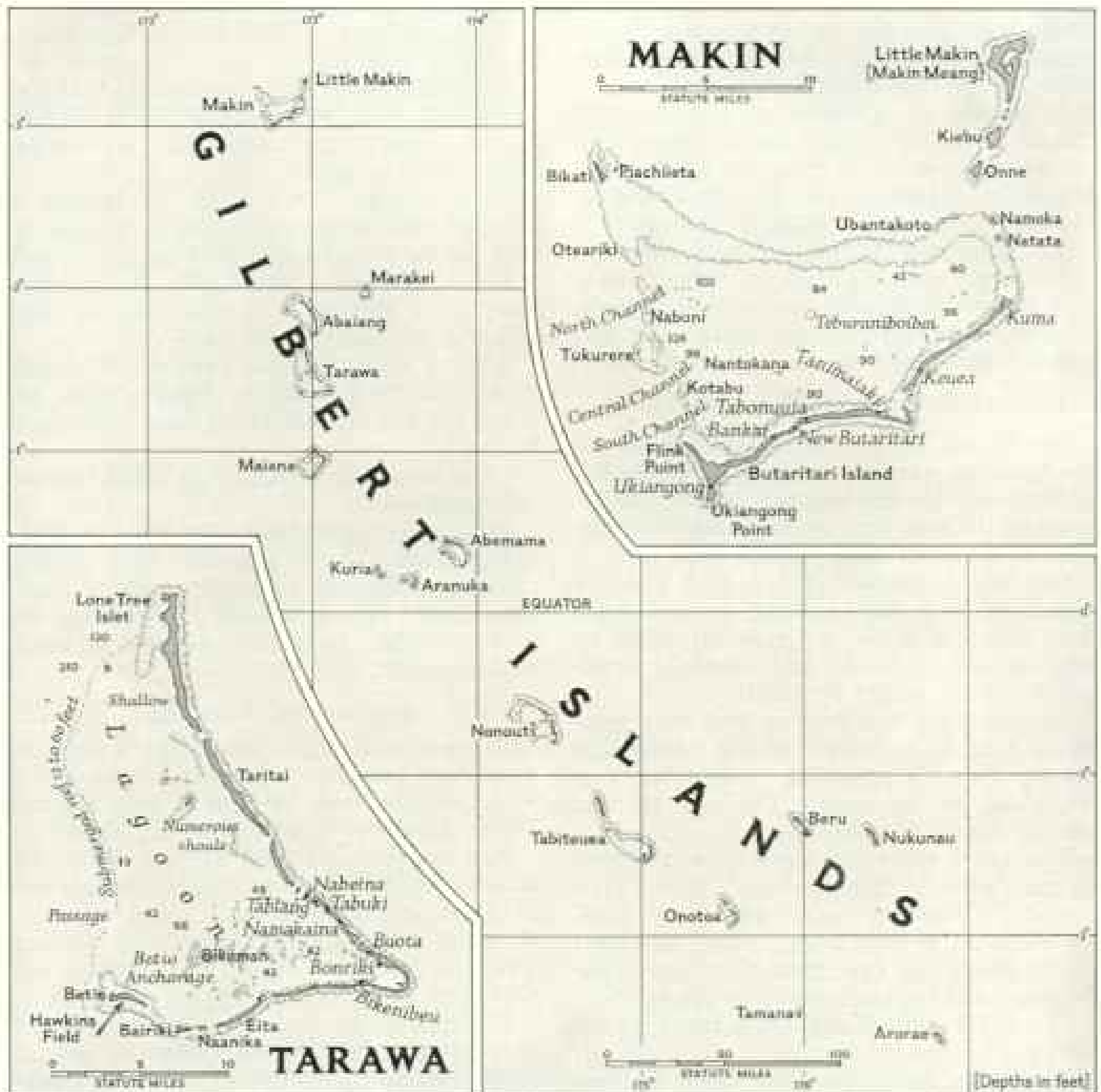
Out on the edge of the coral flats sits the rusting hulk of a stranded Japanese supply ship, which, like the pier, was used as a snipers' nest. Repeatedly, planes and surface ships had to blast the enemy from it, for under the cover of darkness they would wade and swim out with more guns and ammunition.

Look at the antiaircraft guns, the big 8-inch giants set at several places to guard the sea approaches, the twin-barreled 130-mm. Japanese-designed guns, and other armament that the enemy had mounted around the island and you understand why they believed they

could hold this bit of Tarawa against a million Americans (page 132).

But the equipment is broken and twisted and full of holes. The guns that are only slightly damaged had their crews killed by exploding shells and bombs. One big 8-inch gun has its barrel completely broken in two and is cracked in other places, the result of a 1,000-pound bomb loosed on it by a dive bomber (page 133).

Near other 8-inchers at the southwestern corner of the island the magazines are a mass of broken concrete and twisted re-enforcement bars. Direct hits had exploded them with terrific concussion.



**At Tarawa and Makin Japan's Outer Ring of Defenses Was Cracked**

The Second Marine Division stormed and took heavily fortified Betio Island November 20-24, 1943. At the same time the 165th Infantry seized the less strongly held seaplane base at Makin. Previously, on August 17, 1942, Carlson's Raiders went ashore at Makin to destroy its installations and the garrison there. Of the other 14 atolls and islands in the Gilberts only Abemama was guarded by a small force of Japanese.

Blockhouses, thick concrete-protected power plants, and emplacements bear shell holes and dents from the ships taking part in the action.

**Taking Tarawa a Tough Task**

Yes, the taking of Tarawa was a tough, costly task. The Japanese sitting behind their barricades and shielded by powerful weapons thought they could hold it against any attack.

But they failed to reckon with our secret weapon—the tough fighting qualities, or guts if you please, of young American lads who had a job to do, and did it!

How could they reckon with such men as

First Lt. William D. Hawkins, for instance, who, even after having been wounded, carried on to silence several machine-gun nests and to lead in the severe fighting centered around one of the big concrete blockhouses?

He fell during the second day of attack in the area near this thick-walled stronghold, in which was located a power plant and air-raid shelter. For Lieutenant Hawkins the airstrip is named.

Our wounded were safely evacuated to ships. Not so the enemy. It is variously estimated that between 4,000 and 6,000 died in that bellish fury. In their hopeless fight



some held grenades to their own chests; others, aiming their rifle muzzles at their heads, pulled the triggers with their toes.

In gaining the Gilberts we wrote a vivid chapter in the war against the Japanese. With these islands, we could carry the battle to the Marshalls, thence to the Marianas, and to the very heart of the enemy's defenses.\*

Yes, Tarawa is historic and sacred ground.

No longer are the Gilberts forward area. The Japanese remaining on by-passed islands, however, know the viciously sharp sting that bombers based on this island chain still carry.

#### Here Grow Literal "Victory Gardens"

On Tarawa, Makin, and Abemama life for the American garrison forces is becoming settled. Camp life has assumed fair regularity. Some of the men have even set out tiny gardens in the coral sand outside their tents.

One day I bumped into a man joyously munching on a big sandwich he had made from tomatoes of his own growing. With no bees on the island he had carefully cross-pollinated the plants by hand!

Another chap was nursing two little geraniums sent from home. Under camouflage netting I saw a sprawling watermelon vine flourishing in the coral. I'm sure the net was for shade, not concealment!

The usual whimsical signs have appeared on many tents—"Palm Springs," "Ocean View Terrace," "Coconut Park," and many more. On Betio a "Hobby Lobby Shop" has been set up where men can spend their spare time tinkering and making souvenirs (page 134).

"Ye Old Tarawa Hotel" is the name for the section of tents for transients. It gaily advertises bugs, fleas, ants, dirty sheets, and lots of no hot or cold running water! Its register, however, is filled with a remarkable list of names of men who have paused here on trips up and down and across the vast Pacific.

In one Tarawa tent someone in earlier occupancy had chalked these lines:

In here retire by fate,  
Three, noble and great!  
Winter, Meyers, and Stella, too,  
God, what a motley crew!

Someone later had added:

All the boys  
They now have went,  
There's peace and quiet  
In this here tent!

Fishing and lobster hunting attract many of the men. One day I joined a group on a tuna-fishing expedition. We went by boat out beyond the Tarawa reef to fish on the leeward side of Tarawa and near-by Abaiang.

To locate tuna we first had to find birds. Sea birds wheeling in large flocks over the water betray the position of the tuna. As the tunas feed they frighten shoals of small fish to the surface, and from these the darting birds collect a feast.

After cruising for a while we located a flock of these winging fishermen. Almost as soon as we dropped our lines astern we got a strike. It was a nice bonito, not a tuna. They were moving so rapidly that we had difficulty keeping up with them.

After a short time we went off in search of another flock of birds. Again, when we found one and dropped in our lines, we hooked bonito.

"The tuna birds aren't flying today," someone complained.

Many other trips have been more fruitful. Often parties have returned with sizable catches, so that the messes have served fresh tuna steak. Tunas hooked here average 40 to 50 pounds. Some have weighed as much as 85 pounds.

#### Sharks Like Tuna, Too

In these waters you don't play a tuna on a rod for a long time before landing it; otherwise, you are likely to haul in only a head. Sharks have the habit of nabbing them!

Red snappers and other fish are also found in these island waters.† The Gilbertese natives fish in the lagoons and along the reefs at night, using torches made from tied-up fronds of coconut. With long-handled dip nets they scoop up a variety of small fish.

Working in groups of several canoes, the islanders also skirt the outer edges of reefs at night, netting flying fish in the clear torch-lighted waters. Such a procession makes a striking night picture. Flying fish are considered a fine delicacy.

Spiny lobsters, or rather sea crayfish (for they lack the big pincer claws), cousins of those of our Florida waters, come up on the reefs at night. When the tide is low they can be caught by hand in the moonlight or with the aid of a torch.

One night we walked for miles up the outer reef of Tarawa and then waded back through water ranging from ankle to knee depth. It was a long hike! But we scarcely noticed it or the minor discomfort of the broken coral that got in our shoes. The catch was good, and so was the lobster lunch next day!

On the reefs, too, is a strange member of

\* See "Springboards to Tokyo," by Willard Price, in the NATIONAL GEOGRAPHIC MAGAZINE, October, 1944.

† See "Net Results from Oceania," by Walter H. Chute, NATIONAL GEOGRAPHIC MAGAZINE, March, 1941.

## Round About Grim Tarawa

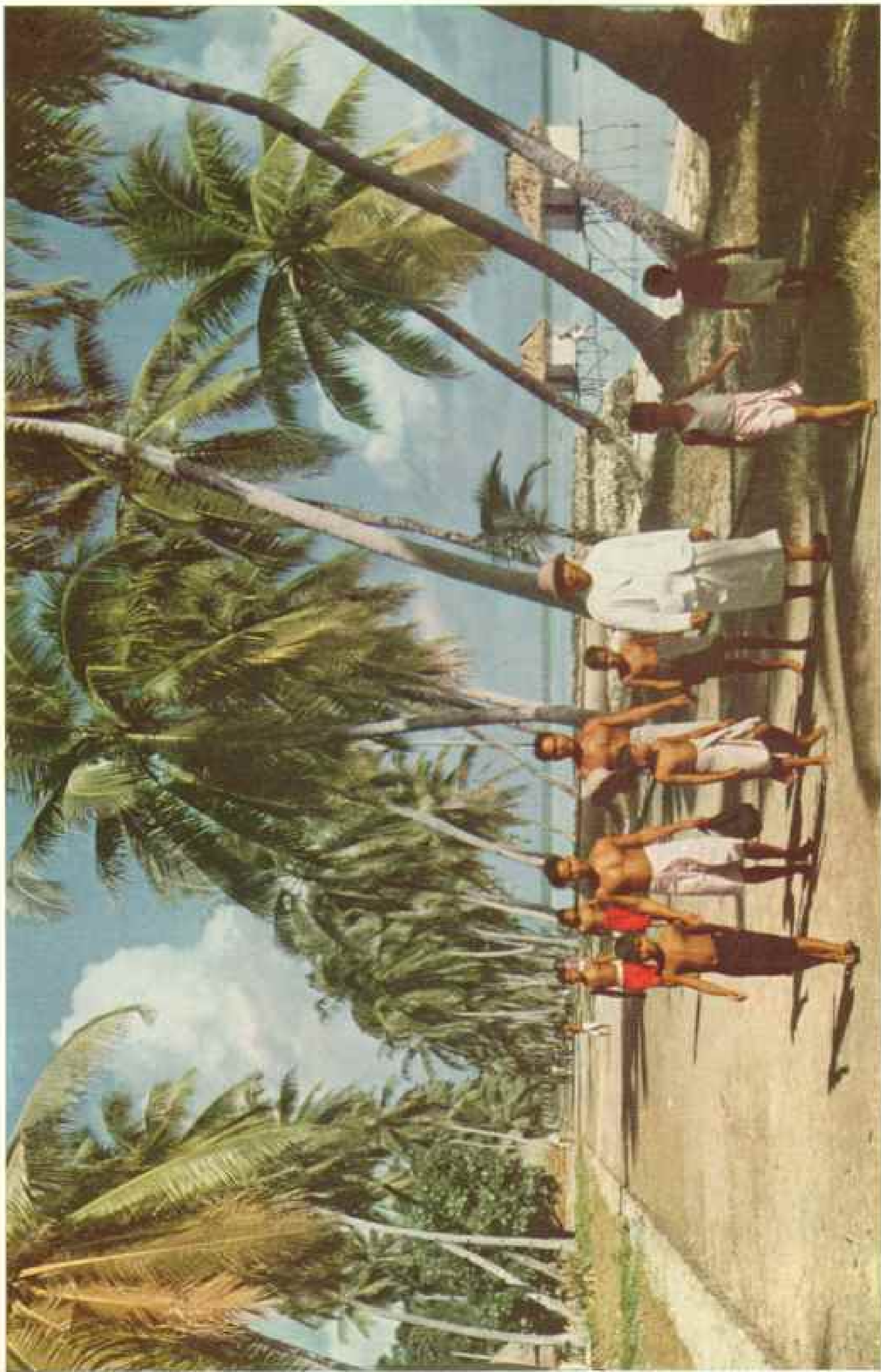


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Kodachrome by W. Robert Moore

### Old Glory Waves from a Beheaded, Shrapnel-torn Palm on Hard-won Tarawa

Here the first colors were raised when the Second Marine Division stormed ashore and took Betio Island, November 20-24, 1943. This area, near the Japanese pier and the beach where our troops first forced a landing, saw some of the toughest fighting. A U. S. Marine cemetery is located between the tent and Quonset hut.



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### Young Gilbertese and a Samoan Pastor Tread Shaded Pathways under the Coconut Trees of Abaiang Atoll

Though lying but 7 miles from Tarawa, this group was untouched by war. Small Japanese patrols came only periodically. Homes are scattered for several miles along this lagoon side. Dr. and Mrs. Hiram Bingham of Boston came here in 1853. Dr. Bingham reduced the Gilbertese tongue to writing.

Enslarhms by W. Robert Moore



© National Geographic Society

**Somewhere in the Gilberts Ground Crews Groom Marine Corsairs for a Strike Against Outlying Jap-held Islands**

Bombs being loaded into their bellies will furnish still more headaches for by-passed enemy garrisons along our island route to Tokyo. Bombs painted on the fuselage above the wing indicate 24 missions. Airstrips are cut through coconut groves and surfaced with hard-packed coral.

Photographs by W. Hobart Mann



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Enslavement by W. Robert Moore

#### Roots of the Elephant-eared Taro Are Bread and Potatoes for the Gilbertese

Throughout the islands, as here at Little Makin, plants tall as a man are grown in pits dug in the rocky coral. As the coral itself affords little sustenance, the watery bottoms are filled with leaf refuse and such dark surface soil as can be collected. Taro root, when cooked, tastes somewhat like potatoes.

## Round About Grim Tarawa



### Gilbertese Play Football, Too, But Theirs Is a Different Game Called "Boiri"

Using a resilient hollow ball woven of coconut leaves, they attempt to keep it in the air by kicking or bouncing it on head or shoulders. Use of hands is barred. Beyond is the *mancaba*, or meetinghouse, of Marakei.



© National Geographic Society

Kodachrome by W. Robert Miles

### A Tiny Dancer at Marakei Entertains a Circle of Playmates

Dressed in a skirt of shredded pandanus, she is trying to imitate some of the dances of her elders. Gilbertese dancing is largely a series of gestured movements of arms and head and glancing of eyes.



© National Geographic Society

Illustration by W. Albert Moore

### As Swift Canoes Race Across Abaiang Lagoon, Crews Stand Ready to Lay Out on Outriggers So Gusts Won't Upset Their Craft

In such double-ended boats Gilbertese journey between island groups and venture far out to sea to fish. When sailing to windward, the canoes are not tacked. Instead, the sail is moved from one end to the other; the bow becomes the stern and the direction of the craft is reversed. When skilful skippers let their canoes heel, thus lifting the outrigger floats above water, their craft attain astonishing speeds; better than 21 miles per hour has been recorded under racing canvas.



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**Navy Men Now Fish off Jap Pier Where Marines Fought Savagely to Win a Foothold on Tarawa**

Scriped at by the enemy hidden in this coconut-log and coral structure and in pillboxes, waves of Marines still forged ashore. In four heroic, historic days, resistance on this heavily fortified island of Betio was beaten down. Here full tide covers the coral flats over which our men and amtracs struggled.

Illustration by W. Robert Mann





**A Hot Set of Tennis on Tarawa**

Temperature under the coconut palms hovers around 90° F. It is even hotter on the glaring, sun-blistered coral court. Yet the men play fast games in off-duty hours. Baseball is popular, too.



© National Geographic Society

Illustrations by W. Robert Moore

**"Rose's Beau" Uses More than a Slingshot to Smack the Japs!**

From the Gilberts, and elsewhere in the Pacific, the 7th Air Force has dealt the Japanese repeated punishing blows.

the shrimp family. It is a mantis shrimp, or stomatopod. Growing to about a foot in length, it has no long legs but possesses oddly jointed and peculiarly shaped claws. These claws remind one of a pocketknife with a jagged blade or a folding comb with curving teeth.

When inactive, these claws are folded up tightly under the animal's head. But with them it can reach out and snare unwary minnows coming within its range.

These queer creatures live in holes some three inches in diameter, which extend down into the coral for several feet. The top of the hole is covered over, save for a tiny aperture.

To catch these *toowaru* the men open the holes, tie a small fish on the end of a flexible stick or vine, and thrust it down into the hole in an attempt to entice the creatures to the surface where they can be captured (page 147).

Before the Japanese went on rampage in the Pacific\* the Gilberts were a little-known group of islands, or chain of atolls, where some 27,000 brown-skinned folk lived on their coconut-covered low coral patches of land.

Britain's flag has flown over these islands since 1892, when a protectorate was proclaimed. Along with the Gilberts, the Ellice Islands to the south, the Phoenix Islands, and Ocean, Fanning, Washington, and Christmas Islands were later formed into one administrative group, with the colony's administrative offices located at Ocean Island.

But native life in the Gilberts went much its own way, save for the general over-all supervision by a resident commissioner. Native magistrates and village headmen controlled most of the local government of the islands.

Tarawa, itself made up of a series of islets on a reef shaped like a triangle, was the main center of the Gilbert chain. Government headquarters, shipping companies, and the Government hospital were situated on Betio. King George V School was located on the adjacent island of Bairiki.

#### Jap Flag Runs Up on Christmas Day

But two days after Pearl Harbor (Dec. 10, Gilbert time) war came to upset the peace that had long prevailed here. On their first call the Japanese set up a pole of annexation, and on Christmas day returned to hoist their flag.

Though they returned to announce the inclusion of the Gilberts with the Marshalls in their administrative sphere, they did not garrison and begin fortifying Tarawa until the following September.

On the other islands in the group, except

Makin and Abemama, they paid only occasional calls, but ordered the native and missionary teachers not to teach English.

Makin was not heavily garrisoned until after Carlson's Raiders crept ashore on August 17, 1942, and liquidated virtually all the Japanese forces there.

But fortify the area they did, as we were to learn. On Tarawa, Makin, and Abemama they moved native villages, forced the island menfolk to labor for them, and cut coconut logs to build the pillboxes and airplane revetments.

On some of the islets of Tarawa one still sees quantities of logs that were cut, but which the Japanese had not had time to move into position. In one coconut grove is a wide seared patch strewn with burned and bulging oil drums. The enemy had labored to build up the fuel dump, only to have it fired when we attacked.

During the period of Japanese occupancy of the Gilberts, the island inhabitants were cut off from all supplies. The Japanese were either unprepared, or too busy land grabbing, to supply any local needs.

As coconuts, taro, and fish are virtually all that the islands can produce, the Gilbertese were glad when American forces came, bringing them medicines and limited food supplies.

Lacking cloth, many had turned again to traditional ways of making clothing from finely woven mats and shredded coconut leaves (Plates IX and XIII). You should see the number of skivvy shirts being worn now!

In all, there are 16 island groups in the Gilbert chain. From Arorae in the southeast to Little Makin at the northern end, the Gilberts extend in an arc for some 500 miles. They lie almost perfectly balanced across the Equator.

Some are islands; others are true atolls with big reefs enclosing a wide lagoon. The reefs themselves vary considerably. Some areas are entirely under water; others are exposed only at low tide; still other portions are built up into islands large and small.

The lagoons likewise differ. Tarawa's is open and deep, as is that at Makin. Marakei's is virtually enclosed. Sizable craft can sail into the deeper ones, but others are shallow and entirely reef-locked.

Fly over the island chain and you see a striking picture of variety and form.

And the color! Even the color gradation of the coconut trees and pandanus alters as you

\* See "Japan and the Pacific," by Joseph C. Grew, in NATIONAL GEOGRAPHIC MAGAZINE, April, 1944; and "Hidden Key to the Pacific," by Willard Price, June, 1942.



#### Gilbertese Boys Take Quickly to Driving Jeeps

Until war came with its mechanized equipment, many islanders had never seen a wheeled vehicle. Now they make excellent truck drivers. These men operate the jeep of Maj. F. G. L. Holland, British District Commissioner on Abemama.

fly southward over the Gilberts. In the north trees are rich green because of abundant rains. Southward, they take on a golden tone because of the drier climate. Periodically the southern islands are subject to severe droughts. Coconuts have been imported for the natives.

It is the water, however, that has spectacular, unbelievable hues. Surrounding the gleaming white beaches are waters of pale green, vivid green; light blues, electric blues, all tones of blue, extending to that deep intense blue which appears almost black.

On reef strips and within the lagoons there are circles and patches of browns, yellows, greens, and blues, all caused by the varying depths of the coral and sand patches below the surface. They look as if someone had dropped varicolored dyes into the water and then failed to stir it.

#### A Butter Ship Becomes a Mine Sweeper

Besides looking at the Gilberts from the air, I was also fortunate in visiting a number of the islands by ship. The British Resident Commissioner, Col. V. Fox-Strangways, was paying a call to the northern Gilberts and invited me to go along.

We sailed at dawn from Tarawa on a small

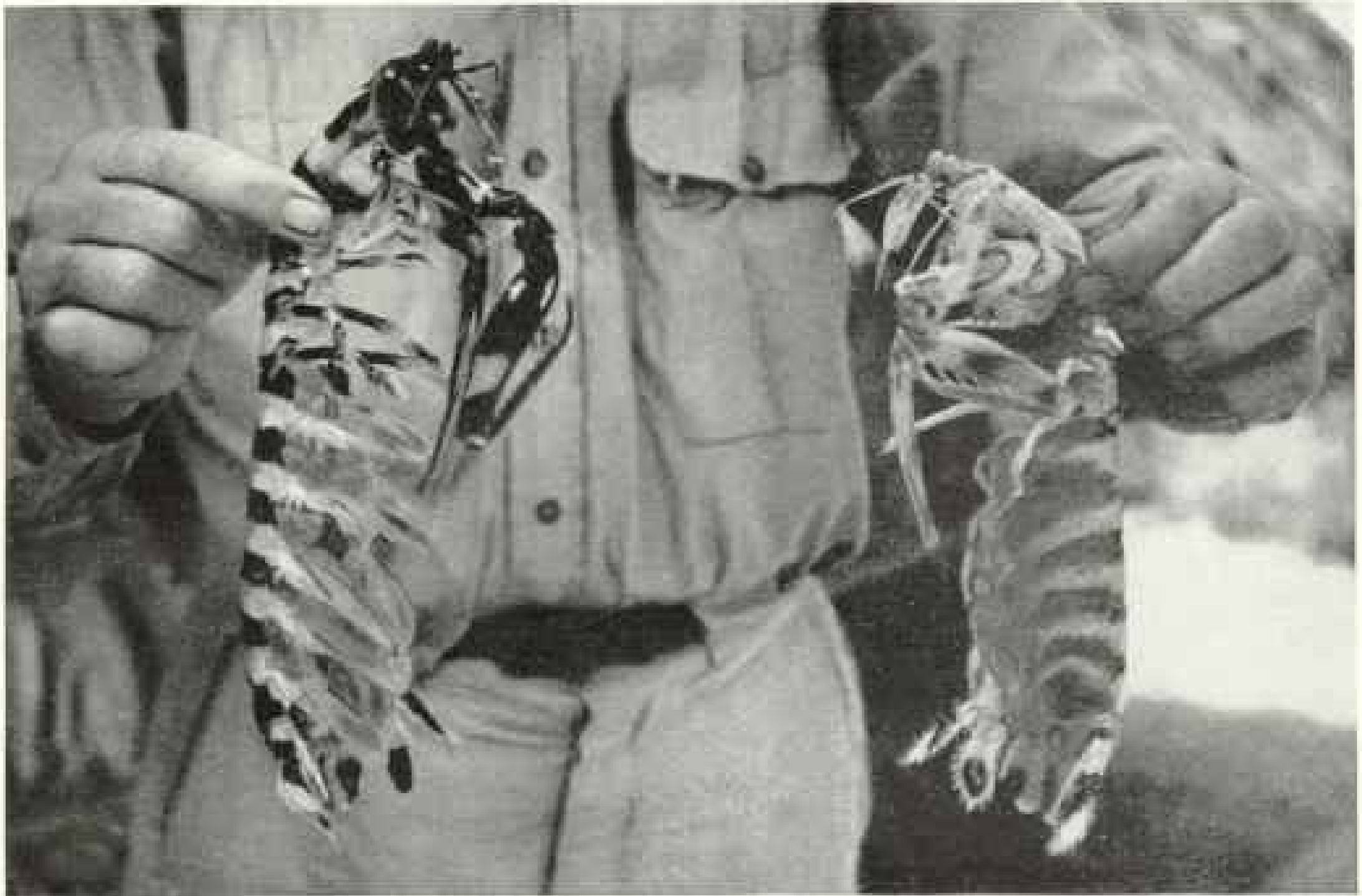
New Zealand ship which had seen service first as a coastal vessel, carrying butter and other produce between New Zealand ports. When war came, she was converted into a mine sweeper, and now has been reconverted for special duty.

It was a short run to Abaiang, which lies but a few miles north of Tarawa. The lagoon entrance of Abaiang is narrow and the lagoon itself filled with coral patches. We had to loaf about and wait to enter after the sun swung overhead to a position where the color patches of shallow areas were easily visible.

Abaiang villagers had gathered along the shore to greet the Commissioner as he went ashore with the local magistrate in a native canoe. I followed in another frail-looking craft.

Gilbertese outrigger canoes are masterpieces of construction. On them in a good breeze you have the nearest sensation to flying that you can get, except possibly on a light iceboat under full speed (Plate VI).

Hulls of these craft are made of thin wood, with pieces carefully fitted together and secured in place by twisted coconut-fiber cord. There isn't a bolt, screw, or nail in the whole structure. The outrigger framework is likewise lashed in place.



#### Mantis Shrimp Caught on Tarawa Reef

This strange creature gets its name from the praying mantis, which it seems to resemble about the head and in the way it folds its jackknife claws. The stomatopod breathes through transparent gills on its thick body. It is edible but difficult to catch in deep holes of the reef (page 145).

The hulls are extremely narrow for their length. A 20-foot canoe will be no more than two feet wide. Sides are not symmetrical, the side opposite the outrigger being flatter than the other.

Canoes are always sailed with the outrigger to the windward. As the craft cannot be tacked in the wind, the sprit of the triangular sail is moved from one end of the boat to the other. The canoe's direction is thus completely reversed; the stern becomes the bow.

For a landlubber like myself to explain it, sailing these canoes may sound complicated. But, in Gilbertese hands, these light craft are speedy, graceful things that seem almost alive. In a good breeze they'll log 15 to 20 knots, and the outrigger often rides well clear of the water.

While the Resident Commissioner sat in the community meetinghouse, *maneaba*, exchanging greetings with the local officials and later inspecting the hospital and police force, I explored the island.

Two young Boy Scouts who spoke excellent English were my guides. We walked miles. When a heavy shower blew up they cut gigantic taro leaves to serve as umbrellas.

Both taro and coconuts are island staples.

Besides furnishing food and toddy (fermented sap tapped from the unexpanded flower), coconuts in peacetime provided the main export—copra. The trees grow readily in the coral sand. The only trouble is that the islanders plant them too thickly for maximum production.

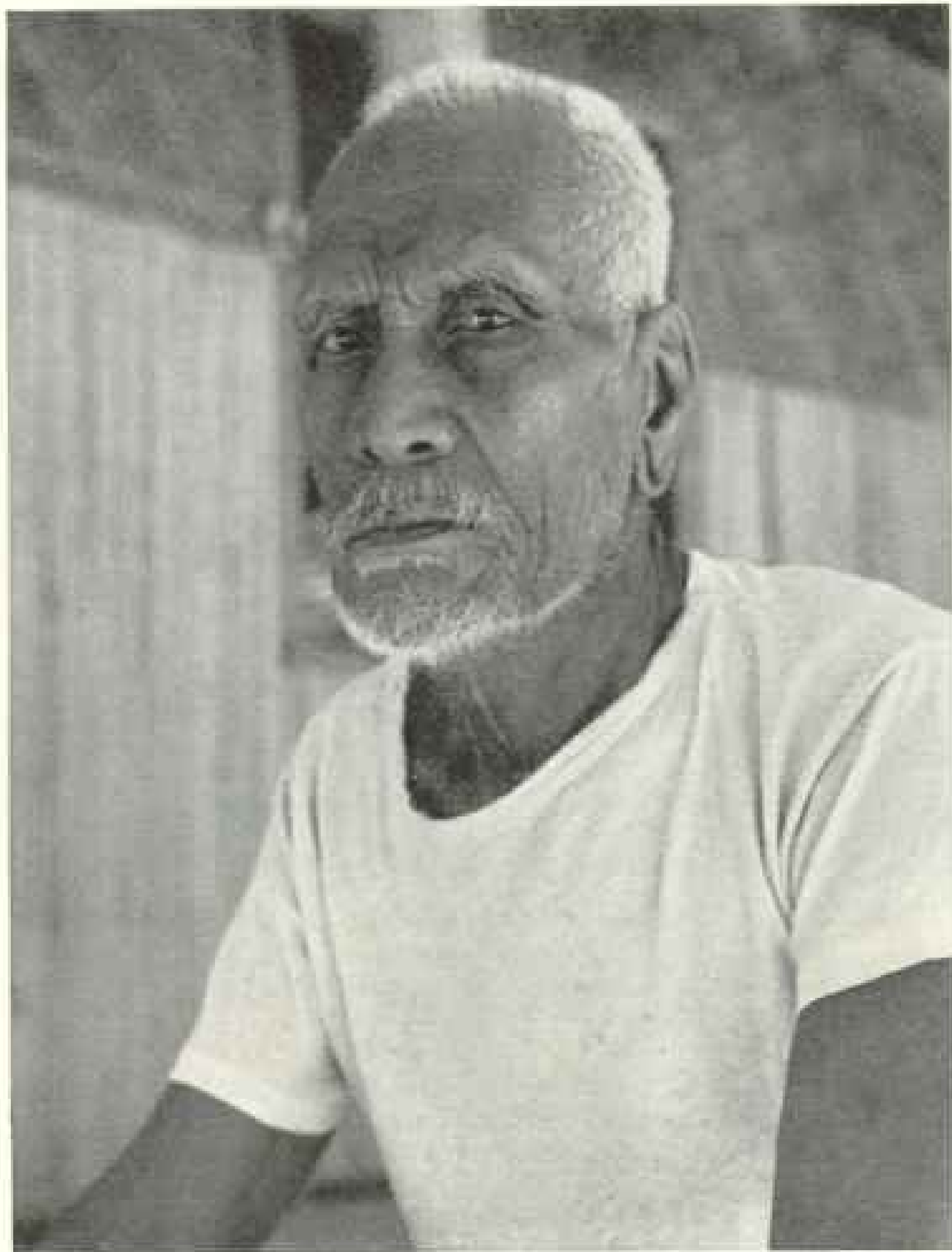
#### Soil Rare on Atolls

Taro growing requires more care. The people dig pits in the hard coral to the depth of several feet, reaching down to water level. Soil (a rare commodity indeed on all the islands) and leaf trash are then put in to provide root support and nourishment (Plate IV).

Once properly planted, the taro roots grow to tremendous size, as do the leaves. At one home I saw sections of roots that looked almost like pieces of coconut-palm trunk.

In village homes we watched women weaving soft pliable mats and baskets from coconut and pandanus leaves. Some of the work is remarkably well done.

A number of brown-skinned youngsters clinging closely to their mothers regarded us shyly while continuing to munch ripe pandanus fruit. The pandanus produces a large



**"Loveliest Animal on Abemama" Stevenson Called "Te Kop"**

When Mr. Moore visited the atoll he met this venerable islander, Tekabu, who remembered Robert Louis Stevenson's visit some 55 years ago (page 152). The famous author devoted several chapters in his book, *In the South Seas*, to Abemama, "land of the moonlight."

seed cluster, often the size of a basketball. When ripened, it can be separated into sections. The orange-yellow portion near the base of each section is eaten. Its flavor somewhat resembles pineapple (Plate XIII).

In the church near the London Missionary Society school the boys showed me a framed photograph of Dr. and Mrs. Hiram Bingham, noted early missionaries to Abaiang. They came from Boston in 1857.

During his stay Dr. Bingham reduced the Gilbertese speech to writing, translated the Bible, and wrote a dictionary of the language. He captured the Gilbertese language at its best. His translation of the Bible is a treasurehouse of Gilbertese vernacular diction.

At nighttime, with members of the crew of the vessel, we attended a ceremonial dance in the maneaba. It was a feast to the eyes to watch the old men in their traditional stylized performances. In some dances grass-skirted women played lead roles.

**A Dramatic Gilbertese Dance**

Gilbertese dancing, unlike the Polynesian associated with Samoa\* and elsewhere, has comparatively little movement of the feet and bodies. The main action is with arms, hands, heads, and eyes (Plate V).

The feeble illumination of a single light heightened the dramatic quality of the performance. Somewhere in the dim background a chorus and a single drummer pounding on a box kept the cadence.

The rhythm started slowly, then singing increased in tempo and volume. There were a postured movement of arms, fluttering fingers, and expressive tilt of head and glancing of eyes.

The dancers moved forward, retreated, and moved forward again. Song and gestures ever quickened until suddenly they reached a climax in an exalted shout or clapping of hands.

Then the same performance, or a similar one, was repeated.

Dance followed dance for hours. Hundreds of youngsters and grownups squatted on mats encircling the dancers. When interest waned or someone got tired, he just stretched out and relaxed. Many youngsters slept. For refresh-

\* See "Samoa—South Sea Outpost of the U. S. Navy," 20 illustrations from photographs by Truman Bailey, in the NATIONAL GEOGRAPHIC MAGAZINE, May, 1941.

ment we drank coconut water from freshly opened shells.

Crew members showed their appreciation of the entertainment by singing "In the Evening by the Moonlight," "Aloha, Sweetheart" (with gestures), and the "Maori Battalion Song," much to the enjoyment of the villagers.

By starlight we returned to our ship.

Next morning, as we still lay in the lagoon waiting for suitable light to steam out through the coral shoals, outrigger canoes darted back and forth. A stiff breeze in taut sails was putting them through their best paces.

In open sea, beyond the reef, we saw nearly a dozen of the craft riding in from fishing grounds with shortened sail.

We rolled and pitched to Marakei, 20 miles away.

#### Ashore on Marakei

At Marakei the ship had to drift to the leeward side of the island, outside the reef. The lagoon has only two shallow passages that can be waded across in low tide. The atoll is an almost continuous strip of land encircling a wide central pool.

I went ashore in an outrigger after the colonel had been piped over the side and had stood long at attention on the sun-blistered beach while a mission school band played "God Save the King"—two verses!

As soon as I touched the beach I acquired a large assemblage of youngsters who followed me on my picture-taking expedition. I fear I upset the colonel's program, as everywhere I went with my Pied-Piper entourage I unwittingly crossed the path of his inspection tour.

But I had a good time on this trim little island, with its cleanly swept coral streets and rows of thatched houses.



#### A Young Abemaman Sets a New Hat Style

He wears part of a discarded U. S. Navy gas mask on his shaved head. His suit is an oversize skivvy shirt. Intent upon watching his elders and some American officers, he forgets to munch on the pandanus fruit in his hand.

In Marakei the dress of the women is particularly attractive. Most of them wore skirts and tops made from shredded coconut or pandanus leaves. Some of the pieces with which many of the women covered the upper parts of their bodies were beautifully woven and patterned in differently dyed strands. Skirts, too, are carefully made.

Catholic sisters on the island were largely responsible for the adoption of this costume, which seems particularly fitting to the island people. It is but a slight modification of ancient dress, which was revived because of lack of cloth during this wartime isolation. Schoolgirls under the sisters' care began making them, and the rest of the island women have followed (page 150).



#### Shredded and Woven Coconut-leaf Dresses Are Wartime Styles on Marakei

Schoolgirls, under the direction of Roman Catholic sisters, designed these two-piece costumes when cloth was no longer available. Other women in the village followed suit. The costumes are similar to those worn long ago. Young men peering over the girls' heads wear soft pandanus mats (page 149).

Here and at other islands, though British officers had not been there for some two years, the normal government had gone on functioning. When officials come back, they find the people presenting few problems for official action other than those which have arisen from necessary neglect and lack of supplies.

Marakei suffered mainly from lack of medicines. Atabrine and sulfa drugs supplied by United States forces have since saved many youngsters. Though the Japanese had hindered the villagers little, they had done nothing to help them.

#### Off for Little Makin

We sailed at dusk for Little Makin, northernmost island of the Gilberts.

Next morning between thick rain squalls we caught glimpses of big Makin, or Butaritari, and soon arrived at Little Makin.

Here again we had to lie off the outer reef, as Little Makin is an island with only a few ponds in its center. We rode ashore in a canoe which showed remarkable bursts of speed. I kept my eye on the lifted outrigger!

Though tiny, the island appears prosperous.

Here, where rains are plentiful, vegetation is more abundant. And when we left, our canoe was loaded with coconuts, papayas, eggs, and a hand-tied crate filled with chickens!

While on Little Makin I called on the "king." Here lives one of the last of the chiefs of the Gilberts. His power has declined, but he still holds some influence over Little Makin and adjacent Makin, or Butaritari.

He lives in a small frame house, a distinguishing feature in itself, as the other islanders have open, thatched structures. We smoked, exchanged greetings, and talked about his island people.

Historically the inhabitants of the Gilberts have an interesting background. Ethnologists, piecing together their story, believe the first dwellers on the islands were black-skinned and had curly hair, flat noses, and big ears.

In the early centuries of the Christian Era, however, a larger, lighter-skinned people from the Celebes\* region swept into the islands.

\* See "Seafarers of South Celebes," by G. E. P. Collins, in the NATIONAL GEOGRAPHIC MAGAZINE, JANUARY, 1944; and "Celebes: New Man's Land of the Indies," by Maynard Owen Williams, July, 1940.

Some stayed to fuse with the original Melanesian folk, while others moved down through the Gilbert and Ellice Islands to Samoa.

About the 13th century they were thrown out of Samoa and backtracked up the route whence they had first come. Here they fought for homes against their distant relatives they had left behind on their southward migration.

The present Gilbertese thus are of mixed Melanesian-Polynesian stock and have fairly dark-brown skins. They are considerably darker than the Ellice Islanders, who were subjected to a further invasion of lighter-skinned peoples.

In the southern Gilberts the inhabitants developed a somewhat democratic form of government, while those in the north leaned more to monarchical rule.

Many of the Gilbertese, though of only medium stature, are superb specimens of physical development. Numerous times in getting to and from an outrigger canoe and shore, one of the men would saddle my 200 pounds on his brawny shoulders and carry me through the water over the sharp coral.

#### Once Prey to "Blackbirders"

During the latter half of the 19th century, many of the Gilbertese menfolk were prey to "blackbirders" who carried them off to forced labor in Central America.

From Little Makin we made the short cruise to the lagoon at Makin. The atoll is also called Butaritari, as was the small village located on its shores. Here, as at Tarawa, the Japanese had set up garrisons with the idea of staying.

But they were due for a surprise. When Carlson's Raiders came by submarine to land on the island, August 17, 1942, they wiped out the Japanese garrison almost to the last man.

On November 20, 1943, American forces in amtracs swept ashore again in an attack synchronized with the assault on Tarawa. To the 165th Infantry of the 27th Division fell the task of clearing the Japs from the atoll (page 130).

Here was no such fight as the 2d Marines met at Tarawa, for the enemy had not garrisoned it nearly so strongly. Parts of the island are pockmarked with bomb and shell holes, and many of the coconut trees have been shorn away.

From the air the main island of Makin looks like a green crooked crutch, its tip pointed in a northeasterly direction. On the long narrow area above the wide shoulder portion of this crutch was the village of Butaritari. Around this, after moving the villagers, the Japs concentrated their defenses (Plate IX).

On either side of the area they dug deep tank-trap ditches across the island and liberally sprinkled the place with protective pill-boxes and guns. United States forces first landed on either side of Ukiangong Point (the southern part of the shoulder piece of the crutch), where they met with little resistance.

Thus the Japanese were pulled from their fixed positions to meet our attack as the men moved inland. Our amtracs then came ashore right over the coral flats within the lagoon. They struck *between* the tank traps, thus flanking those barriers.

By the third day the word "Makin taken" was flashed, though fighting continued up the island until December 13, before the last snipers were finally rounded up.

While rifles still cracked, bulldozers began knocking down coconut trees and filling in taro pits to build the airstrip. On December 11 the first plane landed on this coral runway, which had been begun only 17 days before. It is revealing no military secret to mention this airfield. The Japanese in the Marshalls found out far more than they wished to know of its existence!

There is still a litter of junk scattered around Makin to tell of the fighting. Part of a big Jap "Emily" seaplane lies on the flats near the pier. It is one of several that were picked off like sitting ducks, for the enemy had used this lagoon as a seaplane base (page 130).

Coconut-log shelters are all about. Some belonged to the Japanese; others are ours, as the Nipponese bombers came down from the Marshalls repeatedly to bomb the area. They struck 28 times between the time we took the island and their last visit on January 18, 1944.

Our Army forces stationed on Makin today protest that life is rather dull now. Nurses with whom I talked in the hospital say they have but little to do. In off-duty hours they knit, read, and hunt for shells on the reef.

But planes perpetually roar about the runways and most men seem to be busy.

#### Radio Helps Morale

For such idle time as they may have on their hands, they can flick a radio switch and listen to Radio Makin, WXLH, the American Expeditionary Station, which, with WXLF in Tarawa, fills the air waves with music, news, and entertainment. That is, provided a few Jap parts and other stray salvaged bits built into the senders don't go haywire (Plate XII).

I found the boys at Makin Station busily sorting "platters" (disk recordings), writing gag commercials, and putting their programs together. Sound effects are improvised on



a typewriter and an odd assemblage of junk.

Listening in at odd hours, you may hear "Coconut Capers—Sponsored by Island Brand Coconut Co.," a "Date with Betty" program put on by one of the nurses; or request tunes played for the benefit of Mouseyville, Coconut Park, The Sad Sacks, or others.

In the pauses between recordings you may also hear extolled the virtues of Putrid-X Vitamin Tablets, the bargain in possessing an Army rifle, or the benefit of using GI soap!

There's also a Butaritari Breakfast Club which meets in Donald's Diner and is sponsored by the screwy Butaritari Chamber of Commerce. The program makes about as much sense as trying to fry dehydrated eggs sunny side up. But it provides morale-building mirth.

The alleged "romantic lure" of a moonlit, palm-fringed South Pacific isle has come down to us through generations of poets, singers, and fiction writers. However, it is a vastly different picture to lonesome, and often homesick, lads when the battle is won and they settle down for seemingly endless months of garrison duty on blistering hot and humid coral dots.

Entertainment of any sort, to relieve the deadly monotony of sweating it out, is as necessary to morale as food and tobacco.

#### Fish Traps Viewed from Aloft

From Makin I flew back down to Tarawa and on to Abemama. Cruising over the islands, we saw many of the big, heart-shaped fish traps along the reefs. Islanders pile up coral stone walls into big pens, which are shaped like a heart. In these many fish are captured as the tide recedes.

Abemama is perhaps the nearest approach to the picturesque South Sea Island of romance that you could find anywhere. It is not South Seas, however, as it is about 20 miles north of the Equator!

At the palm-shaded camp where our forces are located, two big arrows have been tacked up on coconut trees. One reads (in nautical miles): "San Francisco 4,120 miles." The other is marked: "Tokyo 2,940 miles."

Abemama means "land of moonlight." And, under the light of the "ineffable brightness of the moon," of which Robert Louis Stevenson wrote, I saw this atoll. But I saw it also in the hard light and shadow of the blazing tropic sun.

In 1889 Stevenson spent some time at Abemama and at Makin and has several chapters in his book *In the South Seas* devoted to their description and to his experiences on these islands.

Here on Abemama, beside a lovely strip of beach, he met Te Kop, the young Gilbertese youth who wore "a fine mat and garland" and was the "loveliest animal in Apemama" (Abemama).

Each made a strong impression on the other. In the ecstasy of the moment, Te Kop kept repeating, "Good night! Good wind!" Then before they parted they exchanged names, as the ultimate expression of lasting friendship.

I, too, met Te Kop.

He is an old man now—in his seventies; even so, you can see that he once possessed a fine figure. Actually his name is Tekabu, but he still likes to be known informally as Robert (page 148).

#### Te Kop Recalls Stevenson

With Maj. F. G. L. Holland, former headmaster at King George V School who escaped from the Japanese at Tarawa and now has come to Abemama as District Commissioner, I talked with Tekabu.

The keen-eyed old man, with a bit of white stubble on his chin, told of his meeting and friendship with Stevenson. His account was almost identical with that which Stevenson penned years ago.

When Major Holland began questioning Tekabu closely on Stevenson's home and his cook, the old man looked up, laughed quietly, and shyly remarked: "But you know more than I do. You can get it from a book. I have only my memory to tell me."

Stevenson also records that he heard beautiful soft voices in the bush.

Visualizing them as originating with comely young maidens, he parted the bushes, to see "a pair of all too solid ladies" squatting there, smoking clay pipes.

I know his feeling! Women do not stay beautiful long in these tropic islands.

But soft-spoken they are. This is particularly true in Abemama. Due in part perhaps to the fact that the island was long ruled by rather severe kings, the people are milder in disposition and quieter in speech than elsewhere.

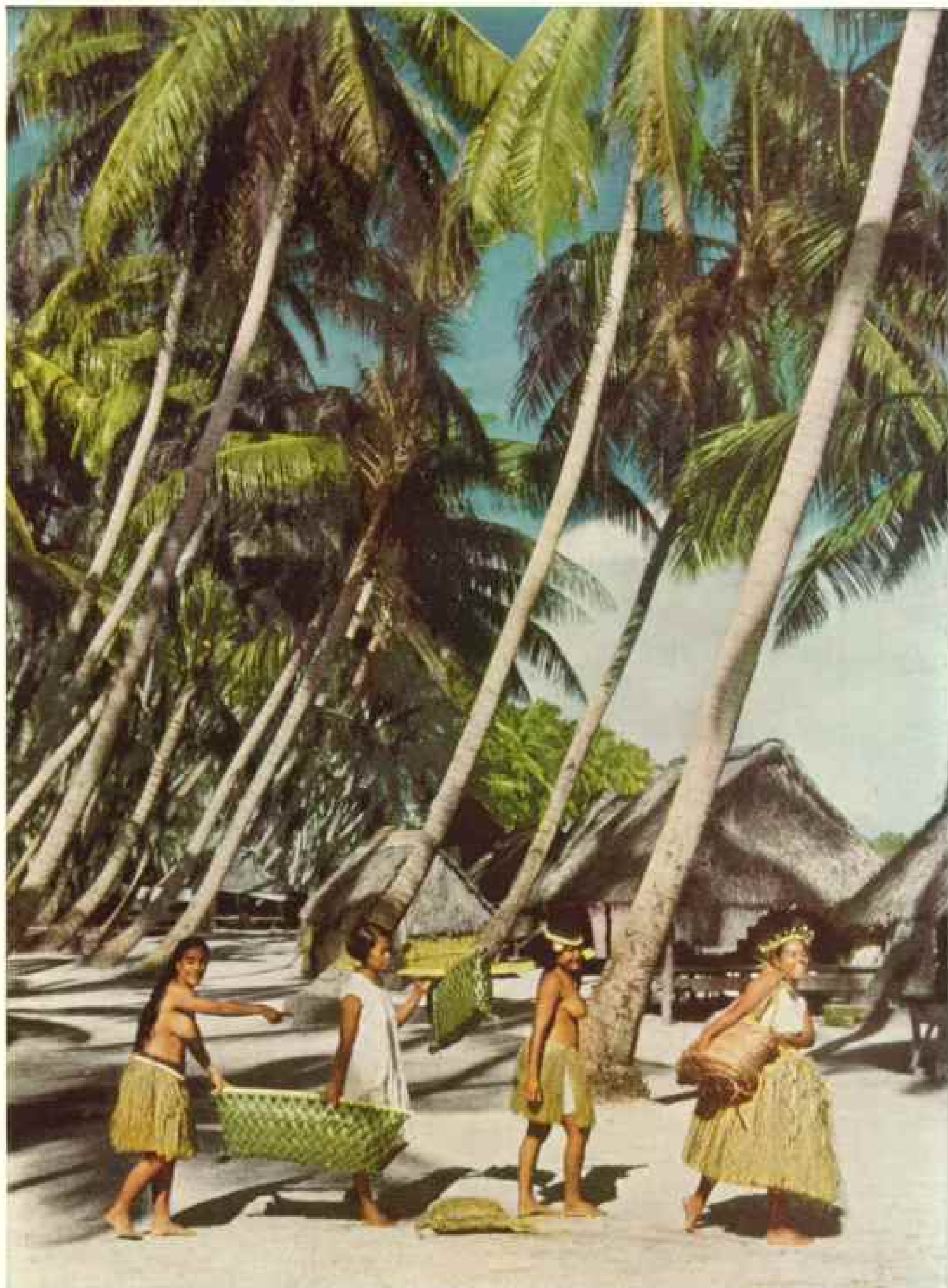
An old native proverb expresses it thus: "A slave shouted and I laughed; a chief whispered and I swooned."

#### Don't Point, Except with Your Nose!

The custom of keeping the head below that of the chiefs has become decadent here only in recent years. To point with the fingers was bad manners. Islanders turned their heads and pointed with their noses.

With the coming of American forces, however, some of the youths have learned to use

## Round About Grim Tarawa



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### Beneath Palms Bent by the Prevailing Winds, Makin Belles Carry Fruit Home

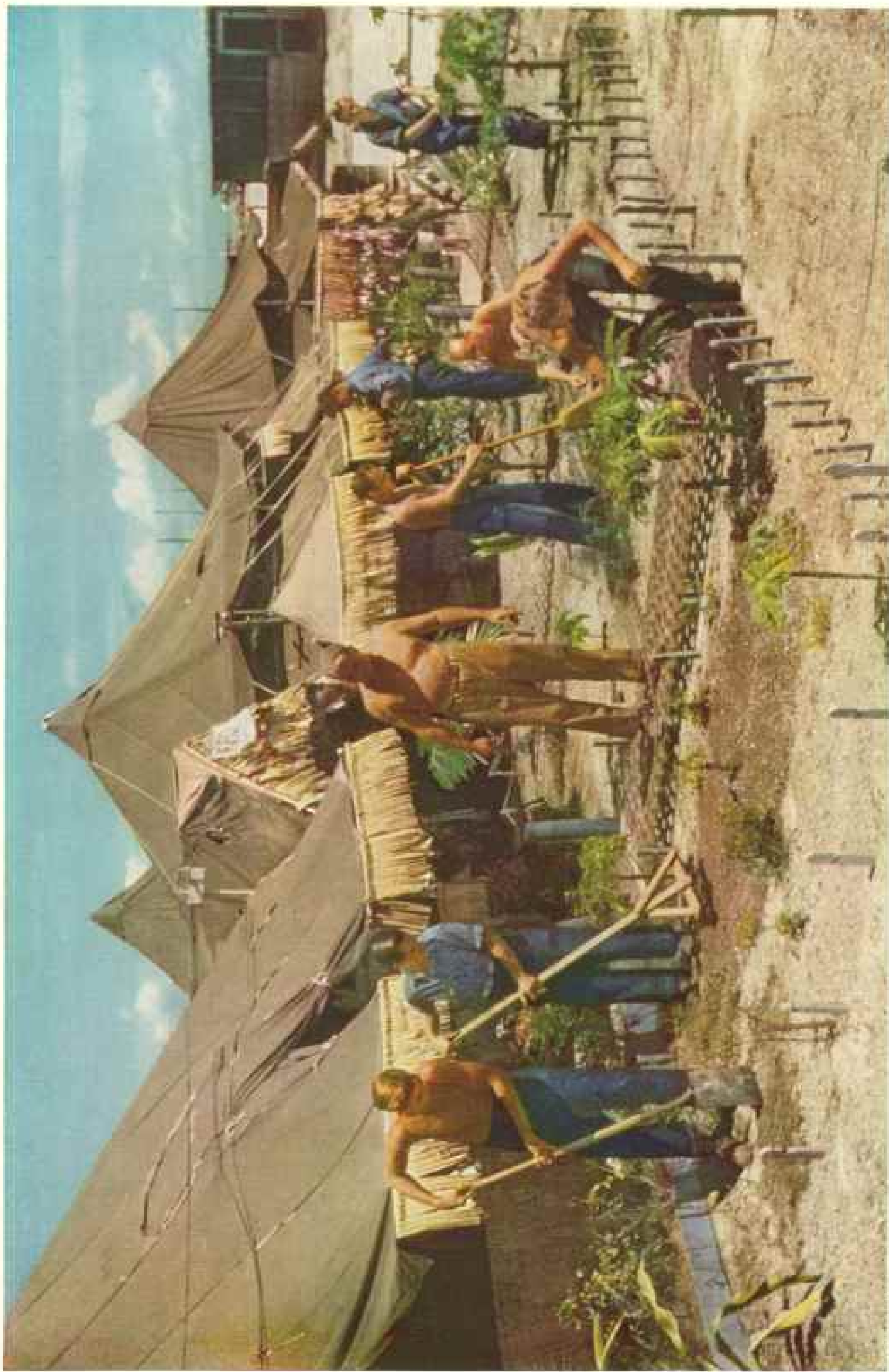
In the baskets woven from green coconut fronds, these soft-spoken, grass-skirted women bring bananas and coconuts. Before war came, they lived at the settlement of Butaritari, but were moved outside this area when the Japanese fortified it. After U. S. forces took Makin, the village was transferred still farther up the island.



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Illustration by W. Herbert Moore

**Laundry a Problem? Just Build a Windmill to Sozzle Clothes in a Suds-filled Oil Drum as Did These Seabees on Tarawa!**



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**"At Least It's Neat and Getting Green," Boast These Would-be Gardeners on Tarawa**

Proudly they point to a few papayas and other plants which have rooted in infertile coral sand. In the tent labeled F.P.O., these Navy men have built themselves a club, with coconut-frond trim for awnings.

Reproduction by W. Robert Moore

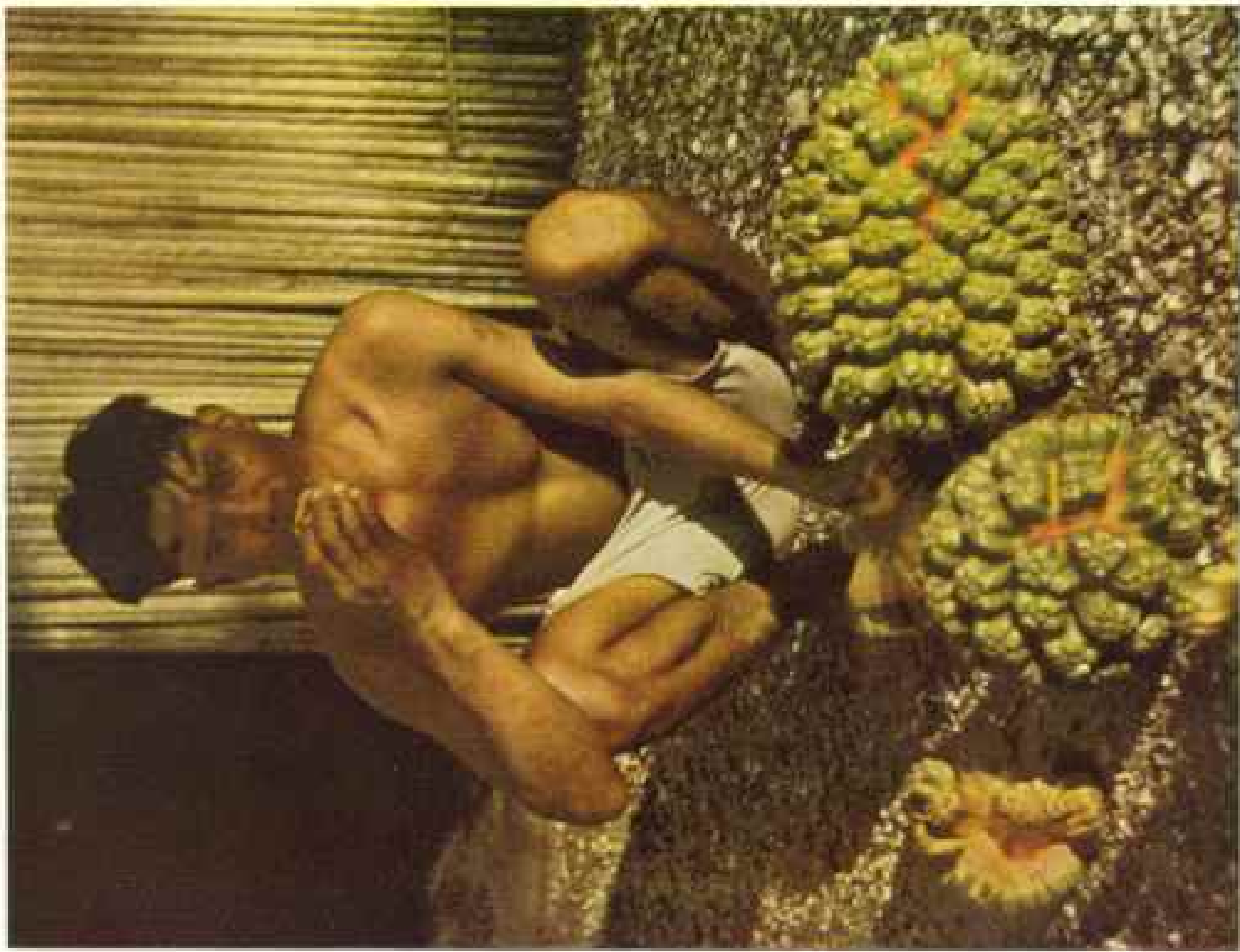


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Keckahama by W. Robert Moore

### Troops Stationed in the Makin Area Tune In on Music and Gay Skits Broadcast by WXLH

"On the Road to Tokyo" is the standard by-line of this and other American Expeditionary Stations set up on the Pacific Islands wrested from the Japanese. They provide popular and classical programs from recordings made in and flown from the States. The men also make up local comedy programs of their own.



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### He Takes a Bite of Refreshing Pandanus Fruit

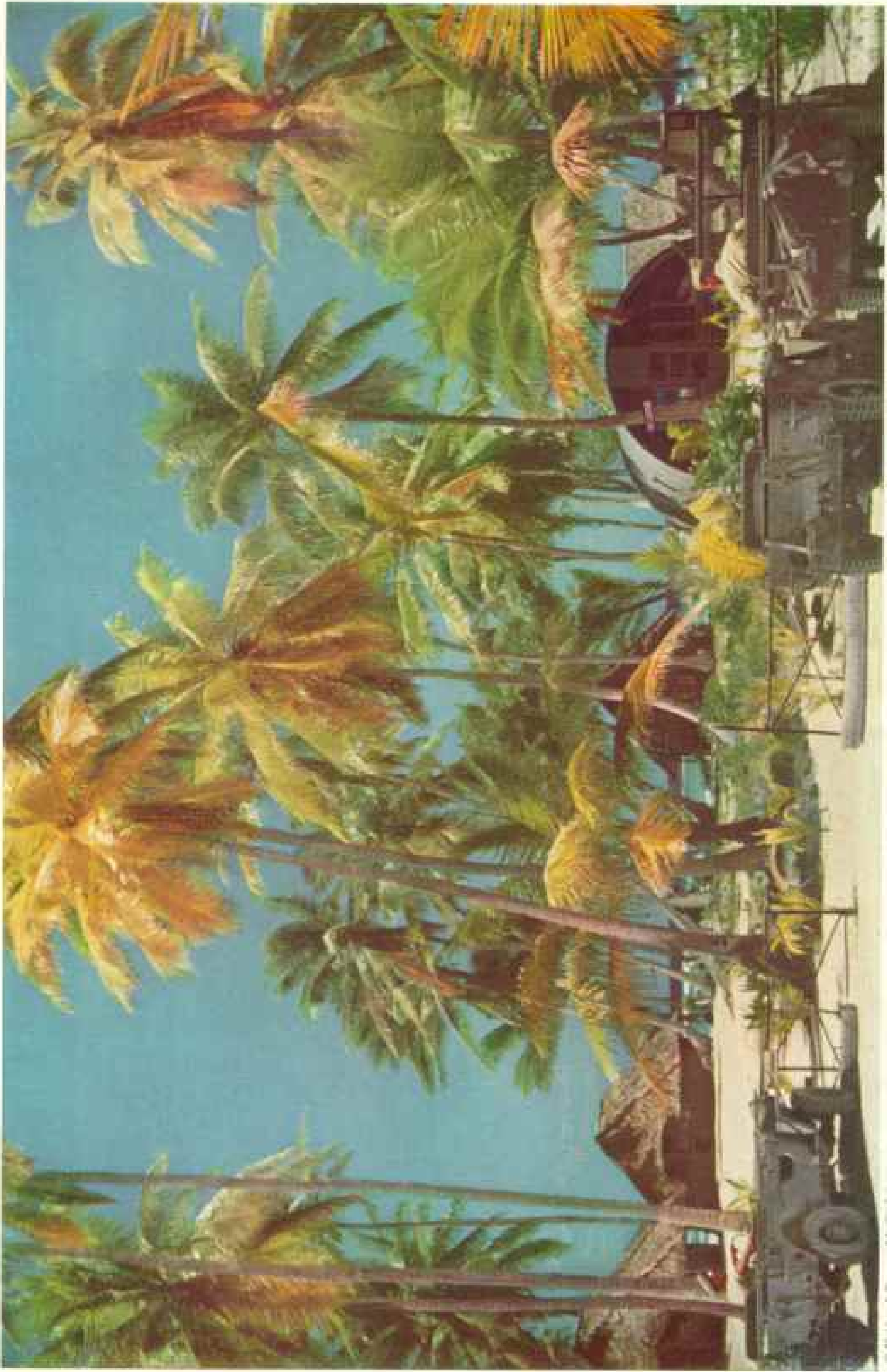
Abaiang youngsters, particularly, are fond of chewing on the stringy inner ends of segments of this ripened fruit. It tastes a little like pineapple. Preserves are also made from it and kept in lead wrappers for off-season use.



Photograph by W. Robert Moore

### Tide of War Passed Her Island By

Coconut leaves serve as a skirt for this girl of Marakei. Many Gilbertese women began making such skirts when the Japanese' occupation shut off their supply of cloth. Some men wore mats of woven pandanus.

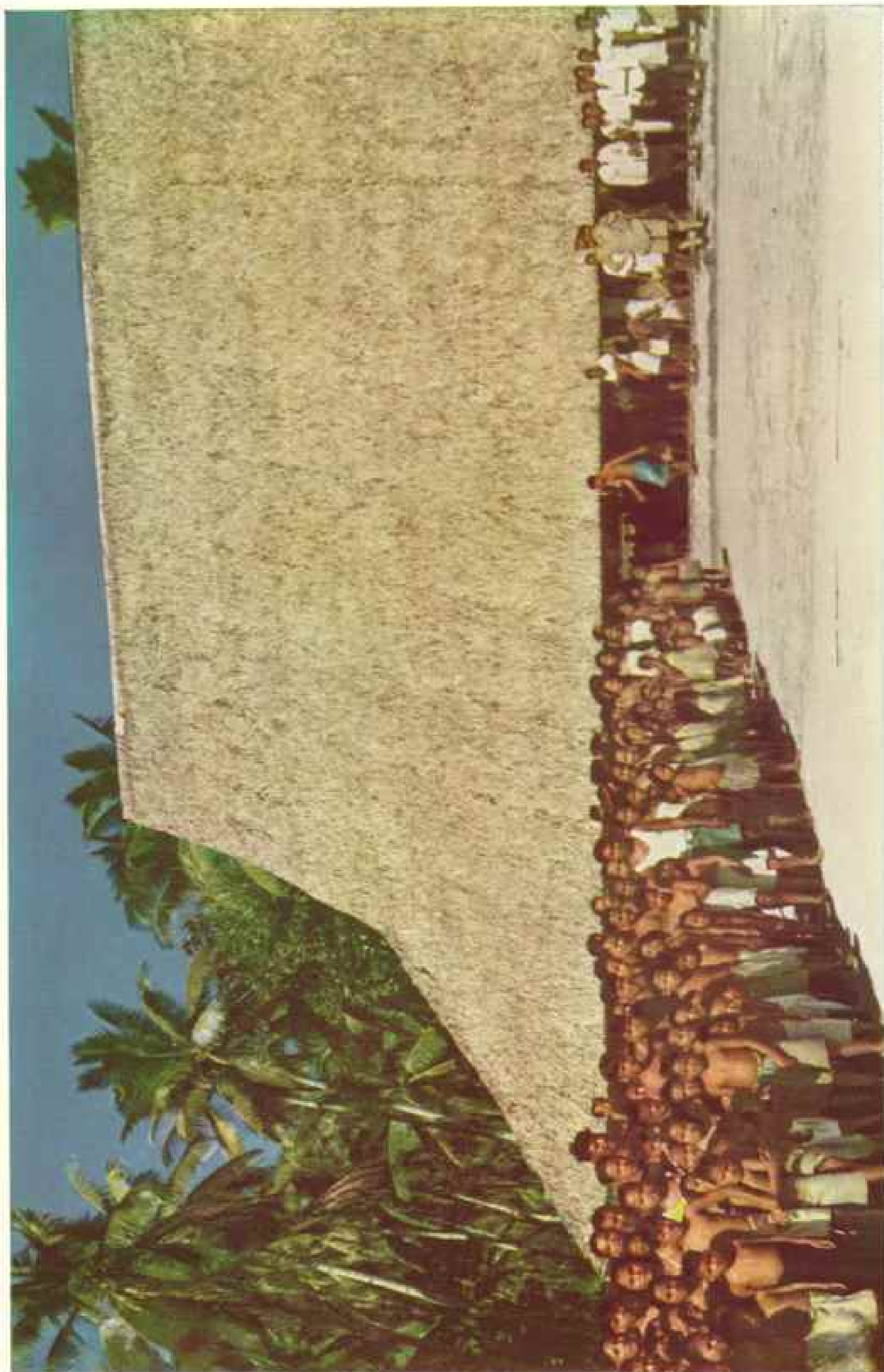


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**Escaping the Ravages of Tarawa, Abemama Has Palms to Shade Tents and Quonset Huts of Island Command Headquarters**

Only a few Japanese were located on this atoll, 20-odd miles north of the Equator. "It is the nearest thing to a South Sea Island pictured in *Tarzan*—Gorilla-land that we've seen," say men there. Beyond, a white curling band of surf crashes on the reef. Robert Louis Stevenson once trod paths where jupps trace.

Illustration by W. Robert Dixon



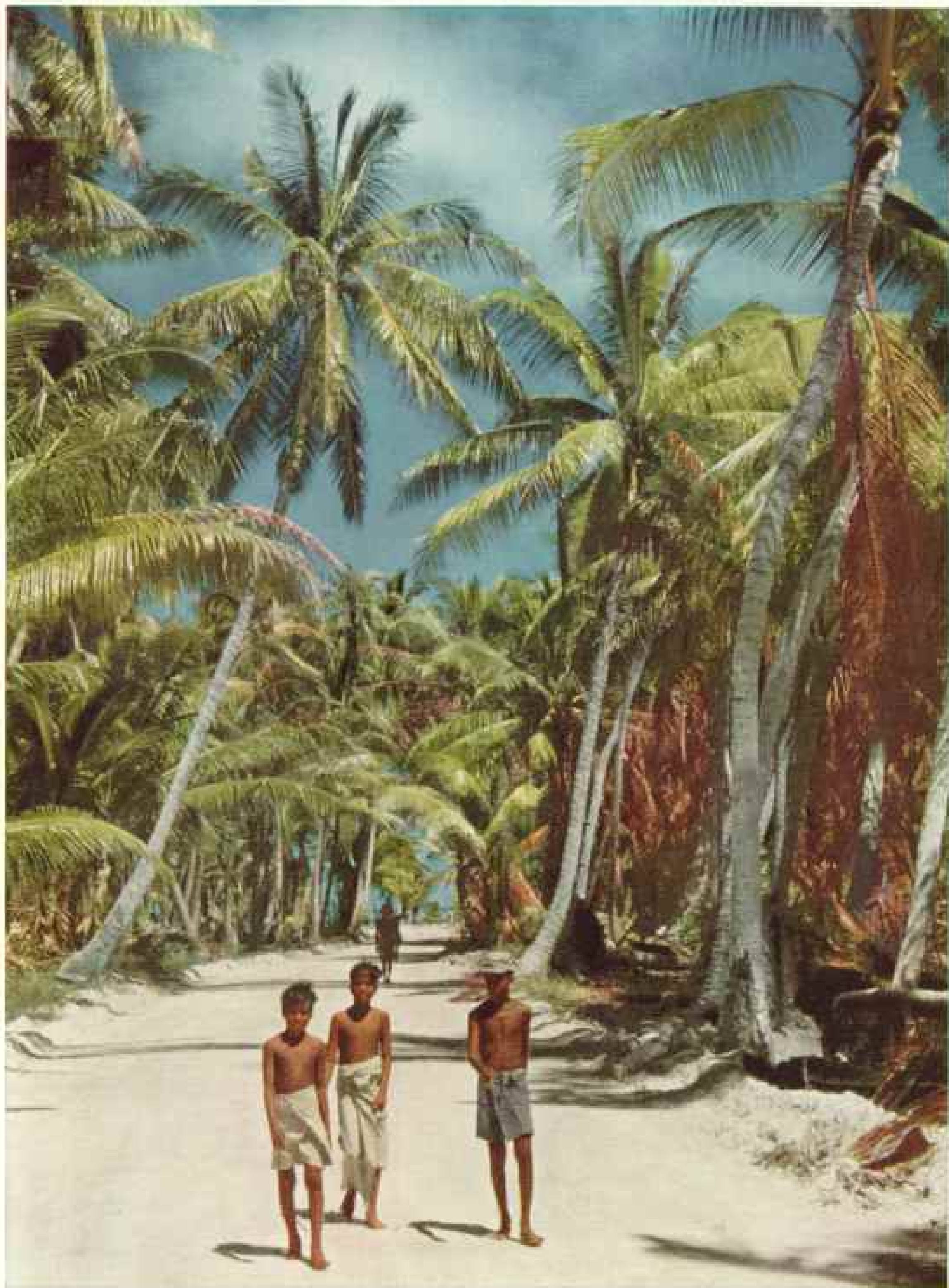
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Photograph by W. Robert Moore

### All Marakei Gathers at the Village Meetinghouse to Greet the Returning British Resident Commissioner

Col. V. Fox-Strangways, Resident Commissioner for the Gilbert and Ellice Islands, stands near the right (in shorts) with a group of village dignitaries and native police. "Momentarily, I fear I stole the show with my camera," writes the author. "Such large village meetinghouses are found in all Gilbert settlements."





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Endorsement by W. Robert Moore

**Thick Coconut Groves Cover the Islands of Tarawa Atoll Which Saw No Fighting**

On some the Japanese cut coconut logs to build pillboxes and airplane revetments which were concentrated on small Betio Island at the southwestern end of the group. U. S. forces widened and improved this coral road. Before the war, production of copra was the chief industry in the Gilberts.

their thumbs to hitchhike a ride in passing jeeps!

Mistake not that the islander, because he is quiet, has no spunk. In severe quarrels one man will often catch another and bite his nose off! Yes, actually nip off the end of his nose to disfigure him permanently. Particularly is this practiced in the southern Gilberts.

This strange method of punishment has also been inflicted on more than one erring wife—and husband—in cases of adultery. Maritally the Gilbertese have had one of the highest standards of morality to be found anywhere on earth.

The line of the chiefs continues here on Abemama in the person of 27-year-old George Murdock. But his powers, such as they are over the people of Abemama, Kuria, and Aranuka, are largely social.

George is the son of the late Tokatake, who died in 1935. He is a pleasant young man and speaks English well, having been educated in the King George V School at Tarawa.

The maternal side of his family, from which he has taken his name, provides an interesting island story. Back about 1882 a British trader, George Murdock, came to the Gilberts and settled. By his first Gilbertese wife he had two children; one was a daughter Agnes.

George is her son. Agnes also lives in Abemama, but she has traveled widely. As I talked with her, she told me that years ago she had accompanied her father to Guatemala when he was overseer of the Gilbertese people employed there for picking coffee.

She spent eight years in the United States, attending St. Gertrude's Academy at Rio Vista, California. Afterward she was with her father while he was deputy British Resident Commissioner at Ocean Island.

After we had talked for a while Agnes softly excused herself, saying that she had to get to work.

"You see," she explained, "I am now helping your American boys. I supervise the girls who do the work in the camp laundry."

#### On the R.F.D. Plane Route

To see the southern Gilberts I flew with the pilots on the "R. F. D. mail route." Periodically planes fly over the islands, dropping mail and minor supplies in small sacks.

The bags are usually weighted with a little sand to prevent their drifting when released. In the beginning the natives tried to catch them, and got a sudden surprise. The sacks pack quite a wallop. On the trip before ours, three young girls rushed to grasp one of the drops and got knocked flat on the beach.

Sitting in the "sun parlor" of our am-

phibian, comfortably draped around a machine gun, I had a delightful observation seat for looking at the islands.

Speeding over rectangular-shaped Maiana, past Abemama and its satellites, Kuria and Aranuka, we bumped across the Equator in a small rain squall and played tag with clouds and bright rainbows.

Then came Nonouti, a 23-mile-long row of serpentine green islands, segmented by pools and a number of water passages. Its broad lagoon was a fantastic patchwork of coral spots which are a nightmare for ships.

I know one captain who had spent 26 hours navigating his ship through its 8-mile channel. He considered himself lucky; an old island skipper had once remarked to him: "Yes, it is a bit bad here. There are a thousand coral rocks roundabout, and I've been on every one of them!"

To us, winging overhead, these shoals and deep channels were only magnificent color patterns to admire. We dipped, skirted the beaches that were lined with village homes and big maneabas (Plate XV), dropped our mail, and swung southward toward Tabiteuea, our next landfall.

#### Warm Welcome at Tabiteuea

Tabiteuea has the largest population of the Gilbert group. Many of its 3,800-odd people rushed out on the beaches and into the village streets as we passed over.

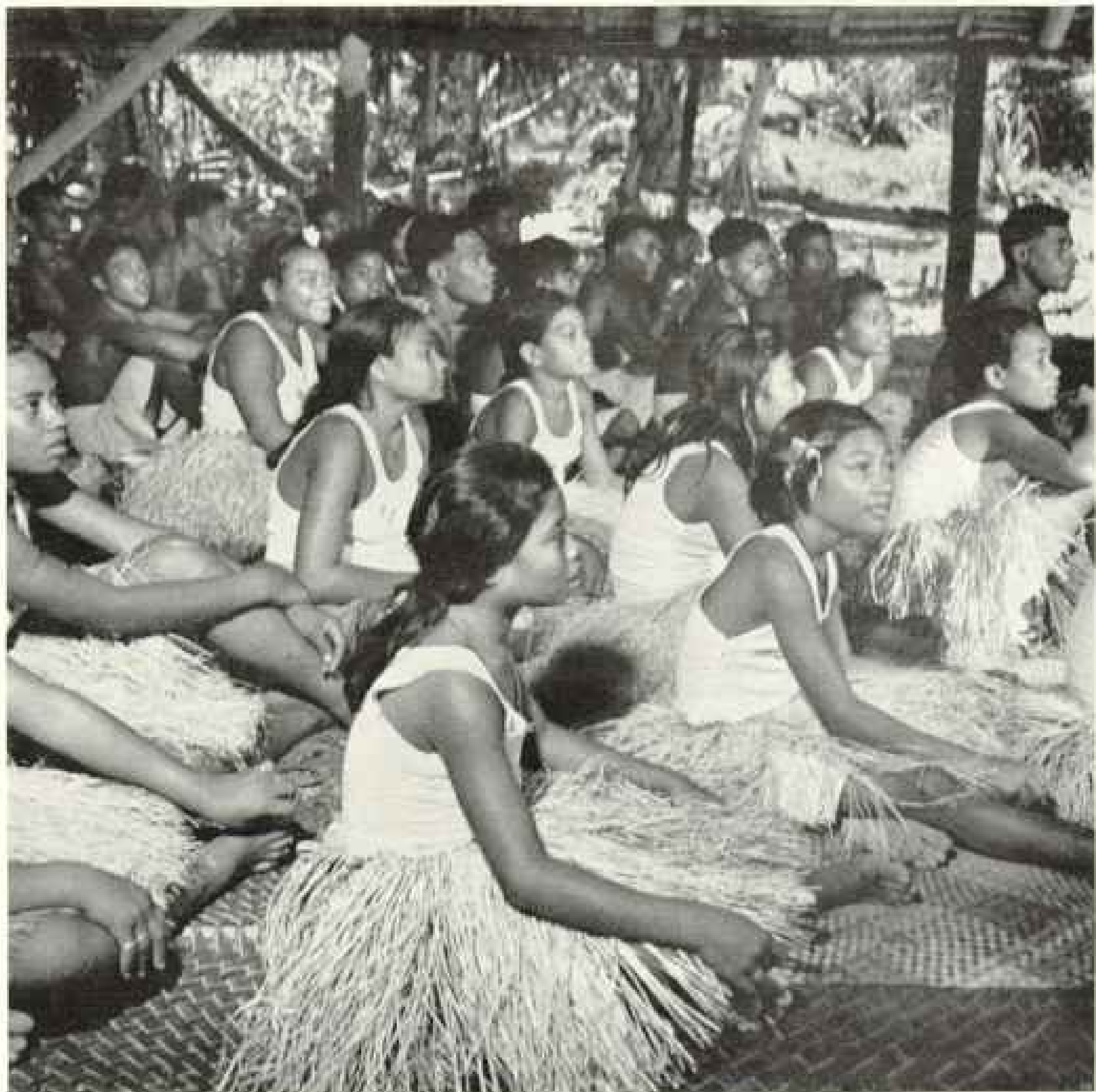
Bare brown youngsters stopped swimming in the lagoon; grass-skirted women and their menfolk paused in fishing and working around their outrigger canoes. All waved wildly, save for those who dashed pell-mell after the plummeting mail sack.

The atoll extends on and on for some 40 miles. Owing to its irregular shape, the land distance is even longer. It is so sprawled out that villagers at one end must almost be strangers to those at the other. The southern end of the atoll is sea-frayed into numerous small islets, separated from each other by comparatively wide cross channels. Communications between them must be by water.

In almost all of these water gaps the people have built a chain of fish traps.

From the air many look like pendants hanging on looped chains; others are heart-shaped, such as those seen along the reefs on most of the islands. But here the people have linked them together into complicated barriers for snaring the fish.

Turning eastward, we flew to Beru to drop mail. Both ends of this small island are linked by a barrier reef, enclosing a narrow lagoon. A number of outrigger canoes threaded its



#### Singlets and Coconut Skirts Are School Uniform for the Girls on Little Makin

Here the choir of young men and women students of the London Missionary Society school gathers to welcome the visiting British Resident Commissioner. The letters M. F. embroidered on the shirts stand for *Mayflower*, the name of their choral club.

narrow channels, while others clustered around a three-masted auxiliary schooner which lay off the reef. Decks swarmed with brown bodies.

The ship is owned by the London Missionary Society. It was then visiting the islands on a medical mission.

Nukunau, Arorae (southernmost land spot in the Gilberts), and Tamana are all islands, not atolls. Indian-club-shaped Nukunau, however, has three lakes, or ponds, in its center. It appears to be undecided whether it should be an island or an atoll!

After flying the triangle of these islands, we swung northwestward again, cruised over and

across the two boomerang-bent islands and handful of small islets that make up Onotoa, and thence continued our homing flight.

I had seen all 16 of the Gilberts. On land and from the sky each of the islands is much like the others, yet in each the pattern varies. So to a small degree do the friendly native peoples.

Only barren, blasted Betio in the Tarawa atoll and parts of Makin lack the massed greenery of coconuts, pandanus, and pits filled with elephant-eared taro.

But on their pocked surfaces is deeply etched a chapter of poignant American history.

# The Yield of Texas

BY FREDERICK SIMPICH

**H**OW we depend on Texas for things to eat and wear, to work and fight with! From Rio Grande Delta in the last shipping season came more than 57,000 carloads of fruit and vegetables.

From elsewhere in the State came trainloads of cotton and wool for clothing, uniforms, and tents.

To haul the State's 1944 oil output of nearly 2,000,000 barrels a day would take a railroad train 33,570 miles long!

"Next to oil, meat is our biggest industry," says the cattleman. "We've got more than 21,000,000 meat-bearing animals. If all these were rolled into one big bovine, it might jump the Mississippi as easily as a lamb jumps a ditch!"

From Spanish times through leisurely generations Texas was one vast cow ranch and farming country. After 1910, oil began to change that; by 1918, oil was a big business.

By World War II Texas saw the rise of gigantic factories, based on oil and natural gas, making everything from TNT and high-octane fuel to synthetic rubber and magnesium from sea water.

## Taking an Inventory of Texas

No boom in our history has been speedier than the changes now sweeping Texas.

But "boom" is not a word Texans like for what is happening. Actually, there is no big rise in land prices, no speculation in the shares of new industries. Texans say much of this industrial upheaval, though accelerated by war, was due anyway, owing to pent-up needs.

But, first, a simple inventory of Texas.

Nearly all our helium and carbon black, most of our sulphur and trainloads of synthetic rubber, and worlds of toluene, butadiene, sulphuric acid, caustic soda, magnesium, and high-octane gasoline now all come from Texas. Here is our chief source of natural gas.

In cotton growing Texas still leads, and from here come much rice, corn, and wheat, as well as millions of cattle, sheep, and goats, and thousands of manufactured things used by Army and Navy.

Without certain things that Texas yields,

\* See "QM, the Fighting Storekeeper," by Frederick Simpich, NATIONAL GEOGRAPHIC MAGAZINE, November, 1942.

† See "Today's World Turns on Oil," by Frederick Simpich, NATIONAL GEOGRAPHIC MAGAZINE, June, 1941.

especially gasoline, lubricating oils, and explosives, we couldn't keep this war going.

You can walk 40 miles among piles of Army supplies in the QM depots at San Antonio and Fort Worth, and still glimpse only a bit of all the 12,000 classes of goods stored here.\*

"That big shed there holds enough Texas-made mattresses to furnish 100,000 average American homes," said Col. W. L. Bartley, the Quartermaster at Fort Worth. "Much of the stuff we carry is made in Texas, including uniforms, furniture, tents, prepared foods, soap, paints, and chemicals, refrigeration equipment, paper, etc."

More soldiers are trained here than in any other State.

Of course Texas is big. To cross the State from east to west you have to ride some 765 miles.

Also, the State's map spot helps it. Lying halfway between two oceans, it offers the shelter of an inland area, but has easy access to Atlantic waters via its Gulf of Mexico ports (map, pages 168-9).

Today our national economy is linked with Texas by the rise here of so many unexpected new industries.

In parts of east Texas this upsurge changes the whole way of life. Stuart McGregor, editor of the Dallas News, says more than 400,000 Texans have left their farms or small town homes to take jobs in shipyards, refineries, ordnance, chemical, and airplane works; in tin smelters, steel, meat packing, and synthetic rubber plants, or in the hundreds of smaller factories.

## Texas' Oil Tops Everything Else

Acre for acre, Texas is still primarily a farm and ranch country.

But, dollar for dollar, oil is above everything. Refining is the State's biggest business. Texas now produces 78 percent as much crude oil as the rest of the world put together, exclusive of the United States.†

In peace days most oil moved from Texas Gulf ports by ocean-going tankers. War slowed this down; now the bulk rides out by rail or flows through pipe lines (page 165).

Within Texas borders lie about 35,500 miles of pipe lines for crude oil and some 12,500 miles of gas lines.

The famous "Big Inch," or 24-inch giant, runs from Longview to Philadelphia and New York. It is about 1,363 miles long, and delivers 300,000 barrels a day.



Staff Photographer Willard B. Carter

### "We Put Pants on Yanks from Fiji to France"

So says this bright-eyed inspector in the big Dallas plant of the Haggar Company. Started by one Syrian immigrant boy with a few second-hand sewing machines, this concern's many Texas factories make carloads of uniforms and sell sports clothes from Boston to Seattle (page 167).

There is also a 20-inch line which begins at Beaumont, Texas, and runs through Louisiana to Little Rock, Arkansas. There it meets and parallels the 24-inch crude line all the rest of the way east along the same right of way to Linden, New Jersey, a distance of 1,475 miles.

In front of the first load of oil, in a new pipe, men put a "pig"—a swab which, forced ahead of the oil, cleans the pipe. In this big pipe oil travels at 4.5 to 5.5 miles an hour, or 12 days from Texas to New York. Gas usually travels at about 15 miles an hour.

Some States live from their soil, plowing its surface only a few inches deep. Texas bores holes, often two miles down, to get most of her wealth, which comes from oil.

Scattered over her plains are oil refineries, and queer-looking factories that make chemicals from oil and gas. Hastily built in the open air, minus either walls or roofs, these nightmarish plants suggest big mechanical animals that drink crude oil and exude it as every petroleum product from asphalt to high-octane aviation fuel.

Bubble towers and catalytic, or "cat" crackers, tied in with mysterious "no admission" places that make toluene for TNT, or

styrene and butadiene, resemble no other structures on earth. The tangled pipes and open-air twisted tubes that keep these devil broths in circulation are like the festooned bowels of some mangled behemoth (p. 166).

From such oddly built units issues a foul dragon's breath sometimes so strong that stray sparrows, accidentally flying into its fumes, fall dead to the ground. Nobody dares smoke in the dangerous areas. Before passing a warning signboard you must empty all "strike anywhere" matches from your pockets.

### From Oil to Rubber

So great is the peril from fire that no motor truck is allowed near the plants, lest a spark from its engine set off an explosion. So mules, unshod, haul all the loads. In some places workers must wear wooden shoes, without hobnails, and use beryllium and plastic tools instead of steel ones.

As in the Bible, when water turned to wine, you see here a man-made metamorphic miracle wherein dirty black oil turns to clean, stout, elastic rubber.\*

\* See "Our Most Versatile Vegetable Product (Rubber)," by J. R. Hildebrand, NATIONAL GEOGRAPHIC MAGAZINE, February, 1940.



Southern Pacific

### Oil Trains Jam Southern Pacific Railway Terminals at Beaumont, Near the Texas Coast

It would take a train about 33,570 miles long to haul Texas' 1944 oil output, which reached almost 2,000,000 barrels a day. Besides tank cars, Texas uses leagues of pipe lines to move its oil and gas; two such, the famous "Big Inch" (24-inch) and another of 20 inches, run all the way to New York (page 163).



Staff Photographer Willard H. Curtis

### Pipes of Great Chemical Works Loop Like the Bowels of Dissected Monsters

Loops are to keep pipes from cracking when expansion occurs. Some are painted with special colors to show what kind of chemical flows through them. Here is the Baytown refinery of the Humble Oil & Refining Company, where a catalytic cracking unit makes base stock for 100-octane aviation fuel.

What an Alice-in-Wonderland adventure to walk with a Humble Oil & Refining Company engineer and see this whole process, from oil well to finished rubber! And all so swiftly! No waste motion, no long hauls. General Tire and Rubber Company's butadiene plant adjoins the Humble Baytown refineries; so needed gases are simply piped right into it, and rubber making begins (page 175).

Our biggest rubber-making plant is the Neches Butane Products Company. Its fantastic structures and 48 giant towers notch the flat coastal skyline between Beaumont and Port Arthur (page 173).

Seen from a distance, it makes you think of some futuristic Coney Island crowded with imitation lighthouses, roller-coaster trestles, and Towers of Babel. Its flocks of silvery spheroid tanks suggest onions 75 feet in diameter or many, many balloons set to take off in a cross-country race.

This factory cost around \$60,000,000; but in a year its rubber plants with roots two miles deep can make more rubber than miles and miles of plantation trees.

Connected with it are two copolymerization plants, built by the Defense Plant Corporation and operated by B. F. Goodrich Company and Firestone Tire and Rubber Company.

Here three parts of butadiene are mixed with one part of styrene. Beaten into globules, this material is then "polymerized" by adding soap under heat and pressure, and gradually it takes on characteristics similar to natural latex. When the milky fluid is coagulated with acid, lumps form like butter in buttermilk. These are

skimmed off, washed, dried, and pressed into bales of raw rubber. When vulcanized, it becomes elastic.

### Our Greatest Stock of Cheap Natural Gas

More valuable even than oil is this State's natural gas. It's not only a cheap fuel; from it men make many useful things, from alcohol to plastics.

More than half of America's known gas reserves underlie the soil of Texas. She pipes gas out to Mexico, to Minnesota—even to West Virginia, where some may be pumped back into exhausted wells and held in storage.

One thousand cubic feet of this gas can

make as much heat as 82 pounds of bituminous coal. Houston Pipe Line Company's statisticians say that gas sold from Texas in 1943, all used as fuel, could have produced one-fourth as much energy as all our electric power plants put together.

Chemically, this gas is mostly methane. From it, as a basic material, Texas makes wood alcohol, synthetic rubber, ammonia, bottled liquid gas for domestic use, formaldehyde, acetic acid—a host of useful things.

Many Texans insist they should not export this gas, but should keep it at home and let industries move here to use it. Some immigrant factories, such as Dow's at Freeport, Monsanto at Texas City, American Cyanamid and Pittsburgh Plate Glass at Corpus Christi, and Owens-Illinois Glass Company at Waco, have already done this.

Most natural gas is produced from oil wells. It is, in fact, the propulsive agent in oil lifting. It also comes from subterranean reservoirs holding gas alone, or "condensate," which is a high-gravity petroleum fraction.

Deeper drilling in search of crude oil often uncovers so-called gas-condensate reservoirs, in which sands under high pressure contain natural gas and "natural gasoline" in vapor form. These are valuable. But when a well is drilled down to them, they will liquefy, wet the sand and be lost, unless recovered by the maintenance of high pressure in the well.

This is achieved by bringing up the valuable gases, extracting the wanted elements, and then pumping the stripped "dry gas" back down into the well. This unique process is known as "cycling."

Some gasoline, made from natural gas, is so "wild," or volatile, that if you throw a glassful of it into the air it will all evaporate before it can hit the ground.

Half our butadiene, made from natural gas, comes from Texas. In an old Texas City sugar refinery, converted now into a chemical works, Monsanto makes big tanks of styrene from this same gas, styrene being one of the ingredients in buna-S rubber.

Carbon black, so much used in printer's ink and to "load" rubber tires, is simply soot from burnt natural gas. In 1944 Texas made nearly 900 million pounds.

Making carbon black is dirty work—so much black smoke escapes.

Fly over carbon black plants at Wink, Pampa, or Amarillo on a cloudy day, your plane riding in bright sunshine above the clouds, and you can locate a carbon black factory by a huge black-stained area where smoke comes up and mixes with the clouds.

In many a nook of Texas the Army has built

big plants that make explosives and weapons, secret operations of which the public knows little. This washes some obscure small towns into national prominence.

Few people outside of Texas knew of Port Neches till it suddenly gained our biggest synthetic rubber factory. It was so with Orange, noted now for all the destroyers and other naval craft it launches.

Faraway Borger, out in the Panhandle, was just another oil town till oilman Frank Phillips of Oklahoma built there its giant chemical and rubber factories.

Kingsville, too, was a quiet town of cattle and Missouri Pacific Railroad shops till a vast celanese plant rose near by.

Daingerfield, in northeast Texas, was only a piny-woods crossroads till Uncle Sam's RFC, plus private millions, suddenly rushed to completion a mammoth steel mill. It gets coal and limestone from near-by Oklahoma and strips trainloads of rich iron ore from adjacent hills.

With the new Sheffield Steel Company near Houston, using scrap iron and ores from Mexico and Texas, this State is now able to meet part of its oil-field and other industrial iron and steel needs. You can't call these steel mills "war babies"; their peacetime need is so obvious you only wonder they weren't built years ago.

#### **New Factories, Long Needed, Will Keep Going After the War**

"Many of our new factories, though hurriedly built to meet wartime needs, will keep busy after the war," said A. D. Simpson, President of the National Bank of Commerce at Houston. "We've needed them for years."

Back of those ventures is hard, cautious thinking.

I talked to J. M. Haggard at Dallas. He came here at 17 from the shadows of ruined heathen temples in Baalbek, hard by the Cedars of Lebanon, learned English, and started selling ready-made clothing.

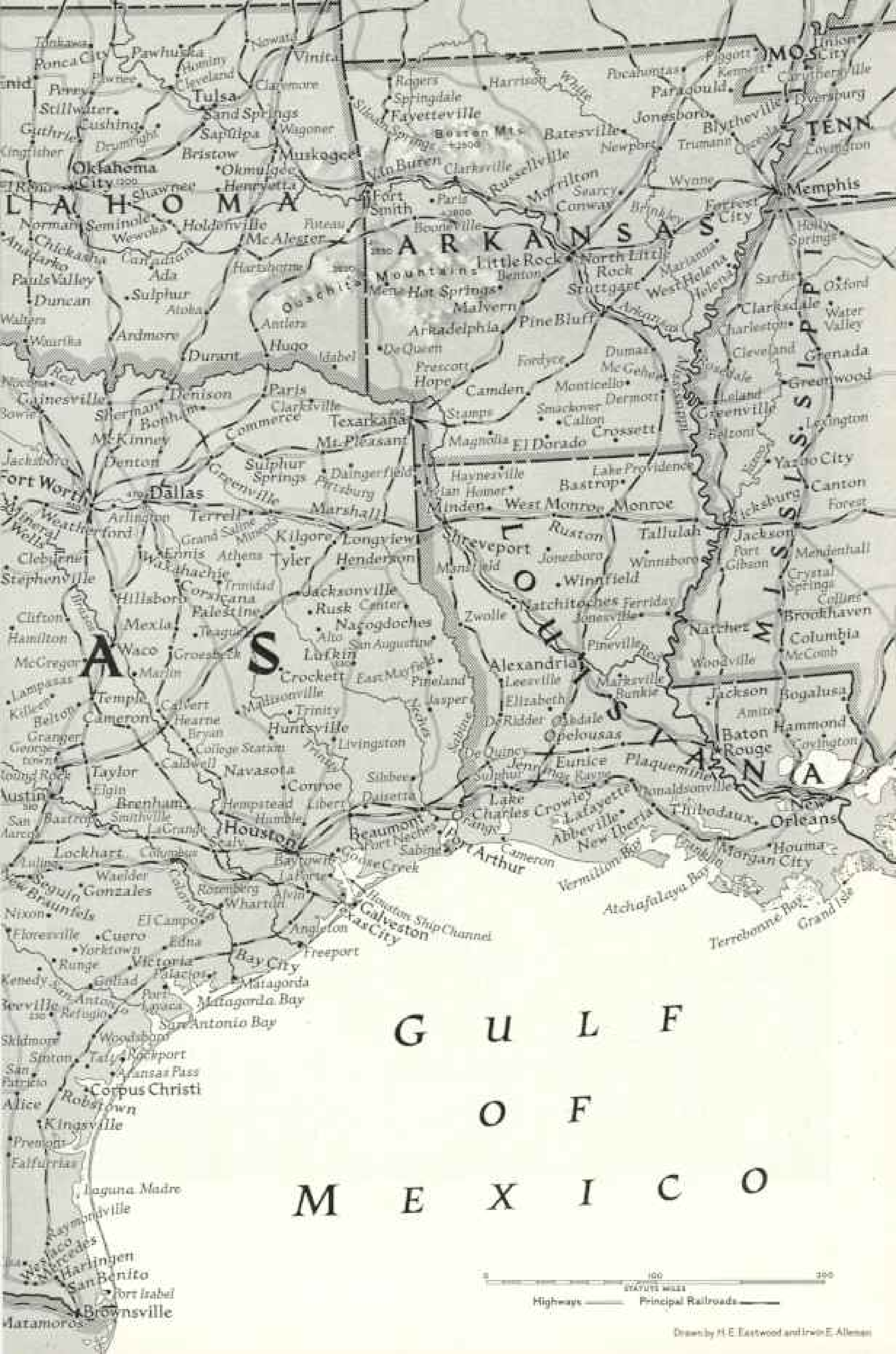
"Why not make clothing here and save freight?" he asked. So in St. Louis he hired two tailors, shipped some second-hand sewing machines to Texas—and began. Now he runs three great factories, makes uniforms for the Army, and his traveling salesmen take orders all over the States for slacks and sport shirts made in Texas (page 164).

"But," says Mr. Haggard, "though Texas raises trainloads of wool, mohair, and cotton, I have to import my cloth from eastern States because so little is woven here."

Of course not all big industrial plants are new, though some old ones have been







G U L F  
O F  
M E X I C O

0 100 200  
STATUTE MILES

Highways ——— Principal Railroads ———

Drawn by H. E. Eastwood and Irvin E. Allen



Lloyd Baker

**It's More Joyful to Admire the Texas Girl, But Rice Also Is a Pride of Texas**

The bundle she holds was cut near Beaumont. Rice is sown there, like wheat, and not transplanted, a few stalks at a time, as in the Orient. On irrigated coastal plains rice growing is an important farm enterprise, though this crop average is far below that of wheat, corn, and peanuts. A fourth of the Nation's rice grows in Texas.

converted to make new things. Some such changes reflect the growth of Texas itself, and show how man's urge to raise his standard of living can deplete certain natural resources and force him to find new material to work with. I saw a perfect case where a changing Texas environment caused one big factory at Lufkin to quit making sawmills and go to making oil-field machinery.

From Milwaukee W. C. Trout came to Lufkin in 1905, when east Texas was a vast forest of virgin pine, and started building sawmills. He built around 50, all big ones. When lumbermen had stripped the woods, sawmill sales fell off. But oil fields were beginning to boom—and calling for pumps. Trout, an inventor, built a new kind of pump.

"And that pump," Senator Tom Connally of Texas told me, "has made that little town of Lufkin known wherever oil wells are working, from Iraq to the Netherlands Indies and Venezuela."

Bombs, howitzer carriages, mobile laundries and delousing trucks, rolling powerhouses for the Russian Army—Trout builds them all now. Some go south to Houston, are loaded on new ships launched there, and ride out across the Gulf and away to the fronts.

#### 400 Miles of Newsprint a Day

I write this on newsprint made near Lufkin from southern pine. A log here can be debarked, chopped up, boiled, and emerge as finished paper in a few hours.

Years ago in Savannah, Georgia, Dr. Charles Herty set up his pilot laboratory, and on its toy mill I saw him make newsprint from slash pine. Today's big Southland Paper Mills, Inc., here in Texas, owned in part by southern newspapers, grew from Herty's pioneer experiments.

Down on the Ship Channel, near Houston, is yet another big mill, of the Champion Paper and Fibre Company (page 174). It makes pulp, some of which rides up inland waterways to Chicago; it makes paper for certain national weeklies. Put a bit of pulp under the microscope, and you see the fishnet-like characteristics of this stout wood fiber.

Here, almost in the shadow of towering San Jacinto Monument, which marks the field where Sam Houston fought Santa Anna when the Republic of Texas was being born, sounds and smells rise now new and strange to this historic spot. Spending millions for wood and wages, these paper mills are not evanescent war babies; they will endure as permanent aspects of industrialized Texas.

"Since Pearl Harbor some 40 million men in uniform have ridden on Texas trains," says

Col. Ernest O. Thompson, of the State Railroad Commission.

"Passenger traffic has increased 725 percent since 1939. In one war year our trains hauled 791,400 cars of foodstuffs alone."

Among railway systems serving Texas are the Rock Island; Missouri Pacific; Santa Fe; Southern Pacific; Burlington; Kansas City Southern; and the historic Missouri, Kansas, and Texas, or "Katy."

#### Tremendous Wartime Tasks of Texas Railways

Moving whole Army divisions to seaports, or in and out of the vast maneuvering areas in east Texas and western Louisiana, may involve from 50 to 75 trains.

Suddenly, too, with only two or three hours' warning, Army may ask for a dozen special trains to move men, guns, and trucks from a Texas post away off to some east- or west-coast embarkation port. In one year the Southern Pacific Lines alone moved over 1,000 troop trains, besides trains of flatcars loaded with guns, trucks, planes, and landing barges built in Texas shipyards.

Solid freights of more than 100 cars are common. The Katy reports hauling a record train of 156 cars, more than a mile and a half long.

"We move cargo now undreamed of in peacetime," said one Katy agent, "trainloads of bombs, cannon, airplane parts, even hospital cars!"

It took 71 trains to move a certain two divisions out of Texas; yet so well timed was cooperation with the Army that only one train departed late!

"To make up for rolling-stock shortage," said Executive Vice President H. M. Lull of the Texas and New Orleans Railroad Company, of the Southern Pacific Lines, "we work our engines more hours and load our cars heavier."

"To help meet labor shortage, we employ older men and more women. Here's a picture of one all-woman section gang—all Mexican women at that, with both mother and daughter working in that same crew."\*

Besides all these military trains, Texas rails must also move monumental civilian cargoes. Consider cattle. When 10,000,000 acres of land were changed, by Federal orders, from growing cotton to raising feed, livestock of all kinds here reached an all-time high of nearly 27,000,000 head.

Texas long has been our leading livestock State. Though value of sales in Iowa and

\* See "Women at Work," by La Verne Bradley, NATIONAL GEOGRAPHIC MAGAZINE, August, 1944.



John Vachon to W.C.T., Official

**This May Day Rain Squall Sprinkles the Garden of a Texas Gulf Coast Farmer Near Victoria**

Rainfall varies from 55 inches on the coast to 9 inches in sun-drenched parts of west Texas. Gulf-coast storms are periodic. From subtropic Rio Grande Delta to high Panhandle plateaus, Texas' recorded temperatures have ranged from 23° below zero to 120° in the shade. During "northers" temperature may fall 50° in 36 hours. Yet some southern cities, including San Antonio and Brownsville, are winter resorts famed for delightful winter climate.



Nechee Rubber Products Co.

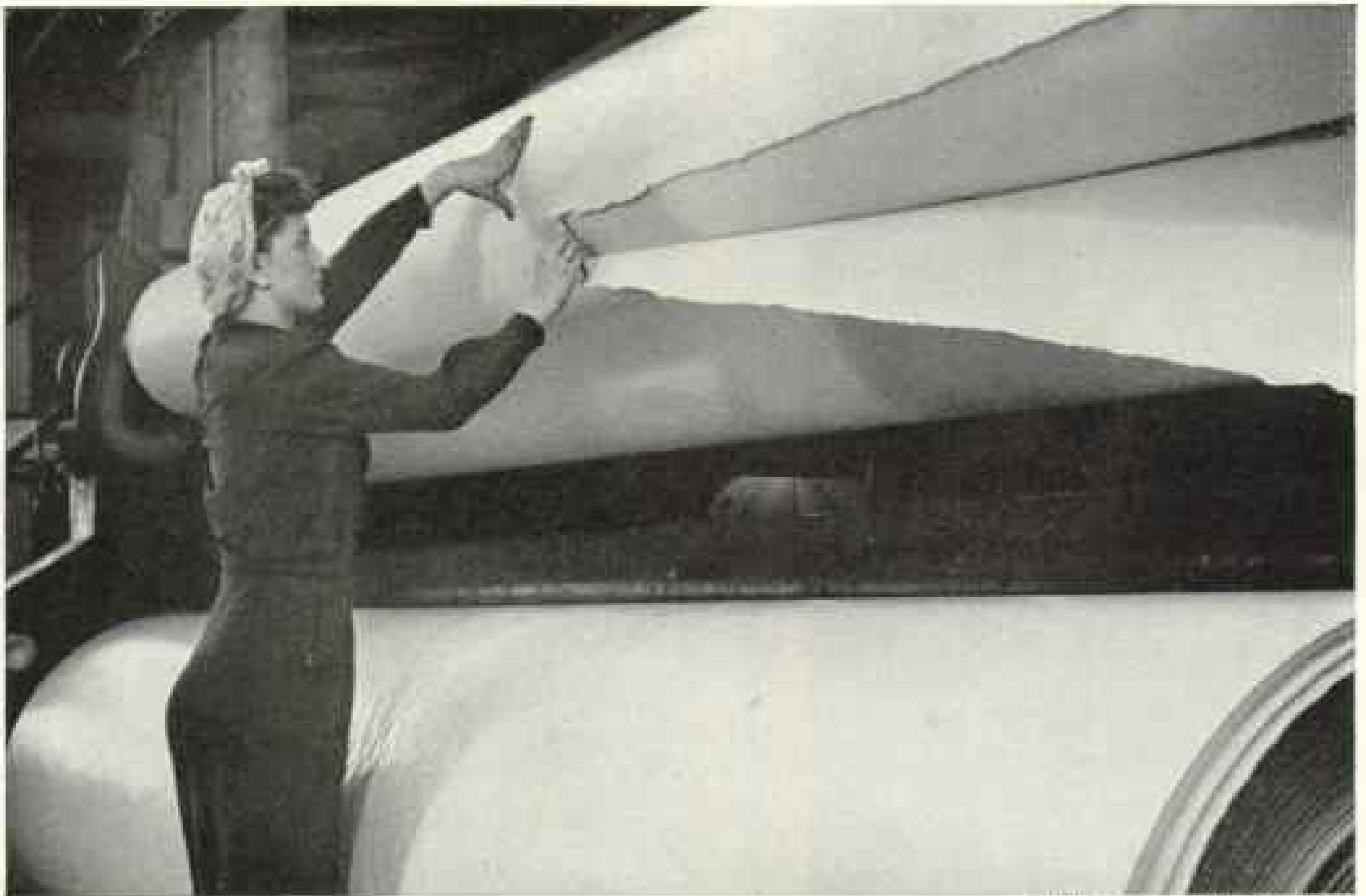
Big Marbles, Onions, Balls, or Captive Balloons? No! Butadiene Tanks, for Making Synthetic Rubber. Port Neches, Texas



Fort Phelan-Jillie Willford H. Carter

A Moment After This Picture Was Snapped, These Mexican Spinach Pickers Jumped Up and Ran Away

Why? They were "wet backs," a Texas expression for Mexicans who enter the United States without immigration inspection by swimming the Rio Grande. Mistaking the cameraman for an immigration inspector, they fled. Texas ships trainloads of green vegetables north each season.



Staff Photographer Willard H. Curtis

### Headlines, Maps, War-front Pictures—All Ride on This Texas-made Paper

She is about to splice the paper going on a roll to take on a high gloss finish. Stock from Champion Paper and Fibre Company's Houston plant is used by certain leading American magazines. The new Texas paper industry consumes each year 16,000 carloads of logs, mostly pine and some oak and gum (page 171).

Kansas may exceed Texas sales, this is because so many Texas cattle go to those States to be fattened.

#### Magnitude of Cattle Herds

Cattle trains move out of Texas every season, taking from 1,000,000 to 2,000,000 animals up to the Corn Belt. Add to these bovine excursionists the 2,500,000 beef cattle and calves that ride to Texas packing plants and it means the rails here must haul around 4,000,000 animals a year, not counting sheep, hogs, and goats!

With, say, 40 cattle in each car, that's nearly 100,000 carloads of cattle, or a train 1,000 miles long! You have to use fantastic figures like that to grasp the astounding magnitude of Texas cattle herds.

This Texas cow business started with the Spaniards, and popular fancy still paints Texas as a cowboy country of big hats, lassos, six-shooters, hoofs, horns, and tails. Fort Worth, with its cattle exchange and vast packing plants, likes to be called a "cow town." And San Angelo and Amarillo, with the latter's enormous Panhandle herds, are still as truly cow towns as may be found this side of the Argentine pampa.

Fancy boots, costly saddles, and silver-trimmed bridles still figure in the trappings of swanky Texas cowmen and, of course, at all rodeos and fat stock shows. Stiff poker games can still be found.

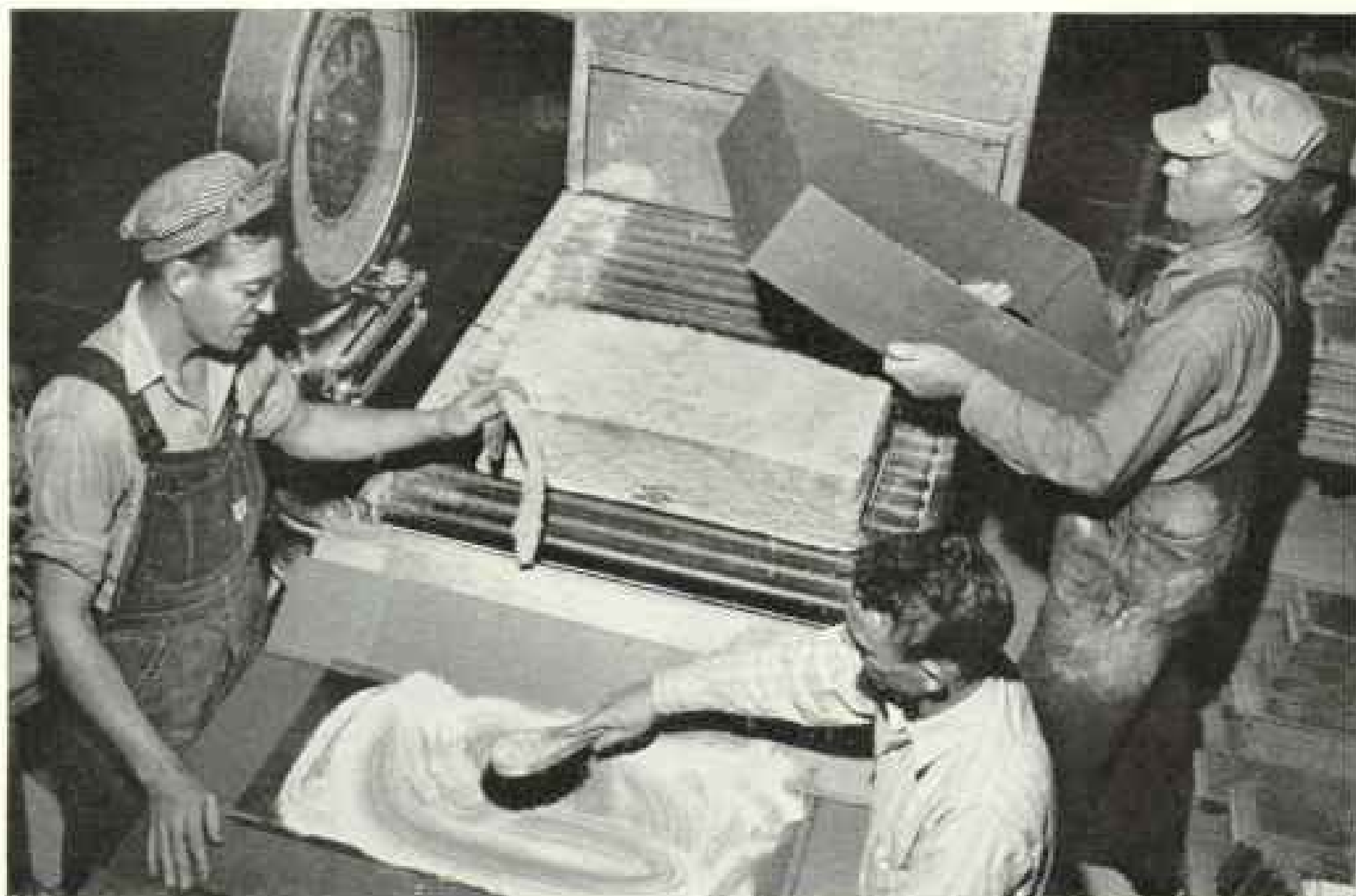
Now and then those who sit in the councils of the ungodly may steal a calf and get shot. But wire fence has cut up the open range—wire fence against which in the beginning even the nervous antelope used to hurl themselves, only to be disemboweled or cut to death—till they learned to crawl under it.

Longhorns, so graphically recorded in J. Frank Dobie's immortal book, *The Longhorn*, hawling bovines that used to snort their way by dusty millions up the long, long trails to Kansas and Wyoming, exist now only in the zoos.

#### Texas Searches the World to Find Better Grass

In their place come big, fat, sluggish, short-legged animals with white faces or humped backs, \$30,000 prize bulls, and stock show calves that 4-H boys chase in "calf scrambles." (The nimble lad who catches the calf is allowed to keep it!)

For years the State's Agricultural and



Staff Photographer Willard B. Carter

### Here at Baytown Is Rubber for Your New Tires, Made from Crude Oil

Styrene, butadiene, and soap, under heat and pressure, form a solution resembling natural latex. Congulated with an acid, crumbs are formed, like butter lumps in buttermilk. These make synthetic rubber. A 75-pound bale is being boxed for shipment. Plant of General Tire and Rubber Company (page 164).

Mechanical College has studied grazing problems.

How to restore range lands, abused by overgrazing, dust, drought, and prairie dogs, and get rid of cactus, brush, and evil weeds—especially on such a vast area of differing rainfall, temperature, altitude, and kinds of soil—is a complicated task. Native grasses alone are of 540 different species.

On the King Ranch, at Kingsville (page 176), and at near-by Texas College of Arts and Industries, some interesting experiments with exotic grasses are also being made. The work with Rhodes grass, from Rhodesia, seems truly full of promise for this part of Texas.

Borden, Carnation, Kraft-Phenix, and other dairy industries are active in Texas. Here a problem is not to keep cows warm in winter, as in big northern barns, but how to keep them cool in summer. A Brooklyn rookie, riding a troop train across Texas, saw his first flock of windmills, used here by hundreds to pump water for livestock.

"Oh, look at all the big electric fans," he said. "They must keep the cows nice and cool on hot days!"

Your woolen underwear may once have warmed a Texas sheep. About one-fifth of

all shorn wool we produce is grown in Texas.

It takes 16 fleeces to clothe a soldier for one year; so Texas sheep can keep 652,000 of our men warm. Incidentally, in Texas I saw 600 carloads of Australian wool, stored here because there isn't room for it in warehouses about New York or Boston.

Omnivorous goats nibble a living off poor dry land where some other animals would starve. Much of Edwards Plateau, an area big as West Virginia, lying between the Pecos and the Colorado Rivers in west Texas, is good goat country.

### Cotton Is Our Number One War Crop

"Were cotton suddenly stripped from our possession," says the Quartermaster General, "not a single one of our fighting men could continue in action."

Army's procurement lists call for more than 11,000 items made wholly or in part from cotton.\*

Cotton linters, the fuzz from cottonseed, are used in various Army equipment from bombers' plastic noses to synthetic yarns.

\* See "Cotton: Foremost Fiber of the World," by J. R. Hildebrand, in the NATIONAL GEOGRAPHIC MAGAZINE, February, 1941.





Staff Photographer Willard R. Colver

### Cowboys Herding Cattle on the King Ranch, Whose Holdings Cover 1,165,000 Acres

Named for a part of the King Ranch, this Santa Gertrudis breed of beef cattle is the only one to originate entirely within the United States. This type is a cross between the Shorthorn and the fever-tick-resisting, humpbacked Brahman cattle of India. Demand for breeding stock from here outruns supply. Animals have been shipped to many foreign lands.

Largest of war's many uses for linters is in smokeless powder.

Uniforms, hammocks, gun covers, life rafts, bandages, jungle suits, balloons, mosquito nets, sleeping bags—all these and much more Army makes from cotton.

Cotton also is food; we eat it as shortening, margarine, salad oil, cooking oil, salad dressing, mayonnaise. Fed to livestock, cake from cottonseed makes more beef, mutton, and pork.

At the height of its cotton glory, Texas exported over 95 percent of its crop. Now that foreign market has vanished.

Of necessity, then, Texas has had to look to domestic buyers. This search revealed that as Texas was developing into the greatest cotton-export State in the world, our domestic mills had been building their technology on types of cotton largely grown east of the Mississippi, and were reluctant to use

the short, harsh cottons typifying much of the Lone Star crop.

Loss of foreign markets proceeded at a more rapid pace than the acceptance of Texas cotton by the domestic mills, and by 1939 Texas had become the major cotton-surplus State in the country. To make it worth while to keep on growing cotton, it was obviously necessary for the State to develop a research program aimed at adapting its cotton to home use.

#### Modern Geography of Texas Business

Dr. E. P. Schoch, Director of the Bureau of Industrial Chemistry at the University of Texas, in 1939 set up a Cotton Division in this bureau to study the feasibility of chemically modifying the cotton fiber so that Texas cottons might be made more versatile and more widely accepted. Some interesting processes are being developed. As research has grown,

the University has established a complete cotton chemical and physical laboratory, with a miniature cotton mill.

Triumph of chemistry, retreat of cotton, population shifts, and birth of new industries—all work now to lift the face of old Texas.

Busy, roaring Houston emerges as the Southwest's greatest industrial center, a "city of inevitable destiny."<sup>\*</sup>

Dallas boasts one of America's leading bookshops and a department store known from Hollywood to Florida resorts for the styles it originates, especially in sportswear. "Many well-to-do Texans used to go to New York, even to Paris, to do their shopping," the store's advertising manager told me. "Now we bring here the fine things they want."

Then there's Corpus Christi, of miraculous growth. It has one of our biggest Naval Air Stations.<sup>†</sup> Even without that, this once-serene, half-Mexican Gulf coast town, with its lucky oil strikes, its cotton business, truck farms, new residential suburbs, and its colossal new alkali works and fat payrolls, would rate its place now among new Texas centers of wealth and power.

Beaumont, Amarillo, Lubbock, Abilene, San Angelo—all have been touched with the magic wand of wartime prosperity.

Texas is so big that even its own people can't see it whole. Most of them know only that part of the State where they live. Mere visitors, looking down from planes or peering out car windows, get only glimpses of its kaleidoscopic life.

Airplanes built here fill the air. Consolidated Aircraft Corporation's mammoth Fort Worth 4-motor bomber plant boasts one of the world's longest assembly lines. At Hensley Field, which is west of Dallas, North American Aviation, Inc., turns out clouds of military craft.

#### Amarillo Supplies the World with Helium

In two plants owned by Uncle Sam and run by his Bureau of Mines, the helium industry about Amarillo supplies the major part of this gas used by our lighter-than-air craft and also provides "inert" noninflammable gas for medical and industrial uses. Here is a world monopoly.

Into Galveston limps many a wounded warship for quick repair at Todd Galveston Dry Docks, Inc. The Houston Shipbuilding Corporation launches fleets of merchant ships. Often for their maiden voyages these are loaded with Texas products, so that both new ship and its first cargo originate in the Lone Star State.

War-front photographs of destroyer es-

corts, launched here by the Brown Shipbuilding Company, often show up in the news; shipyard workers, recognizing them by their numbers, may exclaim, "That's old number 401! We launched her such and such a day."

Landing craft and barges built at Orange, and some at the port of Brownsville, swarm in battle on distant seas.<sup>‡</sup> Destroyers and destroyer escorts splash sidewise into the Sabine River in endless fleets. Young naval officers wait to take command as each new ship goes into commission.

Except for gunners and key officers, most of the crews are raw recruits—former farm boys, paper hangers, garage mechanics, and saxophone players! Hundreds of "sailors" have been shipped on these new craft who never before even saw an ocean, much less set foot on a war vessel.

Including all services, Texas had, at last available count, about 550,000 men and women in the armed forces.

#### New Activities at Every Turn

You can't turn around without running into unexpected activities. Just outside high-brow Austin, with its magnificent capitol and high-towered State University, you come suddenly upon a modernistic hydroelectric plant of classic design. Set in the Colorado River, Mansfield Dam and four more above it not only furnish power but save coastal farmers from once devastating floods.

This State-owned plant's big load of juice is used to run the new International Minerals and Chemical Corporation's magnesium plant, which makes metal from dolomitic rocks hauled here from farther west.

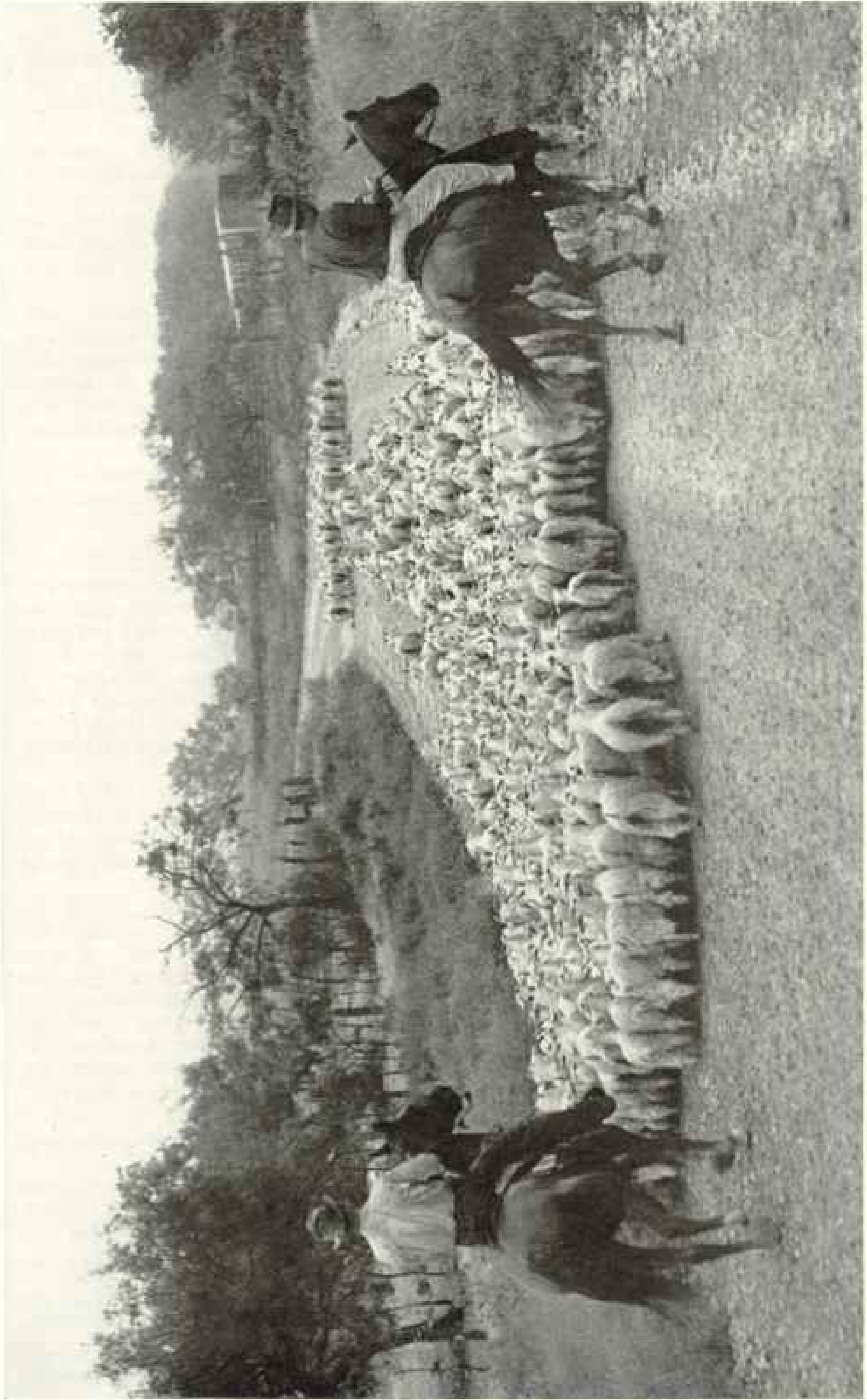
Power lines serve Texas well, though the State is not a hydroelectric paradise like Tennessee, Oregon, or California. A large percentage of Texas' myriad cotton gins are electrically driven. Most spectacular steam powerhouse is that of the Texas Power and Light Company, on the Trinity River south of Dallas. Its smokestacks are among the world's highest. Equipped to burn either lignite or gas, all the water in a 700-acre lake passes through its big condensers once every six days.

To help build more new factories, fresh money pours in. R.F.C. loans, plus Defense Plant Corporation investments, total over 700

<sup>\*</sup> See "So Big Texas," by Frederick Simpich, NATIONAL GEOGRAPHIC MAGAZINE, June, 1928.

<sup>†</sup> See "How We Use the Gulf of Mexico," by Frederick Simpich, NATIONAL GEOGRAPHIC MAGAZINE, January, 1944.

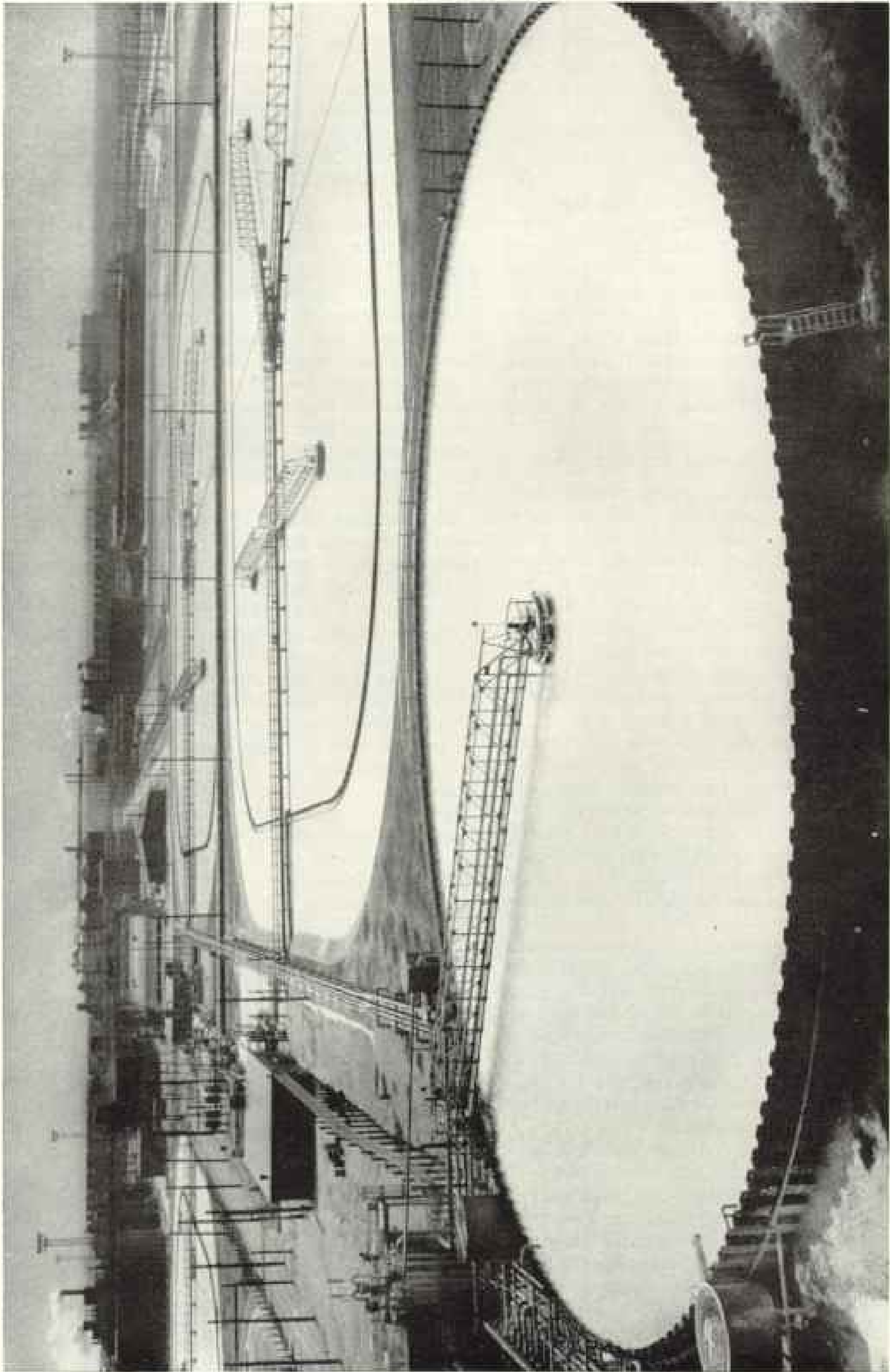
<sup>‡</sup> See "Landing Craft for Invasion," by Melville Bell Grosvenor, NATIONAL GEOGRAPHIC MAGAZINE, July, 1944.



AP Photo Press Arch

**The Long, Hairy Coat and Pants of These Goats Are Cut and Sold Twice a Year**

Texas raises about 85 percent of all Angoras grown in the United States. It is the way of goats to hold a sort of caprine choir practice at dusk each day. When all the 4,465,000 goats of the west Texas plateau bleat together, it's good music to the goat man, who may sell \$12,904,000 worth of that white hair in one season.



The Magnesium Corporation

**Salt Water, Pumped from the Gulf of Mexico, Reaches Giant Vats Near Freeport in One Step of Its Conversion into Magnesium**

Each day from millions of gallons of water minute quantities of bromine and magnesium are taken. Bromine may end up as one important ingredient in tetraethyl lead fuel used as an antiknock material in gasoline. Salt and oyster shells, with gas to generate the needed steam and electric current, all combine to help make magnesium.

million dollars. At Texas City there's even a tin smelter, busy now on shiploads of tin ores imported from Bolivia and elsewhere, all built and operating on R.F.C. money.

Till now most of Texas' riches have come from deep down in the earth. But there's a limit to oil and gas; on them night must fall. Geologists all agree on that, though they dispute how long reserves will last.

Since chemists can't make ham and eggs or beef and orange juice from oil and natural gas, thoughtful Texans are looking ahead. The day must dawn, they say, when Texans will again have to make their whole living on top of the ground: when, if they want alcohol, for example, to help make more rubber tires, they'll have to get it from farm crops.

#### Latent Riches of the Soil

Victor Schoffelmayer, noted Texas agricultural authority, says this State has farm lands and forests that can be dotted with factories to make plywood and plastics from swiftly growing trees; alcohol and rubber from sweet potatoes, grain sorghums, and artichokes; tung oil from groves already rising along the Gulf coast; and other industrial oils from peanuts and castor beans.

With such problems of economic destiny the best brains in Texas colleges now struggle. They admit that till now their State, like certain Latin American lands with a "colonial economy," has yielded oceans of raw materials but has sent most of them to somebody else to process. Teaching youths how to make useful things locally, from Texas farm, forest, and mineral products, is one of the big practical tasks tackled by the State's best educators.

Many useful minerals, not yet exploited, underlie the hills and plains of Texas. In the State College of Mines and Metallurgy at El Paso much work is directed not only at further development of the sixty-odd useful deposits such as oil, gas, sulphur, quicksilver, iron, sand and gravel, clays, salt, gypsum, and lignite, now being produced commercially, but also at many latent resources.

Standing somewhat outside the city, in a dry rocky canyon, this intensive College of Mines seems no part of busy, bilingual El Paso. In fact, you may not even hear of it during a week in half-Mexican El Paso del Norte, so busy is this prosperous border town with clothing factories, gins, cattle, packing plants, smelters, giant Fort Bliss, and workaday affairs. Every day 50,000 people cross the International Bridge here which leads to Ciudad Juárez.

From El Paso 1,500 scenic miles down to the Gulf the silt-laden, meandering Rio Grande forms a frontier with Mexico. Despite a Boundary Commission's hard work, the channel has been known to twist so that families might live in Mexico one year but find their farms back in Texas the next, or vice versa.

Strung along it are border towns of song and story—Ysleta, first permanent white settlement in Texas; then Presidio, Del Rio, Eagle Pass, Laredo, Brownsville. Many of Texas' 700,000 people of Mexican origin live in these border towns and counties. Some communities are almost entirely Mexican.\*

Border settlers here like to talk of turbulent early times. They plow and plant on soil where now and then they strike patches of old bullets and empty rifle cartridges from by-gone running fights between Rangers and border ruffians.

On this long valley trip, quick change of scene proves what a land of contrasts Texas is. Dark Big Bend gorges, such as the Grand Canyon of Santa Helena, in Brewster County, are narrow as a city street but over 1,500 feet deep. Seen from a plane, the canyon is a long, crooked, black crack in the earth.

You may drive 30 or more miles down some of this valley's roads and pass never a house. Then suddenly you may run into green seas of spinach, such as those about Crystal City, with its heroic monument to Popeye, the Sailor Man.

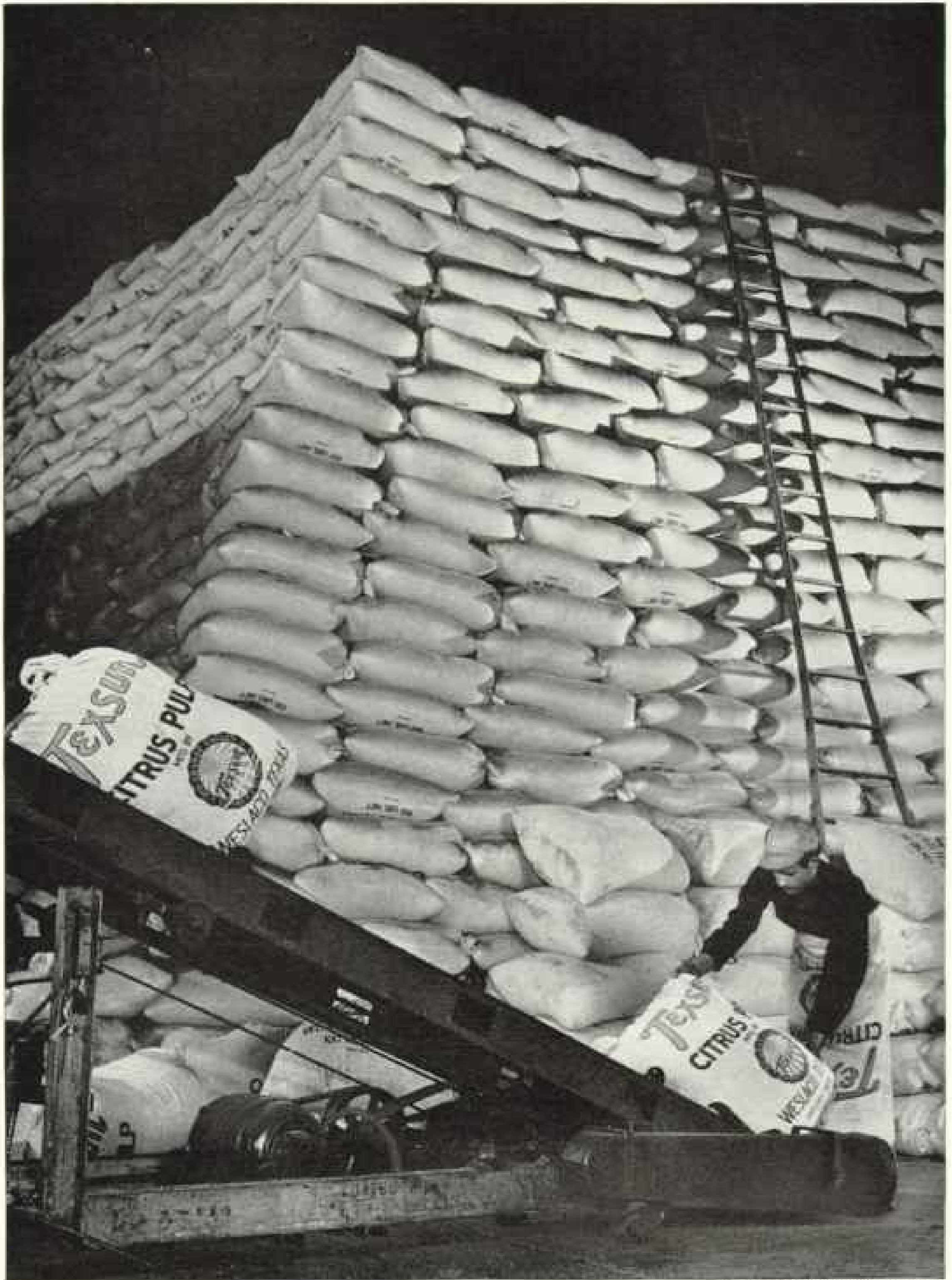
Onions? Laredo grows trainloads. "Soldiers gotta have onions," say the farmers. "If we skinned these all at once, the Russians could smell them away over in Moscow—90,000,000 pounds is a big mess of onions!"

#### Lions Eat Ranchers' Horses

With Mexican bullfights one minute, a Wild West show the next, or a ranch veterinarian vaccinating javelinas with cholera serum to see whether tame hogs can catch the cholera from these wild ones, or cows eating dead fish in dried-up coastal estuaries to get the needed phosphorus, it's no wonder GEOGRAPHIC cameramen keep coming back to this valley.

With me now was the unpredictable Culver with his magic lens. At first the armadillos intrigued him, but he couldn't hold 'em. Then he commenced to talk about making a flashlight of mountain lions eating a horse!

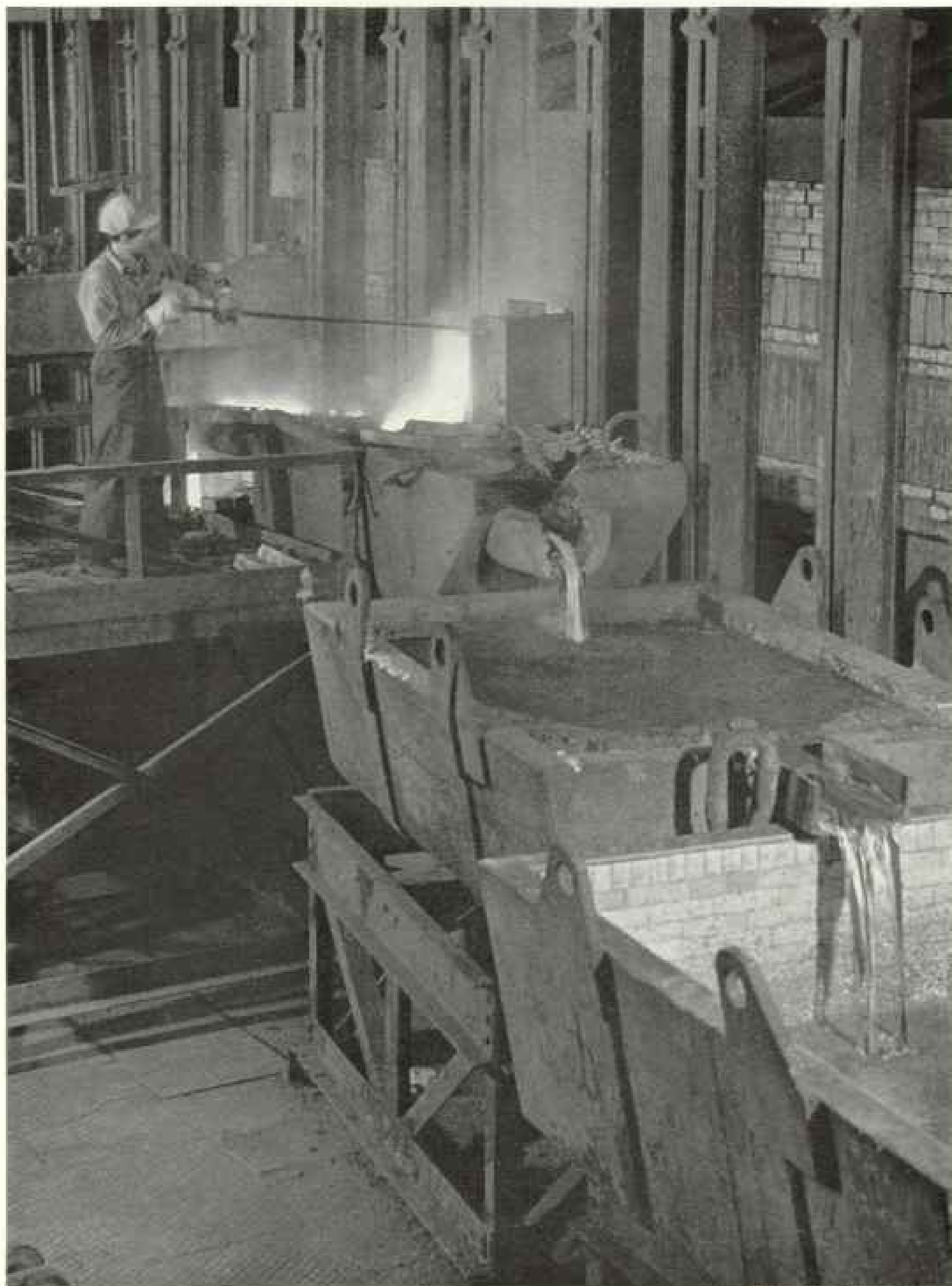
\* See, in the NATIONAL GEOGRAPHIC MAGAZINE, "Along Our Side of the Mexican Border," July, 1920, and "Down the Rio Grande," October, 1939, both by Frederick Simpich; and "Texas Delta of an American Nile," by McFall Korbey, January, 1939.



Staff Photographer Willard B. Collier

### Grapefruit Rind, Once Thrown Away, Now Makes Nutritious Stock Feed

Cows curl their lips in gustatory delight over this fragrant citrus-fruit pulp when it has been ground and cooked. Here bags of it are being shipped by Rio Grande Valley Citrus Exchange at Weslaco. What with beet pulp, soybean and cottonseed oilcake, livestock by millions now fatten on manufactured foods (page 184).



Staff Photographer Willard R. Curtis

### **Nobody Ever Dreamed That in Texas Would Rise One of the World's Chief Tin Smelters**

Here a man taps a furnace and pours off liquid metal at the Tin Processing Corporation's smelter, near Texas City. Necessities of war brought this to pass. Tin ore and concentrates are now imported principally from Bolivia and the Belgian Congo. Some Malayan tin ore still is stacked here.



John Tashon O.W.I., Official

**Part of Texas' Vast Industrial Army Works in Shipyards at Beaumont**

Originally this was largely a cattle-raising country. Then came oil and natural gas. Wartime demands brought the rise of unexpected new industries; so today Texas is also a big producer of chemicals, magnesium, some paper, manufactured foods, and whole fleets of merchant ships and naval craft (page 177).



"That's no joke," ranchers insisted. "Lions eat dozens of horses here every winter. On some river ranches, where lions come over from Mexico, it's practically impossible to raise a colt."

I saw one four-year-old, its back all clawed up by lions. When I was camping here with Frank Dobie three lions jumped into a near-by corral. Mexicans killed them and cooked the youngest. They gave Frank and me some fried ribs—not so good—but *meat!*

And goats, goats! Millions. Standing on their hind legs, they bite all the lower branches from a small tree till it looks as if a man had trimmed this brush with a hatchet (page 178).

We heard a Texan say: "Everything is big in Texas—even the acoustics. When all these goats bleat at sundown, you're never sure whether all the racket is from the goats or if part of it is a glee club trying out a barber-shop chord away up in Denver or Omaha."

Comedy brightens the day. All Mexican spinach cutters quit work when we halted by one big truck garden and Culver set up his camera to make a picture. Some ran away; others swarmed about the boss, demanding their wages (page 173).

"What stampeded them?" we asked.

"They're 'wet backs'—people who swim or wade the Rio Grande to work every morning on this side of the line and go back to Mexico at night," the overseer explained. "They're in the United States illegally and they think you're immigration inspectors!"

This whole valley drips now with money. Even the youngsters make unheard-of wages.

"There ain't plenty of nothin' but money," said one old colored man as he eyed the half-empty shelves of a country store.

At five points on this border railroads link Texas with Mexico. Airplanes, too, tie Texas with South America; besides their full cargoes of mail, express, and passengers, heavily loaded Army transport planes also fly south on mysterious missions. Today Texas is a crossroads both for transcontinental airlines and for planes plying between here and Latin America.

#### Mexico Sends Us Many Things

Few of the visitors who swarm across Texas bound for Mexico even suspect that mountains of freight also cross the Rio Grande, in the free give-and-take of international trade. Besides all we ship to Mexico, she also sends us many things useful in war and peace.

In the news we may read mostly about live Mexican quail sent here for stocking estates,

about fancy rum, gins, beer and tequilas, about all the parrots, perfumery, straw slippers, serapes, big hats, guitar music, and new-fangled costume jewelry that come from Mexico.

What we don't hear so much about is all the henequen, rope, sugar syrup, vegetables, iron ore, lead, copper, antimony, silver, manganese, hides, and cattle that come in. In Texas we saw one lone pile of lead, from the Monterrey smelters, that weighed 175,000,000 pounds!

Not only with Mexico, of course, but through all the States that border her, New Mexico, Oklahoma, Arkansas, and Louisiana, and over the far sea lanes of the great Gulf, Texas trades with the whole world. Texas used to be an independent nation. In an economic way, to a singular degree, she still is. With her many kinds of soil, climate, crops, animals, and industries, she tends to be peculiarly self-contained.

It's about 4,100 miles around the rim of Texas—a six-month walk for an active boy. Of course, a lot of her 267,339 square miles is short of water and sparsely peopled.

But the point is, Texas has never produced to capacity.

#### A Delta Land of Plenty

In lush, rich Rio Grande Delta only 16 per cent of the fertile land has been cleared of brush and cultivated.

Many of the 10,000,000 acres withdrawn now from cotton planting could be made to yield human food as well as stock feed.

Better grasses and improved grazing methods must eventually increase the State's herds of meat-bearing animals, and men are working now with a new wheat they hope will grow on the wet coastal plains (pages 174-5).

Dismal old man Malthus once warned that someday we might all starve, because people tend to multiply faster than food supplies. Making no allowance for modern checks on birth rates, science, since Malthus' time, has shown us how to get much more food from the same acres.

When Malthus did his thinking, we hadn't learned to make milk from soybeans, cow feed from grapefruit rinds (page 181), starch from sweet potatoes, sugar from corn, or lard and butter from peanuts and cottonseed. Vitamin pills were unknown. So were scientific agriculture, dehydration, mass production of canned foods, crossbreeding to get heavier meat animals, and the art of meat packing and food freezing.

All these forces work now to multiply the yield of Texas and to upset the Malthusian theory.

# Insignia and Decorations of the United States Armed Forces

BY GILBERT GROSVENOR

*President, National Geographic Society*

THE National Geographic Society has just completed the revision of its *Insignia and Decorations of the United States Armed Forces*.

In the revision the number of insignia shown in full color has been increased from 1,701 to 2,476, and new data have been added, recording official additions and changes up to December, 1944. In the 208 pages are reproductions of 159 photographs.\*

Any one possessing a copy of the revised book will be able to answer all questions concerning the meaning of any form of military and naval insignia and decorations, including those of women's organizations.

In addition are shown the insignia of agencies officially cooperating with the armed forces, such as the Maritime Service, the Coast and Geodetic Survey, the Public Health Service, the Red Cross, United Service Organizations (USO), etc. "E" and other awards granted to civilians for outstanding war effort are also included.

Never before have all these insignia been presented with full description. Not even the services themselves have printed them in color.

Work on the tremendous task of compiling these data and illustrations for the NATIONAL GEOGRAPHIC MAGAZINE was begun in January, 1941, by Gerard F. Hubbard and Mrs. Elizabeth W. King, of the National Geographic Society staff, under the supervision of Arthur E. Du Bois, Chief of Heraldic Section, Office of the Quartermaster General, United States War Department, and J. R. Hildebrand, assistant editor of the NATIONAL GEOGRAPHIC MAGAZINE. In October, 1943, Mr. Hubbard died, and since that time Mrs. King has carried on the work.

Officials of the United States Navy, the Marine Corps, and the Coast Guard generously cooperated with the National Geographic staff in supplying insignia and decorations of their services.

In December, 1943, The Society combined in a single volume the articles on insignia and decorations which had been published in the NATIONAL GEOGRAPHIC MAGAZINE in the issues of June, October, and December, 1943, and added to the reprint an 8-page supplement to make the material complete to the end of that year. Demands by the services and civilians alike for this publication soon ex-

hausted the supply of copies. Meanwhile, many insignia had been changed and hundreds added for new Armies, new Air Forces, and new units of the Fleet Marine Force, etc. For instance, in September, 1944, the aviation badges of Flight Surgeon and Flight Nurse were changed from gold to silver at their request, to conform with the silver badges used by all other members of Army aviation.

Rather than reprint the 1943 book, The Society undertook the present complete up-to-date revision and expansion. Sixty of the 72 color pages of this revision are new plates; only 12 of the 56 of the first edition could be used.

Some striking new features include the article, "Silver Wings," by Robert D. Ewin, which presents the chronological development of aviation badges from the first one for "Military Aviator," established May 27, 1913, and given to 14 officers qualified as pilots.

When this badge was designed, 25 were ordered, and this estimate was supposed to take care of all the men who would qualify for some time to come. Today more than 250,000 aviation badges are in use.

General H. H. Arnold still proudly wears this badge. Of the original recipients he is the only one now on active flying duty.

Our revision shows for the first time in colors the insignia of the 20th Army Air Force, which is equipped with B-29 Superfortresses for bombing Japan.

Another section included for the first time in the book is the one for the Navy's Motor Torpedo Boat insignia. These insignia compare in function with the aircraft markings used by all services on their planes. The gay, carefree spirit shown in the aircraft insignia is apparent again in this group.

The National Guard was called into Federal service, beginning September 16, 1940, and the State Guard now performs many of its functions. For the first time in color a complete set of the State Guard shoulder sleeve insignia is presented.

\* Copies of this timely book, "Insignia and Decorations of the United States Armed Forces," may be obtained only from the National Geographic Society, Washington 6, D. C. It will be ready for mailing early this year. Prices: \$1 per copy in United States and Possessions, including APO addresses; elsewhere \$1.25. Remittances should accompany orders and should be payable in U. S. funds. Postage is prepaid.

There are many other important additions to this compilation. For example, the Bronze Star, a decoration given by all services for gallantry "not involving aerial flight," is shown in color.

The Navy and Marine Corps Medal, for "heroism not involving actual conflict with an enemy," is now presented in full color. Hitherto it was pictured in black and white.

The Mariner's Medal, the "Purple Heart" of the Merchant Service, is shown in color. This is one of a series of new decorations and medals recommended by Vice Admiral Emory S. Land, U. S. Navy, Administrator of the War Shipping Administration, to give merchant seamen recognition comparable to that granted Navy personnel for similar or equivalent services.

Shown for the first time in color are the new service ribbons authorized for these medals and for the Women's Army Corps (WAC), whose members served before the corps was a part of the Army and who continued in the service; also the Commendation Ribbon for personnel of the Navy, Marine Corps, and Coast Guard, who receive an individual letter of commendation signed by the Secretary of the Navy; or from the Commander in Chief, U. S. Pacific Fleet; or Atlantic Fleet; or from a Fleet Commander of rank of vice admiral or above, for an act of heroism or service.

The new War Department Civilian Awards, authorized by Act of Congress July 1, 1943, are shown for the first time. Comparable Navy awards are also shown.

The magnitude of the war is revealed by the necessary increase in the number of insignia. Our revision shows 324 new Army aircraft insignia, the new Army Air Forces Technical Specialists' sleeve insignia, and 142 new Navy and Marine Corps aircraft insignia.

The effective part insignia play in morale is indicated by the adoption by the Navy and Marine Corps of "shoulder insignia" comparable in function to the Army's "shoulder sleeve insignia," so prominent a part of its uniform. Gayest of these Navy shoulder insignia is that for the Seabees. Our revision shows for the first time these shoulder insignia of the Navy and Marine Corps.

This time attention is given also to the U.S.O.-Camp Shows. Because that organization has contributed so largely to the war effort in morale building, the War Department has authorized insignia for it. The shield of the parent United Service Organizations, so familiar to our service personnel from Alaska to Brazil, is included as well.

Information is included about the new Honorable Discharge Emblem, for wear by all

honorably discharged service personnel on the right breast of all outer uniform clothing until they can get out of uniform and into civilian dress. This emblem was decided upon by a joint Army and Navy agreement on November 9, 1944.

Every effort has been made to show the latest designs and to give the most recent information about the wearing of the insignia.

In every case possible the original decorations and insignia have been photographed. Lieutenant General Mark W. Clark, Rear Admiral Richard E. Byrd, Vice Admiral J. H. Towers, Vice Admiral W. A. Lee, as well as enlisted personnel, have lent their most prized possessions for this work.

In about 600 cases National Geographic Society artists made drawings from designs of official records of the services. Not only are the illustrations based on original awards or official records, but the text also has the stamp of approval of the services.

Too much praise cannot be given to the organizations whose insignia are shown and described in the present book. Every service concerned has given generously of its time to check the information, with the result that this book presents only authoritative material.

How the accuracy of the book stands up under test is illustrated in a communication from Staff Sgt. Joe Loftin, of the Military Police Detachment at Fort Oglethorpe, Georgia.

Sergeant Loftin writes in part:

I thought perhaps you might be interested in knowing that through your Insignia booklet an impostor was caught by the Coast Guard, the Military Police, and the F. B. I. . . . Knowing your booklet well, I knew when he was being questioned at my headquarters he wasn't telling the truth as to stripes on lower sleeve and collar ornaments. . . . He wore three gold stripes on lower sleeve—representing, a Lieutenant Commander, but they were not on as your booklet shows. Then he wore a Second Lieutenant's bar on enlisted man's cavalry overseas cap.

Your booklet and a patch I have that he too had on were placed as Exhibits A and B and photographed by the F. B. I. . . . The Federal Judge presiding was pleased with the information from your booklet. He said the booklet really was the prosecutor.

Authorities of the armed forces consider insignia not only an aid to recognition and a spur to pride but a means of establishing and maintaining discipline. For these reasons they have encouraged the National Geographic Society to publish this compilation. The Society is proud to offer this inspiring presentation of our country's many and varied awards, as it has offered its up-to-the-minute maps and Magazine, for the benefit of the Nation it has served faithfully for more than half a century.

# Wildlife of Tabasco and Veracruz

BY WALTER A. WEBER

*With Illustrations by Staff Photographer Richard H. Stewart*

THE golden afterglow of sunset was fading from the dark jungle foliage, and the gloom of dusk was beginning to cast the landscape into harmonious masses when the still air was suddenly rent by a sonorous, deep-throated birdcall, *cha-cha-lac-d, cha-cha-lac-d, cha-cha-lac-d*.

The sound came from a near-by thicket, but we strained our eyes in vain to discern the source of the voice. Before the echoes of the last note had died away, a timbered patch to our right emitted the same cry, followed immediately by others from various points, and within a minute the surrounding forest had become vociferously vocal with the harsh cries. The subsequent din lasted about five minutes and then ceased as abruptly as it had begun.

Miguel, our Mexican assistant, smilingly offered a bit of information. "The people here call that the 'six-thirty bird,'" he said, "because it announces that time of the day." Quick glances at our watches verified Miguel's statement; it was 6:35. That was our first evening in camp at La Venta, Tabasco, and was early in February.

Subsequent observations of the "six-thirty bird," which is called chachalaca in most parts of Mexico, showed that the birds kept their song time by the sun. Their regular evening recitals came later and later with the advancing season until, by the end of April, it was closer to 7:30 before the echoes of *cha-cha-lac-d* dwindled and finally disappeared into the miasma of insect overtone that ruled the tropical night. Dawn was announced with as much enthusiasm as the day's end, and, as a further evidence of the chachalaca's reaction to the absence of sunlight, its harsh cries would be reiterated at any time of the day when storm clouds darkened the sky.

The chachalaca (*Ortalis vetula*) is a dark-grayish-brown bird, about the size of a common bantam, but with a rather long tail. It belongs to the family of birds called Cracidae, related to our domestic fowls. Chachalacas were abundant at La Venta, but in spite of this and their noisy habits just described, the denseness of their forest home and their wariness, plus the excellent use of their keen eyes, close observation was difficult. Specimens for scientific purposes and as additions to our bill of fare were obtained only by slow, painstaking stalks.

The "six-thirty bird" was only one of the many interesting forms of wildlife encountered by members of the joint expedition of the National Geographic Society and the Smithsonian Institution to La Venta, Tabasco, in the spring of 1943.\*

The green stone tiger masks and precious jade ornaments recovered from the red sandy loam of La Venta receive more than a little competition from the plant and animal denizens of the forest, swamps, and jungles of the area.

## On a "Main Line" for Migrating Birds

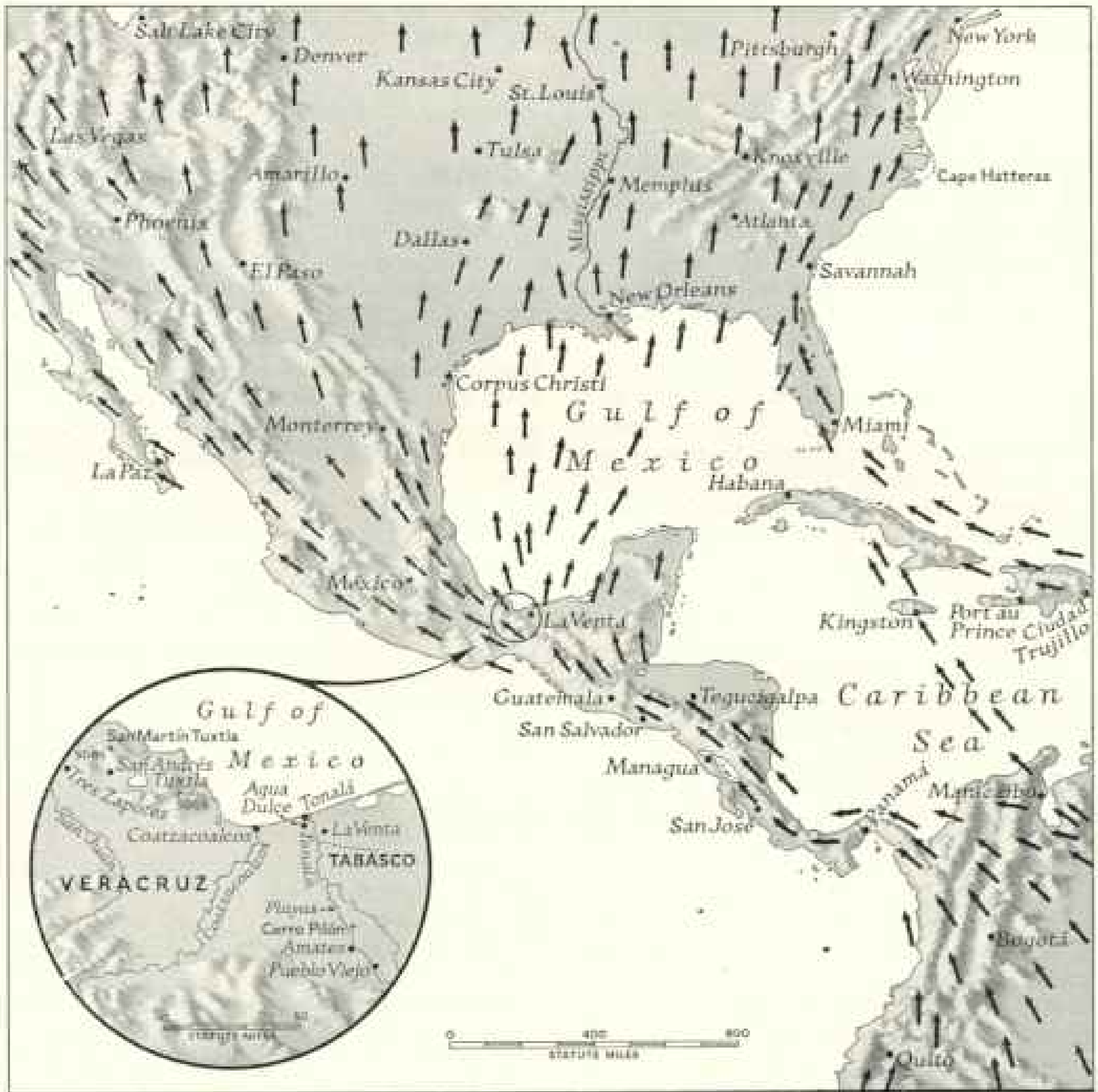
La Venta supports a typically tropical flora and fauna. To the biologist, that statement alone suffices to indicate a wealth of wildlife so vast that it is incomprehensible to one who has not seen it. Moreover, La Venta is an island covered for the most part with heavy rain forest and surrounded by grassy swampland and is directly on one of the main bird migration routes. It is near the center of an area where little ornithological exploration has been done.

I can hear bird students saying "Ah" and sighing, for such a place surely is the answer to a bird lover's dreams.

Such it turned out to be. Of the 173 bird species of which scientific specimens were secured for the study collections of the United States National Museum at Washington, D. C., a few brief accounts and illustrations from paintings of some of the more interesting and colorful forms will help the reader understand the enthusiasm of an artist-naturalist for La Venta (Color Plates I to XVI).

The location of our camp was fortunate for the study of birds. It was on a high grassy knoll, with forest on all sides save one, and on that side a series of swales led down to the edge of one of the endless tidal swamps of Tabasco. Small streams and springs near by and dense bushy thickets added to the

\* In the spring of 1943, the author studied the fauna of La Venta, Tabasco, and neighboring parts of Veracruz and Chiapas as a member of the fifth expedition to southern Mexico, jointly sponsored by the National Geographic Society and the Smithsonian Institution. The primary objective of this expedition was to continue the archeological exploration of this region. See "La Venta's Green Stone Tigers," by Matthew W. Stirling, and "Finding Jewels of Jade in a Mexican Swamp," by Matthew W. Stirling and Marion Stirling, in the NATIONAL GEOGRAPHIC MAGAZINE, September, 1943, and November, 1942, respectively.



Drawn by Lewis E. Allison

### Ocean-squeezed Middle America Is a Funnel in Which Birds' Migration Routes Converge

Arrows indicate springtime's one-way traffic north; with autumn, the direction is reversed. La Venta region (inset), where the artist made sketches for Plates I to XVI, is a natural bird observatory. There species widely separated in their northern summer homes may be seen, together with local residents. West Indies arrows show other flyways from South America, some passing through the Lesser Antilles.

variety of habitats offered and led us to see nearly every form of bird life in the area, except those shy species found only in the very deepest forest retreats.

Many an early morning or late evening hour was spent with binoculars just watching from our doorstep.

The essence of La Venta's "bird charm," however, was found in the primeval forest and the thickets bordering the native farms; and the fine trails which transected the island made practically every part easily accessible. During the three months spent there, I tramped every mile of these trails several times and

each time I had new experiences and saw new birds. But no walk was any more intriguing than the one made the first Sunday morning in camp.

#### A Sunday-morning Bird Walk

The "norther," that strong wind of the Gulf coast, had blown itself out, and gray skies, chill wind, and rain had given way to a bright, clean world. Something about the warmth of the early-morning sunshine and the smell of damp earth reminded me of springtime in the United States, but this feeling was suddenly dispelled by the deep boom-



#### Two Half-drowned Noahs Dry Off on Their Ark after a Midnight Deluge

Walter A. Weber, the author and artist (left), and Dr. Matthew W. Stirling, leader of the expedition, lift the tarpaulin that sheltered them during a violent rainstorm on a gravel bar in the Playas River. Their rubber mattress almost served as a life raft (page 212).

ing voice of a black howler monkey.\* In those reverberations I think I could detect a note of complaint, as if the sun wasn't coming up fast enough to warm one's body after three days of rain. I imagine that old howler, poor chap, was still pretty sodden.

Other voices were greeting the new day in more cheerful and musical tenor and, as I tried to match call notes and songs with the many feathered forms flitting about in the near-by trees, I suddenly became impatient to be off on the trails of La Venta.

Florinda, our cook, must have anticipated my thoughts, for as I started toward the kitchen to learn the progress of breakfast, she appeared with steaming coffee, rice, eggs, and tortillas, and her usual cheery announcement of "Breakfast ready!" The meal was somewhat hastily eaten, and soon I was on my way with binoculars and collecting equipment.

I chose the main trail leading from camp to the archeological site, for on Sunday the workers would not be around to disturb the more timid forms of wildlife. A lucky choice that was, I soon discovered, for Nature was

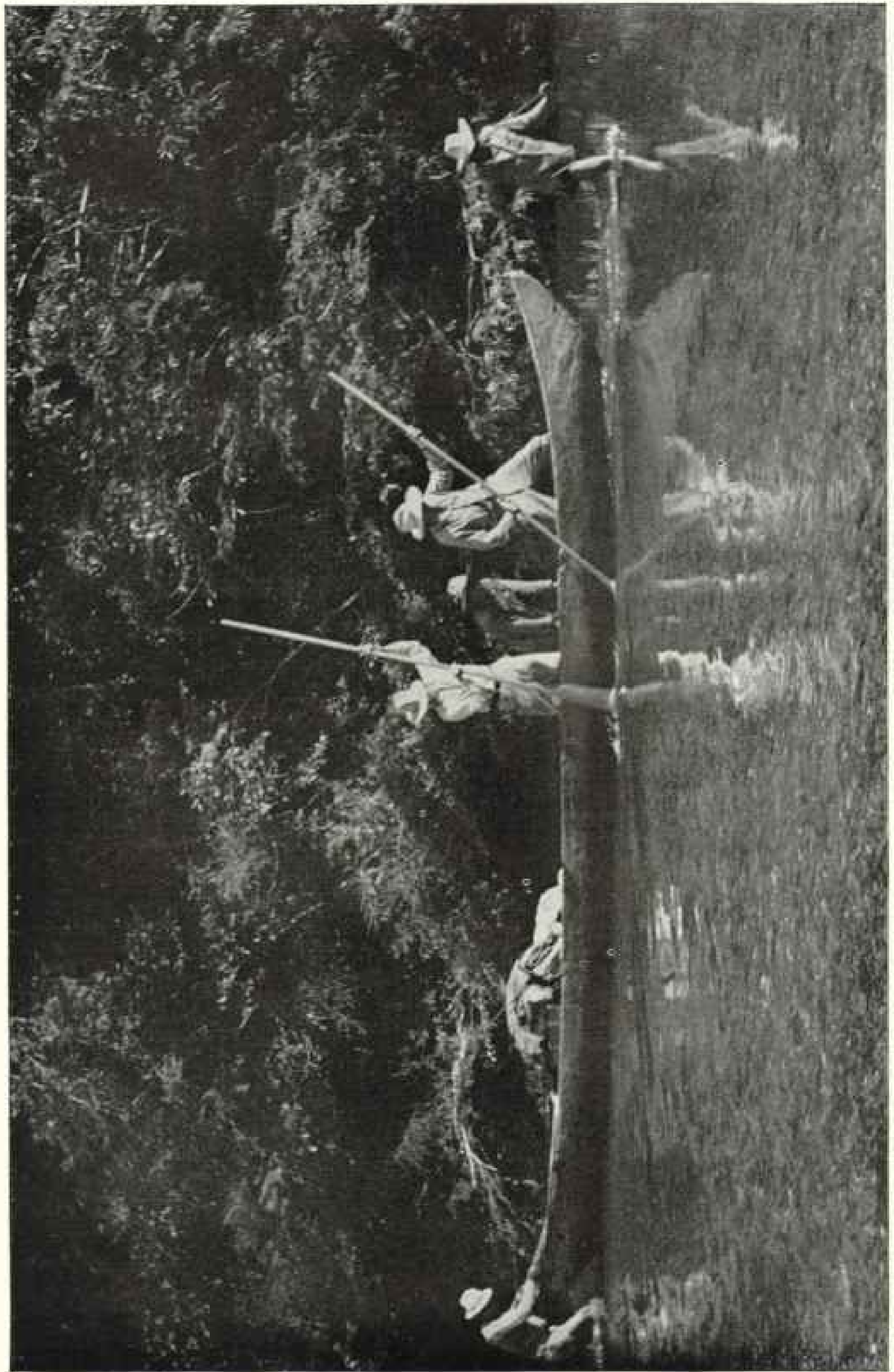
exceptionally generous that day. The leafy canopy overhead was fairly crawling with bird life, and I got thrill after thrill as the binoculars revealed intimate pictures of the feathered creatures about me.

Many of these were birds I was seeing alive for the first time—birds either completely new to me or familiar only from museum specimens or book descriptions. Others were old friends I had seen in Panama, and among these "natives" were many migrants from north of the border. Most of the latter were wood warblers, the commonest being the black and white, whose striped form appeared in nearly every tree.

Myrtle warblers, magnolias, black-throated greens, and redstarts also abounded, and they eagerly searched for insects, unmindful of their Mexican neighbors, who were equally busy doing the same thing.

Several times a yellow-breasted chat appeared. Each time I wondered whether he was the one who always built his nest beside the garden patch at home, and whose voice filled the creek-bottom thickets with eccentric, and often ventriloquial, experiments in sound effect. Here the chat was strangely silent. So were all the other northern visitors, except

\* See "Monkey Folk," by William M. Mann, NATIONAL GEOGRAPHIC MAGAZINE, May, 1938.



**Expedition Members and Guides Pole, Pull, and Push a Dugout up the Shallow But Turbulent Playas River**

In rougher water everybody had to get out. Jungle growth is so thick that a man can walk scarcely 50 feet without a machete to cut a path. In the forest live curassows, howler monkeys, jaguars, and tapirs painted by Mr. Weber (poing, center). While hunting in such a thicket he became lost (page 215).

for occasional call notes or cries of alarm.

If the migrants were niggardly with their music, not so the La Venta birds. I heard many notes that were to take me days and weeks to identify with their rightful owners. One, soon to reveal himself, was the squirrel cuckoo (Plate XII).

I heard the rattling, squirrel-like chatter of this russet-garbed relative of our yellowbill several times before seeing the bird. By standing still and giving a few squeaks in imitation of a small bird in distress, I soon saw one of these cuckoos appear in the branches overhead. His curiosity was evidently so strong that it prompted him to approach closer and closer, until he was barely 15 feet from me.

As he moved into a patch of sunlight, I was startled to see his bright eye, blood-red, like a ruby in the green-gold setting of his eyelid.

The squeaking had attracted other birds, most arresting of which was the yellow and green trogon that lit on a swinging liana directly over the trail. Ornithologists call him *Trogon melanocephalus*, meaning black-headed trogon. This species proved to be a common resident of the region and was usually referred to by us as the yellow-breasted trogon because of its brilliant golden-yellow breast (Plate IX).

#### Trogons Eat on the Wing

Not quite so abundant but even more striking is the larger Massena trogon, which sports a blood-red waistcoat. The two are alike in habits, being quiet and rather inactive but not shy. Several times we observed their curious manner of feeding on fruits and berries while on the wing. In doing this the bird hovers in the air, much like a giant moth or hummingbird, while his bill rapidly strips the berries from the outermost branches.

I wandered on up the trail to a place where the forest opened into the clearing made by the workmen at the archeological site. The sun was up in full force now, and its glare on the freshly turned red sand contrasted strikingly with the dark velvety greens of the forest. What priceless treasures still lay buried beneath that rust-colored loam I mused on, as I remembered Dr. Stirling's discoveries of previous years.

My mind wandered from the realism of surrounding jungle, with its throbbing life, to the time of the ancient La Ventans, who existed on the island fifteen centuries ago. But not for long could my thoughts linger in those intriguing corridors of the past. A swift-moving shadow made me look up in time to see a small, smartly dressed falcon alight on

the topmost branch of a dead tree on the edge of the clearing. It was a white-throated bat falcon—close relative of our sparrow hawk (Plate IV). His steely blue-black back, reddish breast, and pure-white throat, added to the jaunty carriage so typical of the falcons, made him an attractive individual.

The glasses revealed that he had caught a huge grasshopper, which he proceeded to eat with the inherent nicety of falcons. First, he carefully plucked the wings. While they floated earthward in slow spirals, his sharp hooked beak severed the body in pieces just the right size for a smallish falcon. Then he swallowed each piece daintily.

Perhaps birds do not have a highly developed sense of taste, but his evident satisfaction after devouring that tidbit made the little hawk look just about the way one feels after eating his first brook trout of the season.

Just beyond the area now being excavated was an old farm, rapidly being taken over by new jungle growth. On its edge lay one of the great stone heads excavated a few years before.\*

On the round, weathered dome of the idol sat four fat little ground doves, sunning themselves and preening their feathers; in the mud of the ditch in front of the face, myriad deer, ocelot, coati, and agouti tracks told the story of nocturnal four-footed prowlers.

Seeking the shade of the near-by forest, I sat down on a fallen log to view the colossal basalt monument again. In my mind's eye I tried to reconstruct the scene before me into what it was like when that stone symbol marked the shrine of the ancient people. Whatever glorious pageantry of color and culture may have been enacted on that spot, the stone head alone remained with its rotund, inscrutable features essentially unchanged after centuries of exposure to the elements. It seemed, by its presence, to exaggerate the loneliness of the spot.

#### The Motmot Shapes Its Tail

A flock of parakeets flying overhead, screaming unmusically, broke my spell of musing. Not far off I could hear the plaintive whistle of a tinamou. My "still watch" was soon rewarded by the appearance of two Lesson's motmots alighting on swinging vines over the trail (Plate XII).

The sleek birds turned investigating eyes in my direction, while their long pendulum-shaped tails jerked sidewise, rhythmically, as if they indeed were Nature's timepieces, which

\* See "Great Stone Faces of the Mexican Jungle," by Matthew W. Stirling, NATIONAL GEOGRAPHIC MAGAZINE, September, 1940.



had ticked off the centuries while the jungle buried La Venta's stone heads.

That peculiar tail, by which the motmot claims entry into so many books on natural history, is shaped by the bird itself by picking off the barbs near the ends of the long central feathers. Why the bird does this is still a mystery.

Motmots are closely related to kingfishers and, like the latter, nest in holes excavated in banks. The beautiful golden-green body plumage of this Mexican species is set off by a jet-black crown, edged with turquoise blue, and a leaf-shaped black spot also edged with blue in the center of the breast.

Bidding farewell to the motmots, I arose to leave and was startled by the sound of scratching on the branches above my head. A glimpse of a small, black-bodied animal disappearing in the dense foliage was all that rewarded me on that occasion. Before reaching camp that day, however, I discovered that the animal was a squirrel with jet-black body and a tail with silver-tipped hairs.

Later this squirrel was found to be one of the commonest mammals in the region. The same species is found in three color phases—gray and red, red and black, and all black—and practically every gradation in between these colors (Plate III).

#### Night Life of La Venta

Daytime in the Tropics is primarily a period of color display. Then Nature sports her most brilliant hues in feathers and fur, in reptile scale and flower petal, for, of course, color is light. It might seem that with the coming of night and the retirement of scarlet, orange, blue, and green, the jungle would lose much of its interest. On the contrary, it merely takes on new life, perhaps a more insistent form of life than in its daylight hours, but certainly one of equal fascination for the naturalist.

The structural modifications and adaptations to life in the semilight or dark give to the animals of the night certain characteristic features and often a very strange appearance, and these are generally tied up with interesting behavior patterns and habits. It is relatively easy for the observer to get acquainted with these prowlers of the dark, for, with a miner's head lamp held on the forehead by a leather band, the reflected light from the creatures' eyes shows up with surprising distinctness even at a considerable distance. Usually I was able to approach an animal held in the glare of a head lamp much closer than I could get to that same animal in daylight.

La Venta's fine system of trails (cut recently by engineers from the oil company) made night hunting almost a luxury, and I spent many exciting hours "prospecting" those trails in the dark. Deer, raccoon, agouti, peccary, coati-mondi, jaguarundi (eyra), and three species of opossum were all revealed by the beam of the head light on various expeditions. Occasionally an owl would be encountered, but by far the most abundant nocturnal bird was the pauraque.

#### The "Where-Are-You" Bird

The pauraque is the Mexican equivalent of our whippoorwill. Like the latter, its enormous eyes, large mouth arrayed with long, stiff bristles, and soft plumage equip it perfectly for catching insects on the wing at night. It also resembles its northern relative in the intricate pattern of its feather markings, which run the gamut of odd-shaped spots, streaks, bars, and finely penciled vermiculate lines.

Rusty-brown, black, and tawny predominate on the upper parts of the bird, and the breast is softly barred with dark gray over a buffy ground color. A white patch across the middle of the wing feathers and the white outer tail feathers shows up conspicuously when the bird flies. Its insistent cry *par-a-que*, or the English version *where-are-you*, could be heard from dusk till dawn, almost continuously.

One night a particularly vociferous and oft-repeated *where-are-you*, which seemed to come from within a few yards of our screened laboratory, induced me to investigate. Before long the beam of my electric lamp picked up the bird's large eye, which reflected the light with a brilliant rubylike glow.

Since I had already procured enough specimens of the pauraque, I decided to see how close I could approach this bird before it would take alarm. Very slowly I made my way across the grassy slope, being careful to keep the light beam on the bird as steady as possible. I was surprised when I succeeded in shortening the intervening distance to ten feet, then eight feet, finally six feet.

Soon I stood directly over the bird and my feet were within a yard of its large red orbs.

Scarcely daring to breathe, I slowly bent over and started to extend my right hand toward it, being careful to keep it in the shadow all the while. Inch by inch my hand was getting nearer and nearer until it hovered about ten inches over the pauraque's back. Then I made a grab and felt the bird's soft plumage, while its body struggled in my hand.

Finding its struggles of no avail, the pauraque opened wide its huge mouth and emitted a hissing sound. In doing this, its head took

Wildlife of Tabasco and Veracruz



© National Geographic Society

Painting by Walter A. Weber

**With Long Bills Toucans Can Easily Reach Distant Fruits While Sitting in Trees**

Beaks are light, as the bone is cellular. Sulphur-breasted (upper) and Araçari Toucans introduce jungle life observed around La Venta, camp site of the fifth National Geographic-Smithsonian Institution expedition to Mexico. Walter A. Weber, the author-artist, composed these paintings to show what he saw on his travels.



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PAINTING BY WALTER A. WOOD

**Coatis, the Raccoon's Tropical Cousins, Parade Banded, Upright Tails:**

Youngsters wander in bands; grouchy old males live alone. Coatis lately have invaded Texas, New Mexico, and Arizona. Top to bottom: a tropical Redstart, a Forest Sparrow, and Quail Doves, all newly described by Alexander Wetmore from specimens obtained on the Tuxtla volcanoes in Veracruz. They are known only there.

Wildlife of Tabasco and Veracruz



© National Geographic Society

Painting by Walter A. Weber

**Opossum, a Night Worker Awakened by the Noisy Day Shift, Asks, "Who's There?"**

Leaving his palm-frond couch, he takes a grip with his prehensile tail and watches the brightly colored squirrels. When these rodents' teeth chip an oil palm's flinty nut, the noise is surprising. Brown, red-and-gray, and black squirrels could be brothers. Other color gradations mark the same species.



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Painting by Walter A. Weaver

**An Impostor's End: White Snake Hawk Clutches a Harmless False Coral Snake Masquerading as a Venomous Coral**

His mate flies to join him. The foremost onlooker is a White-throated Bat Falcon. One of its tribe occupied a high perch at La Venta and "supervised" the diggers; they called it "Foreman." Beyond, Laughing Falcon is named for its strange, far-reaching cry. Far right: the Mexican Black Hawk, common in this area. A bromeliad, an air plant belonging to the pineapple family, grows on the dead tree. (left).



© National Geographic Society

**Wader, Diver, and Swimmers Hold an Aquatic Congress in a Wild Tabasco Swamp**

His "stripes" name the Tiger Bittern (wading), one of the herons. Perching, a Ringed Kingfisher, largest of his tribe in the New World, is set to plunge for fish. Muscovy Ducks (swimming and flying) are wild brethren of the domestic breed. Mexicans occasionally tame Black-bellied Tree Ducks (three on a log).

Painting by Walter A. Weber



© Southern Descriptive Society

### Brilliant Orioles Sing in the Shade of a Papyrus Thicket

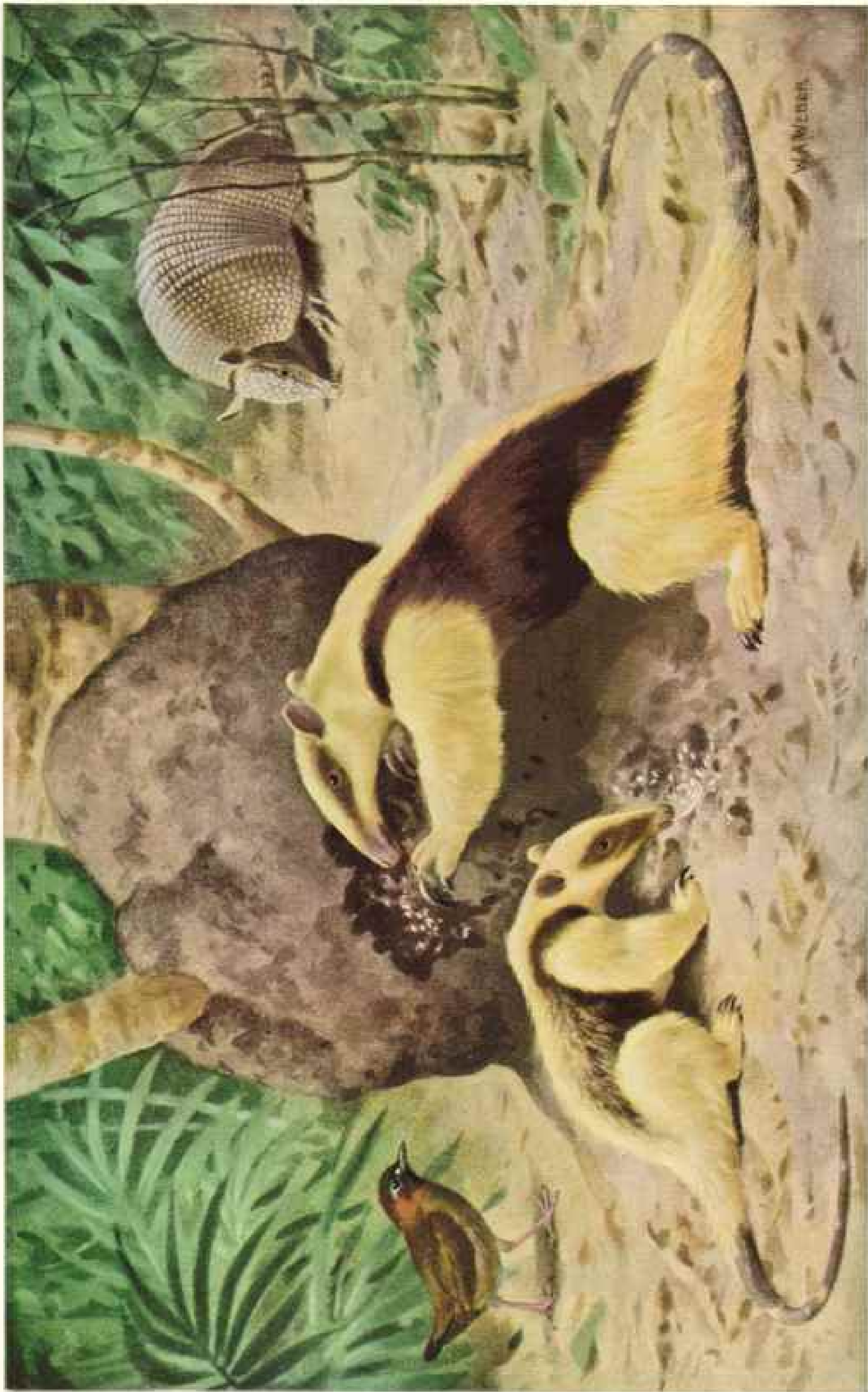
Yellow-tailed Oriole (below) is a ventriloquist. When singing in the rushes, he is hard to find. His companion is Lesson's Oriole. New World orioles are more blackbirds splashed with the gold of Europe's true orioles.



Painting by Walter A. Weber

### Royal Flycatcher Has a Convertible Top, His Folding Crest

Lowered, the crest is concealed by long feathers on the sides of the crown. It opens like a folding fan. In the forest gloom it creates the illusion of a butterfly's moving wing. Above: Yellow-thighed Manakin, a jungle denizen.



© National Geographic Society

Painting by Walter A. Weber

**Sticky Tongues Sweep Up Termites and Eggs as Tamandua Anteaters Open a Nest with Arms as Powerful as Wrestlers'**

To accommodate its eating habits, Nature has given Tamandua a toothless muzzle and long hooks on center claws. Equally fond of ants and termites, a Nine-banded Armadillo prospects for grubs. Though clad in scaly mail, it is a mammal distinctly akin to furry anteater and sloth. Southern Mexico hunters relish the armadillo's chickenlike flesh. Cornered, the beast curls into a ball. Left, a Mexican Ant Thrush runs on the jungle floor.





© National Geographic Society

Painting by Walter A. Weber

### While a Woodpecker Drills, Tanagers Hold a Color Convention

Top to bottom: Blue Tanager, Plush Tanager, and Ant Tanager; right: Crimson-collared Tanager. Only the most brilliant pigments match Plush Tanager's red skirt. Exclusively American, tanagers occur from Canada to Argentina. The Veracruz Ivory-billed Woodpecker is related to our nearly extinct Ivory-bill.

Wildlife of Tabasco and Veracruz.



© National Geographic Society

Painting by Walter A. Weber

**Hovering Like a Hummingbird, a Black-headed Trogon Picks Berries on the Wing**

Massena Trogon (perching, left) allowed the artist to approach close. Trogons live in tropical America, Africa, and Asia. Most beautiful species of a brightly colored order is the long-plumed Quetzal, once sacred to Mayas and now the national bird of Guatemala.



© National Geographic Society

Painting by Walter A. Wood

**Black Howler Monkeys in a Treetop Watch a Flight of Yellow-headed Amazons, Wild Brothers of Pet-store Parrots**

On both male and female howler, a bushy beard conceals a thin-walled, globe-like bone which acts as an amplifier. A pack in "song" sounds like a moving freight train. A lone howler, like the Western coyote, is often mistaken for a dozen. Shattering *La Venta's* stillness, howlers' voices carried a mile or more. They have prehensile tails—tenacious and dexterous—found in three groups of American monkeys. No Old World monkey uses the tail as a "fifth hand."



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W. A. WEBER

Painting by Walter A. Weber

### When Scavengers Convene at a Tapir Feast, King Vultures Are Truly Kings, Driving Black Vultures to the Sidelines

This scene was observed along the Playas River. In three days 33 birds picked the skeleton clean, leaving the tough hide a perforated cover. American vultures are bald-headed, saving feathers from being drenched in carrion. The Tapir is a shy, nocturnal vegetarian distantly related to horse and rhinoceros.



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**"Bright Eye Blood-red Like a Ruby in a Green-gold Setting"**

Lured by a cry, this inquisitive Squirrel Cuckoo came within 15 feet of the artist. Unlike parasitic European cuckoos, his tribe rears its young. When ripe, the culia seed covers will be kapok, a fluffy fiber used for stuffing.



Paintings by Walter A. Weber

**Mexican Motmots Have Plucked Gaps in Their Tail Feathers**

Among birds, this self-mutilation is unique; the reason is unknown. Tails, here pointed in opposite directions, swing like pendulums. Below, the jungle creeps over a colossal stone head carved by the vanished La Ventans.



W.A. WEBER

© National Geographic Society

**As Jaguar Hunts a Meal, Crested Curassows Perch in Safety Above the Playas River**

Painting by Walter A. Weber

These gallinaceous birds were numerous in the wilderness. Unused to man, they permitted canoes within shotgun range. For days the artist's party enjoyed their turkeylike meat. Though readily tamed, Curassow rarely breed in captivity. Its name derives from Curacao, the island. Along the river, jaguar tracks were everywhere. Guides, whose ancestors venerated *el Here*, inherit a mystical dread of him.



As If Walking on Water, a Mexican Jaquana Crosses Floating Weeds on Long Slim Toes  
Swimming, a Finfoot wears "mourning" stripes on her neck. Mexicans call her "little widow."



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Paintings by Walter A. Weber

Helmeted Lizard, One of Mexico's Rarest Forms, Eyes a Morpho Butterfly

Wildlife of Tabasco and Veracruz



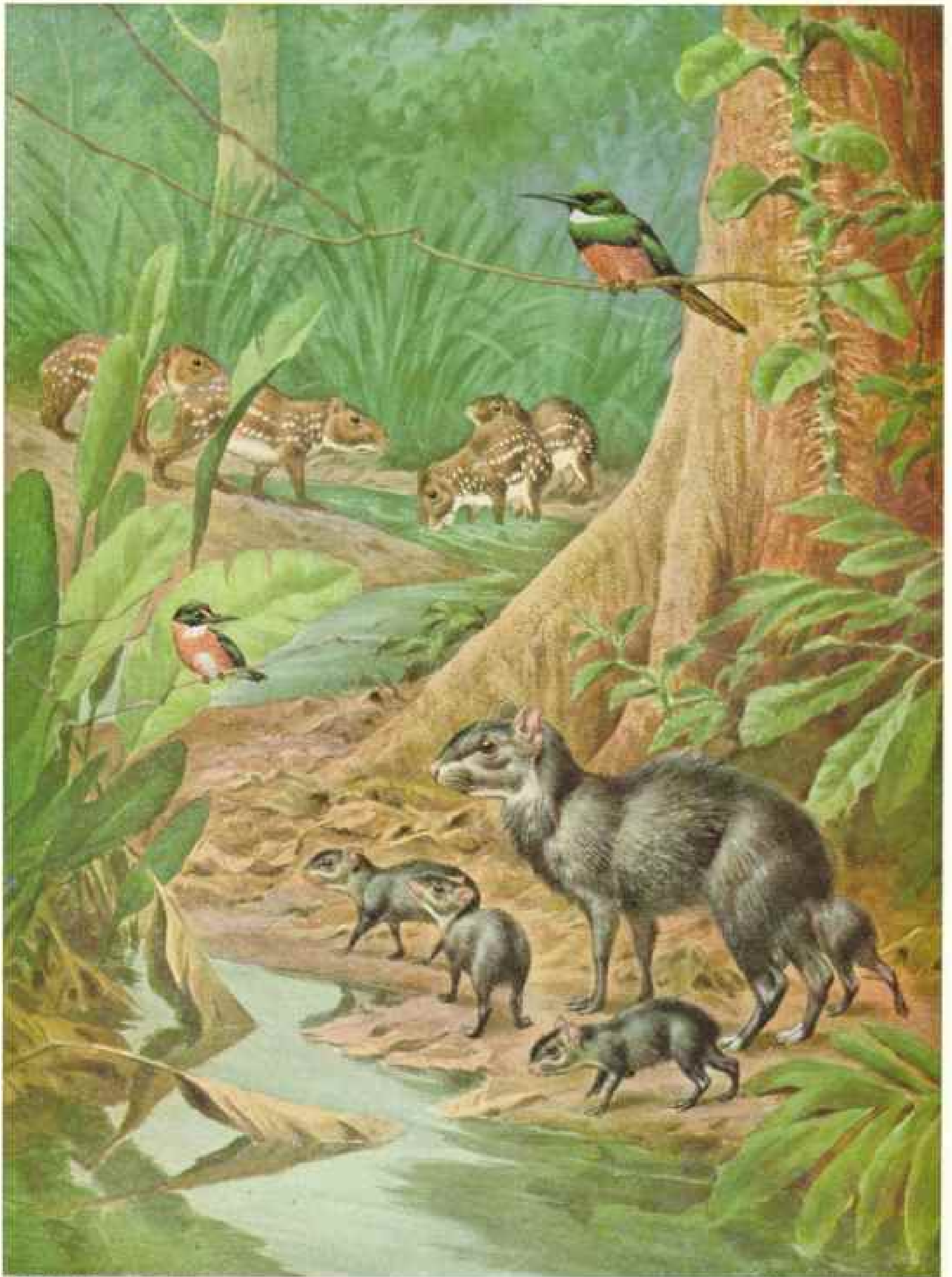
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Painting by Walter A. Weber

**To Woo His Mate, an Acrobatic Oropendola Starts a Full Swing Around Horizontal Bar**

Though the smaller female has woven their home, her spouse boastfully "sounds off" like a rusty hinge while he turns a complete somersault. A distant tree is laden with nests, as if with fruit. Swellings on the trunk house wasps, which protect fledglings from raids by monkeys, raccoons, and opossums.





© National Geographic Society

Painting by Walter A. Weston

**A Timid Agouti, Leading Her Family to Water, Meets Distant Cousins, the Spotted Pacas**

These two rabbitlike rodents serve as a harder for carnivores. Mexicans, too, hunt them for food. Left: Least Kingfisher, smallest of his tribe in America, preys on little fishes in the brook. Above: Jacamar, expert flycatcher, maintains a quiet vigil, head turning from side to side.

on a striking resemblance to a cottonmouth moccasin. I might have been startled into releasing my hold had I not been familiar with this trick, which is practiced by whip-poorwills and nighthawks when disturbed from their nests or when wounded.

After examining the pauraque for a few minutes, I allowed it to escape. Several other attempts to catch these birds with my hands were not so successful as this first one. Many times I was unable to get closer than 25 feet from the intended victim before it would flutter away.

I found, after some experimenting, that if it could be approached directly from one side, keeping but one of the eyes in the glare of my head lamp (instead of coming head on, in which case both eyes would shine), I was usually successful in getting close enough to put my hand on the bird's back.

#### Owls Wary of Night Light

Hunting owls was not like catching pauraques barehanded, for they were much less abundant and also unusually wary of the light. Night after night I would hear a distant *hoo-hoo-hoo*, like the call of our barred owl, but much softer, and I would stalk through the forest searching the trees with my light. Only once or twice did I succeed in catching a glimpse of the two globes of green-gold light that I knew were the owl's eyes.

I was anxious to see the owl and also obtain one as a specimen, for owls are always a great prize for the museum ornithologist. Luck seemed against me until one morning, long before dawn, I was awakened by the customary series of hoots, but so loud this time I knew the bird could not be very far from camp.

Pulling my clothes on hurriedly, I slipped outside with shotgun and head lamp and sat down on a box to finish lacing my shoes. Without warning, the owl cried again. Four loud hoots seemed to come from directly behind me. I whirled around and looked up, to see the bird silhouetted against the sky on the ridge of the hut.

This opportunity could not be ignored; so I backed up to the proper distance to get a good shot pattern. Aiming carefully, I fired. The 16-gauge shotgun never before or since made a report so loud as that one. The shot ripped through the palm thatch and the wounded owl rolled down the roof, clutching and clawing and scraping all the way down, and finally fell off the edge.

I got the owl—its skin now reposes in the National Museum. I also heard a deluge of somewhat incoherent and inhuman sounds

emanating from the sleeping quarters, which led me to believe for a moment that I would have to run for it to save my own skin.

Collecting natural-history specimens by enlisting the aid of local natives is rarely without its incidents, which are sometimes amusing and sometimes nearly tragic.

Our Mexican hosts and neighbors on La Venta were excellent woodsmen, and like most natives they became deeply interested in my collecting activities. Soon after our camp was established, they began bringing all manner of creatures to me.

One day three of the boys came into camp, still flushed with the excitement of the hunt and carrying a dead ocelot. At the heels of the hunters straggled the "pack" of five mongrel dogs which had been used in the chase. The dogs looked weary and the worse for wear. One of them had a long fresh wound on its back that nearly bisected the poor brute; another had one ear completely missing. This wound also was recent.

The ocelot was a fine large specimen without a mark on it save the gaping shot wound in the chest, which must have killed the animal almost instantly. If the ocelot had inflicted such frightful wounds on the dogs, there must have been a considerable battle waged; yet the cat showed no signs of having been in a fight.

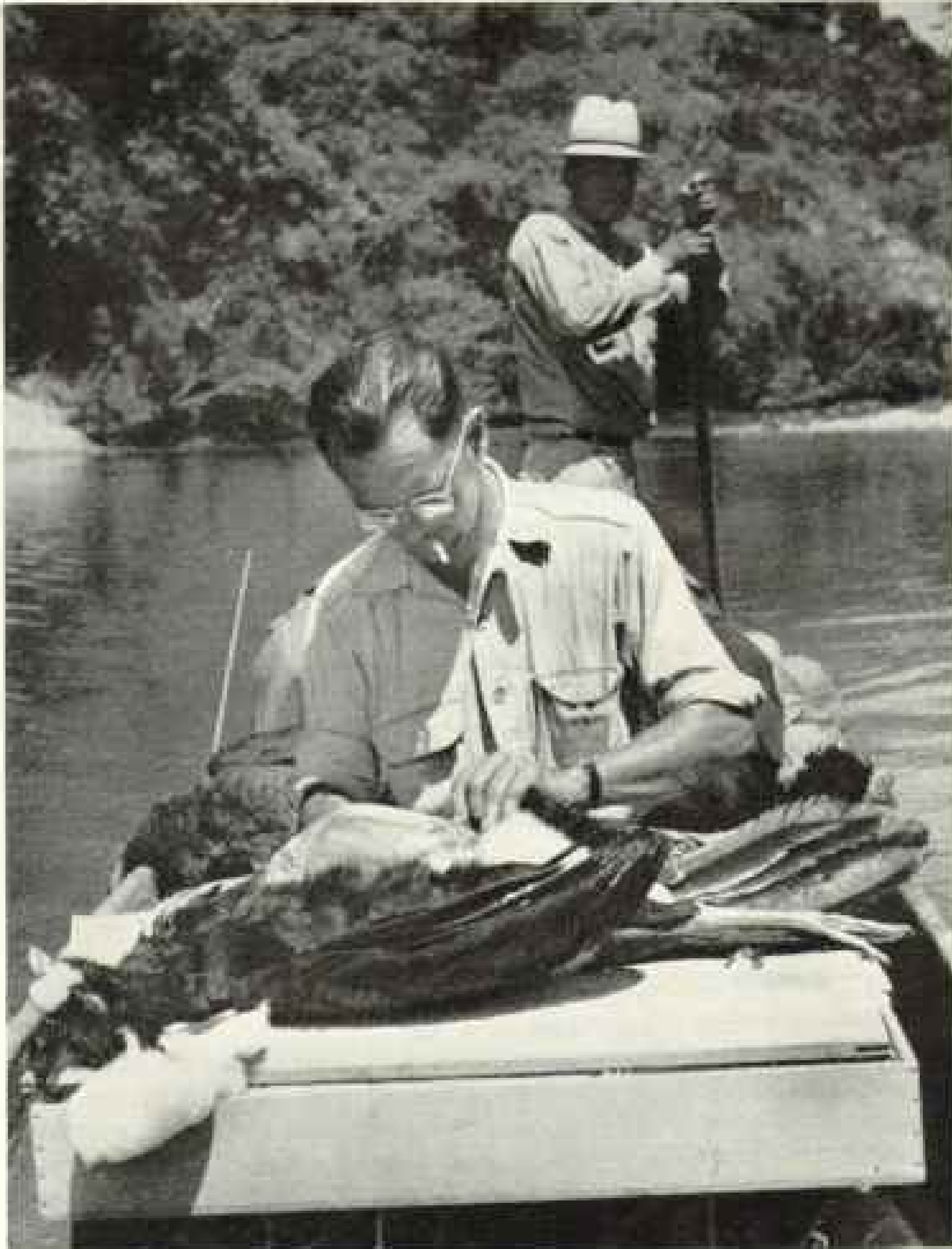
When the excited narrations of the three hunters were pieced together, the story was a simple one. The cat was treed and mortally wounded by a charge of shot fired at close range. As it fell to the ground, spitting and clawing in its death throes, the dogs rushed in, and the excitable natives, in their attempts to finish off the cat quickly, began wielding their machetes—with distressing results for the dogs.

#### A Gift Lizard Proves a Find

Another time a woman brought in a lizard, which she carried in a cleverly improvised bag of woven palm fronds. She told me the lizard came out to sun itself on a rock near the spring hole where she was doing her laundry.

The animal was striking looking, of a pale lime-green color and about 20 inches long. The slender tapering tail was more than three times as long as the body, and the back of the head had a curious bump which gave it the appearance of a helmet (Plate XIV). Such a large, conspicuous lizard must be well known to scientists, I thought, but I accepted the gift. Not until several months later, upon my return to the United States, did I learn how unusual that lizard was.

Dr. Hobart M. Smith, of the University of



#### The Author-Artist Kept This Bird and Ate It, Too

In a dugout on the Playas River, Mr. Weber skins an eight-pound curassow for the Smithsonian Institution's collection. Feathers and bones went into the packing box, used here as a cutting board. Flesh was tossed into the frying pan. On the camp menu, curassow replaced turkey, a relative, but it needed tenderizing (Plate XIII).

Rochester, the herpetologist who examined this specimen of *Laemanctus deborrei*, said: "One of the most valuable items secured . . . which proves to be the second record from Mexico."

It is the first known to have been collected in Mexico in nearly fifty years and is among the rarities of the Mexican herpetofauna.

#### Wild Parrots Say "Hello"

While spending several days in the village of Agua Dulce, near Tonalá, a Mexican sought to sell me a pet yellow-headed parrot. This parrot is well known for its ability to imitate human speech, and this one had a consider-

able Spanish vocabulary. I was amazed, however, to hear it use the word *hello* frequently, for its Spanish-speaking owner evidently knew not a word of English. The mystery was solved when I became better acquainted with this species of parrot. I found that among the wild birds one of their natural calls is a guttural *hello*.

Dr. Stirling's account of the trip up Playas River in search of Pueblo Viejo bears a full description of that rather arduous penetration into one of the wildest parts of the world, still unspoiled by the occupations of man.\*

Our journey, by motor launch and canoe, brought us into contact with many forms of wildlife now restricted to the less settled portions of tropical America. Bird life especially was abundant, and it was my ambition to make a representative collection of scientific specimens for the National Museum, as well as to learn all I could about the habits of the various species and to

gather material for paintings.

Realizing that practically all our time would be spent on the move and that I would have to do most of my work from the boat, I lost no time arranging my collecting equipment in the bow of the launch. My binoculars, shotgun, and notebook were busy from then on.

As we moved up through the flat, swampy country of the lower Tonalá, the monotony of the brown water and mangrove thickets was enlivened by various members of the heron tribe. Large numbers of little blue herons, as well as the handsome snowy heron

\*See THE GEOGRAPHIC for September, 1943.

and his larger cousin, the American egret, were in sight almost constantly. Kingfishers, too, were a common sight. Four species of these were noted on that first day—the huge ringed kingfisher (Plate V), some 15 inches long, with bright-chestnut underparts; the belted kingfisher, migrant visitor from the north; and two types of the smaller green kingfishers.

#### Finfoots Alight and Dive with Slight Pause

The first big ornithological thrill came when three small grebe-like birds got up off the water and with rapidly beating wings spattered over the surface for some 150 feet before alighting and diving almost at once. When located again as they reappeared, I saw they were finfoots (Plate XIV), not unlike grebes or hell divers in general appearance. But they are placed in a separate group by ornithologists and are believed to be the last surviving members of a much larger group of birds, most of which have become extinct.

The name is derived from the structure of the feet, which bear flangelike flaps of skin on the toes to aid in swimming. The Mexicans call the finfoot *viudita* (little widow), presumably because it has a conspicuous black stripe on the side of its neck.

On the second day of our voyage we entered the Playas River, and before long the character of the landscape began changing. The water was flowing swifter and cleaner and the banks became steep.

The flat country surrounding us was occasionally relieved by a low hill. Bird life seemed to be increasing and land birds were



His Siesta-time Formula: Shady Hammock and Good Magazine!

A farmer on the Playas River scans the November, 1942, issue containing Matthew Stirling's "Finding Jewels of Jade in a Mexican Swamp." Schooled only in Spanish, he concentrates on pictures of his fellow countrymen. On his most recent trip to Mexico, Staff Photographer Richard H. Stewart distributed color proof sheets of his NATIONAL GEOGRAPHIC illustrations to his former models. Proudly they pasted them on their walls.

more easily observed because of the proximity of the river banks.

Blue-headed parrots and the large sulphur-breasted toucans (Plate I) became common sights, and doves, pigeons, and chachalacas were seen regularly; also oropendolas (Plate XV and page 213) were noted weaving their gourd-shaped pendant nests. Once a dazzling flash of scarlet in a near-by bamboo thicket resolved itself into a plush tanager (Plate VIII).

So intense is the red hue on the back and rump of this bird that my attempts later on to paint it were most discouraging, for the best

and purest of our manufactured pigments cannot begin to match that product of Nature's palette.

About noon we reached Cerro Pilón, at the foot of the mountains, where it was necessary to forsake the launch because of the rapids and treacherous shoals from this point on. While waiting for a suitable dugout canoe to be located, Dick (Richard H.) Stewart and I decided to make a try for the fish we saw jumping in the near-by pools. Accordingly, we took turns with a light bait-casting rod and, after a little experimenting with various artificial lures, succeeded in finding the one on the fish's bill of fare for that day.

In a short time we caught several robalo, ranging from three to seven pounds, and a fish called by the natives *hobo*, a mullet. These were promptly cleaned and introduced to a skillet by Gabriel, our boatman, who proved to be an accomplished cook.

#### In the Realm of the Jaguar and Tapir

Presently two rivermen appeared, poling a huge dugout canoe which was to be our home as well as our vehicle for the rest of the trip.

After transferring our camping equipment, cameras, guns, etc., from the launch to the canoe and bidding the residents at Cerro Pilón farewell, we set forth. By careful adjustment of food boxes and duffel bags, I was able to arrange a place near the stern of the canoe where I could sit on a small folding campstool and skin the birds I collected en route on a board balanced on my knees (page 210).

The preparation of bird specimens is a rather simple operation under ordinary circumstances, but I soon found that a dugout canoe, lurching through rapids, is not one of the ideal places to pursue this interesting occupation.

The birds were too intriguing to pass up, however, and I consoled myself with the thought that the operation would be nearly as difficult to perform in the upper berth of a Pullman, but without benefit of such fine scenery. Furthermore, there was little danger of cramped muscles, for periodically all hands had to take to the water and push and pull the canoe over shoals and bars.

That night we camped on a gravel bar below a large pool where Stewart and I spent that delightful interval between sunset and dark fishing in the inviting water. Our sleep that night was suddenly interrupted by a thunderstorm and cloudburst of considerable violence; we were thoroughly drenched in a very short time, for our waterproof tarpaulins had to be used to protect the cameras, guns, and growing collection of bird skins.

Breaking our sodden camp in the morning, we proceeded on up the Playas River, through some of the most scenic country it has been the writer's privilege to behold. The river here had cut its channel through limestone gorges, and the steep rock ledges rose sheer on either side. Mosses, lichens, and ferns added lively tints of green to the somber gray stone, and the crests of the canyons were surmounted by giant trees that spread orchid-laden branches over the misty channel.

Blossoms of the epiphytes punctuated the foliage with splashes of vivid color, and occasionally we would pass a *roble blanco*, or "white oak," in the full grandeur of its blossoming period, a solid mass of rosy pink. Its Latin name is *Tabebuia pentaphylla*; it is not an oak, as its Spanish name implies.

We were entering the real wilderness now, the undisputed realm of the jaguar and tapir, the curassow and king vulture, and many others of our most picturesque tropical creatures. I got my biggest thrill when we saw the first Mexican curassow (Plate XIII).

Our boatman in the bow, Elias Palma, was the first to detect the bird, calling our attention first to the low mooring call of the curassow, while his keen eyes searched the lofty branches above us. Suddenly he exclaimed, "Faisán grande!" (big pheasant) and pointed the bird out to us. Although it was a good distance from us, we could see distinctly the huge black bird, nearly as large as a turkey. Before the day was done we saw many of them as well as their smaller brown cousin, *faisán chico* (little pheasant), or guan.

Many times our canoe, gliding under the low-hanging branches of a tree where a flock of one or the other of the species was feeding, scarcely elicited any response from the birds. We took what we needed for specimens and food, but after that we were content just to watch the magnificent birds.

#### Tapir Tracks Everywhere

From all the evidence afforded, the tapir was the commonest large mammal in the upper Playas. His tracks and trails were everywhere. Although he is generally nocturnal, we were fortunate in getting glimpses of two of the beasts, startled by our approach, as they clamored up the steep banks.

My ideas of tapir habitats, gleaned from books, were revised by experiences here, for I had always thought of the tapir as an inhabitant of low, steaming, muddy swamps. Here he was very much at home in a mountain river of sparkling clear water, with gravel bars and rapids.

After two more days of travel we reached the



**For Their Young, Oropendolas Weave Airy Cradles Which Swing in a Tree Like Fruit**

Members of the blackbird family, the birds build nests shaped like those of their relatives, the orioles. When parasitic rice grackles tried to lay foundlings' eggs in these nests, the rightful owners chased them away. On returning to a nesting tree at the opening of the season, oropendolas tear down their old homes and build anew. This Tabasco tree was the model for the one in Plate XV.



#### Beginner's Luck: His First Catch with a Rod

Photographer Stewart caught this two-foot robalo, or snook, with the author's tackle in the Playas River. A fighter, the robalo pounced on the lure, though the line was tangled by a backlash. Mr. Stewart found his catch quite palatable. The tropic robalo occurs in salt and fresh water on both sides of the Equator. One species lives in Texas and Florida. The blue stripe is its trademark.

spot from which we were to start our search in the jungle for the ruins of Pueblo Viejo.

That night in camp on a broad gravel bar, the subject of conversation among our Mexican friends seemed to center around *el tigre*, the jaguar. On practically every spot in the game trails or on the river's edge where a track would register, the round pads of the big cat had left their marks (Plate XIII).

After several stories of the "man-eating" activities of the jaguar were exchanged, the natives rolled up in their blankets, but not until they had gathered a good supply of wood to keep their fire going all night. They also insisted that we keep the gasoline lantern burning to guard against any feline attack.

#### Playing Hide-and-Seek with "el Tigre"

After breakfast the next morning, Dr. Stirling, Stewart, and I, accompanied by two brothers as guides, started out to search for Pueblo Viejo. Climbing the almost perpendicular bank directly opposite our camp, we struck out at right angles to the river bed. Walking was relatively easy because the canopy of foliage of this virgin forest was so dense that undergrowth was practically unable to exist.

We held a more or less direct course for about one hour, during which time it developed that our supposed guides knew no more about the location of the site than we did. Here and there we found machete marks on trees and branches and tried to follow them, but they were evidently made by some wandering hunter, for they held to no definite course.

After another hour we came out on what we supposed at the time to be the river. It did not seem likely that we could have come more than two miles from camp. Since bird life was more abundant along the river than in the deep forest, I decided to leave the party and follow the river back to camp. Just after saying goodbye to my friends, the coughing roar of a jaguar broke the stillness of the jungle, and the jesting admonition from Dr. Stirling was, "Don't let the tigre get you!"

As a matter of fact, I hoped to get the tigre myself and add his beautiful spotted coat to my collection of specimens. So, although I had only two buckloads for the 16-gauge double-barreled shotgun, I waded across the river and soon found jaguar tracks in the soft mud of a tapir trail. For about three-quarters of a mile the trail followed the river and the going was rather easy.

I was moving slowly and warily, for I knew I was quite close to the big cat, when the trail led from the forest into a dense, almost

impenetrable thicket of wild banana and a variety of ground palm that has vicious spikes sticking out in all directions along its stems.

Meeting the jaguar in that sort of place offered no strong appeal to me, so I waded until I got beyond the thicket and then cut back to the edge of it, hoping for that one-in-one-thousand chance that the jaguar would emerge into the more open forest again. Although I was rewarded once more by his reverberating roar, he is still in that thicket so far as I know.

#### Lost in the Wilderness

Having given up hope of getting a shot at the jaguar, I started down the river, alternately wading the shallow parts and walking around the deep holes. Small birds were fairly numerous, and it wasn't long before I had collected enough specimens to keep me busy for the rest of the day. I had walked downstream about two miles and felt assured that I could not be very far from camp, but after another hour of wading and cutting my way through brush, I began to wonder what was wrong, for I should have reached our base by that time.

Suddenly a horrid thought struck: I had passed the camp during one of my sorties away from the river collecting birds. If that were true, however, I should recognize the river where I was, because we passed it the day before in the canoe. Unfortunately, nothing about the stream so far looked at all familiar to me. I decided, however, to go on down for another mile.

The last mile nearly proved my undoing, for the river suddenly became a series of long deep pools, too deep to wade, and the growth on each bank was so dense that nearly every yard of progress meant cutting vines and all manner of thorny growth. Most of the time I could keep the river in sight, but at one point the wild bananas and thorn palms forced me to cut inland for a considerable distance.

I came out to the river again, more by good fortune than by good woodmanship, and found that the stream I was following joined another. This was confusing. Although we had passed a tributary on our upstream trek the day before, this junction of streams looked completely unfamiliar to me. I began to suspect then—and it turned out to be correct—that the stream I had been following was not the Playas at all but a tributary of it, and that the river made a huge oxbow directly above our camp site.

In starting out that morning, we must have made a short cut overland, across the narrowest part of this loop. I was hot and tired; so,

after a refreshing swim, I sat down to take inventory of my predicament and decided that the best thing to do was to stay put and wait to be found. I built a fire and tried to develop a heavy smoke signal, but found that, work as I would, I could not get enough rotten leaves together at one time to carry the smoke much beyond the treetops. Besides, there was very little dry wood available here.

On the assumption that I might have to spend the night in the jungle, and remembering the hair-raising stories about man-eating jaguars, I decided to retrace my steps up the arroyo about a mile, to a point where a high stone ledge and plenty of firewood would assure me a comfortable and safe camp. Accordingly, I cut back into the forest to avoid the deep pools and impenetrable thickets near the mouth of the arroyo.

It was in here that I really became lost, for, once inside a deep tropical rain forest, the surroundings are as much alike as the waves of the ocean. After going in what I thought was the right direction for about an hour, I came back upon my own trail and realized that I had traveled in a circle.

I followed a tiny stream that I was sure would take me to the river again, but it dissipated itself in a tapir wallow. Choosing another, I had the same experience. This was getting to be a little more than disconcerting, but I decided to try one more.

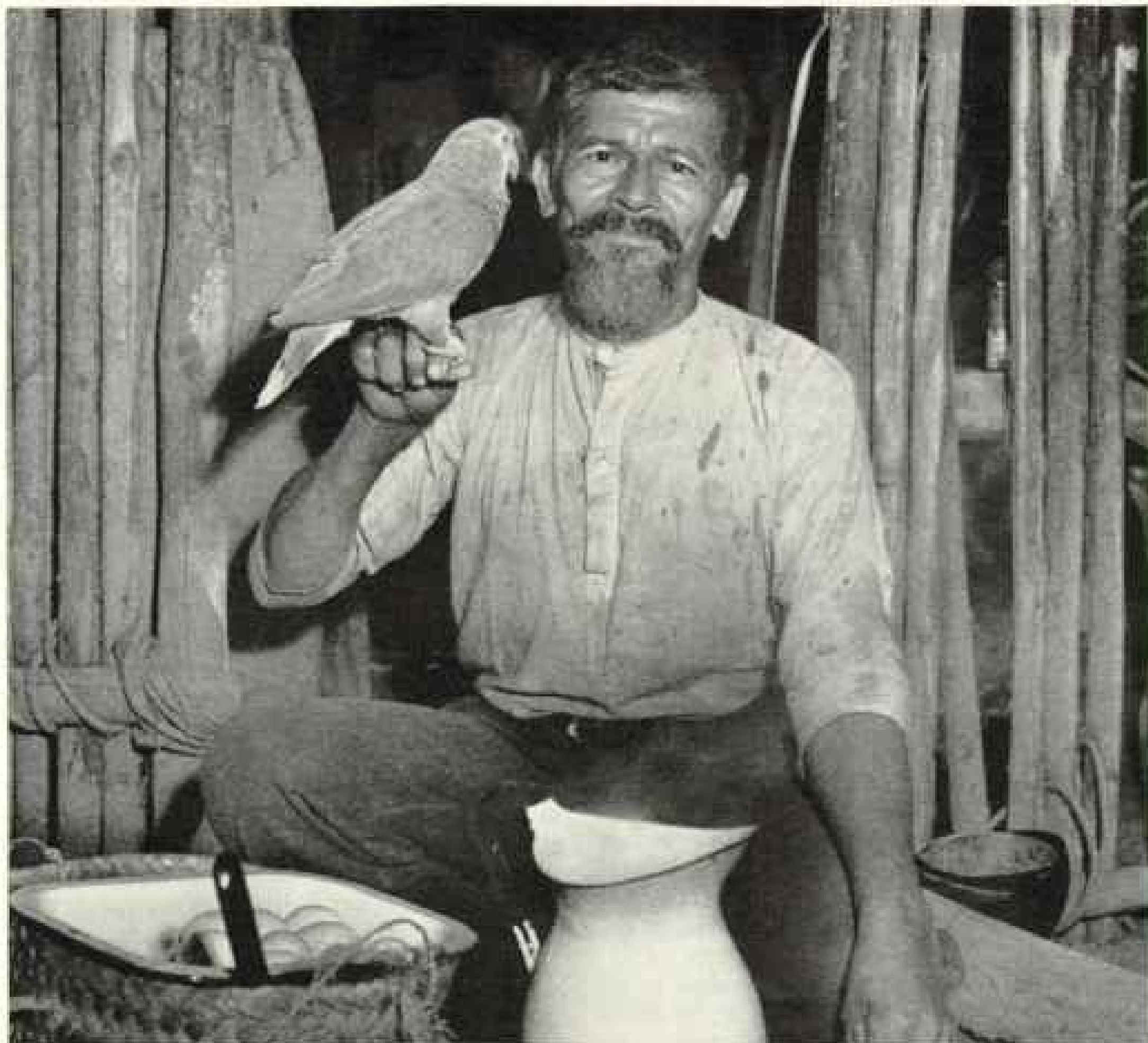
This one stuck to the rules and regulations of good little streams and led me out of the arroyo, and, coincidentally, directly opposite the ledge I had set out to find. My feeling of relief on finding myself once more at a place where I knew the native rivermen could find me is hard to express. If the reader has ever been lost in the woods, he will understand.

It was now five o'clock, and I was sure it would be morning before I should see my friends again. So I selected four of the birds that I had shot that morning and roasted them over a small fire. While munching my tasteless supper, a slim black-and-white-striped head rose to the surface of the near-by pool. It belonged to a finfoot (page 211). I wondered if it were an omen or perhaps a warning. Anyway, I had a fair supply of ammunition and enough firewood to keep a good fire going all night.

#### Three Days Upstream; One Day Down

I was busy arranging my simple camp when I thought I heard a distant shot. I fired two shots from my gun and I was answered, unmistakably this time. Nearly an hour later, after several exchanges of shot signals, the dugout with Dr. Stirling and the two guides





**The Expedition's Venerable, Bearded Host—His Pet Had a Fine Spanish Vocabulary**

This Playas River dweller "was as garrulous as he was hospitable," Dr. Stirling wrote. "He plied us with conversation and offered homemade aguardiente (rum)." That night he shared his humble home with 12 others. His children collected eggs for members of the expedition.

appeared. Viewing my torn clothing and uncivilized appearance, Dr. Stirling couldn't resist a quip. "Dr. Livingstone, I presume?"

The day-long search for the ruins of Pueblo Viejo was in vain; so we decided to go back to Don Vicente's home downriver in the hope of returning again with Vicente himself to act as guide. The journey which had taken us three days pushing the heavy canoe upstream took only one day going downstream.

Early in the afternoon I spotted a huge white bird with black-tipped wings soaring high in the clear blue sky above us. I was convinced it was a king vulture, but it was too distant to make a positive identification. About half an hour later, another one was seen, this time close enough to make out the brilliant orange-and-yellow neck.

This is not a common bird and I was quite

thrilled. But my exclamations of delight at seeing this one were completely inadequate for the spectacle that greeted us as we rounded the next bend in the river. For there, amid a wild flapping of wings, the air suddenly seemed to be literally alive with king vultures and the common black ones, too (Plate XI).

We soon discovered the object of attraction for the great conclave of carrion feeders. It was a tapir carcass on a near-by mud flat.

Pulling our boat to one side of the river, we watched the birds circling overhead and alighting in trees. After about a 20-minute interval they began dropping back on the tapir.

We counted 11 king vultures and 42 black vultures—an imposing ornithological exposition, and a fitting conclusion to the array of exotic wildlife scenes which will long keep alive my memories of the Playas,

# Today on the China Coast

By JOHN B. POWELL

I FIRST saw the China Coast 27 years ago. With another Missourian, Thomas F. Millard, long an American correspondent in the Far East, I edited the China Press, a daily English-language newspaper at Shanghai. Later I also published the China Weekly Review.

In Shanghai, as in Tientsin, we then enjoyed extraterritoriality. In the so-called foreign concessions, or settlements, we had our own courts, post offices, and churches (page 237). European firms had their own stores, banks, warehouses, docks, and shipyards. We played tennis and golf, bet on the ponies, went snipe and duck shooting, took week-end pleasure trips on launches, houseboats, and junks, saw the "latest" American movies, and enjoyed an exclusive club life.

The first sharp break in my journalistic life came in 1923. While on a trip to North China, I was captured and held for ransom by bandits. But that's another story.

Before Japan invaded China in 1937, about 6,000 Americans were settled in China ports, from the Manchurian coast down to Hong Kong and Canton. This number does not include the American Marines and soldiers who, since the turbulent days of the Boxer outbreak (1900) and the Nationalist Army's northward drive (1927), had been maintained as legation guards.

Later, when the Chinese capital was moved south, they remained as permanent garrisons at Peiping, Tientsin, and Chinwangtao, in North China, and at Shanghai, at the mouth of the Yangtze.

## Vast Area Penetrated by Japs

As I write, the Japanese control about 29 percent of China's total area, or about 1,300,000 square miles of the total of 4½ million square miles. Land held by the invaders, as shown by the map on page 223, includes all of Manchuria, part of Mongolia, and a coastal strip taking in most of the Provinces of Hopeh, Shansi, Shantung, Anhwei, and Kiangsu, and, more recently, certain sections of Honan, Hupeh, Hunan, Kiangsi, Chekiang, Fukien, and Kwangtung Provinces.

At strategic points on this long coast we and our allies will finally get bases from which to stage the last acts of our war against Japan.

Reading north, up this coast, the chief ports are: Canton, Hong Kong, Swatow, Amoy, Foochow (Minhow), Ningpo (Ningsien), Shanghai, Tsingtao, Chefoo, Tientsin (some

30 miles up the Hai River from Taku), Chinwangtao, the Manchurian port of Newchwang (Yingkow), and Dairen. The Japs hold every one of these.\* More later of the last two ports, because since Japanese occupation they have become of enormous importance.

## Clipper Ships Traded Furs for Silk and Tea

Canton was the first port with which Americans traded. Our clipper ships sailed there to trade furs for silk and tea more than 150 years ago.

Hong Kong is an island off the south coast of China, opposite Kowloon peninsula (page 224) and some 90 miles by water southeast of Canton. This almost empty rock was ceded by the Chinese to Great Britain in 1841, and the British made it a Crown Colony.† In December, 1941, the Japanese captured it.

Conditions here reflect the picture of events in other ports now held by the invaders.

Already, from refugees, the world knows of the wanton murder, rape, pillage, and starvation which ensued in the first days after the Japanese landed.

One American tells of Japs looting soldiers, proudly going about Hong Kong with their sleeves rolled up, the better to show their arms covered up to the elbows with stolen wrist watches!

This rich British colony was a particularly fat prize. Planning to withstand a siege, Hong Kong residents had crammed its enormous warehouses with goods; of certain supplies enough to last two or three years was on hand. Much of this the invaders immediately loaded on ships for transport to Japan.

British ships, scuttled at the approach of the Japanese, were soon salvaged by them and put into their service.

To make it easier to feed the city and defend it, the invaders deported about half of the native population, sending them back to mainland China.

Hotel men were brought from Japan to manage the Hong Kong hotels, and Japanese were put in charge of bakeries, dairies, rice distribution, and other food industries.

Courts were set up with Japanese judges. Trial by jury was abolished. Above all, every-

\* See "Coastal Cities of China," by W. Robert Moore, NATIONAL GEOGRAPHIC MAGAZINE, November, 1934.

† See "1940 Paradox in Hong Kong," by Frederick Simpich, NATIONAL GEOGRAPHIC MAGAZINE, April, 1940.



E. R. Arner Air Forces, Official

### She Rocks Her Baby by Swinging a Pick

Chinese women by thousands help to build airfields, tramways, and parking areas for use by the American Air Forces operating from China. Rainfall and lack of adequate local road-building materials made it difficult to lay runways solid enough for B-29 Superfortresses (page 234).

body is made to study the Japanese language, and radio broadcasts are in Japanese.

Hong Kong's famous Queen's Road and Victoria Peak now bear Japanese names. When Japs reopened the Happy Valley Race Track, they even gave Japanese names to many popular racing ponies (page 225).

Anticipating that the Allies will attack them at Hong Kong, the Japs began building new military roads and defenses, operating the British-owned Green Island Cement Company to get material for this work.

Months ago the Tokyo radio broadcast news of a continuous flow of raw materials into Hong Kong from the south. Hemp and sugar came from Manila, tobacco from Burma,

Hong Kong was then getting enough Malayan rubber to reopen her rubber factories.

Trade by river with Canton goes on, as does that by junk and steamer with Macau, Kwangchowan, and other points along the coast of South China.

Until lately there must have been considerable traffic with the Philippines, because reports came of barter with those islands, wherein Hong Kong traded medicaments and industrial goods for copra, hemp, sugar, etc.

Trucks and automobiles by the hundreds were seized and shipped to Japan after Hong Kong surrendered. But now local transport on the island and at Kowloon is reported operating fairly well. Because half the population was deported, trams, ferries, and buses are not now so crowded.

The Japs lost no time in raising and repairing the sunken Kowloon-Hong Kong ferryboats and in cleaning out dynamited tunnels and reopening the mainland railway line from Kowloon to Canton. They also took engines from motorbuses and used them to power new wooden vessels they build here.

Kaitak Aerodrome, near Kowloon, so long used by Pan American's trans-Pacific Clippers, was the first place bombed when the Japs attacked. But almost immediately they repaired and enormously enlarged it for use by both military planes and those in commercial service between China and Japan.

### Jap Governor Rules Colony

Hong Kong is ruled now by a Japanese governor. His army and civilian staff work through the Chinese Chamber of Commerce, the guilds, and other native organizations to

carry on police, public-health, and postal affairs. In addition they supervise operation of transportation, the light and power plant, waterworks, ferries, tram and bus lines, public markets, etc.

At their main objective, however, the Japs work harder than at anything else. That is their political aim, to turn the Chinese against both the Westerners and their own Chungking Government and gain their adherence to the "Greater East Asia Co-Prosperity Plan."\*

First direct assault on the Westerner's prestige was the shame and cruelty inflicted on British and American citizens in Hong Kong. In the most hateful manner the Japs arranged, wherever possible, to degrade and humiliate them in the presence of crowds of Chinese, to prove that "the Westerner's day in the East is over."

The bronze statue of Queen Victoria was pulled down, along with others, and melted into scrap. In the British officers' mess hall on Garden Road the Jap cavalry stabled their horses, to show the Chinese their contempt for Hong Kong's former rulers.

Renegade East Indians, Philippine quislings, and pro-Jap Chinese join in propaganda against Occidentals.

Two prominent Chinese, knighted by the British King and once members of the British Governor's Council at Hong Kong, are vociferous for the Japanese cause.

The invaders often attain their end by first converting the Chinese heads of guilds, unions, and native societies; and these natives in turn convert the groups under them.

"We're both of the same race," the Japs tell the Chinese workers. "You can't possibly be any worse off under us than you were



© Seven Traveler, from *Geobruin*

#### Leaving a Beauty Shop, Hong Kong Girls Walk to Their Ricksha

Stepping smartly past a ricksha stand, they wear fashionable long silk dresses and foreign shoes. Beauty parlors, dance halls, cocktail lounges, movies, and Hollywood- or Paris-style frocks were common in large coastal cities of China.

under the British, and the chances are you'll fare a lot better."

Most upper-class Chinese distrust the invaders. But many, to save their own lives, to protect their wives and daughters, and to salvage what they may of their bank accounts and business interests, choose to go along with the Japs.

Every extra day that the Japanese hold their own in China and retain possession of Malaya and the Netherlands Indies, the greater is their political influence throughout the Far East.

\* See "Japan and the Pacific," by Joseph C. Grew, NATIONAL GEOGRAPHIC MAGAZINE, April, 1944; and "I Lived on Formosa," by Joseph W. Ballantine, January, 1945.



Three Lions

Ready-made Clothing Is Featured by One Hong Kong Merchant on This Giant Billboard  
China has no big advertisers, such as American automobile builders, who spend millions each year. Yet posters plaster miles of walls, and billboards rise along canals and suburban roads.

Somewhere on this South China coast, the Japs well know, Americans and British may soon strike. But no matter where the Allies land, Hong Kong must again play an important part.

#### The "New Order" in Manchuria

Look at what the Japs have accomplished in Manchuria and at how they did it, and you can visualize what's happening in other rich spots along the China Coast, where now the invaders are busy running the country for their benefit and implanting Japanese ways of life.\*

In 1937 the Tokyo Government set up in Manchuria a "Law for the Control of Important Industries." Under it, no one could go into major enterprises without a Japanese permit. This virtually excluded all Chinese and foreigners from any large business.

"State companies" organized under this law are monopolies owned and run by such big Japanese interests as the Mitsui, Mitsubishi, Sumitomo, South Manchuria Railway, and the Oriental Development Company. They control the salt, leaf tobacco, motion pictures, rice, coal mining, electric power, automobile assembly, life insurance, textbook printing, alcohol, opium, and other lines.

Flour and spinning mills, breweries, cement mills and chemical works, machine shops and railways—these also are in the hands of Japanese syndicates and industrialists.

\* See "Japan Faces Russia in Manchuria," by Willard Price, in the NATIONAL GEOGRAPHIC MAGAZINE, November, 1942; "Here in Manchuria," by Lillian Grosvenor Coville, February, 1933; "Byroads and Backwoods of Manchuria," by Owen Lattimore, January, 1932; and "Manchuria, Promised Land of Asia," by Frederick Simpich, October, 1929.



Alfred T. Palmer

### Double-deck Buses Lend a Touch of New York's Fifth Avenue to Shanghai's Streets

Under a zone system, similar to London's, short rides here cost only a cent or two. Thousands of rickshas still compete with trams, taxis, wheelbarrows, and buses. Wheelbarrows are often seen carrying a dozen or more small girls to work in cotton mills.

For decades the Manchuria soybean industry was a Chinese enterprise; now it is a monopoly of the Soybean Control Company.

All land, labor, and immigration laws favor the Japanese. It is easy for a Japanese colonist to acquire land, but almost impossible for a Chinese. From Manchuria wartime Japan gets many of its industrial requirements, besides coal and steel.

About Mukden (Shenyang), a Pittsburgh-like industrial area of scores of new factories includes chemical works, machine shops, wood-working plants, spinning mills, and food-preserving industries.

New railways run in many directions; some reach the Soviet border, for military use. Japan has a crack army here, ready and waiting for any movement by the Bear.

Some strategists believe Hirohito may seek to fight the final decisive battles of the Pacific war on the soil of China, rather than on the Japanese islands.

### South of Manchuria

Down the China Coast, south of Manchuria, the Japs try to make economic conquest by using the same methods. But they face new obstacles.

Floods, guerrillas, sinkings of their ships off the China Coast by Allied submarines, lack of adequate railroad transport, their long war against the Chungking Government, their troubles with monetary systems, and their failure to find here the big market they had anticipated for manufactured goods from Japan all change the picture.

First Chinese port on this coast, south of Manchuria, is Shanhaikwan (Linyu).

On Christmas Day, 1931, I stood on a railway siding at Shanhaikwan and saw thousands of Chinese soldiers retreating through the gateway in the Great Wall from Manchuria into North China. They belonged to the armies of "Young Marshal" Chang Hsueh-liang, last Chinese ruler of Manchuria.

This retreat marked the passing of Chinese sovereignty over an empire nearly twice the size of Texas. Its vast farms and mines, a decade later, are of infinite aid to Jap war lords in their attempt to conquer Asia.

Shanhaikwan's importance is due almost entirely to its location at the point where the Great Wall of China once touched the sea. The other end of this longest of all man-made defense barriers reaches a thousand miles into the semiarid wastes of western China.\*

Chinwangtao, a few miles south of Shanhaikwan, is another little port whose name arouses nostalgic memories among many Americans. Our Army and Marines, over a period of forty years, guarded the Legation at Peiping and the railway connecting that old Chinese capital with the sea at Taku and Chinwangtao.

The Marines and the Army maintained summer camps at Chinwangtao, where maneuvers and target practice were held. Summer cottages for officers and men and their families were built along the beach at Chinwangtao by the U. S. Army. They are now, in all probability, occupied by the Japanese.

#### Missionaries Founded a Summer Resort

A few miles farther south is Pehtaiho, summer resort where about everybody in North China who could afford the price of a railway ticket went in order to get away from the summer heat which bakes the flat plains.

Pehtaiho, like most summer resorts in China, was developed by the missionaries, who combined business with pleasure. They held their annual conferences where pious discussion could be interspersed with swimming, boating, tennis, and golf. Later the business men and diplomats also moved in.

Mention of Chinwangtao will also arouse memories in the mind of at least one internationally known American, former President Herbert Hoover, for the port of Chinwangtao

was developed by the famous Sino-British Kailan Mining Administration, which he organized nearly a half century ago.

When the Japanese Army moved into North China in 1937, it immediately brought pressure on the Kailan Administration, forcing it to divert much of its coal output to Japan.

#### Tientsin, Famous Old Center of Trade

Tientsin, busy railroad center a few miles inland from the coastal town of Taku, stands at the junction of the Grand Canal (Yun Ho) with the Hai River. With the aid of ice-breakers, it is open to sea trade the year around, and for centuries it has been the gateway to trade with near-by Peiping,† northwest China, and Mongolia. It was one of the China Coast's busiest trading centers.

Tientsin's winter sandstorms remind you of El Paso, Texas. Sometimes so much sand blows that unexpected hazards form on the golf courses and the streets have to be scraped.

Pig bristles used to come to us from here in heavy bundles, and this was a haunt of our fur buyers from St. Louis and New York. On a trellis like that used for grapevines, you once saw horsetails drying by the thousands. Here, too, we got wool, linseed oil, dried eggs, goatskins, and many fine Chinese rugs.

Now the American who encouraged the Chinese to build up this trade with us is safe in Mexico City, where he is trying to do the same thing. War has cut us off, too, from all those walnut meats and sausage casings.

We sold Tientsin large quantities of books and paper; big loads of kerosene and other oil products; much lumber from our Northwest; also flour, sugar, and cigarettes; motorcars, machinery, radio apparatus, drugs, watches, lanterns, and wild-animal traps.

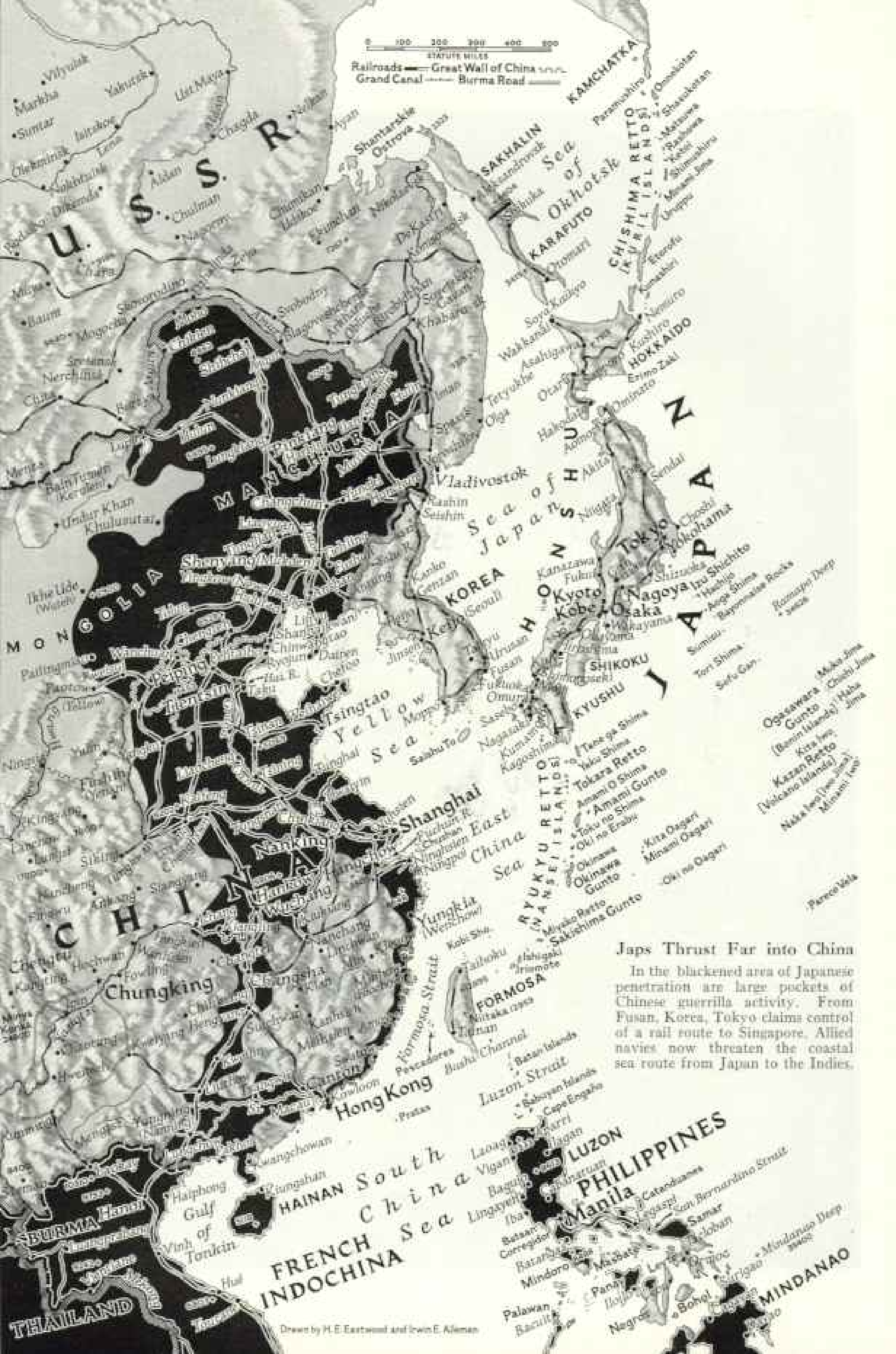
For decades, too, Tientsin has been a center of American school and missionary activities. But to most Americans, especially our soldiers and Marines, it is known as the big, colorful city where the troop trains halted when running between Peiping and the summer camps at Chinwangtao on the coast.

Tientsin formerly had no fewer than eight foreign concessions, once held by the British, French, Japanese, Italians, Belgians, Russians, Germans, and Austro-Hungarians. When the various European powers were parceling out the city, the Chinese authorities also gave the Americans a concession, but, as happened in Shanghai, Washington did not retain it. As a result, the Americans conducted their business affairs and resided in the other concessions, chiefly the British and French.

During the long civil war in North China, from 1917 to 1927, Tientsin often served as

\* See "Thousand Miles Along the Great Wall of China," by Adam Warwick, NATIONAL GEOGRAPHIC MAGAZINE, Feb., 1923.

† See "Glory That Was Imperial Peking," by W. Robert Moore, NATIONAL GEOGRAPHIC MAGAZINE, June, 1935; "Peacetime Plant Hunting About Peiping," by P. H. and J. H. Dorsett, Oct. 1937; and "Peiping's Happy New Year," by George Kin Leung, Dec. 1936.



0 100 200 300 400 500  
STATUTE MILES

Railroads — Great Wall of China —  
Grand Canal — Burma Road —

### Japs Thrust Far into China

In the blackened area of Japanese penetration are large pockets of Chinese guerrilla activity. From Fusan, Korea, Tokyo claims control of a rail route to Singapore. Allied navies now threaten the coastal sea-route from Japan to the Indies.

Drawn by H.E. Eastwood and Irwin E. Allen





U. S. Army Air Force, Official

### Smoke Boils from Blazing Kowloon Docks, Fired by American Bombers Based in China

Twisting angrily, at left center, a Jap fighter bores in to attack the American planes. Between Royal Navy Yard (extreme left) and Stonecutters Island (upper left) enemy vessels are burning. That oil slick on the bay below the big Kowloon fire shows that a tanker was struck. Outside the boat basin on Hong Kong Island (in foreground) another ship has been hit. Over and over again United States forces have bombed Hong Kong and Kowloon.



W. J. Lee from N. A. Throft

**Who Said Chinese Faces Are "Inscrutable"? Each of These Rooters Plainly Shows Whether His Favorite Is Winning or Losing**

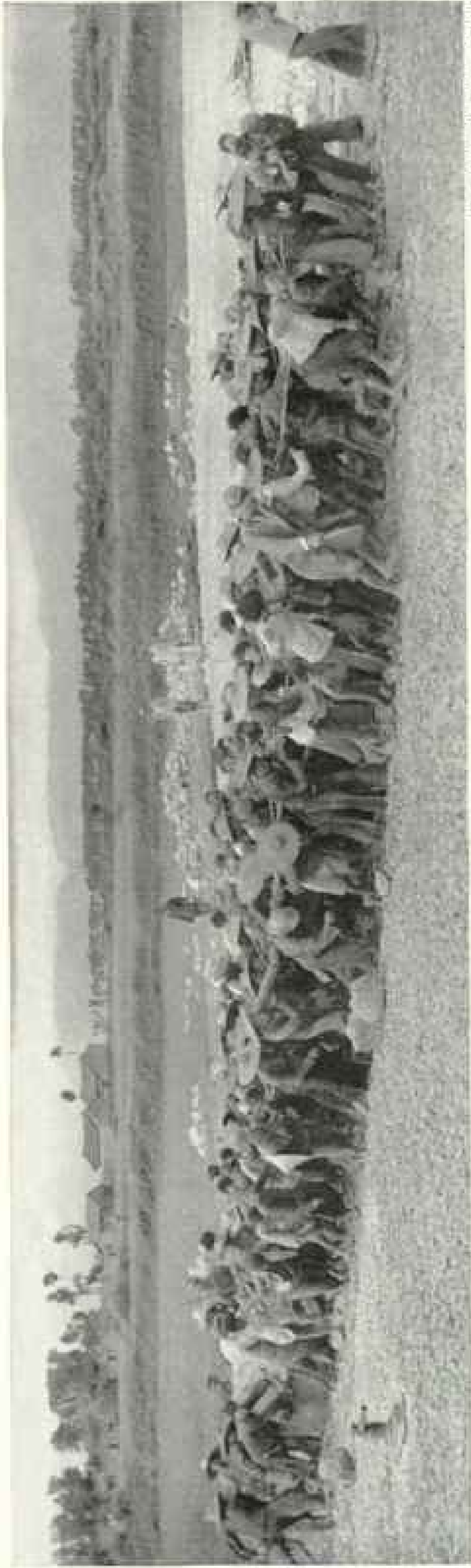
Soccer, tennis, swimming, volleyball, and track sports were popular in peacetime Hong Kong. It even boasted girls' softball teams, umpired by American sailors. There were Chinese basketball teams, too, who went to Manila to play against Filipino teams. Hong Kong, like Shanghai, was also noted for its boat clubs and oarsmen. Sports events are few now, but gambling houses and horse racing are encouraged by the Japanese (page 218).



Staff Photographer W. Robert Mann

### Foochow Was Occupied by the Japs in 1944 in Anticipation of a Possible Allied Landing

Capital of Fukien Province, this old city lies halfway between Shanghai and Hong Kong, on the Min River, 30 miles from the sea. It is a walled city with a population of about 200,000. Scouring ships anchor in the Min, at Pagoda Anchorage, 10 miles below. People here make fine lacquers, and in early days American and British clippers came to the port for tea (page 236).



U. S. Army Air Force, official

**Pulling Their Heavy Roller, 500 Chinese Mash Mud, Stone, and Gravel into a Solid Strip for a Bomber Runway**

One American officer called this crew a "10-ton, rice-burning roller of 500 coolie-power." Many airfields in China have been captured by advancing Japanese.



Alfred T. Peckham

**Ming Emperors' Tombs near Peiping Are Marked by Grotesque Stone Statues of Lions, Horses, Camels, Elephants, and Unicorns**

Forests formerly lined this "Holy Way," or avenue, along which passed many a gorgeous procession in the glorious days of the Mings.



European

**Line Up, You Rich Chinese, and List All Your Worldly Goods—So Jap Officers and Men Can Steal Them All the More Quickly!**

Here conscripted Shanghai policemen sit at tables and make inventories for the Japs as Chinese property owners file past. As the "New Order" gets going, porters trudge off carrying boxes of Chinese valuables, stolen by the invading Nipponese. In the loot of once-rich Shanghai, many high-ranking Jap officers atole enough to make themselves wealthy.

a place of refuge for Chinese officials who found Peiping too hot because of sudden shifts in politics.

Tientsin also was the setting for one of the strangest diplomatic incidents in history. It took place there in 1939 and extended over several months. It was known as the "stripping and searching incident." The Japanese charged the authorities of the British concession with harboring Chinese agitators who opposed Japanese aggression.

When the British refused to hand over certain Chinese whom the Japs wanted, the Japanese proceeded to humiliate the foreign residents of Tientsin—men and women alike—by stripping them of their clothing and forcing them to stand naked before gaping Chinese crowds.

#### Chefoo, Once a U. S. Naval Station

On the route of coastal shipping below Tientsin stands Chefoo. For years part of our Pacific Fleet summered here, and many a U. S. Navy wife, sister, and mother—and flocks of Navy children—used to follow the Fleet here from Manila and Shanghai to enjoy the cool, bracing climate and the sea bathing.

In Chefoo Uncle Sam has, or had, a consulate. There was, of course, a club for Westerners, a busy group of traders, bankers, and shipping men. Years ago American missionaries introduced American varieties of pears, grapes, and other fruit.

A fair motor road runs south along the coast to Weihaiwei; and launches, in normal times, plied between Chefoo and Weihaiwei in four or five hours.

In 1898 the British acquired a concession at Weihaiwei and summered their China Fleet there for years. When seen years ago by Frederick Simpich, another Missouri colleague and Far Eastern newspaper pioneer, the British-trained native Weihaiwei infantry was the crack drill outfit of all China. Undoubtedly, now, the Japanese use the former British piers, government house, hospital, club, etc., as their own.

Tsingtao, south of Weihaiwei, is a name that time and again has been printed in big type on the world's front pages. Here, in 1897, the Germans got a toe hold and built the cleanest, most modern city China had yet seen. It looked more like Leipzig than a Chinese city.

During World War I, however, the Japanese, at a cost of some 2,000 men, stormed the German forts and took Tsingtao. Though they later nominally "returned" the city to China, they actually retained the large commercial interests and landholdings there.

In about the same latitude as San Francisco, Tsingtao has long been known as a popular summer resort. Its trade far exceeds Chefoo's, and long before the invaders struck they had practically monopolized every profitable activity. Here is, or was, a floating dock that could handle ships up to 16,000 tons. Since the opening of the railway connecting Tsingtao with the coal mines, commerce has grown enormously.

#### Shanghai, Queen City of the China Coast

South of Chefoo, in the flat, lush delta of the muddy Yangtze, stands Shanghai, about which reams have been written.\* Its 3,500,000 population includes one or more of almost every kind of human being that walks this earth.

From mission-school workers, Bible colporteurs, and sisters of mercy to gamblers, gunmen, vice-ring and opium-den runners, it may well be the world's most amazing mixture of good and evil.

Anyway, for better or worse, it was for decades the center of American activities and investments in China.

Long before Pearl Harbor the Japs, occupying much of this city in their rape of China, had given foreigners in Shanghai many a revolting lesson in their art of savage cruelty and cold-blooded murder.

Other acts, some of them foolish deeds of wanton waste, are almost inexplicable—as when they bombed an American-owned dairy farm near Shanghai and killed almost its entire herd of 432 purebred cows.

#### Horrors of Internment Camps

First Americans interned at Shanghai were newspapermen, on December 20, 1941; many Britons were arrested the same day. All were taken to that notorious internment camp known as Bridge House, which contains no sanitary arrangements whatever.

Hundreds of Chinese political prisoners who disappeared from the International Settlement through kidnapping, or other means, were taken to Bridge House, thrown into its rat-infested cells, and never seen again.

Some of our cells there were only 12 by 18 feet, yet they were jammed with more than 40 prisoners.

In my cell, for days, there were 46 prisoners. We had to sit in rows, closely packed on the floor, and at night it was impossible for everyone to lie down.

\* See "Changing Shanghai," by Amanda Boyden, NATIONAL GEOGRAPHIC MAGAZINE, Oct. 1937, and "Cosmopolitan Shanghai, Key Seaport of China," by W. Robert Moore, Sept. 1932.



Earl H. Loyd from Paul Gullamotte

### Two Fawning Japs Make Hypocritical Bows of Welcome

The man on the right hides the woman they are bowing to. If a foreigner, a moment later they might have stripped, searched, and slapped her. Civilization cannot forget how barbarous Japs treated white women in North China (page 229). This is the railroad station at Linyu.

Women were kept here, too. In my cell we had a British woman, a Spanish woman, a Russian woman, and three or four Chinese women.

Deaths occurred in the camp almost daily. In fact, the space I occupied on the first night had previously been taken by a Korean who had died from blood poisoning. He had been stabbed through the leg by a Japanese bayonet.

There were eight British prisoners in the same cell with me, all of them charged with espionage activities against the Japanese Empire. One was Ellis Hayim, president of the Shanghai Stock Exchange.

We were threatened constantly with dire punishment if we did not admit what the Japanese wanted us to admit. I was charged with being a secret agent for Maj. G. A. Williams, the American assistant naval attaché. As evidence, it was stated that I had often lunched with him at the American Club!

The Japs claimed I had received money from this attaché. They said they found receipts in Major Williams' office, showing that I had received, on one occasion, a check for \$85,000! Of course all this was silly. My connection with Major Williams was only that of a correspondent, alert for news,

The Japanese are still holding some of the leading American and British business men in the Far East, supposedly as hostages.

On the *Gripsholm* we evacuees were warned that, if we told of incidents in camps, the Japs would retaliate against prisoners still held.

In both Shanghai and Manila, many American business men are still being held. Among them is Mr. Paul S. Hopkins, general manager of the American-owned Shanghai Power Company, a four-million-dollar enterprise now taken over by the Japanese.

J. V. Crowe, general manager of the Ford interests in China, is still held in the Santo Tomás camp in Manila.

### Shanghai Long Center of Nazi Activities

Shanghai became the chief Nazi center of activities in Asia long before Pearl Harbor. Many Germans, expelled from the United States and Latin American countries, fled to Asia and found Shanghai an open city much to their liking. Shanghai's Park Hotel was practically taken over by the Nazis.

Germans once did a profitable business in China, but no more. All German investments have been reduced to the form of American gold bars or bank notes and concealed. The

Japs watch them like hawks and, in final German defeat, the Japs are sure to seize and loot the Germans as they did other foreigners in Asia following Pearl Harbor.

There is a tale told up and down the China Coast which is most revealing. The story is that a Japanese army officer slapped his German friend on the back and said to him:

"We good friends—you will be the last we put in jail!"

Treatment of Italians, following the fall of Mussolini, was a good illustration of what may happen to the Germans. The Japanese were so infuriated over the Italian collapse that all Italians were interned. Later most of them were released, but put under house arrest.

One amazing incident in Shanghai after Pearl Harbor concerned the Italian liner *Conte Verde*.

On the morning of the Italian collapse, September 8, 1943,\* American prisoners who had been interned in a warehouse on the river were amazed to see the *Conte Verde* moving in the stream where it had been anchored for weeks. Thinking the ship was being transferred to a new location, they sat idly by watching it, but were astonished to see it gradually capsize in the river.

Italian sailors responsible for the scuttling were hanging to a guardrail and cheering the American internees to high heaven. The Italians yelled:

"Now we're on the same side!"

This infuriated the Japs. They hurried a destroyer to the scene, and no one knows what happened then to the Italian sailors.

The Germans, naturally, were deeply stirred by this; it set a precedent for their treatment when Hitler's end comes.

The Japanese later raised the *Conte Verde*, but our 14th Air Force wrote the last chapter for the ship by bombing it permanently out of commission as it lay in Shanghai Harbor.

#### Japs Grabbed Everything Americans and British Owned

Though for years we had considerable trade with China, our permanent investments here were worth only about 250 millions when the Pacific war broke. Of these about 15 percent was tied up with our oil trade; another 25 percent was invested in schools, missions, and philanthropic institutions. Much of the rest was represented by Shanghai real estate, telephone plants, power and light companies, etc. In fact, our whole China stake was only one-fifth that of the British.

Such concerns as Ford, Chrysler, General Motors, Standard-Vacuum Oil and Texas Companies, International Harvester, Parke,

Davis & Co., Singer Sewing Machine, Andersen, Meyer & Co., General Electric, RCA Victor, Dodge & Seymour, Henningsen Produce, Inc., and other importers, of course, had certain stocks of goods on hand, just as American banks had deposits, but these did not figure among our permanent investments.

In looking at what the enemy did to our China interests, it must be remembered that practically all the larger American companies here were also established in Japan itself.

There, about 10 years ago, by hook or crook, the Japanese had already gained control of some of these American firms; often this control was so complete that, though we still owned part of the factories, American owners were not even allowed to enter their own plants!

From these "American" plants in Japan, native employees were brought to the China Coast and put in charge of confiscated American plants there. In these, for the first few months, a few American key men were kept busy teaching the Japanese how to run the Yankee industries. As soon as the Nips learned enough to take hold, they put the American key men in prison camps.

#### "Legalized" Theft

Actual operation of such American properties was then taken over either by the Japanese Army or by a sort of alien-property custodian known as the "Asia Development Corporation." While all this was merely armed robbery, the Japanese made a face-saving pretense of "legalizing" it.

After taking over one big American factory that made electric-light bulbs, they suppressed the well-known American trademark and put a Japanese name on the lamps!

In seizing foreigners' effects, many a ridiculous move was made.

In one building was housed the Royal Asiatic Society (British) and the International Institute of China (American). There the Japs packed about 100 cases of rare old books and manuscripts and shipped them to Tokyo.

Weeks later a Jap officer called on the secretary of the Royal Asiatic Society, presented his card, and said he had merely come to say that all the books had reached Tokyo safely!

Big Shanghai figure for years was the Standard Oil man. Along with the British-American Tobacco Company's chief, the automobile agent, and the foreign banker, he was the symbol of foreign enterprise.

China yields but little oil. So she has had to depend on foreigners for kerosene to light her millions of lamps, for gasoline to fly

\* September 9 in Shanghai.



her planes, and for the motorized equipment on city streets and on the network of provincial highways which had begun to spread rapidly just before the Japanese invasion of 1937.

Diesel and lubricating oils, and all kinds of grease for her railroads and factories, she also had to import.

No oil refining was done by Americans in China. But along her coast American companies owned storage tanks and warehouses for finished petroleum products. From such bases a huge distributing system covered every part of China as needs arose. Connected with these storage bases were packaging plants where oil products were packed in tin cans and boxes and sometimes in steel drums. Lack of railroads and truck lines made it necessary to ship oil, in such small packages, by junk, camel back, and even by wheelbarrow.

These oil "terminals" looked like the familiar "tank farms" seen around our big oil fields, but they were on a much smaller scale. The largest oil terminals were at Kowloon and Shanghai, where "farms" of ten to fifteen big tanks were in use. Other American oil terminals were set up at Tientsin, Tsingtao, Foochow, Amoy, Swatow, and Hankow.

All these oil bases were seized by the Japanese.

Frederick J. Twogood, general manager of the Standard-Vacuum Oil Company in China, was interned in Bridge House for 108 days. He was repatriated on the first trip of the *Gripsholm* in such poor health that he died several months after arrival here.

On the China Coast, and in all other Asiatic regions occupied now by the Japanese, their money has been made the medium of exchange.

#### Canal, River, and Coastal Traffic

Your map shows that inland waterways connect China Coast ports with much of the whole country. Main artery is the Yangtze, up which there is year-around traffic for 690 miles, or upstream as far as Hankow. Ocean-going steamers up to 10,000 tons and drawing 27 feet of water can also get up to Hankow during about half the year.

From Hankow, smaller steamers drawing five to six feet go to Changsha and Ichang most of the year; and those drawing 14 feet can get to Ichang—1,120 miles from the Yangtze's mouth—in the summertime. Above Ichang a towing service and native junks carry loads as far upstream as the capital, Chungking. Absolute limit of steam navigation on the Yangtze during high water is Suifu (Ipin), 270 miles upstream from Chungking and 1,850 miles from the mouth of this great river.

Chief river of South China is the Si and its

tributaries, which flow into the ocean west of Hong Kong Island. Up it junks and launches ply for more than 800 miles, but steamers of 13-foot draft can ascend only 200 miles.\*

The Hwang Ho, or Yellow River, despite its enormous flow of water, can handle steam navigation over only a small part of its course. Rapids and waterfalls limit navigation until the river reaches Kaifeng. The river's last 400 miles, below that point, see it flowing between dikes, like the lower Mississippi, its surface higher than the surrounding country. It is here that the famous Yellow River floods have often caused much loss of life.

Manchuria's waterways include the Amur and Sungari, but they do not reach the China Coast. Meeting near Tungkiang, they flow into the Sea of Okhotsk. Important waterways in south Manchuria are the Yalu and the Liao Rivers. Though not deep enough for large steamers, these rivers are navigable for smaller native craft, the Yalu for some 100 and the Liao for 350 miles. Newchwang, on the Liao, handles thousands of small boatloads of grain and beans each season.

Japan so obscures her acts of war that now there is no clear picture of China Coast shipping.

China herself never had any ocean-going lines plying to the States and Europe. Under her flag were coastal ships of the China Merchants Steam Navigation Co., and on her rivers and along her coasts much of her trade was carried by British-owned vessels of the Jardine, Matheson and the Butterfield & Swire lines. Some few of the latter fell into Japanese hands, but most escaped to Australia.

Of the 193 coastal and river steamers of 25 gross tons and upward owned by Chinese, it is estimated that only 34 remained in Chinese hands as of March, 1944.

Yet her inland water transport, despite Jap control of so much river and canal mileage, is still very heavy. The Szechwan Junk Owners and Workers Association still controls more than 40,000 junks, which carry rice, salt, cotton, sugar, coal, iron, steel, and tea.

It is known that the China Shipbuilding Administration has set up yards and marine workshops at safe places and is building many small wooden steamships and river boats.

#### Railroads and Airlines Touch the Coast

For years American lines like the old Pacific Mail, Great Northern, and Dollar flew their flags in China waters. Most prominent, on Pearl Harbor day, was the American Presi-

\* See "Through the Great River Trenches of Asia," by Joseph F. Rock, NATIONAL GEOGRAPHIC MAGAZINE, August, 1926.



ALFRED T. CHAMBER

#### Modern Bathrooms Replace the Hot-water Peddler of a Generation Ago

In Shanghai, noted for real-estate booms (page 229), this wheelbarrow carries a bathroom outfit to somebody's house or apartment. The youngster helps guide a perfectly balanced load.

dent Line (formerly Dollar), some of whose vessels were lost.

A large proportion of the motor vehicles used along this coast are of American make. In all China there were fewer than 75,000 automobiles and trucks on January 1, 1940, and most of these were in use in the coastal cities. Lack of interior highways and low buying power keep cars out of the interior.

But road planning on a big scale began after 1933, and much progress in actual road building has been made in backward provinces. Quite a network, including toll roads, for example, runs out of Amoy, and you can drive fairly well from Chefoo to Weihaiwei. Miss A. Viola Smith, when U. S. Trade Commissioner in China, once drove her car from Shanghai to Kunming, in southwest China, over the new road system.

China, including Manchuria, had a network of about 69,000 miles of highway by the end of 1936, of which some 15,000 miles were surfaced and the rest were dirt roads. Another 10,000 miles were under construction.

Various commercial airlines served this coast and certain inland cities prior to the war. Leading air terminal of the Far East was Kowloon, serviced by Imperial Airways, Ltd., Air France, and Pan American Airways.

Pan American also owned about 45 percent of the China National Aviation Corporation, all of whose equipment and most of whose personnel were American. There was also the Eurasia Aviation Company, one-third of which was owned by the German Lufthansa; all its equipment and most of its personnel were German. There were also two other small airlines, entirely owned by Chinese.

With the outside world, in more normal times, China had air connections at Kunming with Rangoon, by Imperial Airways; at Canton with Hanoi and Air France; at Hami (Qomul) with Russia; at Tientsin with Japan; and, of course, at Kowloon with Europe and Sydney, Manila and the States.

Since the Japanese invasion began in 1937, China's air net has felt many changes; and, with all the airports now being built for military use, her airline layout of tomorrow may be very different.

In 1937 China had only about 7,500 miles of railways, excluding some 3,700 taken from her in Manchuria, compared with close to 240,000 in the United States.

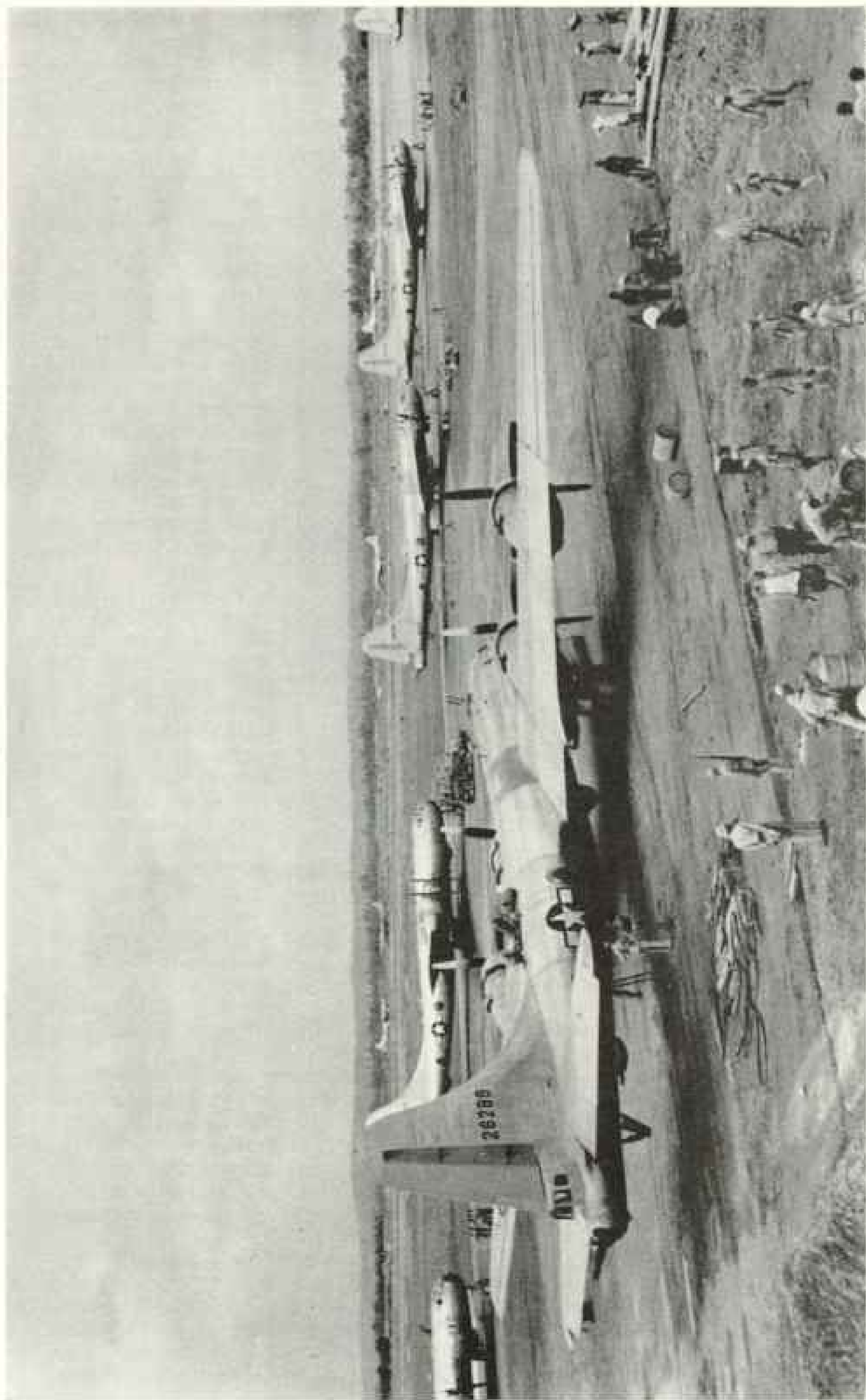
Today the Allies are most interested in the Peiping-Hankow-Canton line, around which there has been so much fighting. Japan obtained practically complete control of this



Army Air Frank Covert/Staff

**With Carts, Baskets, Buckets, Wheelbarrows, Hundreds of Thousands of Chinese Built the American Airbases in China**

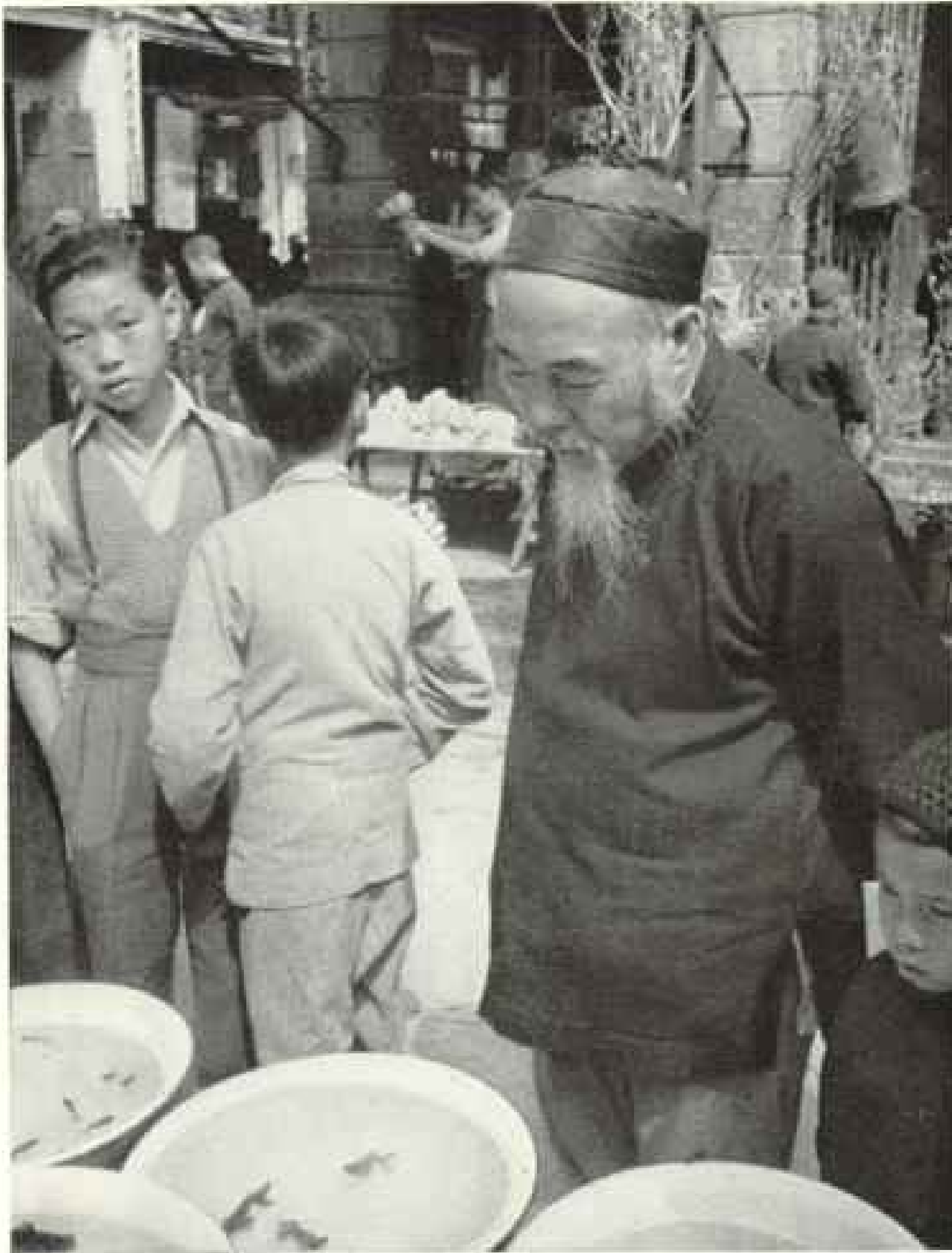
Building the Great Wall of China, the Pyramids, the Tower of Babel itself, never called together a more motley host. Working under American and Chinese Army Engineers, these people used thousands of homemade wheelbarrows; they even clipped by hand the stones used on such enormous fields, from which the Yanks bomb Japan,



U. S. Army Air Forces, official

### Ten China Based B-29's Are Gassed and Bombed Up for Their First Raid on Yawata Steel Mills Near Moji, Japan

More than 400,000 native farmers helped build the Army Air Force bases in China. With four motors, aggregating more than 8,800 horsepower, Superfortresses carry a crew of eleven, including six gunners and a bombardier. Look at that "poisonous stinger" tail gun sticking out behind! Pressurized cabins permit the crew to work at 40,000 feet without suffering from cold or using oxygen masks. Portable oxygen tanks are available, should the men have to parachute from extreme heights. Here a Chinese soldier stands guard with a gun, while other Chinese and Americans roll barrels about and finish a drainage ditch.



John Nerves Catala

### Age Watches the Antics of Long-tailed Goldfish

Songbirds, fighting crickets in tiny cages, fish flashing in glass bowls, potted plants, flower gardens, and waterfalls—all appeal to the Chinese. But the Macau boy in sport sweater and foreign suspenders is fascinated by the camera.

railway in her drive into southern China begun in mid-April, 1944.

Only recent new railways built are those lines laid down by the Japanese, largely for military use, in Manchuria (page 220).

### Ningpo Known for Tea and Laces

An overnight sail south from Shanghai are the ports of Ningpo and Wenchow (Yung-kia), busy missionary centers.

Ningpo, outlet for Chekiang Province, is a name familiar to all tea drinkers. Large sections of Chekiang are given over to tea culture, one of the best grades being produced by the Buddhist priests in the mountainous regions. Some of the priests' private brands, made from the tender tea buds picked early in the spring,

are never exported and sell for fabulous prices in the Shanghai market.

Ningpo and Wenchow have special interest for American women because these old Chinese ports produce many of the fine laces and embroideries they get from China. This district also turns out thousands of women's hats and hat forms, which bring fancy prices on Fifth Avenue. These are the work of nimble-fingered Chinese women and girls, most of whom learned the art in the schools operated by the friendly Roman Catholic sisters.

The secret airbase for which Jimmy Doolittle's men were searching after the bombing of Tokyo was located in the Ningpo neighborhood. The Japanese later destroyed the base, as well as all the villages in the vicinity where Doolittle's flyers received assistance.

Still farther south are two sleepy old ports which were once household words in America. These are Amoy and Foochow,

sources of tea in the days of clipper ships (page 226).

Masters of American clippers used to load tea at these ports and sail for London. Until the British built clippers of their own, these American ships literally sailed rings around the British, as had the earlier American vessels which forced the British East India Company to relinquish its monopoly and open the China trade to all comers.

After the decline of the East India Company, competition became acute. It whetted the appetite of the early Anglo-American traders for more trade in all the ports of China and paved the way for those Anglo-French wars with China which forced the Dragon Empire to open additional ports.

Most of the newspaper strategists who draw maps with broad arrows curving about the Pacific have the arrows pointing at the ports of Amoy or Foo-chow. Today these ports, under Japanese control and cut off from Western markets, are supplying tea to the Soviets through Japanese hands.

Should China recover Manchuria, her victory will reopen and restore to world trade many Asiatic ports long closed to us, ports which will then be of tremendous importance to our own Pacific coast.

These will include Newchwang, Dairen, the new port of Hulutao, and the new secret bases and railway terminals Japan has built just across from Vladivostok.

After an 11-day trip over the lumbering Trans-Siberian Railroad from Moscow, I got into Vladivostok some months before the Japs hit Pearl Harbor. I was astonished at the forts, tunnels, and air-fields Russia has built there for defense against the Japs. Preceded by an icebreaker, I sailed out of Vladivostok Harbor. When I awoke next morning, off Rashin on the Korean side of the Sea of Japan, the weather was quite warm.

Defeat of Japan, in any event, means the dawn of a new day in the commercial geography of the China Coast.

Briefly stated, visible Jap war spoils now are these: Filipino hemp, rice, sugar, and gold; East Indian oil and rubber; Malayan and Burmese tin, rice, and rubber—and forced labor. On the China Coast: shipyards, coal, iron, steel; telephone, light, power, and city transportation systems; oil terminals; many junks, launches, and some steamers; and many motor vehicles.



Alfred T. Palmer

#### No Parents Treat Children More Kindly Than Do Chinese

Their family life is happy. Here a Shanghai merchant and his trousered wife walk through the French concession, their daughter between them. How comfortably he's dressed for a warm day! No tie, no tight collar, no hot coat.

Also, Japan now makes full use of confiscated machine shops, cement works, sugar refineries, spinning and weaving mills, soap, cigarette, and rubber-shoe factories, tanneries, breweries, distilleries, canneries—and infinite other smaller factories.

Invisible Jap gains include these:

Giving new Japanese names to many places once familiar to us under their English, Dutch, and other European appellations. In fact, a Japanese geographic board has been set up, simply to do this.

Bringing pressure to substitute Shintoism for all forms of Christianity.

Undermining all forms of Western culture (page 219) and any feelings of friendship natives may once have had for Westerners.



C. E. Army Air Force, Official

#### Maj. Gen. Claire L. Chennault About to Knock a Home Run Somewhere in China

Commanding the 14th Air Force, dreaded by the Japanese, General Chennault plays ball with American airmen in China at every opportunity. "And he stays in for nine full innings," correspondents report. The catcher calls for a high one.

Arousing higher sense of pride in Asiatic culture and religions.

Taking hundreds of delegates from the China Coast, Thailand, etc., to attend "Greater East Asia Educational Conferences" in Japan, whose motto is "Drive Out American and British Influence."

Even after discounting Japan's boastful claims, we cannot look at her actual gains without being disturbed.

They work at "good neighbor" and "good will" tasks, even as America does with her Allies. Writers and literary men from the China Coast, as well as from Burma and the Philippines, held a convention in Japan under

\* For numerous articles on Chinese provinces and places and on various aspects of Chinese life, see headings under China in the Cumulative Index to the NATIONAL GEOGRAPHIC MAGAZINE; also references under Canton, Hainan (Island), Hong Kong, Korea, Macao, Manchuria, Mongolia, Nanking, Peiping, Tibet, and Yunnan.

the auspices of its literary association and passed resolutions to promote youth culture, set up lecture bureaus, give prizes for good writing and translations of representative works of great Asiatic writers.

Certainly our fighting job is cut out for us.

First by compulsion and now by rote, the Chinese parade on Jap holidays, celebrate Jap victories, make obeisance at Jap shrines, and sing Jap war songs. Here evolves a new kind of Sino-Jap society, in which an ever-growing share of the population speaks Japanese, reads her papers, sees her movies, gains a vested interest in the status quo.

But—and this is significant—there is little or no intermarriage between Chinese and Japanese.

Indeed, this picture is disquieting. Time is on the side of the Japanese. The longer they remain in possession of this China Coast, the more they tend to "Manchukuoize" it.\*

#### INDEX FOR JULY-DECEMBER, 1944, VOLUME AVAILABLE

Index for Volume LXXXVI (July-December, 1944) of the NATIONAL GEOGRAPHIC MAGAZINE will be mailed upon request to members who bind their copies as works of reference.

# Bornholm—Denmark in a Nutshell

BY MASON SUTHERLAND

FROM a Baltic deep rises granite Bornholm, a small Danish world. It is an island of medieval round churches, ruined castles, Viking rune stones, and smoked "Bornholmers." The last are herring.

With the exception of Christiansø, its own group of satellite islets, Bornholm is the most easterly of Denmark's 500-odd islands. In addition to its own peculiar characteristics, it contains most of Denmark's important features, including an occasional stork.\* Indeed, some students have termed Bornholm a pocket edition of everything Scandinavian. Its people are as thrifty, tidy, and fair-haired as any in the Norse world.

So small, remote, and isolated that many Americans have never heard of it, Bornholm is likely to be big news at any minute. An almost total darkness settled over the island in 1940, when Germany occupied Denmark.

Today Bornholm, sitting astride the Baltic's mouth, is a barrier to the Soviet Navy's westward drive. Whenever Russia undertakes amphibious operations, Bornholm needs to be captured.

Reports from Sweden say the Nazis have reinforced their Bornholm garrison in expectation of a landing.

You may examine tiny Bornholm in panorama from its summit. Such a vantage point exists in the center of the island. In Almindingen forest, Horseman Hill (Rytterknægten) rises 531 feet above the Baltic. King's Memorial (Kongemindet), crowning the hill, adds another 40 feet. At its top is an observatory platform.

## Bornholm's "Empire State Tower"

Just as the *New Yorker* may study his city's 365 square miles from the Empire State Tower, so the Bornholmer may con his island's 225 square miles from King's Memorial. From Hammeren to the quicksands of Dueodde, greatest distance across the island, the eye has only a 25-mile journey.

If you wish to see a happy Bornholm, turn back the clock to the summer of prewar 1939. Then carnival has come to Almindingen. Here for country fair, farmers exhibit prize horses, cows, and pigs. Roads converging like spokes pour in picnic parties—a cross section of Bornholm's 45,000 souls.

Children, with hair as sun-bleached as

Bornholm's beaches, have faces shining and ears scrubbed red. Just now they explore Lilleborg, fire-blackened old fortress, and pretend it is robbers' castle or ghosts' palace. In swampy hollows they play that the grotesque, writhing tree formations are goblins locked in combat.

Young couples, arm in arm, wander to Echo Valley, near King's Memorial, to match their voices' rebound from the cliffs.

Close by, the carnival grounds swarm with conjurers, organ grinders, and sweetmeat vendors. Concertinas, inhaling and exhaling, breathe merry tunes.

With you a crowd of jolly youngsters climbs the stairs of granite King's Memorial. Giggles cease at the platform's edge as girls reel back in giddiness. Boldly the boys lean over the platform's rim to see how far they can spit.

The day is clear. Zealand (Sjælland), 95 miles to the west, is not visible, nor is Germany, 70 miles to the south. But Sweden is a hazy blue line 33 miles to the northwest, a "herring's swim" from Hammeren.

## Fruits and Nuts Flourish in the Far North

Geologically, Bornholm is a granite chip off the primeval Baltic Shield, backbone of the Scandinavian Peninsula. Cliff-girt Bornholm was poured in granite when the world was young. The mass of Denmark, its soil glacier-ground to powder, is a product of the recent ice age.

Although you are in Hudson Bay latitudes, your eye may rest on walnut, mulberry, magnolia, or fig, its limbs drooping over garden walls. Imagine figs ripening in mid-Labrador—same parallel!

The Baltic seems to favor Bornholm with an oceanic climate. And, as if they stored up the sun's heat, granite fissures are festooned with wild flowers. In their seasons, wild strawberries tint hillsides red, blackberries ripen in crannies, blueberries mature in lowlands.

Winter will bury bushes and flowers with snow. Deep drifts will seal the people in their homes until they tunnel out. Sometimes an ice pack locks the island in dead white arms until icebreakers plow a channel. But this is the summer of 1939, and summer is the season for catching the fat Baltic herring.

If seaside cliffs did not interfere, the view from your tower would disclose the half-dozen neat little seaside villages where Bornholmers smoke "Bornholmers" for eating.

The Bornholmer dressed in quotation marks

\* See "On Danish By-Lanes," by Willis Lindquist, in the *NATIONAL GEOGRAPHIC MAGAZINE*, January, 1940, and "Denmark and the Dunes," by Maurice Francis Egan, August, 1922.





### Bornholm Island Is the Baltic Sea's Granite Stopper

Like the rest of Denmark, of which it is an integral part, Bornholm is held by Germany. Its strategic position invites a Soviet landing. Eleven miles above Bornholm, tiny Christiansø is Denmark's most easterly outpost. Shaded areas show new Russian territory annexed by treaty from Finland; also the reannexation of Estonia, Latvia, and Lithuania, and the claim against Poland.

is only a smoked herring, but at its mention epicures smack their lips.

When the fleet returns with herring and quarter-mile-long nets, docks are crowded. Grannies, graybeards, wives, and cotton-topped children—few are too old or too young to clean the catch. Quickly they pin the fish in pairs, one balancing the other, and hang them across lines on a rack (page 245). Tier on tier of glistening silver, into the smokehouses they go!

Every port has its smokehouses, small low sheds topped with broad chimneys (page 242). From such houses you might expect the Seven Dwarfs to emerge singing "Heigh ho!" Ac-

tually the working inhabitants are sturdy women in aproned blouses and kerchiefed headdresses. On their feet, wooden clogs grip wet, slippery floors.

In interiors lit by flickering fires the women drench grates of embers with dripping mops. Billows of smoke permeate the herring.

After a three-hour treatment the Baltic silver is a russet gold. Smoked Virginia ham has not received more loving attention.

Now the "Bornholmer" is packed immediately for shipment, principally to Copenhagen. Encountering it there, your islander elevates his nose as at a long-dead salmon. He insists that smoked herring, like certain wines and tropical fruits, does not stand shipment. It is best eaten right in the smokehouse, he assures you. For winter fare the Bornholmer takes his herring pickled.

More than a fishing village is Rønne, eight miles west of your tower. Administrative center of the island, it has 11,000 residents

and a harbor crammed with steam and sail. From Rønne generations of seafaring men have sailed the world's waterways.

### Rønne, a Vest-pocket Copenhagen

High, peaked roofs of red tile crown Rønne's gay little dollhouse dwellings. Timbers dividing plaster walls are tar-black. The walls themselves are coral, creamy yellow, dazzling white, or russet. These colors may change from year to year as owners add a new coat of lime wash.

On crooked, cobbled streets, rows of attached houses unfold like illustrations from a children's storybook. Each house is a



**For the Photographer, Miss Copenhagen Lends Bornholm Fishermen a Reluctant Hand**  
 Like many other prewar visitors, this girl liked to arise early and watch the fishing fleet come in from its night's labors. Granite Bornholm tolerated, but did not imitate, her shorts.



**Herring Fleet's In! Gudhjem's Grannies and Graybeards Go to the Dock to Help**  
 Holds have been unloaded. Any fish caught in the nets, as at left, are picked out. For such slippery work, the man at the left wears clogs.



**"Gnome House" Is a Herring Smokery and the Three "Dwarfs" Are Children**

Its "all-chimney" design gives the Bornholm smokehouse a fairy-tale appearance. Wood to light its fires is stacked like hay. Bornholmers like smoked herring best as they emerge piping hot from these sheds.



THOMAS LIND

**Silver "Bornholmers" Hang until Smoke Turns Them Golden Brown**

To create denser fumes, the woman will sprinkle embers with a mop in the water pail. Clogs keep her feet dry. Apron and kerchief headdress are the style in a herring smokehouse (page 140).



Wille Lindqvist

### Having Ground Grain for Three Centuries, Svaneke's Tree-stump Windmill Has Retired

Its base, a solid length of oak embedded in concrete, takes the place of the customary tree stump once employed on Bornholm. Slanting timbers underneath the housing support the central beam. Entrance is by a door in the rear. The shed was turned facing the wind with winch and tackle.

new page, different from its neighbor.

Most are of one story. The homes of prosperous merchants are a more pretentious story and a half. Almost skyscrapers, by comparison, are the new four-story apartment houses. Modernistic are they, yet their peculiar curves jibe with Rønne's out-of-this-world flavor.

Attached to the ground floor of many a home is an odd arrangement of mirrors overhanging the narrow sidewalk. It is generally at a level endangering the heads of unwary tall men. Nicknamed "busybody" and "peeping Mary," this device enables the housewife to observe street life from the privacy of her parlor chair (page 250). It is her television set into the doings of neighbor and stranger.

If you are an early riser, you will see this

broad-aproned housewife, pitcher in hand, emerging from her Hansel-and-Gretel door. She has been summoned by the alarm-clock bells of the milkcart horse's harness. From a spigot in his butter-yellow cart, the milkman pours a pitcherful the while he relates news and gossip.

Danish artists—and many a Danish family boasts its tyro with paint and brush—love to paint Rønne's Big Market and Little Market. They need a palette full of colors to match Rønne's walls!

Many visit Gudhjem to paint its harbor. Seen from the cliffs, the compressed little haven is a bathtub with a flotilla of toy boats (page 247).

What American has never pridefully referred to his home State as God's country?



#### Fortune Spared a Wooden Lady from the Wreck of Her Ship

A century ago the figurehead was left ashore for repairs when the *Mutilla* sailed from Christiansø (page 239). On that voyage the ship was lost. Here the carving hangs from the home of the shipowner's great-great-grandson.

Translated, Gudhjem is God's Home. Once upon a time it was "the Gods' Home."

Not many centuries after Bornholmers had been converted to Christianity, the island built its four round churches. At least two are visible from your tower.

A typical round church is a granite cylinder with six-foot-thick wall. Like a dunce's cap, its roof is a perfect cone.

#### Round Churches Defense Against Pirates

When pirates swarmed ashore during the insecure Middle Ages, the round churches were turned into fortresses. Bells in churchyard towers sounded warning. If attack was by night, hilltop brush heaps were lit as beacons.

To their holy forts Bornholmers raced like American settlers to Indian-proof wooden stockades.

Securing domestic animals in the courtyard, fighting men took positions at loopholes. Women and children huddled on the lower floor. Upper stories were armories and provision depots. Behind impregnable doors, Bornholmers ate their fill and withstood siege until enemies departed in hunger.

Østerlars Church (Østerlars Kirke) is most elaborate of the four. Additions have left it no longer perfectly round (page 249). A staircase winds around its inner wall. A shaft indoors is filled with murals painted by its Catholic founders. Their stern Lutheran successors whitewashed the shaft year after year until its frescoes were forgotten. Uncovered late in the last century, the walls revealed scenes from the life of Christ. A less strait-laced generation of Lutherans restored them to a place of honor.

All four round churches are in farming areas.

#### Cobblestone Barnyard within Four Walls

Seen from King's Memorial, cultivated fields alternate with forests or heather-covered wastelands.

Like Americans, Bornholm farmers scatter their homesteads, each building on his own land. In all the interior there is but one sizable hamlet, Aakirkeby.

Farmhouses are often thatched. White-washed walls are checkered with tarred beams. Tidy curtains rim rows of square windows.

On larger farms, dwelling, barn, and sheds are joined as in New England units. Then, as if following Spanish pattern, the buildings

form a square. In Bornholm, however, the court is a barnyard, paved with granite blocks.

Cows and calves share their domain with hissing geese, cackling hens, rooting pigs, and daydreaming horses. If there is a pond or tank, ducks wave webbed feet above it as they dive. Husky dairymaids preside over milk cans.

Bornholm is a dairy country. Hills of dandelion-yellow butter are served by housewives. Breeders boast that their mahogany-red herds are superior to those of the mainland. Cattle, lacking a range, are tended by herdboys (page 252).

Grain, potatoes, fruits, and vegetables are the crops for man. Much of the land is given to hay and clover for livestock. Stacked near homes, hay forms children's playtime alps.

Near the coast, many a fisherman and even a lighthouse keeper tend gardens.

On Bornholm the toughest crop is granite. Two-thirds of the soil has a granite bed. If the poor farmer cannot till a living from his cobblestone acres, he will slash his fields and hew the rock.

Of granite are Bornholm's iron-hard roads and its rune stones. Granite houses and churches withstand centuries of weathering.

Hammeren, a seaside promontory, is seat of the larger quarries. Pits reverberate with the rasp of mechanical saw, clatter of drills, and explosion of dynamite.

With the coming of war, the RAF overlooked Bornholm. But from German city streets Allied bombs have sent Bornholm-quarried cobbles flying like cannon balls.

Southern Bornholm, having been submerged at various times, has sandstone, limestone, and marble above its granite. These are mined,



Tied in Pairs, Herring Dry on Racks

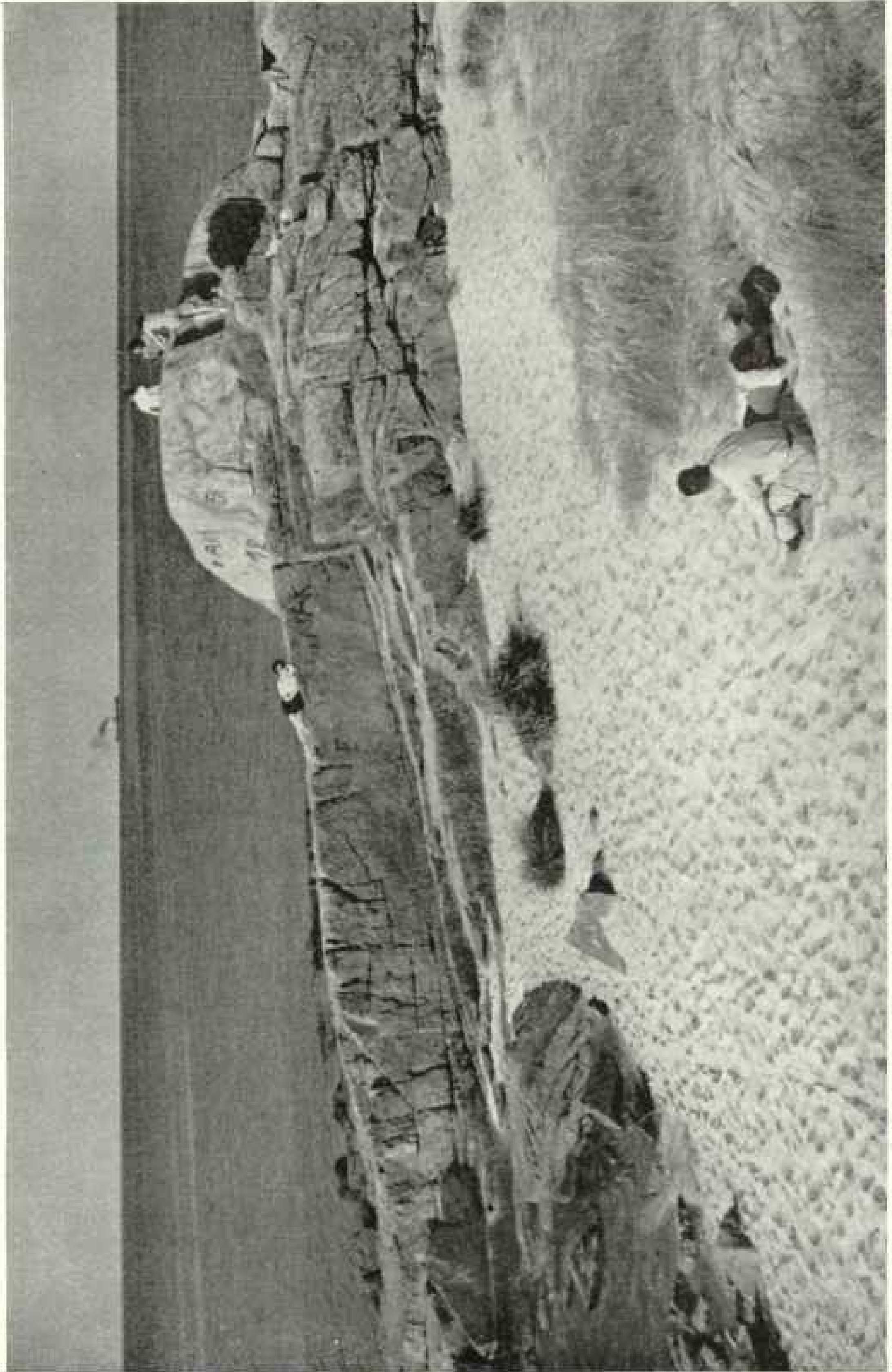
After a few hours they will be ready for the smokehouse (page 242). Fish nearest the camera are distorted. Those held by the women give the true measure of the Baltic herring.

cut, or quarried. Neksg, a small port, is sandstone from graveyard tablets to paving blocks (page 250). Native clays feed Bornholm potteries and Copenhagen's famous porcelain industry.\* Bornholm coal, brown and inferior, is generally neglected. Wartime has revived its use.

#### Island Almost Self-sufficient

Surely the island could be almost self-sufficient. With farms and fisheries, it could lock out the world and still eat. Wood, peat, and coal are for its fires. For wool it has sheep; and for linen flax. Hemp is for its

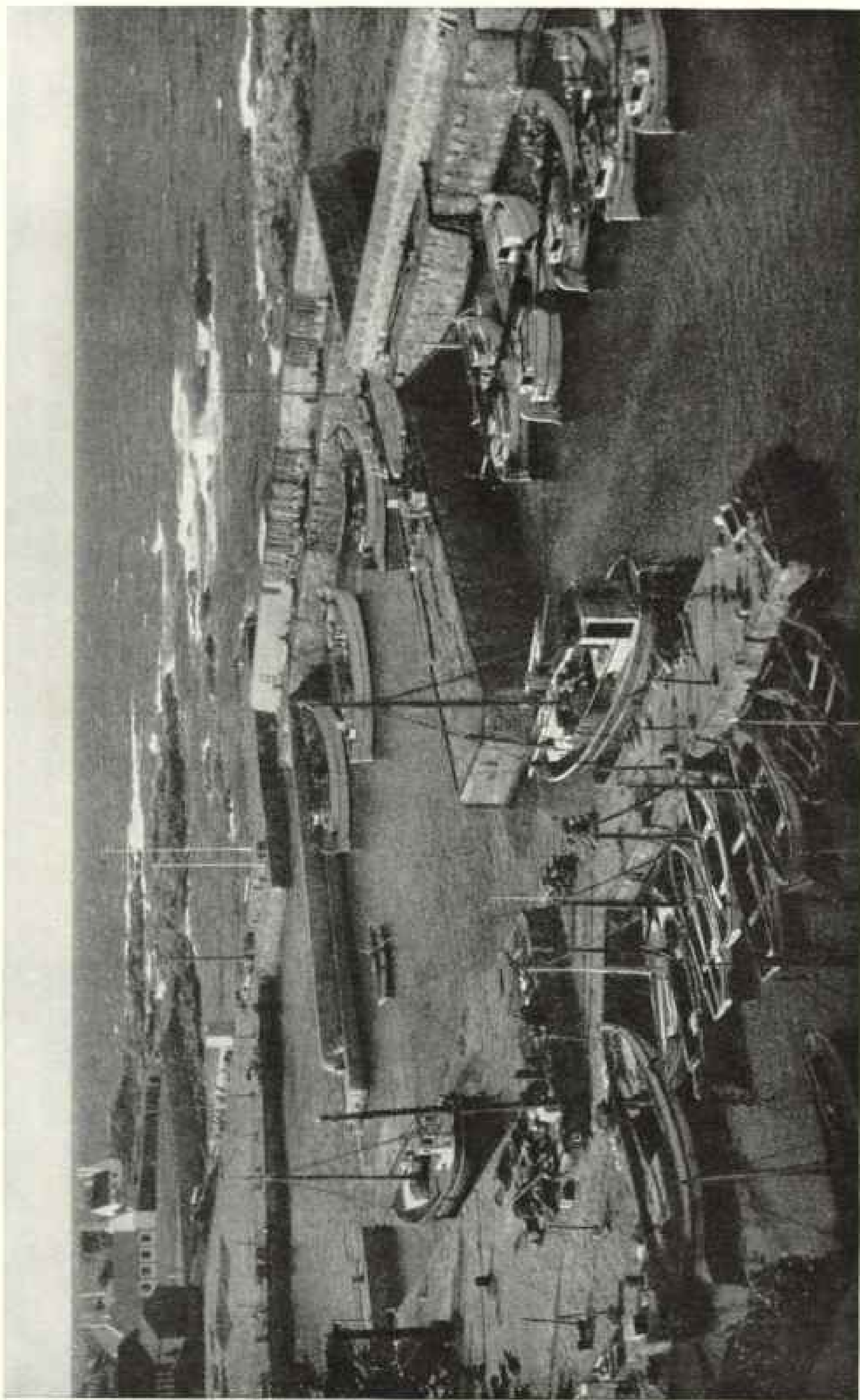
\* See "Royal Copenhagen, Capital of a Farming Kingdom," by J. R. Hildebrand, in the NATIONAL GEOGRAPHIC MAGAZINE, February, 1932.



Zimella Co.

**In Hudson Bay Latitudes, Vacationists Bask on Sun-warmed Granite and Watch Steamers Ply the Baltic**

Before the war Bornholm welcomed thousands of Germans on their summer holidays. In 1940 they came back uninvited. At Dueodde they started building fortifications (map, page 240). One day they found their work swallowed by quicksands. Now there is talk of a Russian landing in the making.

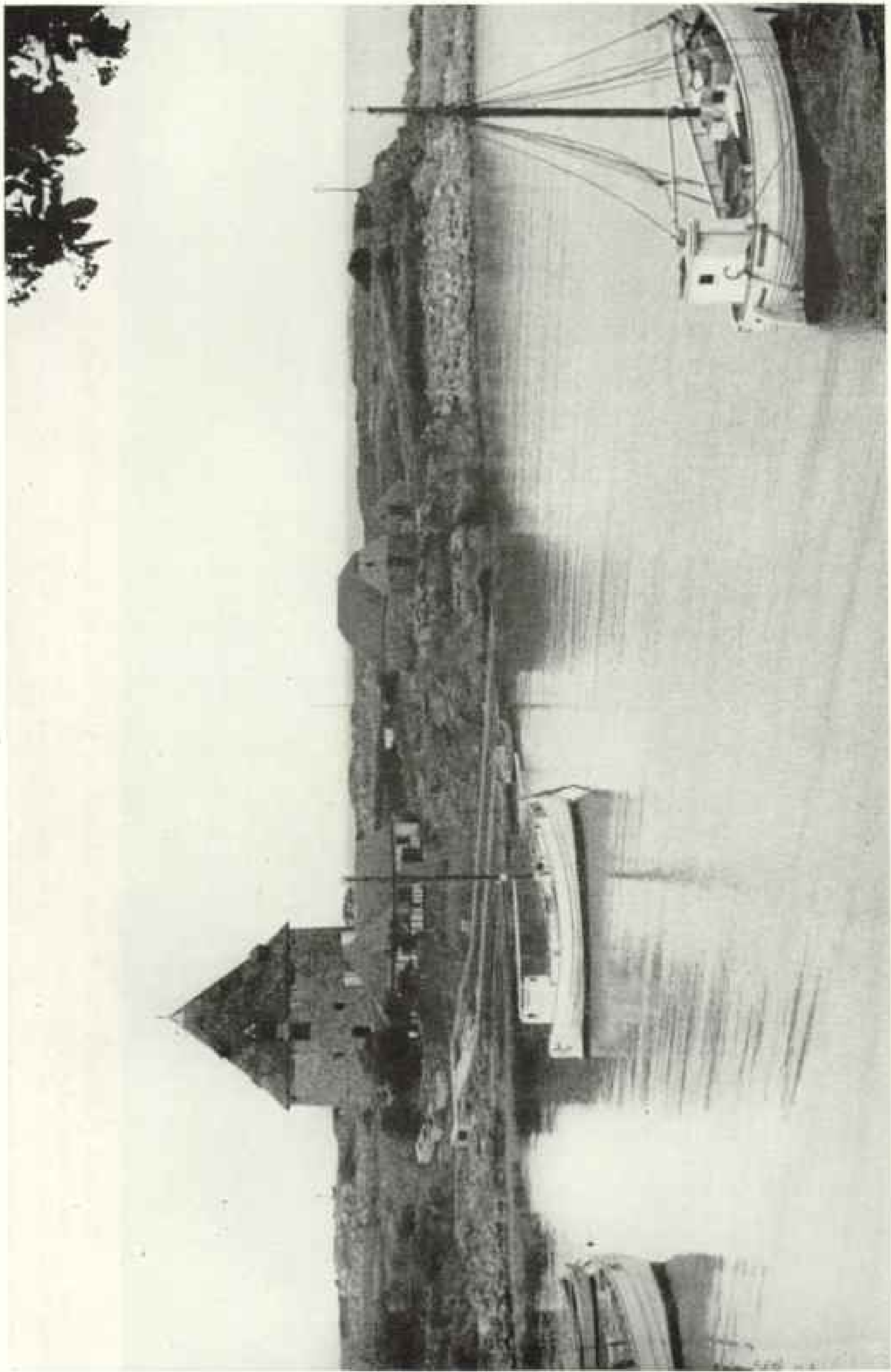


7 miles S.

### To Reach Gudhjem's Tiny Harbor, Fishing Boats Must Run the Foaming Gantlet of Rocks Lining the Entrance

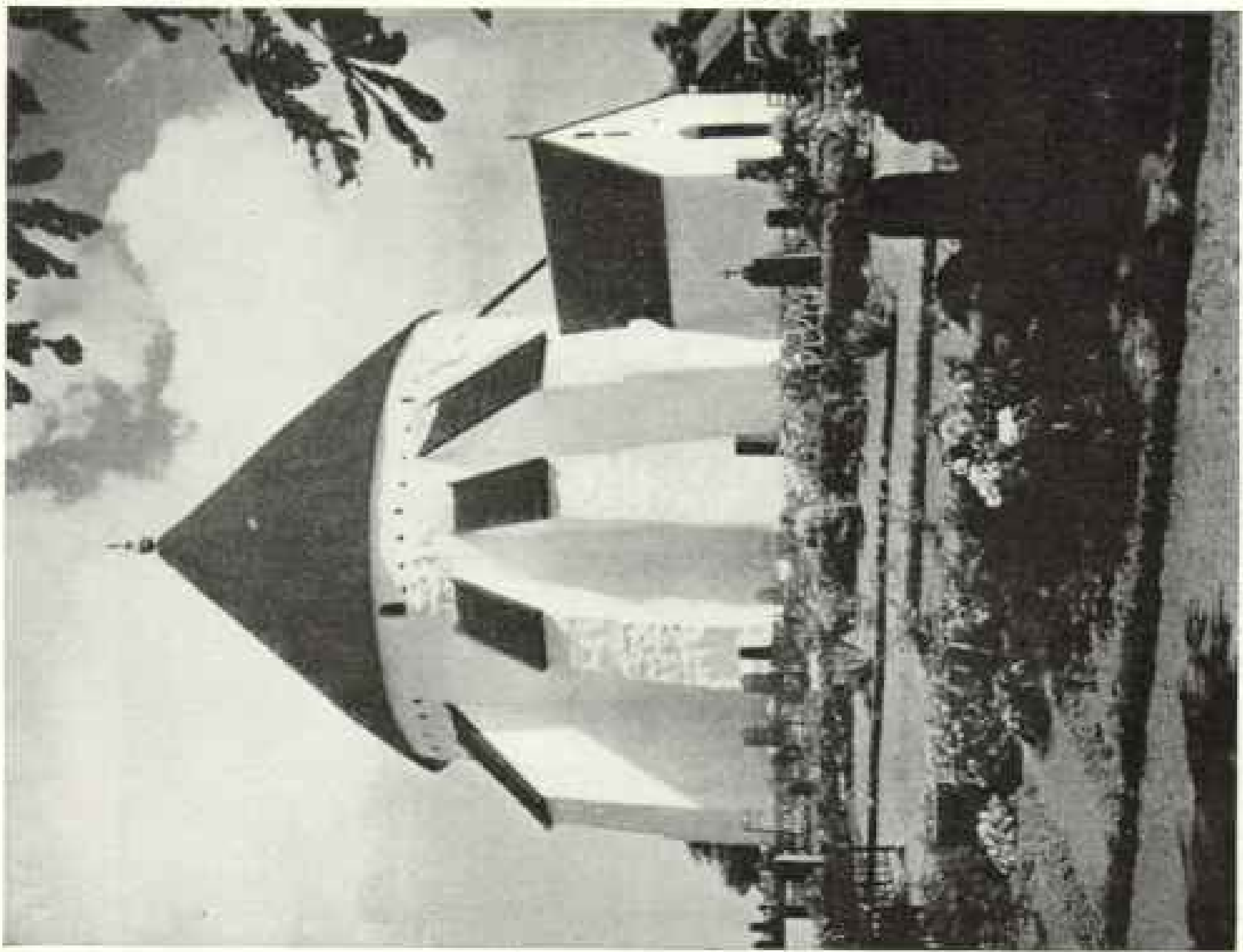
When the wind is strong, small steamers must lie offshore. On coming in, passengers can count the rocks on either side of the 46-foot-wide channel (upper right). During storm breakers leap the sea wall. Bornholm, lacking natural harbors, has constructed havens of granite and concrete. Gudhjem, translated, is God's Home.





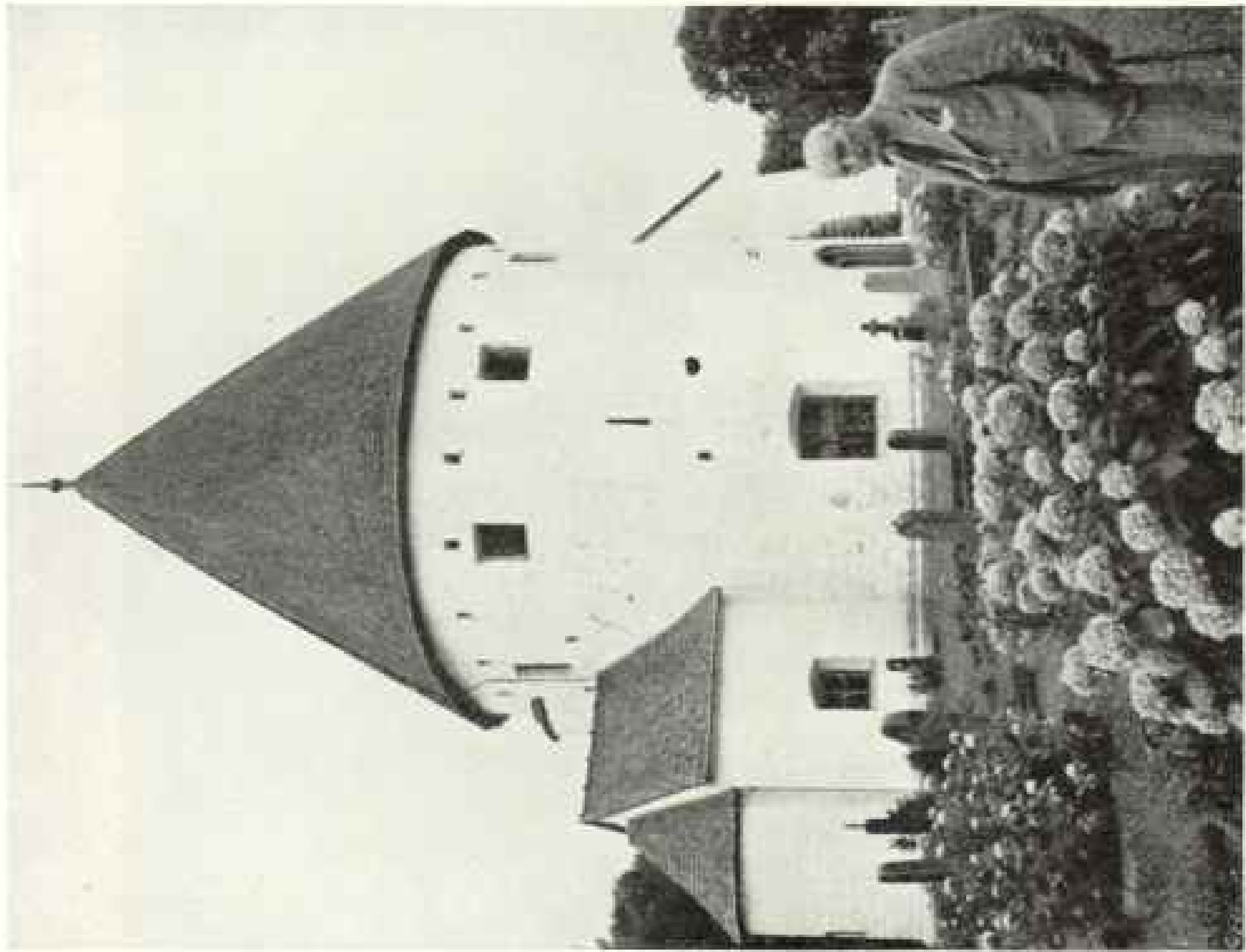
**Once a Fortress, the Circular, Peaked Tower at Frederikshø Has Served as a Prison**

In the one-room interior, rings fastened to heavy timbers show where prisoners were shackled. Seen from Christiansø, the channel was a refuge for Viking pirates. Now it is the home of fishermen, whose white smacks gleam at their moorings. Båsk Frederikshø and its neighbors are Denmark's most secluded outposts in the Baltic.



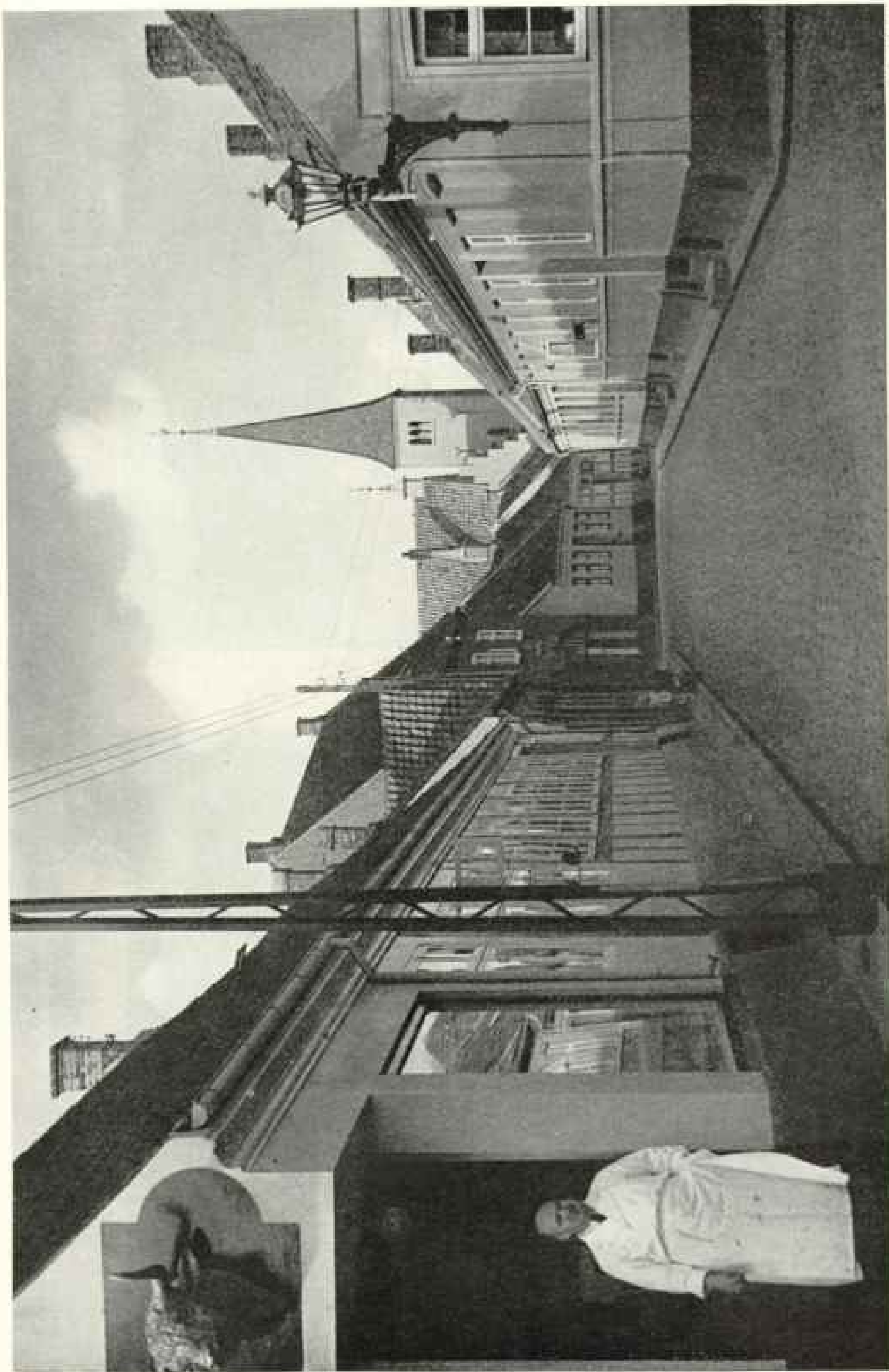
**This Round Church Is No Longer a Perfect Cylinder**

Buttresses and entrance hall have been added since Østerlars was built in the Middle Ages. Stern Lutherans whitewashed primitive frescoes on the interior. The murals were scrubbed clean and restored in the last century.



**At Church and Fort Medieval Danes Prayed and Fought**

Old Kirke, near Allinge, is one of Bornholm's four round churches. Within their thick walls, stuffed with provisions and arms, islanders took refuge when pirates ravaged the coast (page 144).



Three Towns

**In Nexø (Nekspø) the Butcher Stands Beneath an Oxhead, Sign of a Meat Shop**

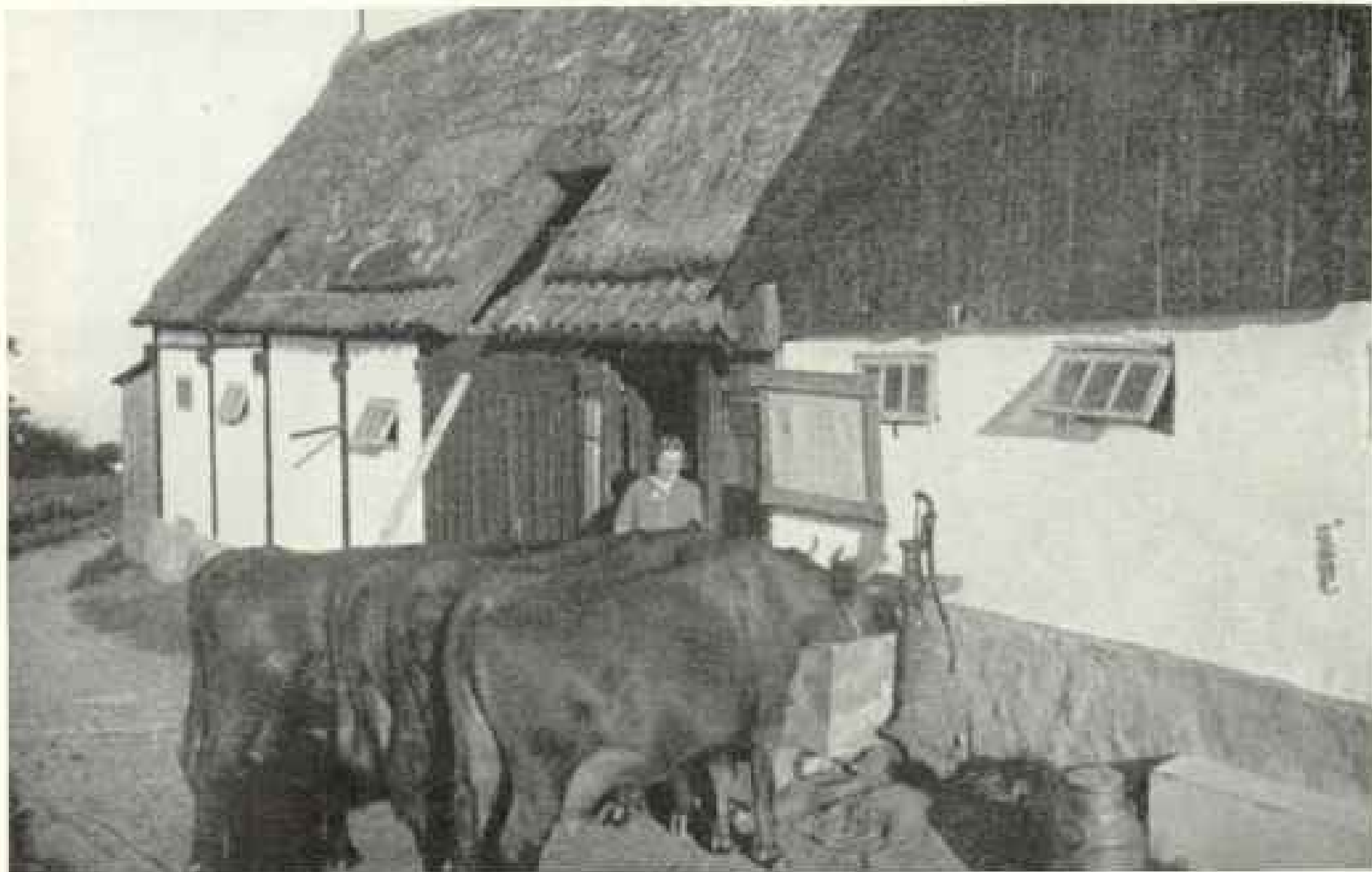
This sandstone-built town so delighted Martin Andersen Nexø, author of *Pelle the Conqueror*, a novel about Bornholm life, that he adopted its name as his own. Cur-tained windows look directly into narrow, twisting streets. Attached to a window (right), a curiosity mirror measures passers-by (page 252).



Three Light

**Hammerhavn, a Small Port on Bornholm's Northern Tip, Is Headquarters for Granite Quarriers and Shippers**

Germans once owned the industry here; they relinquished control after the first World War. Many streets in Bornholm were paved with Bornholm cobbles. Bornholm was poured in granite. If the topsoil does not support a farmer, he mines its granite base (page 245). Hammeren hill is crowned with a lighthouse.



**Did Hungry Germans Spare This Mahogany-red Herd, Pride of the Bornholm Farm Wife?**

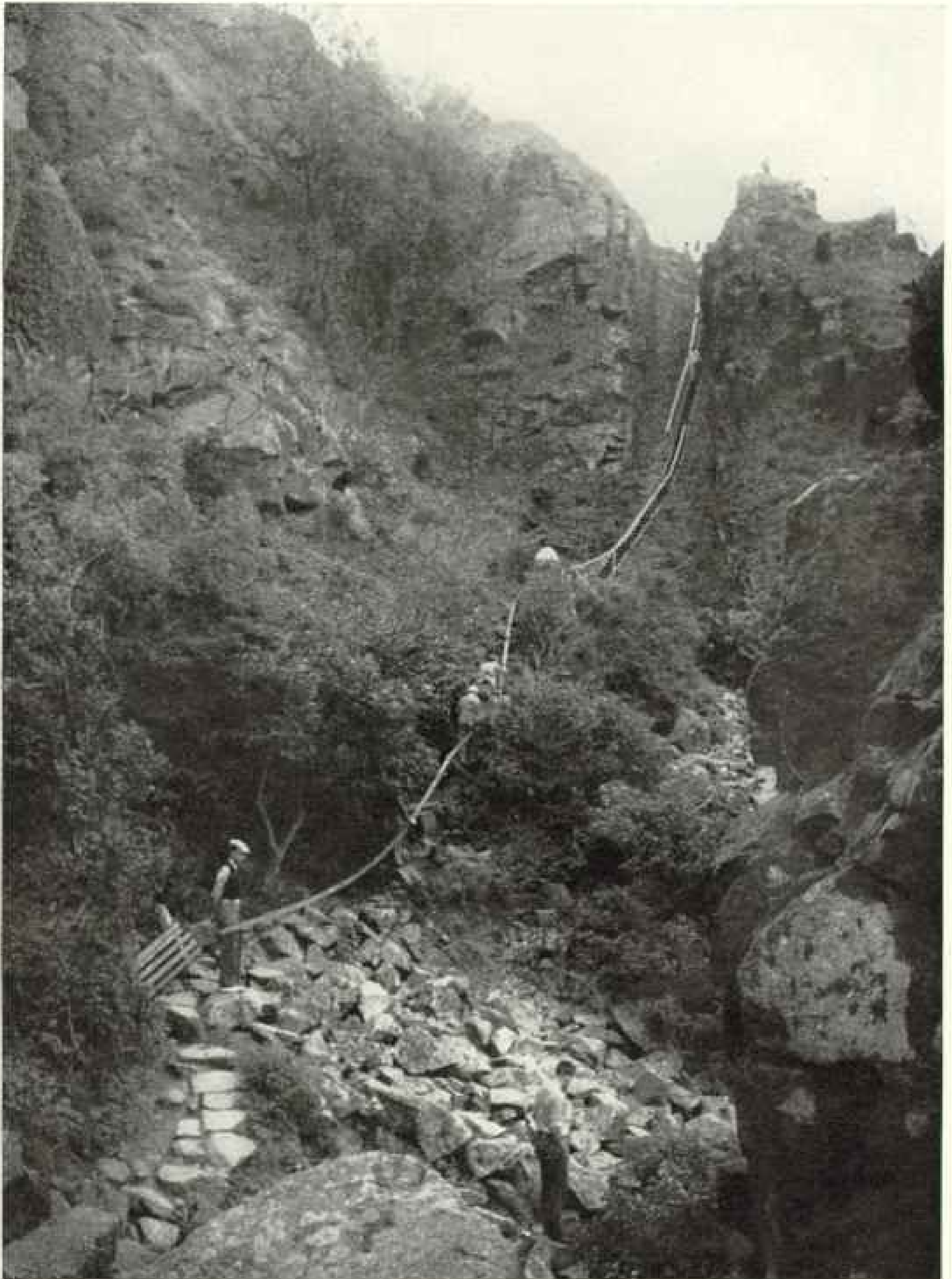
Nazis camping in the Channel Islands shipped prize Jerseys and Guernseys home. To improve milking stock, Danes crossed the old Red Danish breed with Angeln cattle from northern Germany (page 256). The almost inaudible click of the camera caused these touchy animals to jump.



W. H. L. L. L.

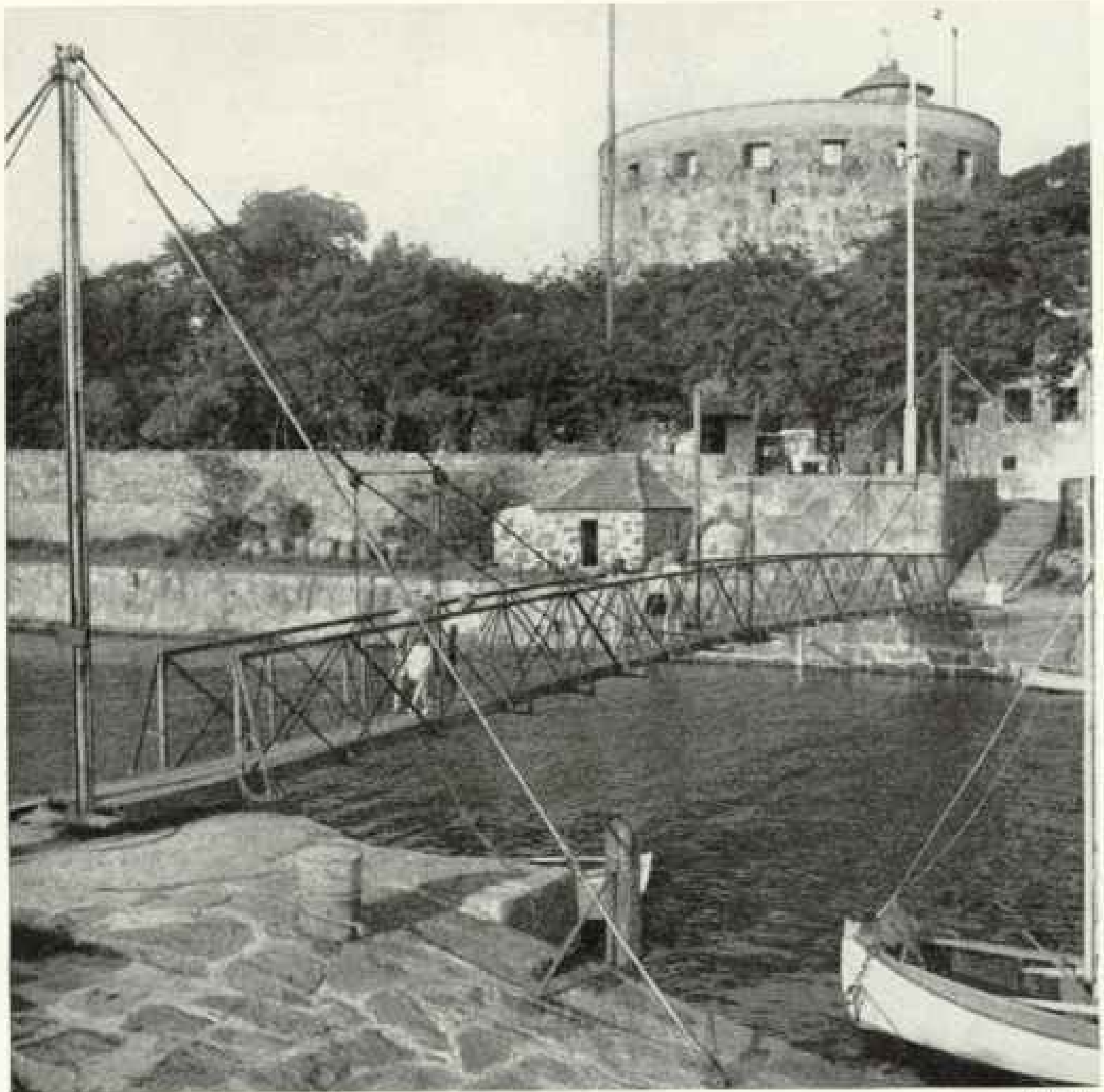
**By Looking into Her Curiosity Mirror, the Danish Housewife Watches the World Go By**

Scanning the narrow walk, the "busybody" or "peeping Mary" reflects pedestrians' faces to the parlor rocker. While this example was found in Ribe, Jutland, it illustrates the many in Bornholm (pages 243, 250). Rising off the sidewalk like Bornholm homes, a few Baltimore and Philadelphia houses have similar mirrors.



**In John's Chapel, an Airy, Seaside Temple, a Legendary Hermit Preached Centuries Ago**

The path leads to a natural pulpit used reputedly by John as he shouted to his congregation of fishermen seated on the "chapel's" rocks. He lived in a cave near by. Travelers are fond of this spot. Elsewhere they visit Sanctuary Cliffs, near Gudbjerg, and Lions' Heads, near Hammershus, rock formations carved by waves.



Zonals Co.

#### Over a Footbridge, Visitors Approach Christiansø's Circular Fort, Built in 1684

Christian V of Denmark erected the citadel on a bare rock in the Baltic. Today it supports the domed lighthouse perched on its top. Once barren, the rock now blooms, soil having been shipped in from Bornholm, 11 miles to the southwest. Seen from Frederiksø, an adjacent island, this narrow channel is a haven for mariners in icy weather.

fishermen's nets and reapers' binder twine.

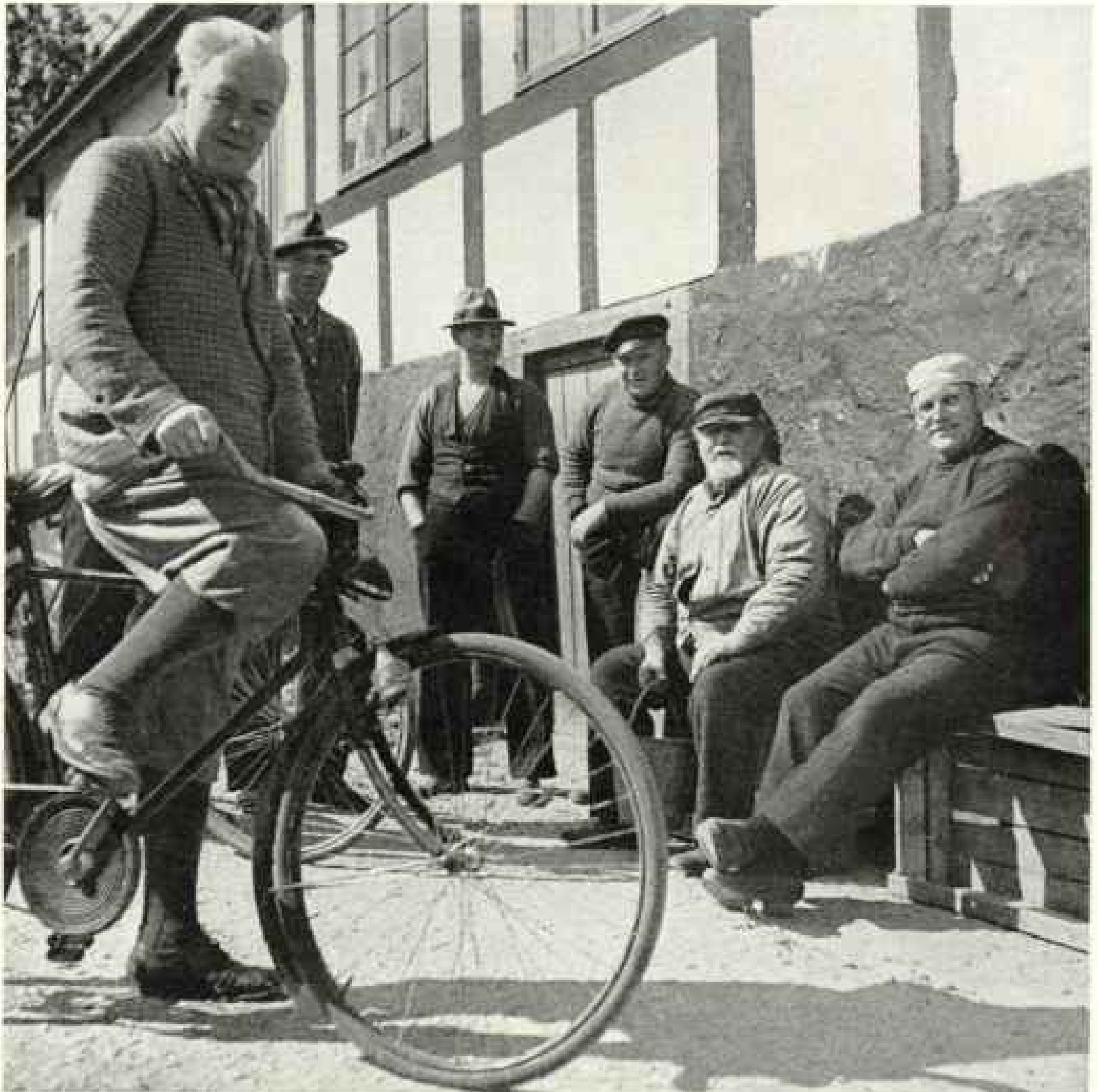
A century ago Bornholm was so isolated it never knew when the next boat would arrive. Then Copenhagen opened regular service to Rønne. Vacationists and health seekers soon found the way (page 241).

From confining offices the Copenhagen secretary and the Malmö bookkeeper arrived each summer in search of romance, sun tan, fresh air, and strange paths to explore. For them, seaside hotels brimmed with Copenhagen beer, vintage wines, and good things to eat. That was in 1939.

From Horseman Hill some of the vacation-

ists' haunts may be observed. Could you have seen the white beaches, they would have been flecked with the red and blue of bathing suits. Alternating with the sands, seaside cliffs provide narrow trails for hikers. Near Louisenlund sight-seers marveled at the wordless gray monoliths left by prehistory's islanders. Like American boys hunting Indian arrowheads, visitors looked for Viking rune stones carved a thousand years ago.

Boat parties peered into the clear blue Baltic depths. Under the cliffs they explored wave-drilled grottoes. These are picturesquely named "ovens."



Kjøl from Mankovær

### Where a Dane Goes, So Does His Bicycle

Prewar Denmark, which led the world in cycling, had one bike to every three persons. Copenhagen vacationists visiting Bornholm often took their wheels. Basking now in the sun, these Tejn fishermen will be on their boats by night.

Lions' Heads is a descriptive name given to rock formations wave-chiseled from the shore. Another, John's Chapel (Jons Kapel), honors the cavern-dwelling hermit who, according to legend, preached to fishermen from his natural temple (page 253). Sanctuary Cliffs, a series of seaside crags, derive their name from a spring reputed to have cured the ailing.

Ruined Hammershus was the visitors' favorite marvel. Perched on a 243-foot cliff, it is a conspicuous landmark to sailors. Some eight centuries ago it was built by the Danish Archbishop of Lund, Sweden.

Among the Danes it is renowned as the 17th-century prison of King Christian IV's

rebellious daughter and traitorous son-in-law. Its shell remains to remind one of the clank of arms and chains.

### Stump Windmills and Toy Railroad

Bornholm's old stump windmills are a favorite subject of camera fans (page 243).

The long summer day is darkening. It is time to turn forward the clock to 1945. Horse cart, bicycle, and train are waiting as you leave the tower.

Bornholm's railways resemble a toy system covering a papier-mâché landscape. Cow-catchers on the locomotives are equipped to carry passengers' bicycles. Rails to Nekstø





Klud Esau, Munkensvæst

### For Fresh Butter, Cheese, or Milk, Hikers Visit a Farm Home

Unlike most Europeans, rural Bornholmers scatter their homes, as in many parts of the United States. Dwelling, barn, and sheds are grouped in a hollow square sheltering the barnyard (page 244). Often the old folks retire to a separate cottage, such as that on the right, leaving the larger unit to their son. Despite their high milk yield, Red Danish cattle are little known in the United States.

and Sandvig fan out from Rønne. A spur to Gudhjem goes through Almindingen.

Once independent, Bornholm united with Denmark about a thousand years ago. At various times it has had foreign masters. In 1658 its people threw out the next-to-last alien garrison. Then, in April, 1940, the Germans moved in.

#### Nazis Built on Quicksand

Concerning the Nazis, John Christmas-Møller, president of the Danish Council in London, told Danish Americans:

"The Germans wanted to build fortifications at Dueodde, southernmost point on the island. Huge cement blocks were placed one on top of the other. The fortifications

were just about on the point of completion.

"But one morning when the Germans came out to admire their fine work, it had gone. The fortifications had disappeared in the quicksands" (page 246).

A steadfast Dane is your Bornholmer. His insular pride and native stubbornness withstood the blandishments of shorts-clad visitors. He remained his sailor-capped, pipe-smoking, and often clog-wearing self, his language a little strange to Copenhagen ears.

Always he and his ancestors have resisted foreign domination. His kinsmen in the United States are convinced he will outlast his German jailers. Like the Vermonter, he is anchored to granite. He does not build on quicksand.

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To carry out the purposes for which it was founded fifty-seven 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 The Magazine uses, generous remuneration is made.

In addition to the editorial and photographic surveys constantly being made, The Society has sponsored more than 100 scientific expeditions, some of which required years of field work to achieve their objectives.

The Society's notable expeditions 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 solved secrets that had puzzled historians for three hundred years.

In Mexico, The Society and the Smithsonian Institution, January 16, 1939, discovered the oldest work of man in the Americas for which we have a date. This slab of stone is engraved in Mayan characters with a date which means November 4, 291 a. c. (Spinden Correlation). It antedates by 200 years anything heretofore dated in America, and reveals a great center of early American culture, previously unknown.

On November 11, 1935, in a flight sponsored jointly by the National Geographic Society and the U. S. Army Air Corps, the world's largest balloon, *Explorer II*, ascended to the world altitude record of 72,395 feet. Capt. Albert W. Stevens and Capt. Orvil A. Anderson took aloft in the gondola nearly a ton of scientific instruments, and obtained results of extraordinary value.

The National Geographic Society-U. S. Navy Expedition camped on desert Canton Island in mid-Pacific and successfully photographed and observed the solar eclipse of 1937. The Society has taken part in many projects to increase knowledge of the sun.

The Society cooperated with Dr. William Beebe in deep-sea explorations off Bermuda, during which a world record depth of 3,025 feet was attained.

The Society granted \$25,000, and in addition \$75,000 was given by individual members, to the Government when the congressional appropriation for the purpose was insufficient, and the finest of the giant sequoia trees in the Giant Forest of Sequoia National Park of California were thereby saved for the American people.

One of the world's largest icefields and glacial systems outside the polar regions was discovered in Alaska and Yukon by Bradford Washburn while exploring for The Society and the Harvard Institute of Exploration, 1938.

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## **HOW** *can you be sure of quality in watches sold today?*

It's hard to be sure, because most of the watches sold today are imported, have unfamiliar names. Many of these have

*no reputation of quality*—which is the consumer's and jeweler's only guarantee of dependable performance.

## **WHAT** *should a consumer look for when he buys a watch?*

Not even a skilled watchmaker can tell the quality of a watch by merely looking at it. Most people must buy on faith

—faith in the integrity of the maker. That's why it's important to look for a well-known, established name.

## **WHO** *is making "official" military watches today?*

Only *American* firms are making watches for our Government. These timepieces are *issued* to our armed forces for spe-

cific purposes only. They are not sold to the public. So-called "military" watches on sale today are *not* "G.I."!

## **WHERE** *is the best place to buy a watch?*

Your family jeweler's store. He alone has the experience and training to give you honest advice about available

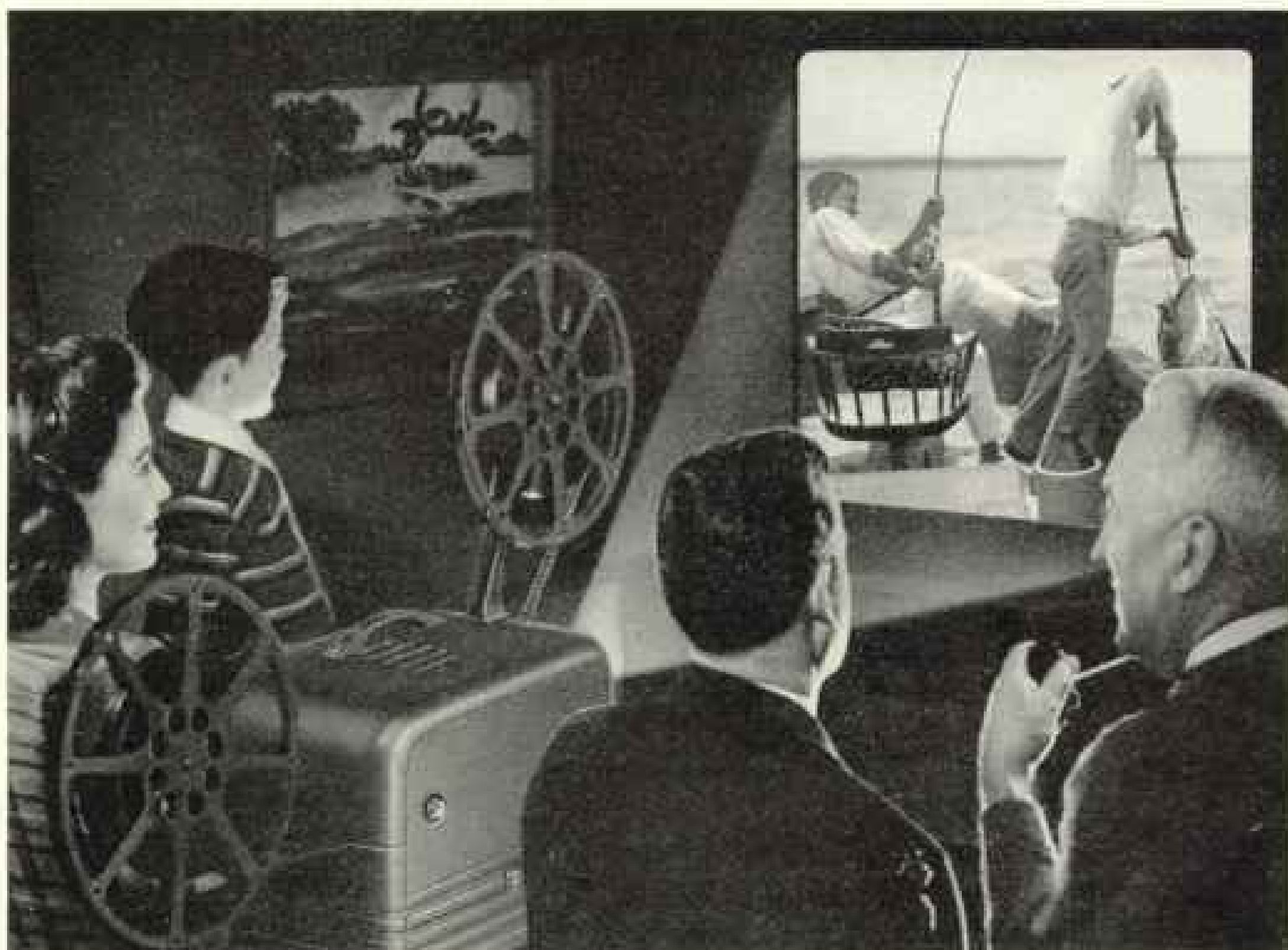
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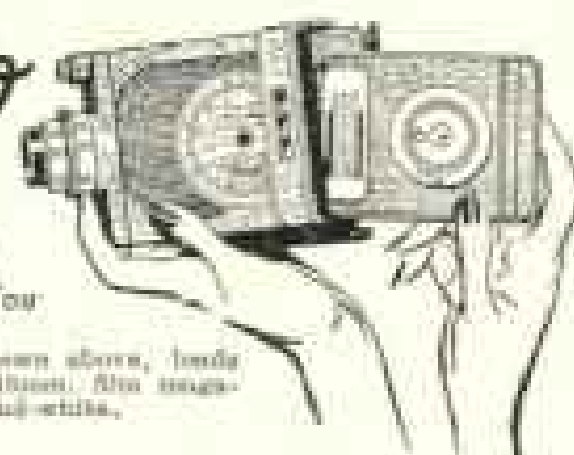
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With our missions done and the roar of guns  
and the bombs fading and faint in my ears . . .

Back here, I remember, now, the power of  
America at war!

I don't want to kill any more . . .  
I don't want to destroy . . .  
I want to work and build and make things  
live and grow.

And now I know we've got the power and the  
might to smash factories and cities and  
countries into dust . . . I know that here at  
home we've got the power and the will to  
build new towns and cities . . . to build an  
even finer, an even greater country of our  
own . . .

Now I know Americans can think and plan  
and work together to build the greatest war  
machine the world has ever seen . . . I know  
there's no limit to what we can do when this  
war's won and we've come home to peace.

Now I know this war will not be fought in  
vain . . . this Victory can be made real for all  
of us . . . if we keep on working together not  
to destroy but to create.

Now I know that if we turn all the power we  
have gained in war, to peace . . . there can  
*always* be for me and every man a boundless

opportunity to dream, to work, to grow . . .  
to build *our* America the way we want it to  
be . . .

That's what War . . .  
That's what Victory . . .  
That's what Peace means to me.

When Victory comes, Nash will go on . . .  
from the building of instruments of war to  
the making of two great new cars designed to  
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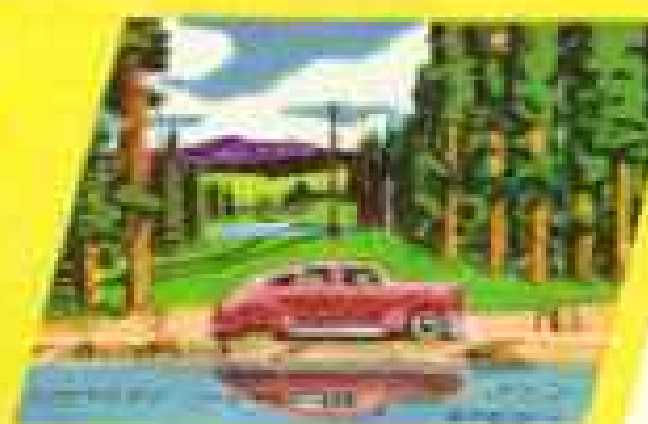
And we will build these cars in numbers three  
times greater than we ever have before!

In this way, Nash will help contribute the  
jobs, the opportunities, the future which will  
insure the strong, vital and growing America  
all of us owe to those who have fought to  
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in their third year at war]

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19¢ was paid in taxes—federal, state and local.

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2¢ was paid in dividends to stockholders.

5¢ was left over in "change" to cover all such things as restoring roadways and equipment after the war, paying off debts, and providing reserves for the improvement of plant and the modernization of service necessary to keep pace with American progress.



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For Parker 51's will be more available. And you'll be glad you waited!

Colors: Black, Blue Cedar, Dove Gray, Cordovan Brown. \$12.50 and \$15.00. Pencils, \$5.00 and \$7.50. Famous Vacuumatic pens, \$8.75. Pencils, \$4.00.

THE PARKER PEN COMPANY  
Janesville, Wisconsin

*Writes dry with wet ink!*



**PARKER**

“51”



WHEN YOU'RE HAUNTED BY 29 jobs



that all have to be done

at once...and while your secretary is free to ward off unnecessary

interruptions



...you just relax and talk your problems

to your microphone, sending a memo here...an instruction there,

and dictating a long complicated report



...and when

that phone call from Washington comes through you record every

word of it



without losing the trend of your report

...and when the end of the day comes, you're on your way home

knowing that everything is on record and attended to... Right.

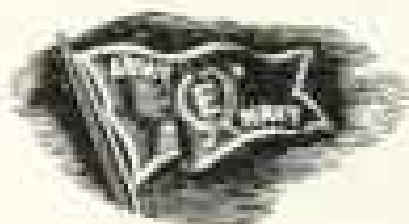
Mr. Secretary, that's

**DICTAPHONE**<sup>®</sup>

*Electronic Dictation*



The microphone on your desk is the heart of Dictaphone Electronic Dictation. Make it your Control Center for executive action. It will help you keep on top of your job. Developed in pre-war years and widely used by war-time executives, Dictaphone Electronic Dictation is now available for essential uses. Send for our new, free descriptive booklet.



**NOTE:** Standard Dictaphone dictating machines, without electronic amplification and telephone recording, are currently being produced and offer outstanding value for general office dictation.

**DICTAPHONE CORPORATION, 420 Lexington Avenue, New York 17, N. Y.**  
In Canada, Dictaphone Corporation, Ltd., 86 Richmond Street, West, Toronto 2, Ontario

\*The word DICTAPHONE is the registered trade-mark of Dictaphone Corporation, makers of dictating machines and other sound recording and reproducing equipment bearing said trade-mark.



# Lockheed Constellation

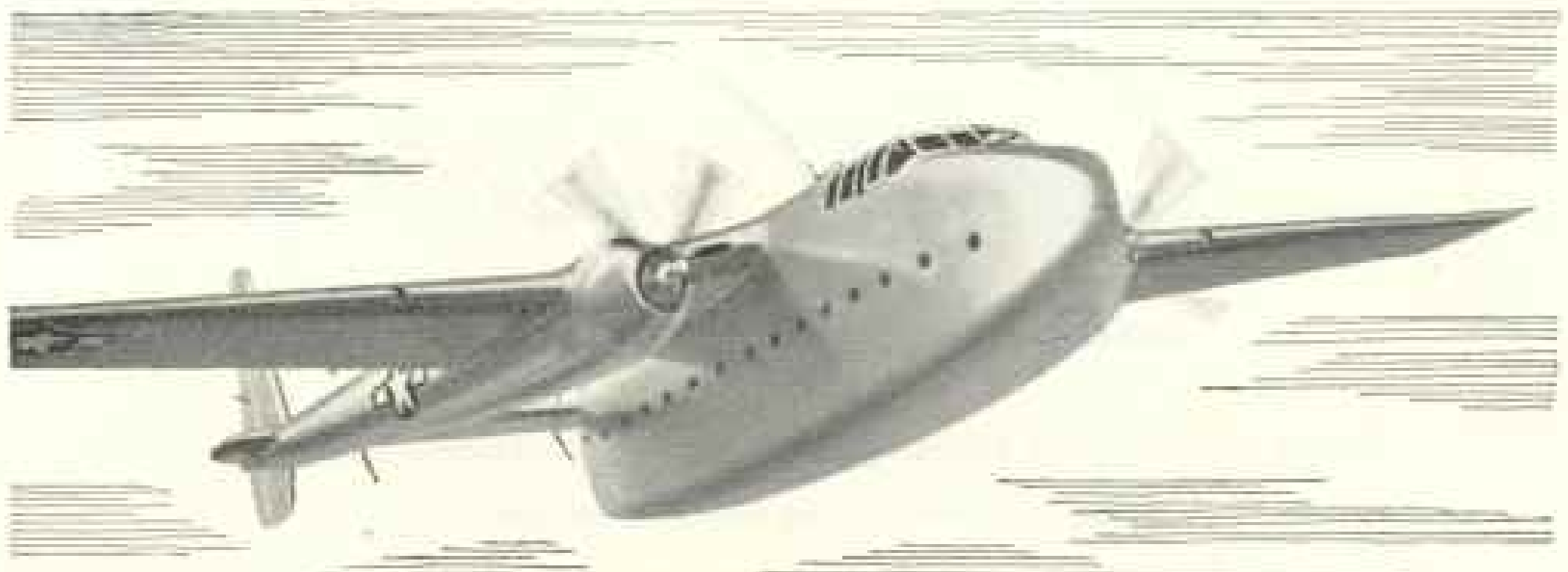
**FAMED AIRLINES WILL FEATURE THEM**

This is the Lockheed Constellation—the largest, fastest, highest-flying transport in use today. Efficient and hard-working as an Army express, its career is just beginning. Already many farseeing airlines including TWA, Eastern Air Lines and National Airlines have contracted for fleets of these majestic craft—are prepared to offer you, when peace comes, the swiftest schedules and most luxurious travel in the history of flight.

**LOOK TO LOCKHEED FOR LEADERSHIP**

*Lockheed Aircraft Corporation, Burbank, California*





FAIRCHILD ANNOUNCES  
*The* **PACKET**  
FOR AIR CARGO



**T**HE PACKET is designed specifically to transport cargo and troops by air . . . to carry boxcar loads at air express speed; to utilize average airports; to fly long and short distances economically.

Built for the Army, the PACKET can deliver 42 fully equipped paratroopers through two rear end jump doors and "paracans" of equipment from a belly bomb bay. Loaded with ease through a door forward and through a huge split door in the stern, cargo goes onto the fuselage

floor that is parallel to the ground at truck floor level. No need for hoisting devices.

Two 2100-horsepower engines power this all-metal, high-wing, twin-tailed "flying boxcar."

Fairchild's "touch of tomorrow in the planes of today," has given the PACKET another invaluable quality. While today it can carry the weapons and machines of war, tomorrow, with but minor modification, it can transport the goods of peacetime commerce.

BUY U. S. WAR BONDS AND STAMPS



**FAIRCHILD**

ENGINE AND AIRPLANE CORPORATION

30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

Rogers Aircraft Engines Division, Farmingdale, L. I. • Fairchild Aircraft Division, Hagerstown, Md. • Durawald Division, New York, N. Y.  
Subsidiary, A-Fie Corporation, New York, N. Y. • Allied: Searos Corporation, New York, N. Y.



# POWER

*TO PACE THE FUTURE*

Here's the drama that comes off a drawing board . . . first of a series of new engines now in service on the East-West route of the Pennsylvania Railroad! Capable of speeds up to 120 miles an hour . . . different in design . . . this long streamlined giant not only marks another forward stride in the science of railroading—it is indicative of the spirit of progress in an industry vital to the welfare of America, now and in the future.

## Pennsylvania Railroad

*moves ahead*



BUY UNITED STATES WAR BONDS AND STAMPS

★ 50,265 entered the Armed Forces ☉ 492 have given their lives for their Country



# Tropical market basket

FOR  
NORTH AMERICAN  
TABLES



*... a prosperous business  
with our good neighbor, Cuba*

Tomatoes from Cuba? . . . eggplant? . . .  
lima beans?

That's a big surprise to most people, yet before the war the export of these popular vegetables, as well as of pineapples, grapefruit, bananas and avocados, was a prosperous and growing business in Cuba.

It could not have existed, of course, without ships equipped to carry perishable foods safely. The Cuba Mail Line, which has served Cuba for over 100 years—Mexico for more than fifty—was a pioneer in providing Cuba with the necessary facilities for this important trade.

Before the war Cuba Mail was operating a fleet of fine modern vessels—carrying thousands of travelers every year, as well as thousands of tons of cargo.

When Victory comes, and Cuba Mail's ships return to their established trade routes, the Line will bend every effort to aid Cuban exporters to resume their normal overseas business as quickly and smoothly as possible.

Docks and warehouses will be ready with trained personnel, prepared to expedite—whether by sea or by air—the movement of both passengers and freight between Cuba and the United States.

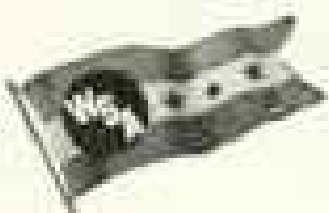
## CUBA MAIL LINE

ATLANTIC GULF and WEST INDIES STEAMSHIP LINES

Foot of Wall Street, New York 5, N. Y.

Cuba Mail Line ★ Porto Rico Line ★ Clyde-Mallery Lines ★ Southern S. S. Co.

*Serving Cuba, Mexico, Puerto Rico, the Dominican Republic, Texas, Florida and the South*





© 1945 The Studebaker Corporation

# *It's a jungle "Weasel" too!*

**S**TUDEBAKER'S amazing new Weasel personnel and cargo carrier is now in action in the Pacific islands—advancing, as it has been doing in Europe, over terrain that seems impossible for any mechanized military vehicle to negotiate.

The Weasel glides forward swiftly and stealthily in mud and swamp as well as on sand and snow—floats like a boat in lakes and rivers, as its powerful Studebaker Champion engine propels it from shore to shore.

This new "Champion" in invasion warfare not only transports men and supplies but also serves to carry wounded back to hospital areas. It's geared to clamber up seemingly impossible grades on its flexible, rubber-padded tracks.

Built by Studebaker, powered by the famous Studebaker Champion engine, the Weasel supplements such other Studebaker war production assignments as Wright Cyclone engines for the Boeing Flying Fortress and heavy-duty military trucks.

Awarded To All  Studebaker Plants

## *Studebaker*

**PIONEER AND PACEMAKER  
IN AUTOMOTIVE PROGRESS**

New building Wright Cyclone engines for the Boeing Flying Fortress—heavy-duty Studebaker military trucks—the Army's versatile personnel and cargo carrier, the Weasel.



**YOUR WAR BONDS HELP KEEP  
THE FLYING FORTRESSES FLYING**

Keep on buying War Bonds and keep the War Bonds you buy. They're the world's best investment. Every \$3 you put up comes back to you worth \$4.



## Seamstresses of steel....

Using the dazzling electric arc for a needle...molten ribbons of metal for thread, women welders in war industries everywhere fashion sturdy steel battle-dress for fighting machines.

Today their traditional feminine dexterity—and their modern steel-sewing implements—are meeting a crucial need of the nation. Tomorrow this war-proven fabrication method will realize important savings in time, cost and materials in the manufacture of countless metal products.

Modern equipment for this improved fabricating process is but one of many products of Air Reduction.

★ BUY UNITED STATES WAR BONDS ★

AIR REDUCTION SALES COMPANY  
 MAGNOLIA AIRCO GAS PRODUCTS CO.  
 NATIONAL CARBIDE CORPORATION  
 PURE CARBONIC, INCORPORATED  
 THE OHIO CHEMICAL & MFG. CO.  
 WILSON WELDER & METALS CO., INC.



# AIR REDUCTION

60 EAST 43rd STREET

NEW YORK 17, N. Y.

OXYGEN, ACETYLENE AND OTHER ATMOSPHERIC GASES • GAS WELDING AND CUTTING APPARATUS • CALCIUM CARBIDE  
 ARC WELDING MACHINES AND SUPPLIES • CARBON DIOXIDE • "DRY ICE" • ANAESTHETIC AND THERAPEUTIC GASES AND APPARATUS



*Finish the Fight — with War Bonds*

## All-star Production

Long before the B-29's bombed Japan, the Boeing Superfortress faced its first great challenge. This was in the battle of production, the problem of establishing one of the greatest manufacturing programs ever attempted.

Producing the Boeing-designed Superfortress in quantity is literally a colossal example of teamwork involving people and plants all over America.

Completed B-29's are turned out by Boeing plants at Wichita, Kans., and Seattle-Renton, Wash., and by the Martin and Bell aircraft companies as well.

Major assemblies are built by Briggs, Cessna, Chrysler's De Soto

Division, General Motors' Fisher Body Division, Goodyear Aircraft, Hudson, Murray and A. O. Smith.

The Superfortresses' huge engines are manufactured by Wright Aeronautical and Chrysler's Dodge Division. Their 16½-foot Hamilton Standard propellers by United Aircraft and Nash Kelvinator.

Thousands of sub-contractors and suppliers build sub-assemblies, parts and equipment.

To Boeing fell the task of coordinating this vast, nation-wide manufacturing organization. Its engineers furnished design and engineering data to the other companies involved, and laid down the tooling plans.

Boeing production specialists blazed new trails in planning, developed new facilities, processes and manufacturing procedures on a scale never before tried. They had to execute the program in terms of other manufacturers, and in Boeing plants at the same time. For Boeing's own eventual schedule is approximately 75% of all Superfortress production.

*After Japan is defeated, this unique experience, and this same Boeing ingenuity in research, design, engineering and manufacture will be turned to peacetime aircraft. And you can know of any product . . . if it's "Built by Boeing" it's bound to be good.*

DESIGNERS OF THE B-29 SUPERFORTRESS • THE FLYING FORTRESS • THE NEW STRATOCRUISER  
THE KAYDET TRAINER • THE STRATOLINER • PAN AMERICAN CLIPPERS

**BOEING**

# FALSE TEETH WEARERS



## Why Risk DOUBLE DANGER by Brushing with MAKESHIFT CLEANERS?

Take care, Grandpa! Sally seems to be annoyed. Could it be your unpleasant breath due to unclean dentures? Avoid offending in this way. Don't brush your plates with ordinary cleansers that scratch plate material. Such scratches help food particles and film to collect faster, cling tighter, causing unpleasant breath.

### PLAY SAFE—SOAK DENTURES IN POLIDENT DAILY

#### It's Easy! It's Quick!

Soak your plate or bridge in Polident fifteen minutes or overnight . . . rinse . . . and it's ready to use. A daily Polident bath gets into tiny crevices brushing never seems to reach—keeps your plate sparkling clean and odor-free.



NO BRUSHING



What's more . . . Your plate material is 60 times softer than natural teeth, and brushing with ordinary tooth pastes, tooth powders or soaps, often wears down the delicate fitting ridges on your plate. With worn-down ridges your plate loosens. But, since there is no need for brushing when using Polident—there's no danger.

**Later**—Now Grandpa doesn't worry about unpleasant breath due to unclean dentures. He's one of the delighted millions who have found Polident the new, easy way to keep dental plates and bridges sparkling clean, odor-free.

If you wear a removable bridge or dental plate . . . *play safe*. Use Polident daily to help maintain the original natural appearance of your denture. Costs less than a penny a day. Get Polident at any drug counter, 30¢ and 60¢ sizes.



**NEW!**

Another  
Polident Product

**DENTU-GRIP**

Pleasant Powder to  
Hold Plates Tight

Use **POLIDENT** Daily TO KEEP PLATES AND BRIDGES  
CLEAN... AND ODOR-FREE!





Meet the New York Central test engineers  
who help create tomorrow's  
finer engines

*They put Locomotives  
in a Test-Tube*



Mile after tense mile, New York Central test engineers cling to the speeding locomotive, or watch each flicker of the instruments back in the Dynamometer Car.

They feel the pulse of the mighty cylinders. They sample the smoke-box gases. They weigh every pound of coal for the firebox and every ton of pull on the drawbar. And steadily, the data they gather is recorded on the Dynamometer Car's moving chart. For this little car with the big name is their "laboratory on wheels" . . . where they figuratively put 250 tons of locomotive in a test-tube to study its performance.

Today, their work helps New York Central operate more efficiently as a vital link in the wartime supply line. And tomorrow . . . when critical materials are again available . . . their records will point the way to still finer locomotives for the future.

**He Puts "Dino" in Dyn-a-mometer**

Testing a locomotive often takes weeks. So the staff lives aboard the Dynamometer Car. A New York Central dining car chef goes along to serve hearty meals.



**"Scientists in Overalls"**

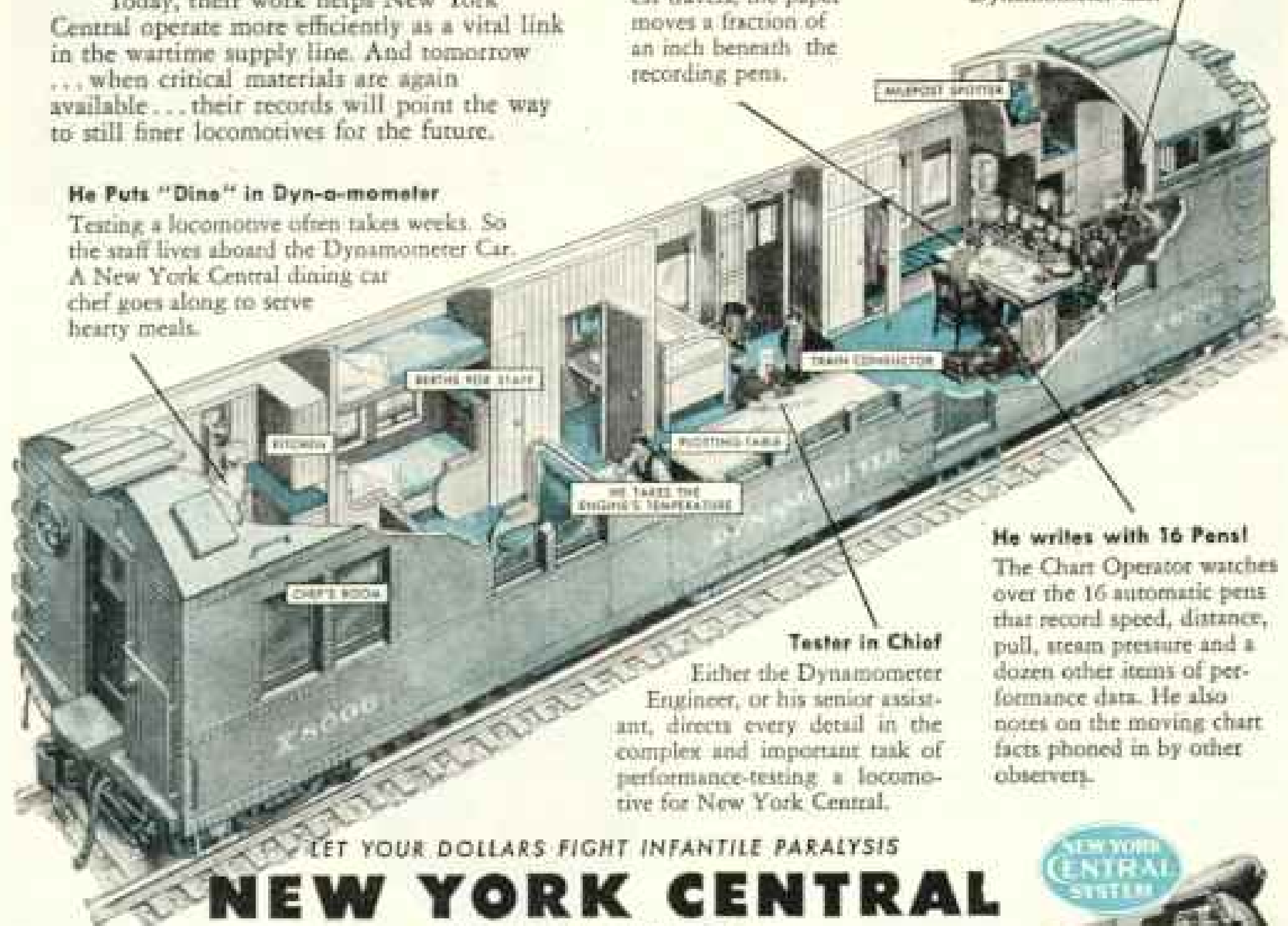
Dressed in overalls and protected by temporary windbreakers, these New York Central engineers check engine performance and flash their findings back to the Dynamometer Car.

**Chart Keeps Pace with Train**

Gears link the wheels of the Dynamometer Car to these paper rolls. For each yard the car travels, the paper moves a fraction of an inch beneath the recording pens.

**Tons on a Pen Point!**

These oil cylinders can reduce a locomotive's 500,000-lb. pull to a tiny force that moves a pen in New York Central's Dynamometer Car.



**He writes with 16 Pens!**

The Chart Operator watches over the 16 automatic pens that record speed, distance, pull, steam pressure and a dozen other items of performance data. He also notes on the moving chart facts phoned in by other observers.

**Tester in Chief**

Either the Dynamometer Engineer, or his senior assistant, directs every detail in the complex and important task of performance-testing a locomotive for New York Central.

LET YOUR DOLLARS FIGHT INFANTILE PARALYSIS  
**NEW YORK CENTRAL**  
THE WATER LEVEL ROUTE





Dear Sir:  
 Since August 1943 I've been on several islands in this area and recently took part in an invasion in New Guinea. Watching AC's guns in action is a thrill I wouldn't have missed for anything. Almost all of the .50's I've seen were made at AC and there are plenty of them around. The gun is ace high with every one in the Army and is generally thought of as the best all-around gun the Allies have.  
 A fellow AC worker is in a neighboring outfit here. We enjoy getting together with your letters and the papers you send and talking them over.  
 A FIGHTING AC EMPLOYEE

**HOW WERE WORKING FOR HIM**

Original letter in longhand



Letters from the front, like this one written in New Guinea, turn war news into flesh-and-blood reality for the men and women of the AC factories. Such letters make them realize, vividly, what wide and effective use is being made of the flood of war products they have been turning out since nine months before Pearl Harbor. Such letters build morale. And high employe morale has been an important factor in the remarkable wartime record AC Spark Plug has achieved . . . "beating the promise" on many deliveries . . . cutting the costs on many contracts . . . contributing to improved quality or manufacturing efficiency in many of the 450 kinds of war products AC has produced.

This splendid co-operation with our fighters has meant more than 225,000 .50 caliber Browning machine guns, more than 16,000 bombsights,

more than 5,000 Sperry automatic pilots for bombers. It has produced millions of ceramic aircraft spark plugs, fuel pumps, oil filters, automotive spark plugs, engine intake silencers, air cleaners, and driving instruments for the Army, Navy, Coast Guard, and Marine Corps.

Today, as Victory draws nearer, AC employes are determined that there shall be no let-up in their efforts until the men and women in America's fighting forces have come back home—victorious.

Every Sunday Afternoon — GENERAL MOTORS SYMPHONY OF THE AIR — NBC Network



**Back YOUR Fighting Man!  
 BUY AN EXTRA WAR  
 BOND THIS MONTH**



*"Keep your eye on the Infantry . . . the doughboy does it!"*

## **"Milk! Real milk from a cow!"**

The excited soldier had just landed in the U. S. A. after a year in the lonely Aleutians. But he might have come from any other front.

At Mitchel Field, N. Y., where thousands of wounded have been flown in, officers report, "The first request is almost invariably for a glass of fresh milk."

In the South Pacific, a Marine combat correspondent asked men what they missed most next to their families and got answers like these: "Fresh milk and the morning paper." "A lettuce-and-tomato sandwich, with cold fresh milk to wash it down."

This GI appetite for milk has been officially encouraged from the start of training for the sake of good nutrition. Service menus provide generous portions of all dairy products—and help make service men huskier and healthier than ever before in history.

Fresh fluid milk, of course, is tough to ship to foreign combat areas. But in other more convenient forms, milk, ice cream, butter and cheese go *everywhere*.

So nature's most nearly perfect food—milk—is making American fighters more fit today and assuring better health to future generations. And nourishing new foods are ready in our laboratories for the peaceful years ahead.

*Dedicated to the wider use and better understanding of dairy products as human food . . . as a base for the development of new products and materials . . . as a source of health and enduring progress on the farms and in the towns and cities of America.*



**NATIONAL DAIRY  
PRODUCTS CORPORATION**

AND AFFILIATED COMPANIES

# Jewels of Today



ARGUS, INCORPORATED . . . ANN ARBOR, MICHIGAN

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Cameras and Optical Instruments

ANN ARBOR MICHIGAN

**"The Supreme Authority"**

IS WORTH WAITING FOR

Be Sure  
You Get the  
**MERRIAM-Webster**

**WEBSTER'S  
NEW INTERNATIONAL  
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UNABRIDGED

**D**EMAND is heavy and paper rationed but better to wait for your copy of the MERRIAM-Webster than accept a substitute. Ask for the genuine Webster—the MERRIAM-Webster—identified by the circular trade-mark. Contains 3,350 pages, illustrations for 12,000 terms, and a total of 600,000 entries—122,000 more than any other dictionary. Order now from your bookseller or stationer. He will get your copy as soon as he can.

G. & C. MERRIAM CO., SPRINGFIELD 2, MASS.

## SHEPARD HomeLIFT

THE AUTOMATIC ELECTRIC RESIDENCE ELEVATOR

*Operates from Light Circuit*

Safe—dependable. Moderate price—inexpensive to operate. Easily installed in new or old homes. Operates from light circuit.

The Home-LIFT is designed by experts who have been building commercial passenger elevators for years. Send for descriptive literature.

Representatives in Principal Cities

**THE SHEPARD ELEVATOR CO.**

*Builders of Finest Office and Hotel Elevators*

2452 COLERAIN AVENUE

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*Americana*

**GUILD PLAYING CARDS**

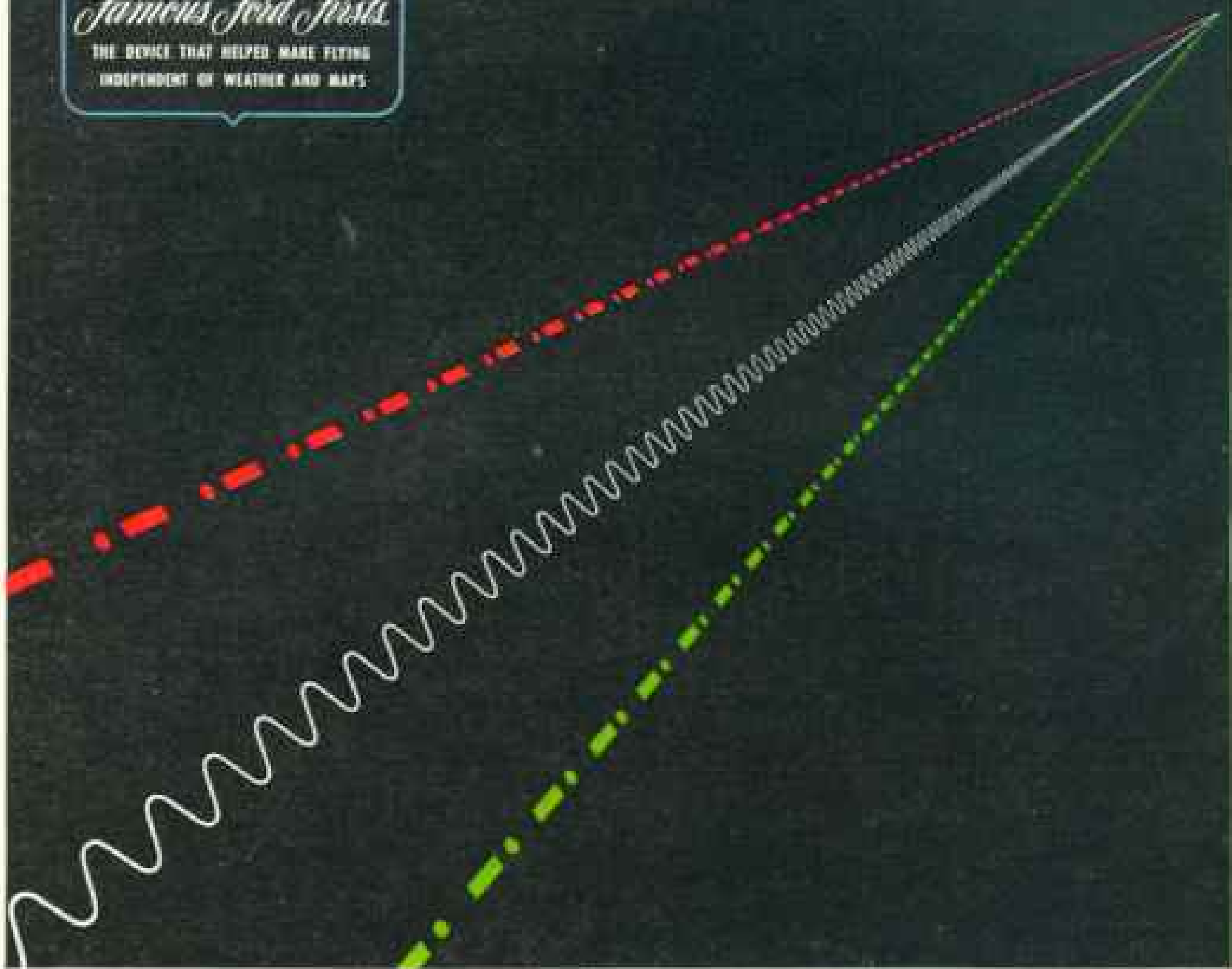
*Authentic in Style and Design*

WESTERN PLAYING CARD CO. • RACINE, WISCONSIN

"Buy U. S. War Bonds—They Identify You"

*Famous Ford Firsts*

THE DEVICE THAT HELPED MAKE FLYING  
INDEPENDENT OF WEATHER AND MAPS



**1<sup>st</sup>**

with a radio beam  
for planes!

Eighteen years ago the first radio range system was set up by Ford. And a Ford plane made a daring round-trip flight through a snowstorm from Dearborn to Dayton, guided solely by radio.

The original Ford radio beacon was essentially that in use today. Two sending loops were set at an acute angle, transmitting signals alternately. From one was beamed the letter "A" . . . dot-dash. From the other, the letter "N" . . . dash-dot. These signals interlocked to give the pilot's "on course" hum.

Basic patents have been issued

to Ford on this greatest navigation aid. But in the interest of safer air travel, Ford has made these patents available to the air transport industry without charge.

The radio beacon is just one of many important "firsts" resulting from the Ford desire to benefit the greatest number of people in the most effective way.

Naturally, Ford-built cars and trucks have profited fully by this seeking for new and better things. And with the pioneering spirit more alive than ever at Ford today, you can continue to "expect the *firsts* from Ford."



**EXPECT THE "FIRSTS" FROM FORD!**

---



**Dedicated . . .  
to the  
unfinished work**

**W**HEN peace returns we, the living, must take renewed inspiration from him who wanted the nation and the world to be free; who saw that only through education and training could government of the people, by the people and for the people survive on earth . . . Lincoln, who learned by firelight with a board for a slate, a coal for a pencil, had the vision . . . Will we, with the great tools of education and training now at hand, fail to use them?

In rebuilding a new world 16mm films and Victor Sound Motion Picture Equipment can and will take a great part — speeding and advancing training and teaching, presenting to a receptive world the methods, achievements and meaning of Democracy.

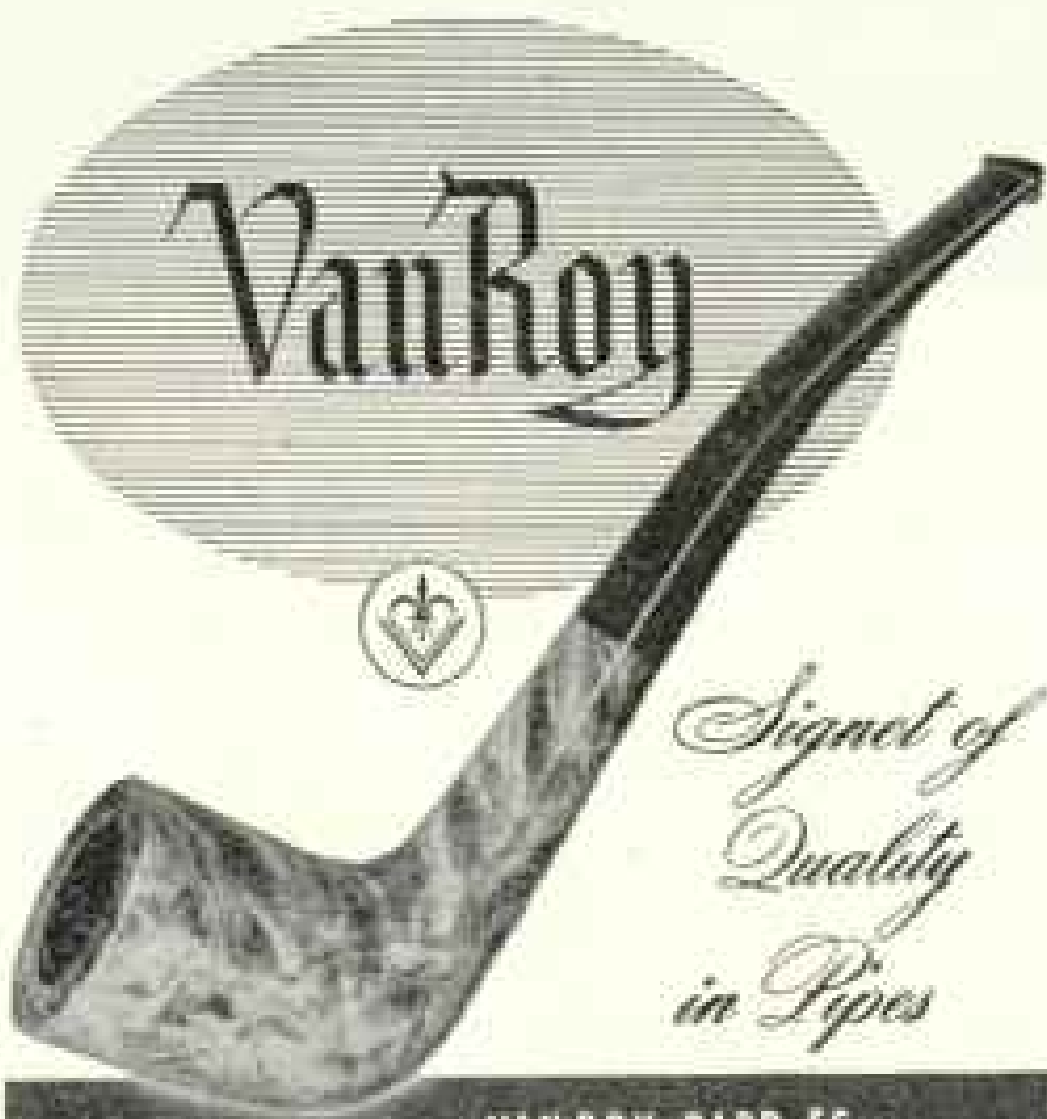
**Victor Animatograph Corporation**

Home Office and Factory: Davenport, Iowa

New York (18) — McGraw Hill Bldg., 330 W. 42d St. • Chicago (1) 188 W. Randolph



For Freedom . . .  
An Extra Bond



*Signet of  
Quality  
in Pipes*

**VAN ROY BARD \$5**

Give yourself . . . or some one you esteem . . . the proud satisfaction of owning a Van Roy — the pipe that proclaims the exacting smoker.

Van Roy Pipe Family: ARISTA • BARD  
COURIER • DUMONT



VAN ROY COMPANY, INC., EMPIRE STATE BLDG., NEW YORK 1

**MODERN BOOKCASES  
for the MODEST BUDGET**

*Lundstrom*

**SECTIONAL BOOKCASES**

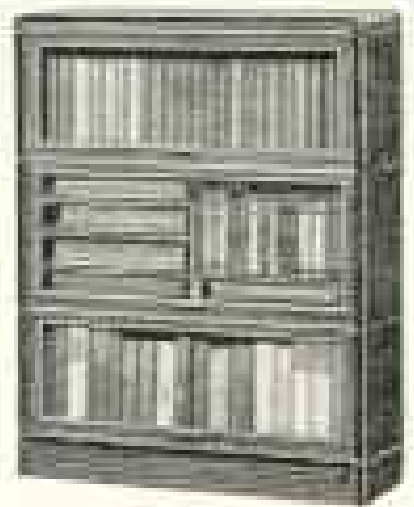
On Approval  
DIRECT FROM FACTORY  
AT FACTORY PRICES

Save up to 40% of Cost

SECTIONAL—Fits any space, Recceding doors for protection and convenience. Made in many Designs, Woods and Finishes. Endorsed by over 25,000 users. Send for Catalog No. N-31.

G. J. LUNDSTROM MFG. CO.  
Little Falls, N. Y.

Makers of Sectional Bookcases for the Better Homes and Offices since 1899.



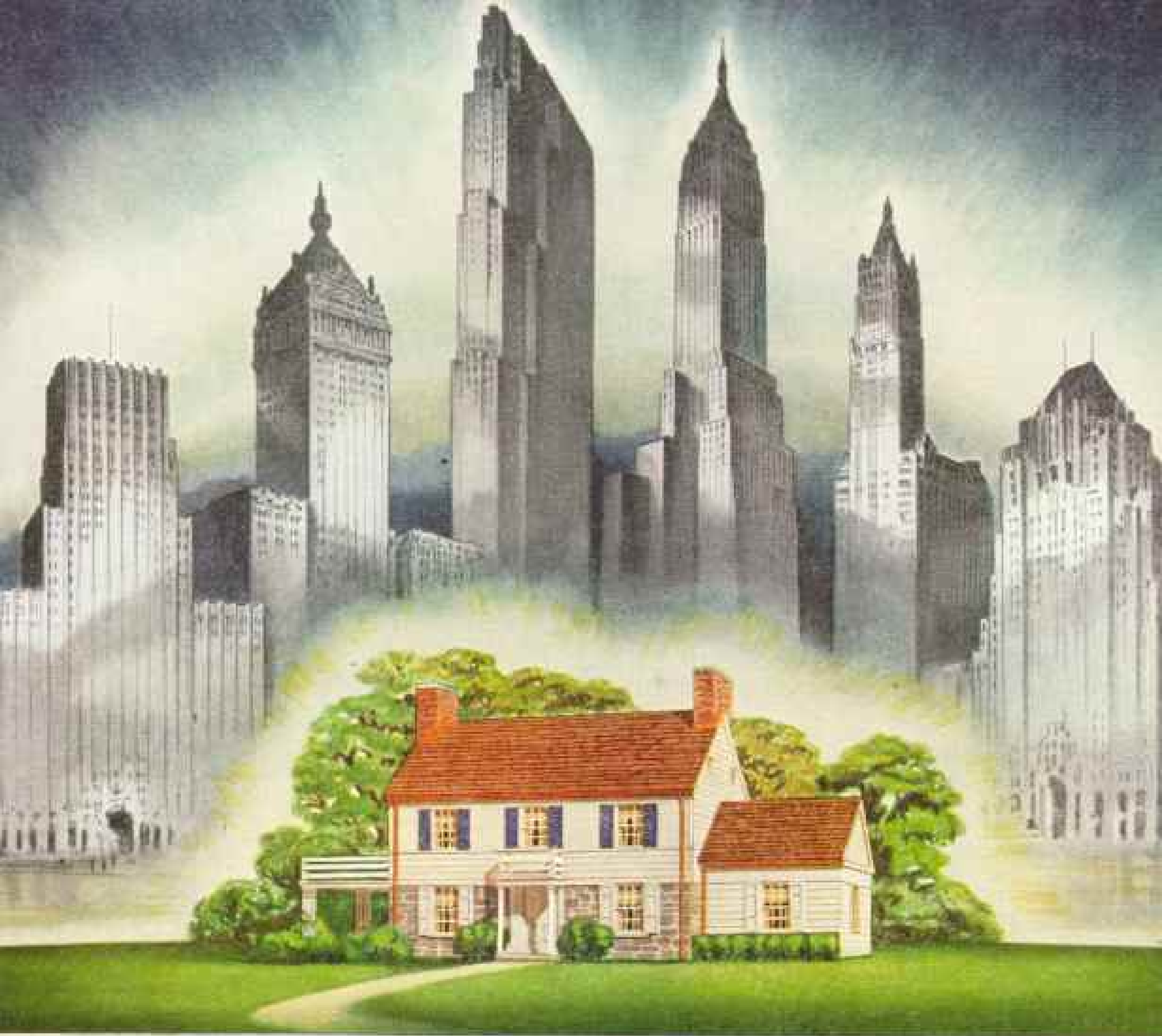
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**finch facsimile**

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Finch Telecommunications, Inc., Passaic, N. J.



## *Copper saves millions in Building upkeep*

COPPER is traditional in the building that is erected to endure... whether it be a skyscraper, a public building or a modest home.

Copper roofs protect the United States Capitol and the Capitols of 21 states! And everyone is familiar with architectural bronze, the metal that distinguishes the store fronts and entrances of eight out of ten buildings along New York's famed Fifth Avenue from 42nd to 57th Street.

Less obvious, but even more important to such buildings, is the long-lasting protection copper and its alloys provide, both inside and out, wherever metals are exposed to rust or corrosion.

In small homes, too, the use of copper and brass is equally important. No other metal offers the homeowner so much as copper in assuring protection, convenience, comfort and low upkeep. Roofs, flashings, gutters, downspouts and insect screens

that can never rust. Water lines of brass pipe...or copper tubes that cost, installed, little if any more than rustable pipe. Water heaters with tanks of non-rust Everdur\* Metal. Solid brass and bronze hardware for beauty and endurance.

You may *spend* a little more for copper and copper alloys, but you *get* more... much more in lasting satisfaction and protection. \*Reg. U. S. Pat. Off.

The skyline illustration above shows six of the many outstanding buildings rustproofed with Anaconda Metals. From left to right: The Russ Building, New York Central Building, RCA Building, Bank of Manhattan, Woolworth Tower and Fisher Building. Many millions of pounds of Copper, Brass and Bronze perform more than 50 distinct functions in these structures. 4412-11

### **THE AMERICAN BRASS COMPANY**

*Subsidiary of Anaconda Copper Mining Company*

General Offices: Waterbury 88, Connecticut

*In Canada: ANACONDA AMERICAN BRASS LTD., New Toronto, Ont.*

BUY WAR BONDS  
...buy more to shorten the war



# Anaconda Copper & Brass



*New Chris-Craft 36-ft. Double Stateroom Enclosed Cruiser*

And even this picture does not tell the story. For there are 2 complete staterooms forward . . . built-in dinette . . . complete ship's galley . . . you can sleep 6 in solid comfort and cruise where you choose at speeds up to 23 m.p.h. Ready after Victory. See your Chris-Craft Dealer for details. . . . We are 100% on war work now.

**Buy U.S. War Bonds Today—**

*Tomorrow command your own*

*Chris-Craft*

CHRIS-CRAFT CORP., ALGONAC, MICH. ★ WORLD'S LARGEST BUILDERS OF MOTOR BOATS





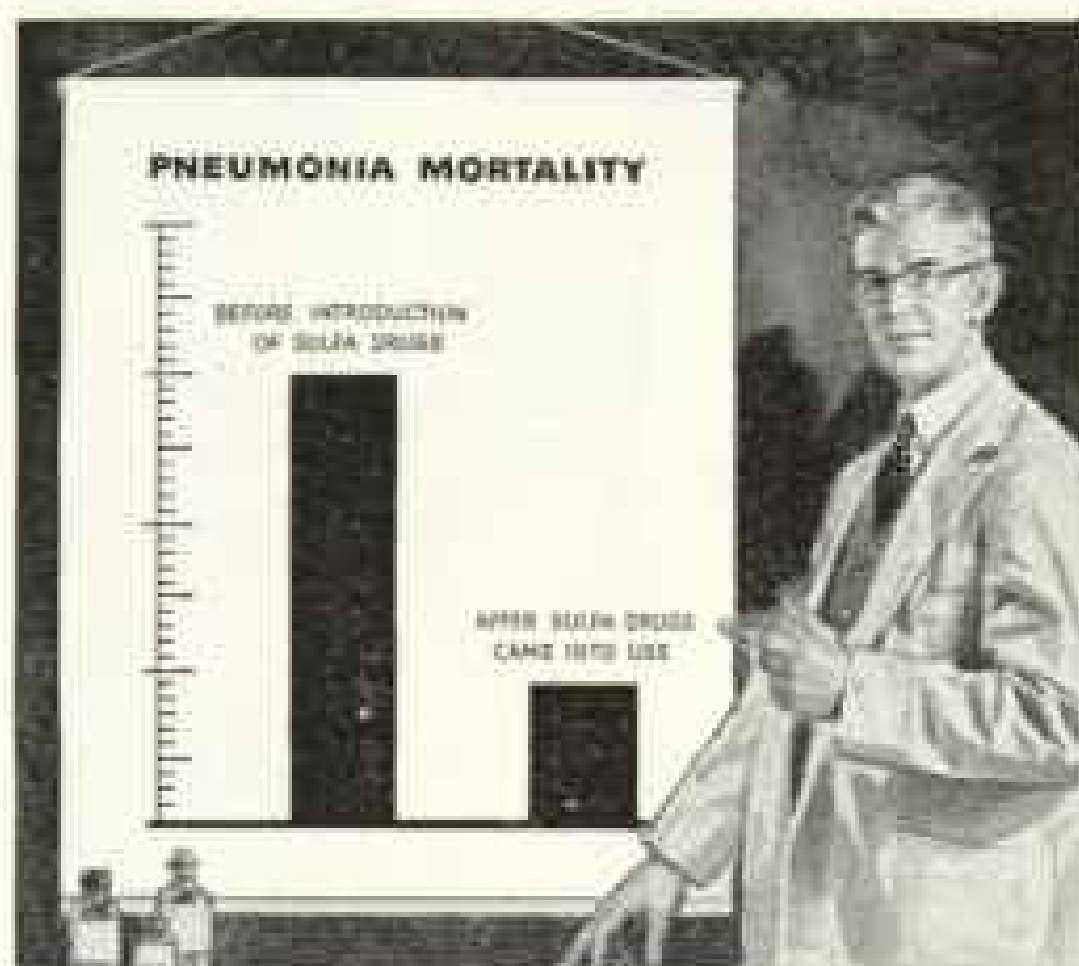
# What's this new word *"Chem' o' ther' a py?"*



Medical science is full of strange and unusual words.

One of the most exciting is "chemotherapy." As it may mean a lot to you—you might like to know more about it.

**1.** Many of our badly wounded soldiers, sailors, and marines owe their lives to new drugs... sulfa and penicillin... which have had spectacular success against perils like gangrene, terrible burns, and blood poisoning. Chemotherapy—which takes advantage of the effects of chemical action upon body tissues and invading bacteria—is ages old in theory. But its modern, most effective practice began soon after 1900 with the discovery of salvarsan.



**2.** For the 20 years after that, research brought no striking discoveries. Then a strange chain of events revealed that a patented dye possessed a life-saving element. And so, the sulfonamide drugs were made available to the world. In the less than ten years they have been in common use, they have saved countless lives. Some forms of meningitis, streptococcal infections, and other dread diseases including the common forms of pneumonia, have met a powerful adversary.

**3.** The next discovery, penicillin, although not strictly a chemical, attacks some of the same germs as the sulfa drugs—and others against which these drugs have little or no success. But the search for other "specific" chemicals is far from over. Medical scientists constantly seek to improve existing ones and find new germ-fighting elements. There must be long and careful experiments for each discovery, for sometimes the "germ-poison" is poisonous to the human body.

COPYRIGHT 1945—METROPOLITAN LIFE INSURANCE COMPANY

## Metropolitan Life Insurance Company

(A MUTUAL COMPANY)

*Frederick H. Ecker*      *Leroy A. Lincoln*  
CHAIRMAN OF THE BOARD      PRESIDENT  
1 MADISON AVENUE, NEW YORK 10, N. Y.



**4.** But chemotherapy is no cure-all. Because it does so much to reduce the deadliness of some of our worst diseases, some people may expect it to perform miracles. It must always be remembered that these chemicals should not be used without sound medical advice, otherwise there may be detrimental results. But chemotherapy, rightly used, is a tremendous gift of medical science to our civilization.

*Just alike? . . .  
not when you know them*



## ...tires all alike today? There is more difference in mileage than before

**T**RUE, all tires are made from synthetic rubber today . . . but that doesn't mean they're any more the same than when they were made from crude rubber.

Actually, *long mileage* from synthetic tires demands *even more* careful control of quality, every step of the way . . . by *specialists* in quality.

Recognized leader for 30 years in getting *more miles out of rubber*, General Tire today makes synthetic rubber by its own extra-mileage process hailed as the greatest advance since America's synthetic program was launched.

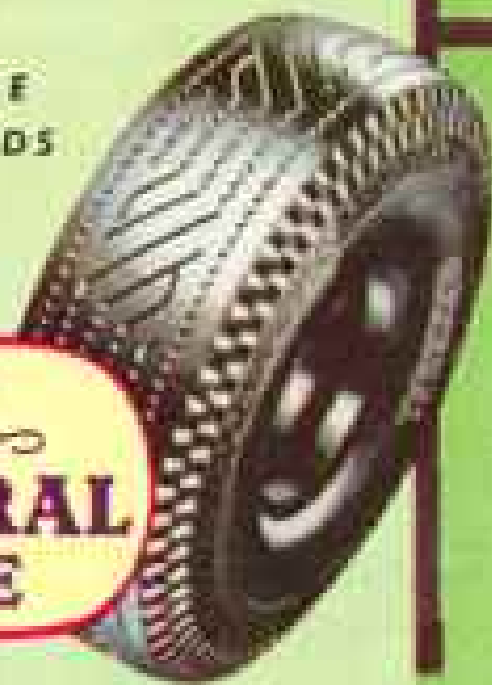
General makes its own cooler-

running, extra strong cords—in its own mills, as always.

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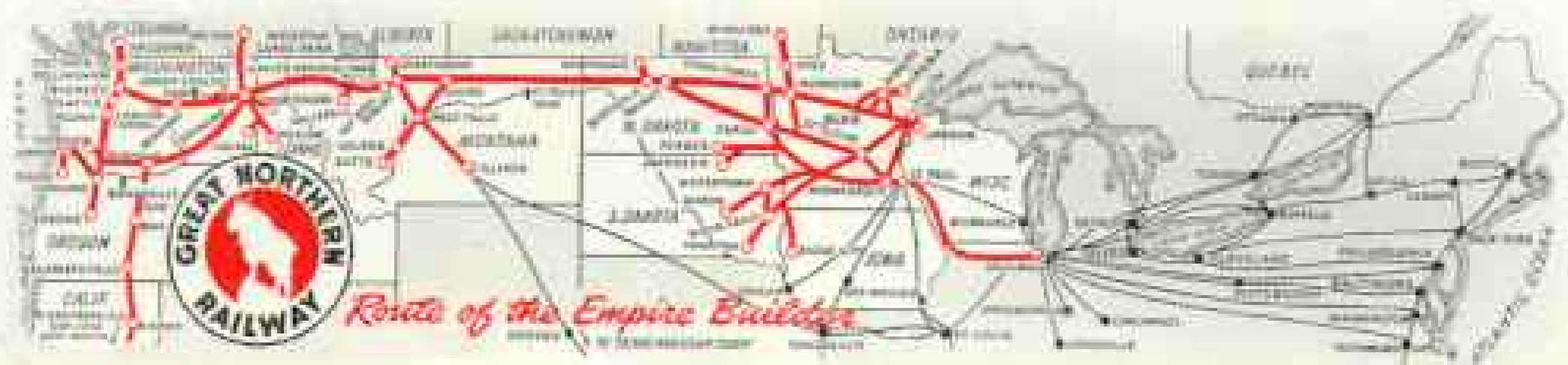
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### Continual Improvements of Line, Equipment and Operations Mark Railway's Progressiveness

On January 6, 1893, Great Northern became a transcontinental railway when a line extending eastward from Puget Sound was joined in the Cascade mountains with track pushed westward from the Great Lakes.

The construction crews posed that wintry day for the traditional "last spike" picture. But, actually the job of building and improving Great Northern never has stopped—in good times and bad!

Great Northern constantly has been improving its roadbed and structures by reducing grades and curves, laying heavier rail, building stronger bridges, boring time-saving tunnels, including the 8-mile Cascade Tunnel, longest in the Western Hemisphere.

Typical of the railway's forward-looking policy is the major track relocation project now under way on Great Northern's main line through the Flathead River canyon, bordering Glacier National Park in the Montana Rockies. Here three tunnels are being blasted through solid rock to eliminate several sharp curves.

A real "last spike" has not been driven on Great Northern—and never will be!



New, heavier rails and tie plates are spiked to chemically treated ties. Maintenance crews give daily attention to roadbed.



West portal of one of three new tunnels through solid rock on G.N. main line in the Montana Rockies to expedite train movements.



Steel rails are lifted by crane from G.N. flatcars and placed in position.



"Last spike" picture, taken January 6, 1893, when crews spiked rails together, joining G.N. tracks from the Great Lakes with those from Puget Sound.

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We never dreamed that a bridge—no matter how beautiful or how daring in conception—could ever mean so much. It took the veterans to see it.

Only these men can tell you what it means to them to sight this bridge, to sail under it and see the vast and fabulous harbor open before them, and there, beside the Golden Gate, resplendent in the sun, or studded with a million lights by night, high-piled San Francisco waiting—to welcome them home!

Most service men and women out in the Pacific think of San Francisco as their second home. They embarked from here for the great adventure. They dream of the day when they will come back again, under the great red bridge...to San Francisco.

Many of them each day are coming back now, to mingle in the crowds of service men and women here from all over America. They ride the little cable cars up Nob Hill, to a famous sky room from where they see San Francisco and the Bay and the hills...

They saunter along cosmopolitan Market Street... see the sights around Fishermen's Wharf... shop in the bazaars of Chinatown... explore the Latin Quarter... walk or ride horseback through Golden Gate Park

...bask in the sun at the Ocean Beach... eat famous foods prepared by chefs from every nation... drop in at the Stage Door Canteen... worship in the churches.

Today, service people are the only "tourists" for whom the San Francisco Bay area can provide accommodations. Together with war workers, they are taxing to capacity all facilities. This is a main port of embarkation, and the world's greatest naval base. It is also producing nearly one third of all American ships being built during the war. Naturally, the whole area is crowded. This is why we must ask all non-essential visitors not to come here until after Japan surrenders.

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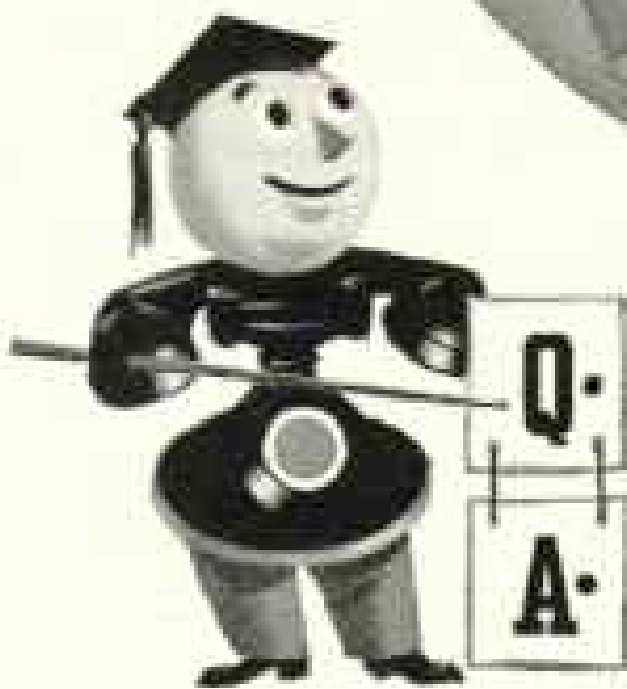
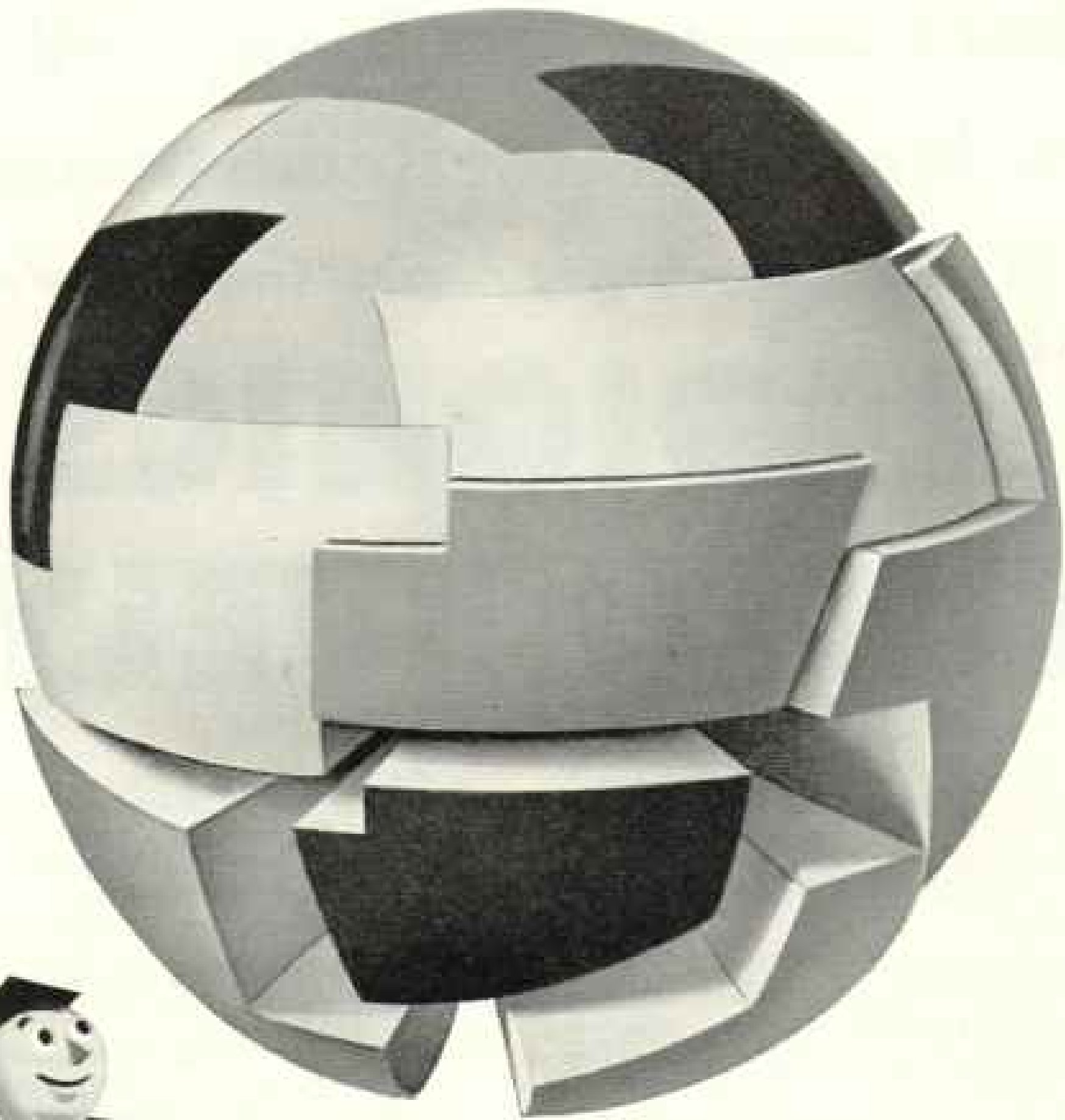
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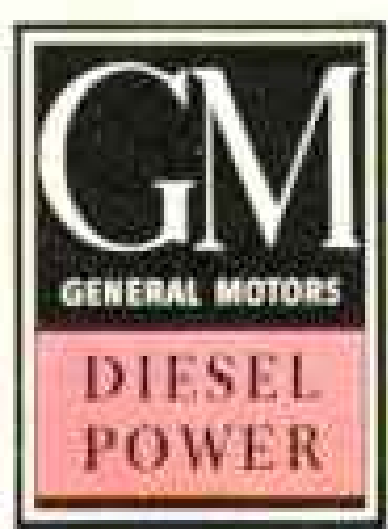
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