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Formosa—Hot Spot of the East

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20 Natural Color Photographs J. BAYLOR ROBERTS

So Much Happens Along the Ohio River

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Strange Courtship of Birds of Paradise

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Formosa—Hot Spot of the East

BY FREDERICK G. VOSBURGH

Illustrations by National Geographic Photographer J. Baylor Roberts

THE POSTAGE will be \$86,000," said the Chinese girl clerk at the post office in Taipei, capital of Formosa, as she handed me stamps for sending an air-mail letter.

"I don't want to air-mail this letter to the moon," I started to explain. "Just to England."

Then I realized calculations were in order. These postage stamps cost 86,000 *old* Formosan dollars. Last spring the inflated currency had been stabilized at 40,000 old dollars to one new Formosan dollar, or *yuan*. Many old bills were still in circulation—worth little more than the paper they were printed on.

Let's see . . . 40,000 into \$86,000 gives \$2.15 in new Formosan currency. At the official rate of exchange the new Formosan dollar was worth 20 cents in United States money. So the stamps really cost 43 cents.

I paid and was motioned toward a public paste pot.

"I see why they don't put stickum on the stamps here," said my colleague, Joe Roberts. "Too hot and humid. They'd all stick together."

Island Eden Bristles with Troops

Five and a half hours out of Tokyo, 1,275 miles away, our big four-engined Douglas plane of China National Aviation Corporation had roared over the north coastline of Iha Formosa, "Beautiful Island," as early Portuguese explorers called it. Chinese and Japanese call it Taiwan, translated literally "Bay of Terraces."

From the air Formosa had looked as peaceful as paradise. Opalescent waters edged her

shores and broke on her beaches in ivory foam. Water-covered rice fields flashed their facets in the sun. Silvery rivers coiled to the sea, and southward to the limit of vision stretched high mountains wrapped in green, their haughty heads cloud-covered.

This illusion of peace had vanished as soon as we landed at Taipei. At a military field alongside lay camouflage-painted American-built planes of the Chinese (Nationalist) Air Force. And almost immediately we had made the acquaintance of Chinese police, bent on keeping Communist spies from this uneasy island.

From the embattled mainland, only 85 miles away, had come a million refugees, including Generalissimo Chiang Kai-shek and many high officials. In addition, the island bristled with thousands of tan-clad Nationalist soldiers (pages 140, 151, 173).

Rivals Australia in Population

An official civilian population figure of 7,026,883, based on a checkup made in April, 1949, was already far out of date in August as more mainlanders kept pouring in.

Troops, their exact number a military secret, raised the total almost to the population level of the continent-country of Australia, more than 200 times Formosa's size. The island reminded me of a heavily loaded lifeboat.

After half a century of Japanese rule, from 1895 to 1945, Formosa had been returned to the Chinese pending a peace treaty with Japan. All the Japanese—some 478,000—had been deported.

The Nationalist Chinese, taking over in accordance with the wartime Cairo agreement



Margaret Bellus from Acme

Chinese Nationalists Moved Thousands of Troops and Their Capital to Formosa

During training maneuvers at Fengshan, Gen. Ho Ying-chin (left), China's former Minister of National Defense, confers with Lt. Gen. Sun Li-jen, in charge of Formosa's defense. American-educated General Sun played a prominent part in the Burma campaign against the Japanese in World War II.

between Allied Chiefs of State, were greeted at first as liberators and brothers by the 6,000,000 Taiwanese, descendants of emigrants from southern China generations before.

This fraternal feeling faded quickly, and dissatisfaction over mainland rule flared into the Formosan revolt of February and March, 1947, in which thousands were killed.

From the Japanese the Government had inherited the problem of Formosa's aborigines, some of whom were hunting heads till shortly before the war. These former head-hunters live chiefly in the mountains of the interior. The Government now estimates their number at 131,261.

At the Taiwan Tourist Company an employee pointed to the interior on a map and said to us with a grimace, "The barbarians live in this part."

When we sought permission to visit the aborigines, the chief of the foreign section of the police looked grave.

"We shall have to send a policeman with you," he said through an interpreter. "For your protection, of course."

Meanwhile, the police required a detailed itinerary, both for the trip into the interior and for our proposed circuit of the island.

Though Nationalist China was fighting for its life against the Communists on the main-



Beyond the Tanshui River, Chikoutai's Rice Fields Gleam Like Panes of Glass

This lonely village in northern Formosa is inhabited by aborigines of the Taiyal tribe. It seems largely paddies when seen from this trail winding down the steep valley side from Chinopanshan to the footbridge faintly visible at lower right. But along the edges of the fields rising in tiers from the river are 80 houses, largely made of bamboo, which shelter some 400 Taiyals (pages 146, 153, 160, and 176).

land, Government offices here were closing at 1 p. m. because of the August heat. While our request went slowly from desk to desk for approval by various officials, we had plenty of time to look around Taipei.*

Taipei Travels Largely by Muscle

Most of the swollen city's 439,793 people seemed to be riding bicycles, rickshas, or bicycle buggies called pedicabs. Jeeps and sleek American cars carried a minority. Wealthy Chinese, chiefly Government officials, had brought Cadillacs, Mercuries, Buicks, Chryslers from Shanghai and other mainland ports.

Chic nylon-stockinged Chinese girls with permanent waves and high-necked, tight-fitting, slit-skirt dresses rode bicycles or pedicabs to work in paper-piled Government offices. The city has a few buses but no streetcars.

Except for pedicabs, which often darted about with little regard for the rules, traffic moved on the right-hand side. Chiang Kai-shek in Formosa, unlike General MacArthur

* See, in the NATIONAL GEOGRAPHIC MAGAZINE: "I Lived on Formosa," by Joseph W. Ballantine, January, 1945; and "Formosa the Beautiful," by Alice Ballantine Kirjassoff, March, 1920.



Rice Fields Flash Myriad Mirrors in This Valley of Two Rivers near Taipei

Across the background flows the Tanshui, and closer at hand is the Chitung River, which runs beside the larger stream for miles before joining it—like the Yazoo and the Mississippi. Mist veils the distant capital.



As the Rice Grows, the Paddled Panorama Will Turn Bright, Living Green

In August, when the season's second crop is young, the scene seems more water than land when viewed from the mountains north and east of Taipei. On their terraced flanks grow oranges, tea, peanuts, sweet potatoes, squash.



Thomas P. Thompson and Irvin E. Alliman

Shaped Like a Fish Ready for the Pan, Formosa Has a Backbone of Rugged Mountains

Facing Asia are fertile plains, but on the east coast the mighty spinal range comes down to the sea. There a one-lane highway clings to the cliffs. After four mainland capitals had fallen to Communists in a year, Chinese Nationalists made Taipei their capital in December, 1949. About 240 miles long and a maximum of 85 miles wide, Formosa contains fewer square miles than Connecticut and New Hampshire, but three times their combined population.

in Japan, had decreed a postwar change-over from the Japanese left-hand rule of the road.

As we rolled through the business section in a pedicab, a Taiwanese newsboy stopped us. Briefly and furtively he revealed an English-language newspaper printed in Hong Kong. This he wanted to sell—for four dollars, Taiwan (80 cents, U. S.). We declined the doubtful bargain.

Later we learned this was bootlegged news. Mainland English-language papers had been temporarily banned.

Across a wide plaza from our hotel stood

the huge red-brick Japanese-built Government Building, accurately bombed during the war but repaired. Now Chinese troops were quartered there, and it bore a new name translated for me as "Long live Chiang Kai-shek Hall" (page 150).

Daily Dozen at Dawn

From this direction, soon after dawn every day, came staccato barks in Chinese. The Generalissimo's troops were taking calisthenics.

The hotel, tucked in a corner of a park full of flowers and waving palms, provided excellent Western-style meals often topped with sweet Formosan pineapple, watermelon, or bananas. When I asked the waiter the name of the blooms that decorated the dinner table, he replied, "We call 'Smells-good-at-night flower.'" To me it smelled good any time.

Beds were equipped with mosquito nettings, and all night hordes of hungry hunters whined just outside in peevish frustration. In the morning when I reached for my clothes a small cloud of them flew out of the closet.

Water was a problem. More often than not, when we turned the tap, none emerged. City water pressure, the management explained, was now insufficient to reach the second floor. The hotel had a pump, but it was often out of order. We became adept at bathing from buckets—in a country whose rushing rivers have vast power potentialities.

Shortly after noon skies usually clouded and produced at least a squall.

"At this time of year," observed an American friend, "you're wet with sweat in the morning and wet with rain in the afternoon."

For keeping off both sun and rain, the arched streets of Taipei's business section are ideal. Stores contained quantities of American goods, from gum and soap to clothes and cameras, at considerably higher prices than at home.

Stores and Hawkers Sell U. S. Goods

"That's \$8,000,000," Joe was told when he priced an exposure meter. This figured out to \$200 Taiwan, or \$40 in U. S. money.

United States Army uniforms were being sold. A khaki shirt cost the equivalent of \$6, U. S.

On a side street we saw coolie-drawn coal carts equipped with old jeep tires. One cart even wore aircraft tires.

A street-corner salesman selling pineapples, peanuts, and cigarettes said Camels were 58 new yuan a carton. That would make them \$5.80, Taiwan, a pack, or about a nickel, U. S., for one cigarette, even at the black-market rate of exchange (6 to 1 instead of 5 to 1). Formosan cigarettes were cheaper. The island grows some tobacco, a Government monopoly.

Few Americans live in Formosa—209 at latest count. Occidentals here consist largely of consular officials, executives of the U. S. Information Service and Economic Cooperation Administration, a few businessmen and transient reporters, and devoted, hard-working missionaries, both Catholic and Protestant.

Returning after the Japanese surrendered, missionaries found the war had opened the hearts of hundreds of aborigines to Christian teachings.

"Aborigines had been drafted into the Japanese Army," explained Mrs. James Dickson, of the Canadian Presbyterian Mission at Tai-



One of Tainan's Loveliest Flowers Admires Another

Suz Zoo holds a grand crinum (*Crinum asiaticum*), a member of the amaryllis family. A Taiwanese (Formosan Chinese), she works in the Western-style hotel in the railroad station building in Tainan, one-time capital of the island (pages 151 and 175). Her camouflage-colored kerchief of parachute cloth is a souvenir of United States Marines stationed in Tainan after the war to aid in deporting Japanese from Formosa.

pei. "Their officers told them not to let themselves be captured because the Americans would torture, kill, and eat them.

"When my husband came back here after the war, he was met by a chief who said his 600 people all wanted to become Christian. His son had been wounded and captured at Bataan. Instead of the merciless treatment he had been told to expect, he found himself well treated, better fed than ever before in his life, and restored to health by an American Army doctor. I wish that doctor could know the results of his care of that boy."

Another Christian worker, George W. Mac-

Kay, son of a Canadian missionary and a Chinese mother, described aboriginal ways.

"My father used to tell of the custom of getting guidance from the birds when traveling in unfamiliar territory," he recalled.

"If the birds flew back toward home, that was a warning to return; if they flew ahead, it was all right to proceed; but if they flew across the trail, the only thing to do was wait."

Movie Film Lines a Formosan Hat

As soon as our police permit was ready, we headed by jeep for the Taiyal country beyond Kakubanzan, or Chiaopanshan as the Chinese call it, in the mountains on the upper Tanshui River southwest of Taipei (map, page 144). The tattoo-faced Taiyals have long been known as the most warlike of the island's seven major tribal groups.

With us went geologist Arnold C. Mason, of the U. S. Army Engineers, whose mapping work took him in the same direction; an interpreter, Loa Heng Siong, from the Taipei Y.M.C.A.; and our little Chinese policeman "protector," who told us to call him Robert.

Formosa's morning sun was scorching, so Joe stopped to buy a "Panama" hat on Taipei's arcaded main street. The hat—price, 80 cents, U. S.—was a "made in Formosa" product, but obviously its sweatband wasn't.

"Why," exclaimed photographer Roberts, "it's 35-millimeter movie film with the emulsion removed. What, no Technicolor?"

Just outside of Taipei, Formosan farmers were raking rice out into the concrete road. Mason, at the wheel, started to avoid it, then realized the grain was put here to be threshed by the wheels of traffic (page 148).

It was August 10, and in the rice fields farmers were weeding the second crop of the season. Unlike Japanese, who bend from the waist, Formosan farmers get down on their knees in several inches of mud and water and go down the green rows like a charwoman scrubbing a floor (page 172).

Police Station in a Temple

As we passed a Buddhist temple in Taoyuan, west of Taipei, we saw a policeman with fixed bayonet standing guard at the entrance. Robert successfully talked us inside, and we found that the temple was being used as a police station.

"The town is crowded," Robert explained. "There is no other suitable place."

While off-duty policemen ate lunch in one corner, worshippers went through their rites before an elaborate assortment of images.

At a near-by store big bamboo baskets were full of bundles of bills like stage money. This,

explained our interpreter, was "money for ghost." Chinese buy this false money and burn it at funerals for use by the departed.

Friends had told us of the strange Formosan push cars, which are pushed by hand or even poled like a boat, and soon after leaving the main road we picked up their spoor—small twin iron tracks 19 inches apart and so uneven that it seemed impossible for a car to stay on them long. These led toward the distant mountains, which were turning from purple to green as we approached.

Far up the track an object appeared, a car about as big as my office desk and half as high. Under a parasol sat the passengers, a mother and her small daughter.

The "engine" was in the rear, a wiry little Taiwanese. When he saw us he grinned and fired what I imagine was his entire English vocabulary. It came out all in one breath: "OK-come-on-let's-go."

Now the road grew rougher and began to climb. Push cars on the wavering track alongside carried coal from a small mine near by. Formosa contains considerable coal, but deposits are chiefly in veins too thin for large-scale production.

Through Blackness to a Different World

When the speedometer read 52 miles from Taipei, the rough road suddenly ended at a dark hole in a mountain spur. Into this muddy, rock-strewn tunnel the push-car tracks adventurously vanished.

As we munched the lunches we had brought and wondered what to do next, an old Chinese woman emerged from the dripping tunnel, her bare feet plastered with mud. To show her appreciation of the prawns we offered from our lunch boxes, she offered to go back through the tunnel and summon a push car.

When the car appeared, its motive power proved to be a 15-year-old Taiwanese girl, short but constructed about as powerfully as a Notre Dame running guard. She pushed five men through the eighth-of-a-mile-long tunnel without even puffing.

We emerged feeling like Alice in Wonderland when she ducked down the rabbit hole. Beyond the barrier mountain was a new, green, and quiet world. Humming of motors had given way to the lulling sound of cicadas and songs of birds.

From a huddle of tiny houses two sinewy Taiwanese men appeared, naked except for shorts. Their legs were knotted with muscles and veins from years of pushing people and freight.

After the dickering the Chinese love, we agreed on our fare to Chiaopanshan, only



♣ **This Fair Formosan Aborigine
Captures Hearts, Not Heads**

She comes of a proud fighting tribe, the Taiyals, called "the Mohawks of Formosa," but lives in the now-peaceful town of Chiaopanshan. Prewar Japanese rulers of Formosa called civilized tribesmen "ripe savages" in contrast to "raw" head-hunters.

♣ **Home-grown and Secondhand Fibers
Blend in Crude Looms**

To get the gay colors they love, tribesmen buy bright blankets or cloth, unravel threads, and weave them into strong filaments of native hemp or ramie. The warp, wound around the chestlike object, is held taut by this east coast Taiyal weaver's feet.





"Why Flail the Rice? Rake It Out in the Road and Let the Traffic Thresh It!" So Reasons This Farmer Near Taipei

Cars, buses, trucks on the concrete road all serve as threshing machines. Every wheel removes grains, and the rush of air from fast-moving vehicles blows away some of the chaff. While his wife winnows, he turns the pile and sweeps up stray grains. Volcano-shaped hats are made from a bamboo tree.

Transportation Ranges from "Slowly Motion" Push-car Railway to American-built Planes of China National Aviation Corporation

"Push car is very slowly motion," remarked a Formosan. It is—except when brakes fail on a mountain. Always ready to jump were the author (lower left), Geologist Arnold C. Mason, Photographer Roberts, interpreter, and policeman "protector" on a trip to aborigine country. On downgrades all five—plus two pushers—rode. At Taipei's airport, Irene Tsou checks the passenger list of a Tokyo-bound DC-4, bearing China's name and flag, with hostesses Penny Ling and Katherine Woo.

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Renamed "Long Live Chiang Kai-shek Hall," Formosa's Former Japanese Government Building in Taipei Now Houses Chinese Troops

Lean Young Chinese Nationalist Soldiers March Through the Railroad Station Plaza in Tainan, Formosa's Early Capital

Here simmered some of the discontent which resulted in the suppressed revolt of Formosans against the Chinese Nationalists in February and March, 1947. From the station's roof this palm-plumed city of 202,000 looks as flat as a Texas Panhandle town; it lies on the west coast plain. The towered building is a newspaper office.

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"It's Delicious," Said These Taiyal Tribesmen Squatting Around Their Stew of Giant Snails on the East Coast

They pluck the big crawlers off cliff walls and boil the "choicest" parts of the black, sluglike bodies. The result looks a bit like oyster stew, but smells like just what it is. Destructive to foliage on Pacific islands, giant African snails have reached United States ports; but all found have been destroyed by Government inspectors.



Mountain Taiyals Hunt to Eat, Smoke to Relax

Wearing little but a knife of the type formerly used for head-hunting, the hunter holds his bow and "bird shot"—three-pronged bamboo arrows for shooting birds. One native said he gets better results with a slingshot powered by a bicycle inner tube. Rifles are prized but scarce because Chinese authorities fear guns might be turned against them.

The old-timer bears both the tribal tattoo on his forehead and the chin mark that once meant the wearer had taken a head. In place of his brass-bound bamboo pipe, he now has the author's Algerian briar, presented when he admired it.

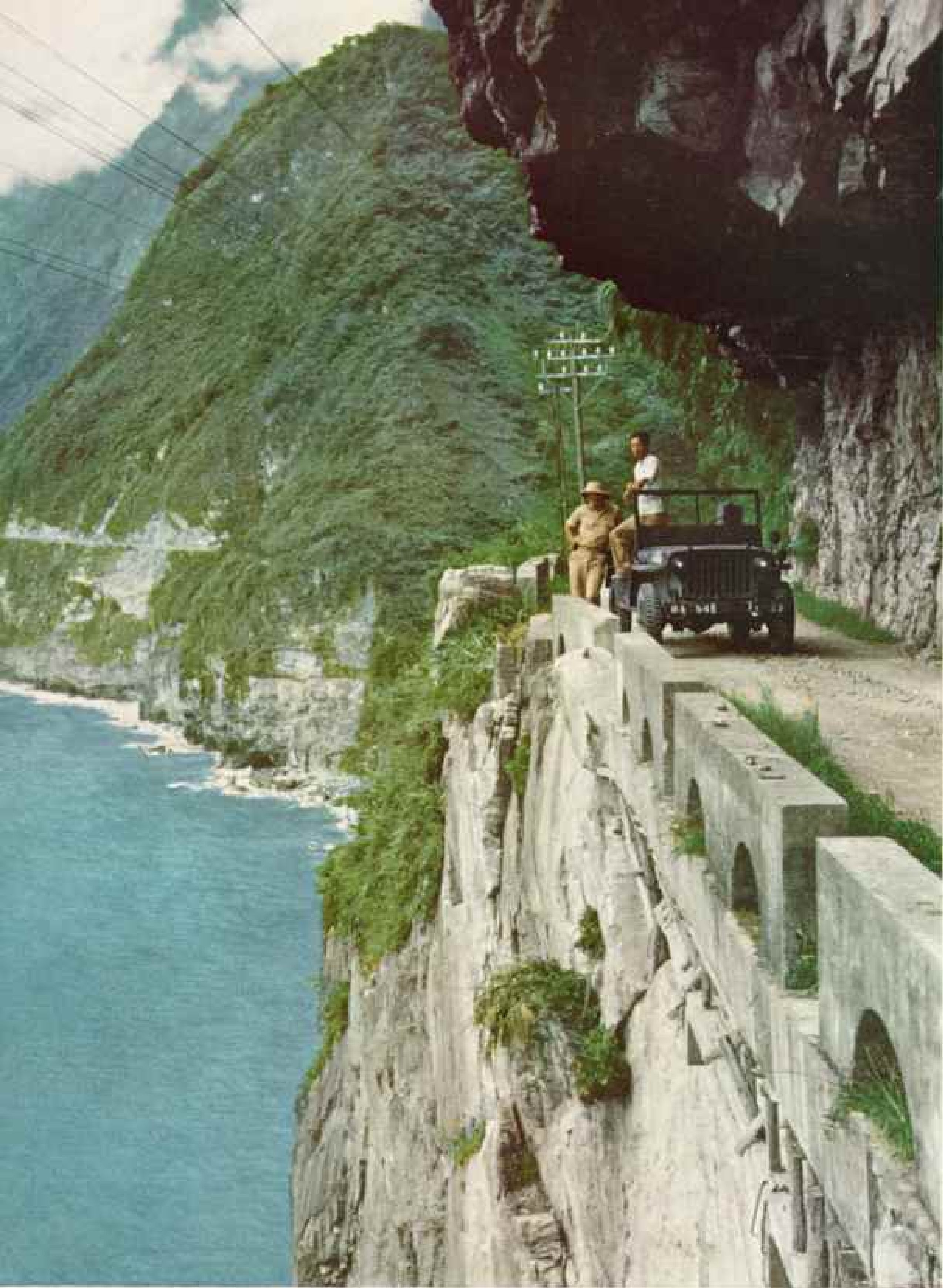
Many of the Taiyals, both men and women, knock out or pull two teeth, the upper lateral incisors, when they come of age. They think it improves their looks.

"Once I asked a man why he did it," said a missionary. "He grinned and said, 'So I can smoke and spit at the same time.'"

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Reproduced by J. Dwyer Roberts





Blasted from Cliffs, the East Coast Highway Forms a Shelf Between Sea and Sky

On Tachingshui (Great Clear Water) Cliff, U. S. Army Geologist Arnold Mason and his Formosan assistant look down at the Pacific 200 feet below. Two-way traffic plies this road, wide enough for only one car except at turnout points.

to find that at a way station we had to pay again "for maintenance of the railroad."

Every quarter-mile or so the push car ran off a bowlegged stretch of track and had to be lifted back on the rusted rails. Log bridges trembled with the ague of age as we crossed gorges cut by mountain streams. Mason, of the Engineers, marveled that these could bear our weight (pages 149 and 157).

"Just the Passengers Get Killed"

On downgrades the pushers ride, keeping the car from running away by crude home-made brakes. I recalled something a missionary had told me.

"Aren't these push cars dangerous?" he once asked a pusher.

"No," replied the coolie. "We always jump clear. Just the passengers get killed."

Of our own pushers we inquired, "Do many people get killed on this railroad?"

"Not so many," was the reply.

"Maybe," said Mase, "he means 'not so many' but what there could be a few more!"

Forewarned by all this, we were ready to jump as fast as any Formosan.

As the way grew steeper and the pushing harder we lightened the load by walking ahead. Clouds wreathed the highest peaks. The wild mountain scenery, rank vegetation, and strange bird and insect calls were like something out of Herman Melville's *Typee* or *Omoo*. Wild white lilies gleamed in the verdure, and the only sounds were Nature's own.

At my feet a big bird rose in a blur and roar of wings like a ruffed grouse. In the forests cicadas "zit-zitted" a ringing, monotonous, telegraphic tune of dots and dashes.

Once we met push cars loaded with tea, and passenger traffic gave way to freight. Our coolies lifted our car off the track till the others had passed (page 161).

"Miz Lee," of Formosa's First Families

At last, across a deep ravine, we sighted the towering triangle of land on which stands Chiaopanshan, like a lookout on the prow of a ship. After duly checking in at the police station, we rolled up to an ex-Japanese inn, now run by a Taiyal, Mrs. Li Goat-kiat.

"Good evenin', Miz Lee, how're you-all," said Virginia-born Joe as our slender, smiling hostess in slacks appeared with her dark-eyed little daughter. Though they couldn't comprehend a word, they understood the good will in his drawl and grin.

Mrs. Li had a quiet, friendly manner, gentle brown eyes, and white teeth interspersed with gold ones in accordance with the Oriental idea that they improve one's looks.

The tattooed "marriage mark" on her face formed a blue-black line an inch or more wide, running from ear to mouth, then up to the other ear. As one American remarked, "It's cheaper than a wedding ring and more lasting."

A real lady, Mrs. Li wore this adornment with poise and apparent pride (page 156).

It was pleasant to take off our dusty shoes and pad over polished-wood floors to a paper-paneled room where cushions had been spread around a low table. After a hot bath came food, served by Mrs. Li's small daughter—fried eggs, chicken, leeks, breadfruit, and bamboo-sprout soup (served in the middle of the meal); rice, too, of course; tea, and sweet pineapple. (Eating a fried egg with chopsticks gives quite a sense of achievement.)

Mrs. Li, a leader among her people, had represented this district at the Taiwan capital for several months in 1946.

"She say she resign," explained the policeman, interpreting, "because she a lady and not want to do anything political. She say equality of man and woman not very convenient for woman."

For pictures of the true Taiyals our hostess suggested that we visit her home village, called Keikodai in Japanese, Chikoutai in Chinese, and Lahowsha (meaning "leaning tree") in the Taiyal tongue. In Chiaopanshan, we knew, the tribesmen had intermarried with Formosan Chinese and few of the aboriginal ways survived.

Giant Snails Travel Slowly But Far

Hot sun burned through the clouds in the wake of an early-morning rain next day as we started down a steep trail toward a bridge like a spider web that crossed the Taushui River (page 141).

As we rounded a turn in the wet trail we almost stepped on a huge snail with a shell as big as a lemon. It was a handsome "two-tone job" in cream color and brown. This portable home, roughly conical, rested on a black body about four inches long which was bound for safety in trailside rock crevices at somewhat more than the usual snail's pace, groping ahead with its feelers like a blind man with a cane.

There was no mistaking this slimy stranger. Without any introduction we knew it to be *Achatina fulica*, the giant African land snail, whose legions are devouring vegetation on Saipan, Tinian, and other Pacific islands and have caused consternation by invading Hawaii. Recently it smuggled itself into the United States on salvaged war equipment landed in California and at New York and Baltimore, but the Department of Agriculture reports



Broad Bands of Tattooing from Ears to Mouth Show a Woman Is Married

This custom is practiced in Formosa by only the Taiyal tribe of aborigines. Most adults of both sexes wear the vertical tribal mark tattooed on their brows. Mrs. Li Gout-kiou, gracious guide to the NATIONAL GEOGRAPHIC representatives, holds her seven-month-old grandson. Behind, her 80-year-old father leans on his cane. He lives in the mountain village of Chikoutai, accessible only by foot (page 141).

that all the invaders were detected and destroyed by plant quarantine inspectors.

"It" is the only word for the creature. Every mature *Achatina* is both a he and a she, and this sexual versatility makes each snail a potential egg-layer.

Seventeen years ago, giant snails spread to Formosa from China, and this subtropical island proved an *Achatina* Eden. We saw them later in distant areas, for they have made their relentless way over hundreds of square miles. Even in the capital city they strip leaves and flowers from gardens.

Formosan Chinese break the big shells and feed the sluglike bodies to ducks. Aborigines eat them (pages 152 and 159).

Japanese once thought this oversize snail might be a made-to-order means of feeding their mounting population. Some were reared in glass houses in Tokyo, but proved to have little palate appeal. Fortunately for Japan,

the climate there proved too cold for the snails to thrive in the open.

Suddenly from ahead came a shout. Mason had almost stepped on a snake, a black fellow ringed with white and about five feet long.

"If you are bitten by that snake," a Taiwanese told us later, "you soon die."

All hands left the zebra-colored stranger strictly alone. It was a krait, *Bungarus multicinctus*, armed with a nerve poison more deadly than that of a cobra.

Shaky Bridge Leads to Taiyal Town

Another downward zigzag of the trail and we reached the Japanese-built bridge that spans the Tanshui River. It consists of a wooden catwalk about 18 inches wide and 100 yards long, with many holes and loose boards, suspended from cables of untwisted wire. A network of wires on each side serves as a safety net to keep pedestrians from falling



"Many People Get Killed on This Railroad?" "Not So Many," Said the Pushers

Such questions elicited fatalistic replies (page 155). On the 14-mile round trip to Chiaopanshan, this car bearing the author and his companions jumped the track dozens of times, but never on one of these crude log bridges across mountain ravines. Push cars are used only in remote areas; Formosa's populous west and north are served by good steam railroad lines; the east coast line is less dependable (page 171).

into the wild mountain river a hundred feet below.

Across the quaking bridge we saw little people approaching. On their backs men, women, and children bore bamboo hampers like fishermen's creels.

In answer to Virginia Joe's pleasant "How're y'all this mornin'?" tattooed faces creased into welcoming smiles though their owners understood not a word.

"They are very pure-hearted, naïve," said Loa in an English aside as Mrs. Li explained our errand to her fellow Taiyals.

They are also very strong, as I discovered when I tried on one of the hampers of rice they bore. It staggered me, much to their amusement. Yet little men and women of not more than five feet and 100 pounds carry these man-killing loads up the precipitous slope to Chiaopanshan.

Several men had the tattooed chin mark

which used to indicate the wearer had taken a head. Married women wore that now-familiar ear-to-ear band like a huge blue smile (page 176).

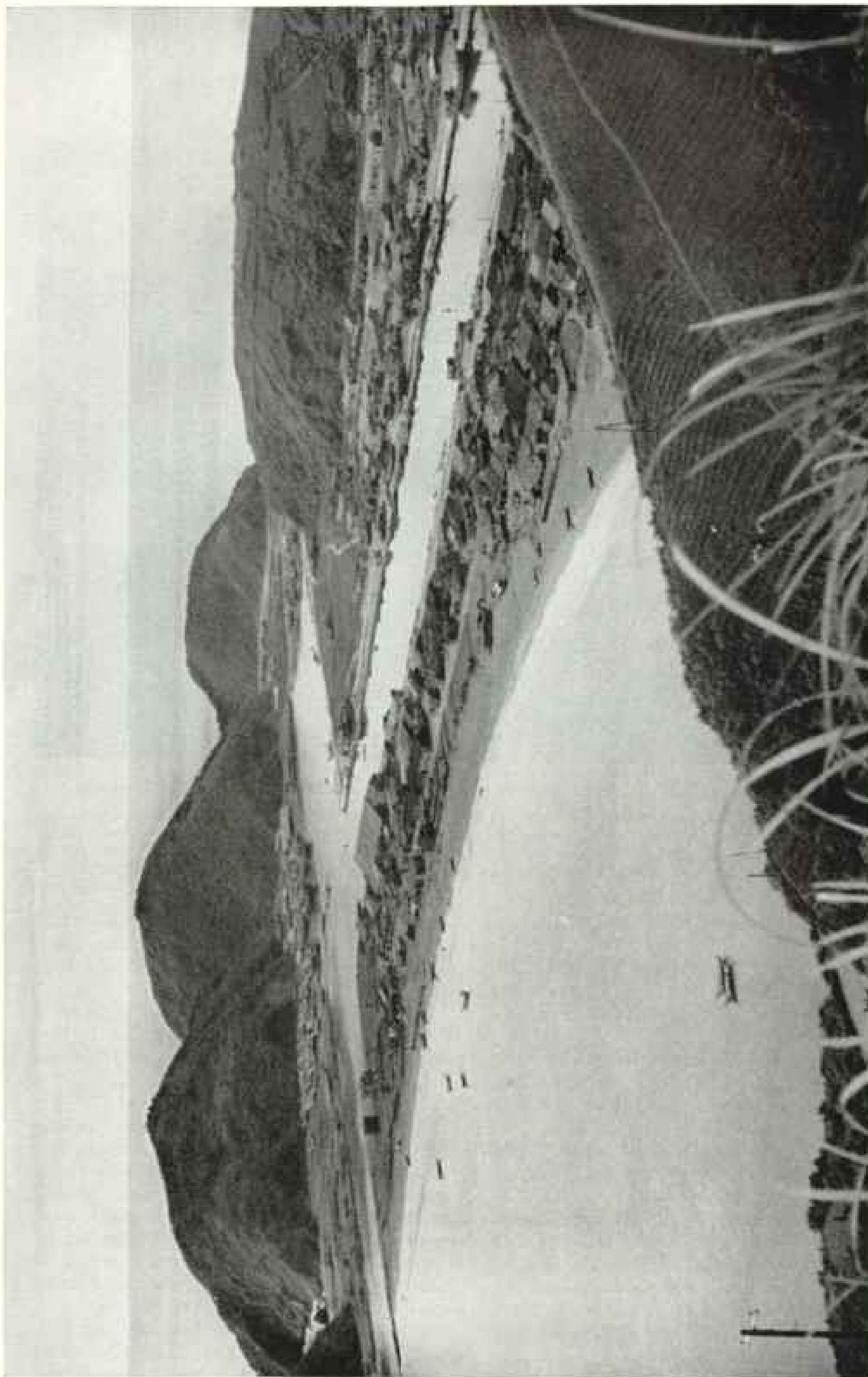
"They accept us more naturally than some of the plains people," murmured Loa in surprise after chatting with them in Japanese.

U. S. Fertilizer on Formosan Fields

With the sensations of a tightrope walker, we crossed the swaying, pitching bridge.

Here the Tanshui seems a river of paint, its color almost battleship gray. Tons of soil and disintegrated rock were whirling downstream in its swift waters. Far down, where it reaches the sea, the once good harbor of Tanshui is suitable now only for small craft because of silting of the river mouth.

As we climbed past the rice fields of Chikoutai, we saw two Taiyals staggering along with shoulder-suspended loads of nitrogenous



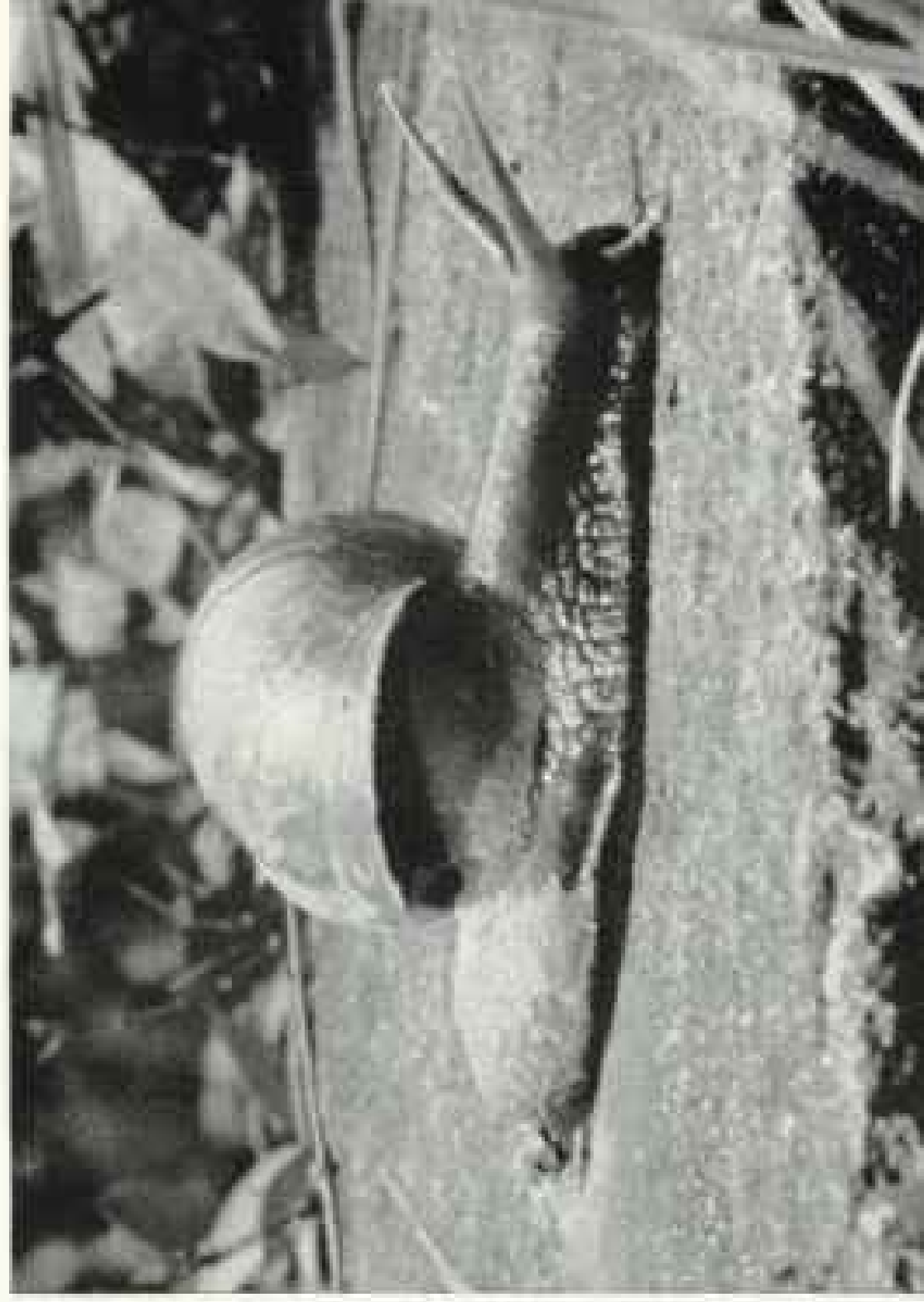
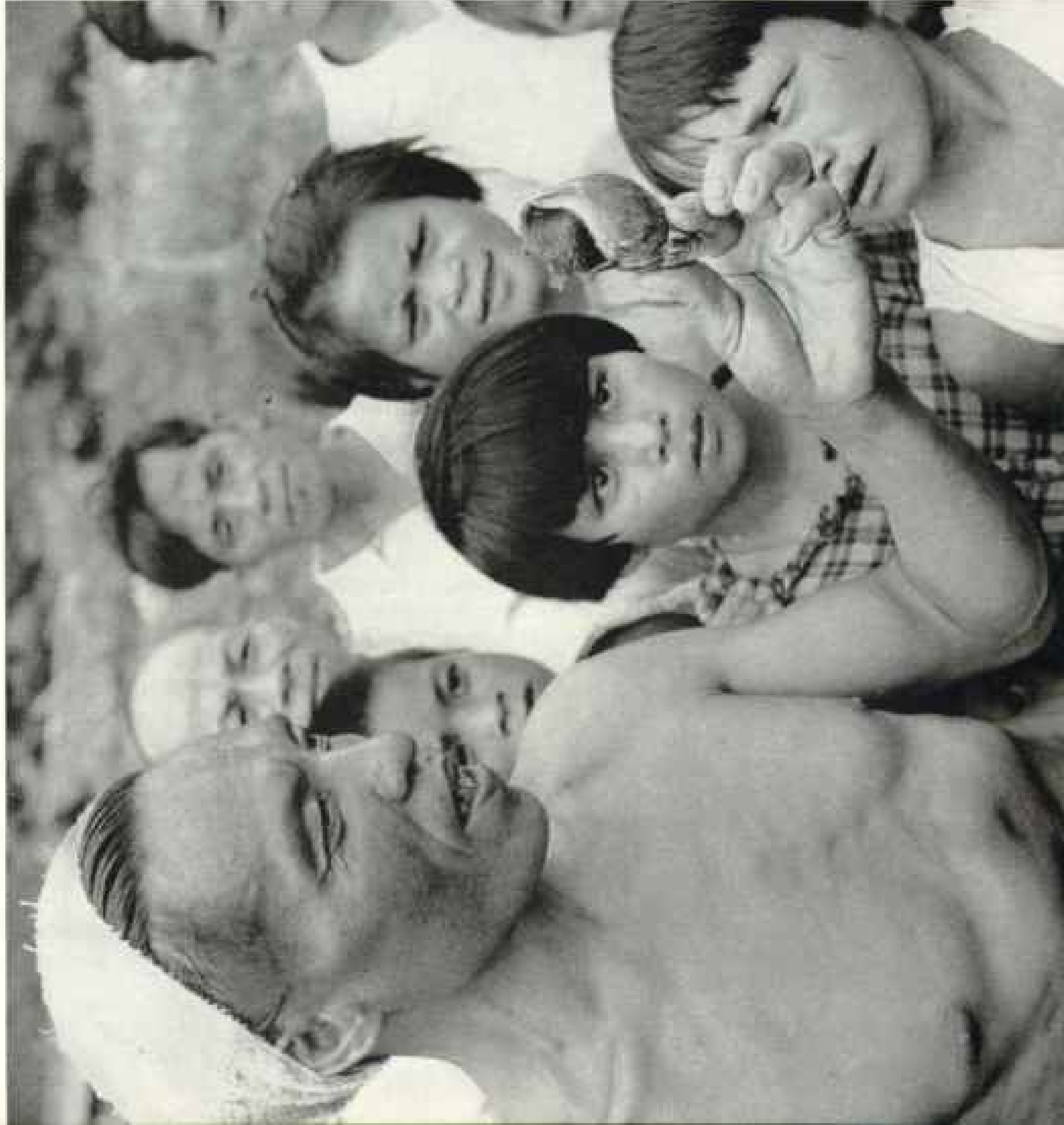
Hills Facing the Pacific Protect This Man-made T-shaped Harbor from the Full Fury of Typhoons

Behind the natural breakwater nestles the salty little town of Nantungao, here seen from the east coast highway south of Suao. The port shelters fishing and trading vessels, which enter through the channel at upper left. Formosan fishermen are often seen as far north as Okinawa. Some do a bit of smuggling on the side. Small craft sometimes have eyes painted on their prows—a Chinese custom arising from the old idea that if a boat had no eye it could not see its way.

Giant African Snails Abound in Formosa: Chinese Feed Them to Poultry, but These Taiyal Aborigines Eat Them in Stews (Page 152)

Warm, green Formosa has proved a paradise for the crawling, hungry invaders. They reached the island from China in 1933 (page 135). Some attain a length of half a foot. These, photographed on the east coast, are about average size; scale is indicated by the 1949 Taiwan five-cent note (worth one U. S. cent), which is 37½ inches long.

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Chinese Policeman and Taiyal Tribesmen Peer at a Different World

In the mountain aborigine village of Chikoutai, the photographer's copy of the NATIONAL GEOGRAPHIC draws a crowd. Big and little Taiyals alike gaze, absorbed, at Newfoundland, on the opposite side of the earth. The old tribesman at left has stuck a cigarette into the bowl of his little bamboo pipe.

fertilizer. On their return trip from Chiao-panshan they had brought the precious nutriment to their leached-out, hungry fields.

This was the mountain "grass roots" end of the long arm of ECA. To prevent widespread want, disorder, and possibly starvation, the U. S. Government's Economic Cooperation Administration was providing these essentials for good crops.

The chemicals had to come at high cost from the distant USA and Canada because Japanese nitrate plants—source of explosives as well as fertilizer—were casualties of World War II and Japan's postwar disarmament.

Alas, "No Beautiful Dressing"

At the first houses of Chikoutai, children shyly greeted us and reacted gleefully to the international language of American candy.

The village had been shorn of most of its pulchritude. Its girls with their colorful dancing costumes had gone to the city of Hsinchu for several days to entertain Chinese Nationalist troops.

Of those that remained Loa said tragically, "Some of them have no beautiful dressing."

Two of the houses seemed on fire, but investigation showed that the smoke was the overflow from stovepipeless kitchens. It found its way out around the airy edges of the bamboo roof. Houses were largely bamboo.

When I emerged, eight or ten Taiyals were clustered about the NATIONAL GEOGRAPHIC MAGAZINE which Joe always carried as an unofficial passport.

"I was reading about Newfoundland while you looked around," said Mason, "and they took it away from me."



Downhill Goes a Fast Freight; the Engineer Plies His Brake

That handle gripped by his right hand keeps the push car from running away down mountainsides. Simple but effective usually, it pries a piece of wood against the wheels. On upgrades the woman and girl help push. The policeman watching the load of tea pass was a passenger on a push car bound in the opposite direction and derailed in accordance with the rule that freight has the right of way.

Education, even here, is opening new doors. One handsome, intelligent young Taiyal spoke good English and explained that he was home on vacation from school in a distant city.

Another young man had learned English while a prisoner of war in the Philippines. He called us all "captain" and kept announcing, "Americans very good!"

Younger Generation Untattooed

Four generations of Mrs. Li's family showed how the life of the Taiyals is changing—her dignified 80-year-old father and vivacious 51-year-old stepmother, both with the tribal facial tattoos; tattooed 46-year-old Mrs. Li herself; her son and daughter-in-law, both untattooed, and her 7-month-old grandchild, dressed with all the care of any American baby.

Tribesmen puffing their bamboo pipes showed interest in a visitor's cigar. Proffered, it went around the circle like a pipe of peace. Each sampler winced at its strength but politely tried to hide his distaste.

Head-hunters? We had found them a people who live crudely but respond warmly to a smile and a friendly gesture (pages 153, 176).

We left to the accompaniment of Japanese "sayonaras" and something that sounded like "cigareyta," meaning not "cigarette" but "good-bye" in Taiyal.

After a hot, gruelling climb, we slumped on the floor of Mrs. Li's inn, ate about what we had had for dinner the previous day and breakfast that morning, then started down the mountain on the push car.

In the seven miles the car jumped the track 15 or 20 times, but nobody suffered more than a jolt, since the careful coolies, braking constantly, kept the speed down to about eight miles an hour.

Emerging at last from the dark tunnel that formed the entrance to this different world, we drove back to teeming Taipei, slept, and boarded the jeep next morning for a trip around the island. Few persons make this arduous circuit, for neither roads nor rails entirely encircle Formosa (map, page 144).

Roller-coaster Road to East Coast

From Taipei we headed for Chiaochi on the east coast, over a bumpy, rocky, roller-coasterlike road through rankly wooded mountains studded with giant tree ferns.

Artificial caves along the way had been blasted out by the Japanese for storing war supplies against the invasion that never came. Instead, the Allies struck at Okinawa, 370 miles northeast.

Landslides had dumped tons of rock and dirt on the road, and crews of young peak-hatted Taiwanese—mostly girls—were removing the debris in shoulder-suspended bamboo baskets. When they threw it over the cliff below, seconds passed before the sound reached us.

After noon came the daily rain, this time a cloudburst that all but hid the road and yawning gulf. Discretion demanded a stop.

Drenched, we turned in at the first shelter, a tiny house-store selling "ghost money," cookies, tea, and straw hats. The Taiwanese girl in charge served us hot tea and would take no money. Candy bars and soap expressed our appreciation.

On we went, while the day waned and rain clouds walked the sky.

Just at sunset the jeep rounded a turn, and we stared enthralled at the picture painted against the sky. We had reached the edge of the mighty escarpment. Far below lay a green plain and beyond it the Pacific.

Offshore, like a sea monster, sprawled Kueishan (Tortoise Mountain) Island and a rocky islet forming the turtle's head. Arched in glory around the scene, a rainbow formed a softly painted frame.

American Tragedy: "No Bleed"

Still under the spell of this sight, we wound down the steep mountainside to Chiaochi, where we found a former Japanese inn. After a few words in Chinese, Chao-siang Wang, Mason's interpreter, turned to us with tragic face.

"They have no bleed," he said.

Like almost every Taiwanese we met, Wang seemed to think Americans would die if they did not eat bread daily.

Thanks to a huge dinner featuring chicken soup, pork, eggs, bamboo sprouts, big bowls of rice, tea, and bananas we managed to live breadless till morning.

Jeeping south next day toward Suao, we passed paper factories fed by wood from the mountains. Freight cars bore huge cryptomeria logs to be sawed into lumber.

Camphor trees thrive in the mountains. Formosans hack the trees into chips, distill them, and send the product to Taipei for refining. Once camphor was a big money maker for Formosa, source of most of the world's supply, but large-scale manufacture of synthetic camphor from turpentine by Du Pont and others has reduced production of the natural kind to a minor industry.

Glassy fields of rice between mountains and sea were dotted with Formosa's white herons. These are cattle egrets that feed on insects flushed by plodding water buffaloes.

At a pool by the road sat a Taiwanese boy. A small rope in his hand led down into the water. I thought he was fishing. Suddenly he jerked the rope and up came a huge slate-colored head with curving horns—a water buffalo.

Each of these giant creatures, used for tilling the fields, is tended by a pint-size boy or girl (page 174).

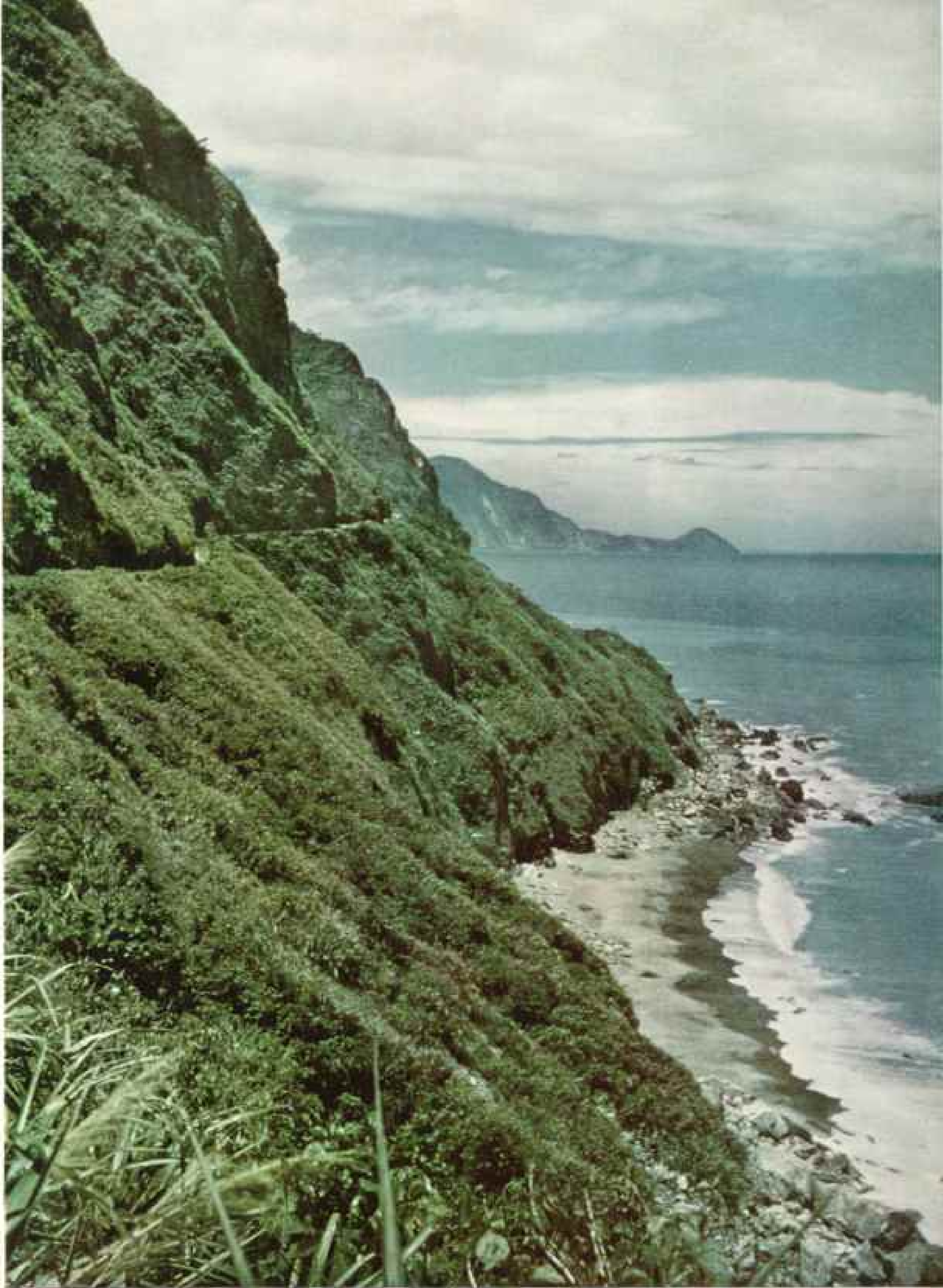
One-lane Highway Carved from Cliffs

Gradually the plain petered out, and at Suao the mountains came down to the sea. Here began the most spectacular and dangerous road I have seen, the Japanese-built east coast highway carved from the face of thousand-foot cliffs. At some points it is blasted through cliff walls; we counted 14 tunnels (pages 154, 158, 163).

This road is only a single track, with occasional turnout places—but traffic is two-way. Several times we rounded a curve and just in time saw a truck or bus coming head on in the same narrow track.

In places the outer edge of the road had caved away, carrying concrete guardrails with it, down to the turquoise-bordered sea hundreds of feet below. In their stead some joker had placed feeble little foot-high stones.

At one point hundreds of golden-backed spiders seemed to have joined forces to ambush every flying insect in the vicinity. Their round webs, the size of an average window, hung from telephone wires and bushes for a mile, forming a formidable barrier for butterflies and other potential prey. In each sprawled a spider



Only That Narrow Gash of a Road Links North and South Along This Rugged Coast

No wheels roll in this part of Formosa except along the hair-raising Japanese-built east coast highway (page 154). Passengers and goods must shift to buses and trucks to travel between the railheads at Suao and Hualienchiang.



When Tainan's Water System Fails, Soldiers Use This Well Beside Old Fort Providentia. The Men Are Clad for Physical Training

Soldiers of Nationalist China Get Inspiration at the Feet of a 17th-century Hero

In an elaborate shrine at Tainan sits this imposing image of the warrior Cheng Cheng Kung, called Koxinga by the Japanese. The fighting son of a Chinese father and Japanese mother drove the Dutch from Formosa in 1662. He is still revered as a liberator, and annually this image is borne through the streets in tribute.

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Kodakgrams by J. Barber Roberts







As Gaily Arrayed as Jungle Birds, Arnis Gather for a Dance

When their American missionary introduced the photograph, their east coast aborigines adorned themselves with beads, coins, flowers, and declared a festival in honor of the National Geographic.

On some such occasions they got so playful that two American women who yielded to their invitation to join in the dancing soon found themselves being tossed in a blanket held by husky, laughing Arni men.

Arni women walk with the utmost grace, and it comes as somewhat of a shock when one of these poems of motion turns around and is seen to be smoking a huge homemade cheroot.

Full of rhythm, Formosan aborigines will dance at the drop of a fancy headdress. One missionary told the author that when some of his native charges were singing *Onward Christian Soldiers*, "they suddenly got up and danced, they liked the tune so well."

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Excerpt from *2, Haplo Roberts*



Crude Fishing Craft Ply Sun Moon Lake, Chief Source of Electric Power

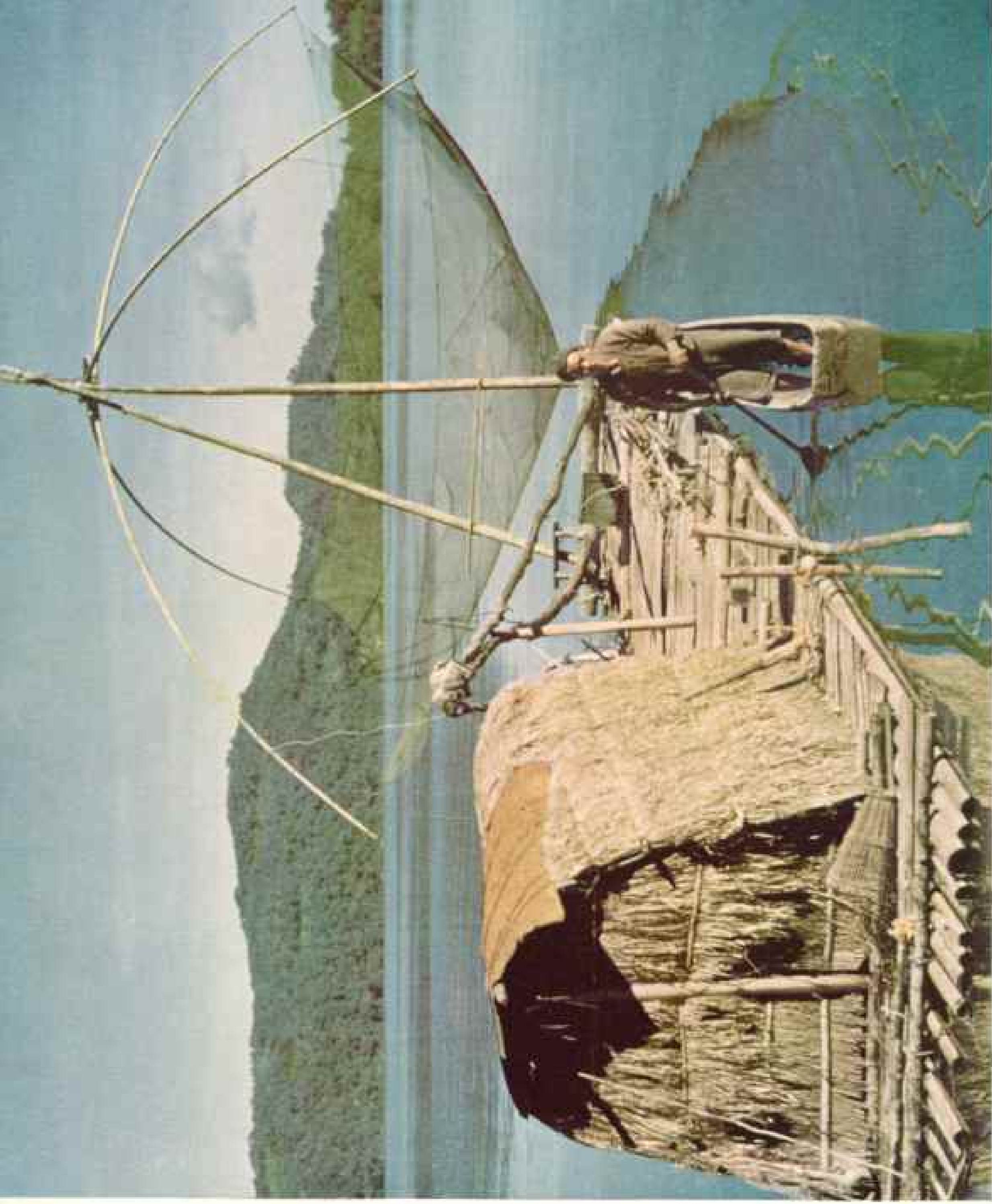
For shelter from sun and rain, the fisherman has built a grass hut on his bamboo raft. Lowering the Y-shaped boom, he will dip the net just below the surface in quest of the tiny, semitransparent fish that Orientals love for flavoring soups and stews. Big fish are caught in larger, deeper nets.

Formosa's most important reservoir of water for generating electricity, Sun Moon Lake provides light and power for most of the island's population. Big penstocks carry its waters to hydroelectric plants far below.

In a crippling blow at the Japanese in Formosa, the transformer stations were bombed by American planes during the war. Chinese Nationalist troops now guard the installations closely and wave photographers away with American-made Tommy guns.

Tunnels from distant sources of water help feed this important lake, incidentally a pleasure resort. Its level fluctuates violently, sinking many feet in times of drought.

© National Geographic Society
Illustration by J. Dastoy Roberts



Taiyal Aborigines Dance with Slow, Precise Movements, Singing the While

In head-hunter days, aborigines danced in celebration if a raid had been successful, in lamentation if it had failed. This east coast village is visited by Christian missionaries, and now the natives raise their clear voices chiefly in hymns. Hand-woven costumes donned for the dance contrast with onlookers' everyday clothes.

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Kodachrome by J. Taylor Roberts





With Wooden "Bells," Natives at Sun Moon Lake Play an Aboriginal Carillon

Pounding resonant poles on a round, flat stone, they produce musical notes that blend in an old tribal tune as they circle and sing. Each strikes her note at the right time. Length of poles determines their tone.

four or five inches across, ominously waiting for dinner to fly in.

On the cliffs of soft schist and harder limestone crawled more of the giant African snails we had met near Chiaopanshan (page 155). Taiyal tribesmen, less clean than the ones seen there, were gathering and stewing them over campfires (page 152). Only the "best" part is eaten, the rest being fed to pigs.

"How do they taste?" we asked through an interpreter.

"Delicious!" was the reply, but none of us grasped the opportunity to try them.

When we stopped at a Taiyal village we were almost mobbed, the aborigines were so enthusiastically friendly. In the cluster of huts stood a little wooden church with a big cross, and perhaps the tribesmen associated Americans with their much-loved missionary (pages 147 and 169).

When we drove away the whole village came running after, waving and shouting good-byes. One lad pursued the jeep for a quarter of a mile.

Soon we crossed the silt-laden Taroko River and on foot explored Taroko Gorge, a silent place of towering cliffs and occasional wild-looking Taiyals hunting snails, panning for gold, or scratching in lonely sweet-potato fields.

Where the river dashes from this defile a hydroelectric power plant stood silent and idle, paralyzed by mounting banks of gray silt which blocked its outlet. One at Tungmen fared even worse; it was buried bodily in sand when the river bed rose 56½ feet!

One reason for the growing gravity of the problem was as apparent as if it had been emblazoned on the mountainsides—increasing cultivation of steep slopes, usually for planting sweet potatoes. Formosans burn patches of mountain forest, grow a few crops till fertility is gone, then burn another slope. Heavy rains quickly leach out nutriment and carry more of the soil itself down to those laden streams.

Site of Wartime Prison Camp

At a troop encampment outside Hualienchiang, known to the Japanese as Karenko, athletic-looking Chinese soldiers were playing good basketball. "We Must Keep Our Homes Happy," said a large sign in Chinese. "Stand Firm," exhorted another.

Here during wartime the Japanese maintained one of the prison camps which made Formosa synonymous with suffering to many an American soldier, including Gen. Jonathan M. Wainwright, U. S. commander at Corregidor.

Not even a jeep could go much farther south than Hualienchiang, harbor and site of a war-

time Japanese aluminum plant. Here rails take over, forming a tenuous link with Taitung, 108 miles south.

From a missionary we learned that rivers swollen by typhoon rains had washed out the railroad at several points and passengers had to walk across them, carrying their baggage. Joe, burdened with photographic equipment, decided to stay with the others and photograph the gay, dancing Amis (pages 166-7).

At dawn next day I set out alone, the one white man in a jam-packed train of Formosan Chinese and a few aborigines.

"If you are of good will you will have no trouble," Wang the interpreter had said. I found it true. A smile and a greeting in my own language invariably brought an answering smile—and help if I needed it. I wondered if a lone Formosan aboard a crowded American train and dependent entirely on sign language would have fared as well.

Fellow passengers squeezed close together to make room for me to sit. On one side sat an aged grandma clutching a huge edible bamboo sprout and a grandson not much bigger. A farm woman across the way had clucking chickens in a bamboo basket. One man carried a live duck. Others had rice or other produce in gunny sacks or wrapped in matting.

Five Walks in 108-mile Train Trip

Our route lay across the Tropic of Cancer, and as the burning sun rose higher it turned the train into a series of ovens. All the passengers visibly wilted; all except one, a Buddha-faced woman calmly nursing her baby. Her expression never changed.

After several stops at noisy towns, the slow-moving train jerked to a standstill, a trainman jabbered something, and everybody began to get off, restrapping babies on backs, picking up bamboo sprout and grandson sprout, chickens, duck, rice, and assorted bundles. I followed suit, shouldering my heavy bag.

Outside was a strange, almost Biblical, sight—a long procession of humanity winding across a wide gray waste of rock and silt, flood bed of a restless river. Bridge and approaches had been cut in several places. Rails with ties clinging to them formed a precarious footway across the now-shrunken sullen gray stream.

As I looked, something shielded me from the sun; a stranger was holding a parasol over me and my sunburned nose. In a halting handful of English words, this pleasant-faced little fellow passenger introduced himself as Mr. Tsu and a stocky friend as Mr. Tsung. Could they not, he asked, carry my bag?

At first I declined this friendly offer, but by



Weeding Rice, Formosans Crawl Through Muck and Water on Hands and Knees

To lighten the drudgery, neighbors help each other. In this field the author counted 12 men, chatting and laughing as they sloshed along on bare knees, their hands always busy under water among the green shoots of young rice. The method contrasts with that in Japan, where weeders walk and stoop over.

the end of the two-mile trek they were carrying the bag and I was carrying the parasol.

Four more times in that blazing day we all had to get out and walk across flood-wrought desolation to another train. At word of approach of the recent typhoon, officials of the Government-owned railroad had given up these bridges as lost and stationed trains between them to run this walk-ride shuttle service.

Every time a typhoon comes, the rains turn the short, swift mountain rivers into giants of destruction that bowl down the low timber-and-masonry bridges like tenpins. Now nearly naked coolies were rebuilding them, like pin-boys "setting 'em up in the other alley."

"Why not end this interminable game by building higher, stronger bridges or even tunneling under the streams?" I later asked a Chinese railroad official.

"No money," he replied. "People here on the east coast are poor and revenues are low."

That was true. My ticket cost the equiva-

lent of 50 cents for a 108-mile, 13½-hour ride (and walk).

One of the aborigines aboard was an aging Ami man carrying a mat and a burlap pack and wearing no clothes except a waist string from which a cloth the size of a handkerchief hung down in front. He was the envy of all when, at the end of one of the hikes, he untied the string, dunked himself in a brook beside the train, "dressed" in half a second, and climbed aboard, cool and dripping.

Ami Women Smoke Big Cheroots

On another "portage" I passed two Ami women in Western-style dresses embellished with bits of red-and-blue cloth. Arms swinging, they walked with exquisite grace. I passed them, and did a double take: Clamped in the mouth of each was a huge pale-brown cheroot.

Farther south, a brown-faced Bunun boy in an old Japanese army cap insisted on carrying my bag; he would accept no reward.



Margaret Delgin from *Annals*

Chinese Nationalist Soldiers Hit the Dirt in Training on Formosa

Running over an obstacle course, they sprawl full length and crawl under barbed wire, which teaches them to keep their heads down. Partly as a result of GI-style training, Generalissimo Chiang Kai-shek's troops on the island look lean and well-conditioned, but many are worried about homes and families in Communist-overrun territory on the mainland.

After these hot, tiring treks, children came aboard in tears. To console one small Taiwanese girl, I gave her a pellet of candy-coated chewing gum. Her father thought it was medicine and tried to get her to swallow it. She only cried the more. When I demonstrated the use of gum, she chewed it and shower gave way to sun.

Wooden seats got harder and harder. One well-dressed Taiwanese man squatted on his heels on the seat instead of sitting down.

High mountains, often scarred with farms, looked down on the plain through which we passed. The Japanese developed this area for irrigated farming, but mountain rivers writhed out of bounds, spewing silt over rice and sugar cane.

Toward the end of the all-day rail-and-foot trip a little Chinese fellow passenger spoke to me in good English, and I realized suddenly how keen had been the hunger for conversa-

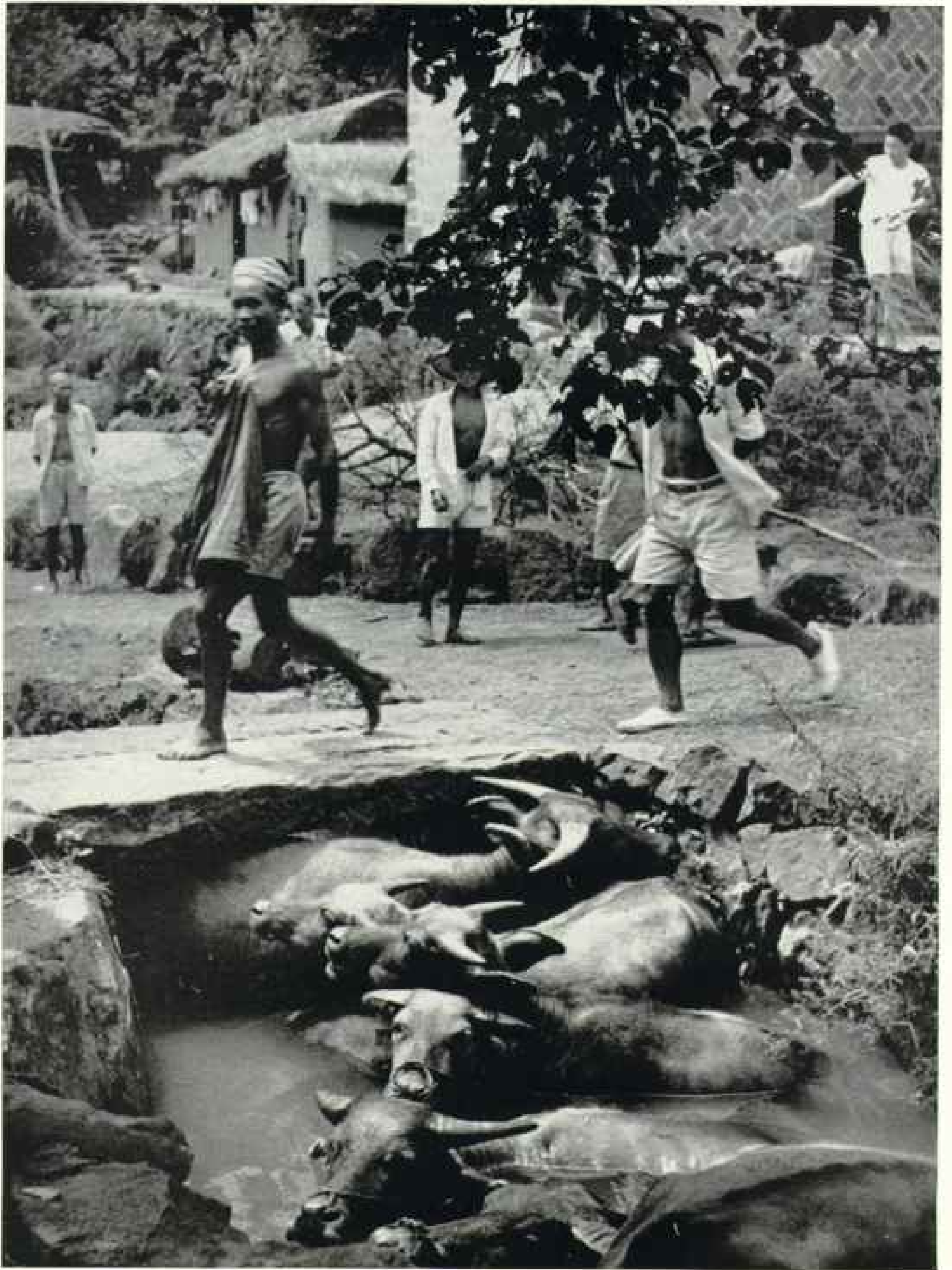
tion. Mr. Chou, a refugee from Canton, was bound for the west coast, as I was; we decided to travel together.

Next Stage by U. S.-made Bus

At Taitung, minor port and end of the railroad, my new friend found us an inn and managed to buy us hard-to-get tickets for the next stage of the trip, by bus. The one we boarded next morning was a Ford, jammed with luggage and passengers, including a squad of Chinese soldiers in peaked brown caps, shorts, shirts, and basketball shoes.

Until I made an overture, these rifle-toting troopers seemed rather sullenly silent. Then they softened up and one offered me a bunch of longans, small pulpy fruits with a nut-brown skin.

Only once did we have to walk, across a flood-weakened bridge. Empty except for the driver, the Ford crossed gingerly but safely.



In a Mountain Stream, Water Buffaloes Take a Sunday Afternoon Siesta

These big, slate-colored beasts of burden lack ability to perspire freely, and they miss no opportunity to cool off in a muddy wallow. More than a dozen packed this pool near Tsaoshan, hot-spring resort north of Taipei. Small boys or girls tend the creatures, used for plowing rice fields.

Music was Mr. Chou's hobby, and when it rained he sang an Ami rain song.

"It means," he explained, "that the rain is like a young girl's tear. The Ami mind is simple, but the heart is good."

Skirting high cliffs and threading wild mountains, we finally crossed the southern end of the island and reached the fertile western plain at Linpien on the west coast railway. Waiting for a train were tall young members of the Chinese Fourth Air Force, their unit shoulder patches attached with safety pins.

Hereabouts, airfields abound. These and the big naval port of Kaohsiung (Takao) were used by the Japanese as springboards for their attack on the Philippines. Under the Chinese Nationalists, Kaohsiung is still a closely guarded military area. With a population of 211,000, it is second only to Taipei in size.

When we reached Pingtung and found a former Japanese inn, Mr. Chou disappeared into the night, though rain was pelting down. In an hour he returned with a loaf of "bread" for me. He had scoured the city for it in the rain.

Signs of Wars 300 Years Apart

Past fields of sugar cane and pineapple, banana plantations, and paddies, we chugged next day to historic Tainan, once the capital of the island and now its third largest city. A good Western-style hotel occupies part of the railroad station (pages 145, 151).

As I passed an open door, I saw a white man pounding a typewriter and realized with a start that this was the first white face I had seen in two and a half days. The welcome acquaintance was Herbert G. Bennett, an Englishman selling American lubricating oil to sugar-cane crushing mills.

In Tainan, as in other principal cities, the seat of local government had been neatly pinpointed by wartime bombing.

"You chaps just pranged 'em in the vital spots," said Herb, who had served as an officer in the Royal Air Force.

"The aluminum factory in Takao was 60 percent destroyed, but not the big cement mill there. Cement was needed for postwar reconstruction.

"At the Sun Moon Lake power plants, bombers got the transformer stations without destroying the turbines. Beautiful bombing!"

U. S. Air Force and Navy pilots share the credit for such hamstringing, and British carrier planes attacked Formosan airfields.

At Tainan, too, are mute survivors of a far older war—brick forts built by the Dutch more than 300 years ago. After nearly forty years they were driven out, and the island was

restored to the Ming Dynasty by the warrior Cheng Chen Kung, or Koxinga as the Japanese call him. This fighting son of a Chinese father and Japanese mother is still a hero to Chinese, Japanese, and Formosans (page 165).

In Anping, Tainan's old port, I found the remnant of Fort Zeelandia being used as a police station. From a concrete watchtower erected upon the brick ramparts by the Japanese, I looked out to sea and down on the town, which seems to contain less land than water—large ponds for making big fish out of little ones. Down a canal ghosted a fishing boat with rakish, reddish, triangular sail.

Fort Providentia, in the heart of Tainan, looks about as Dutch as a pagoda. Koxinga rebuilt it in Chinese style, and now its ornate dragon-crowned but leaky roof shelters a museum (page 164).

"To become an army officer in the Ching Dynasty, a man had to be able to lift this stone," said my young Chinese guide, tugging vainly at a rock about the size and shape of a small safe.

"Formerly I think Chinese people more strong, same as Western people."

I had left Mr. Chou in the bosom of his family, newly arrived by air from Canton, but just before I boarded a train for the north he hurried into the station. Friendly and thoughtful to the last, he bore a present of Formosa tea.

Saltcellar and Sugar Bowl

The west coast train was prompt and comfortable and never required its passengers to walk. Here the coastal plain is wide and green, unravaged by rampaging rivers.

Fields full of sugar cane's waving swords alternated with green-rowed mirrors of rice, fruit plantations, and vegetable gardens beside farmhouses of brick and tile.

Saltcellar as well as a rice, sugar, and fruit bowl, the southwest coast makes salt from the sea and annually ships thousands of tons to Japan for industrial use, chiefly from Putai and Kaohsiung.

Distributing centers for farm produce are such cities as Chiai and Taichung, roughly the size of Bridgeport, Connecticut, and Fort Worth, Texas.

Many of the sugar-cane crushing mills that abound in this part of the island were "pranged" during the war, but repairs have been pushed.

Major industries are controlled by the Taiwan Provincial Government, and in Taipei an official declared that the output of its Taiwan Sugar Company had risen 398 percent since 1946. That postwar year was rock bottom,



A Taiyal Housewife's Marriage Mark Extends Her Smile from Ear to Ear

"Wedding band" and tribal forehead mark are tattooed with a substance like lampblack, obtained from burning oily nuts (page 155). This good-natured Chikontai woman dries filaments of home-grown fiber for use as the warp in weaving festival attire. Ramie is often grown for this purpose (page 147). Like those of the girl and young bride at right, her everyday clothes are of factory-made fabric brought from the outside world. In accordance with tribal custom, she has parted with two upper teeth (page 153).

however, and production still is far below the prewar level.

Most industries and cities get their light and power from the Sun Moon Lake hydroelectric plants, pulsing heart of Formosa (page 168). This lofty lake is a tourist resort, but the plants themselves are closely guarded and soldiers warned the photographer away.

Here the Generalissimo had one of his mountain aeries, alternating his residence between Sun Moon Lake and sulphur-smelling Tsaoshan, hot-spring resort in the mountains north of Taipei.

Formosa Faces an Uncertain Future

On a day of alternate sun and rain we jeeped among the dead volcanoes that look down on Tsaoshan. In a smelly, yellowish valley workmen were extracting yellow crystals from sulphur-laden waters. On the moun-

tainsides grew tiers of tea shrubs and orange trees. When we stopped at a roadside inn, a phonograph struck up "Anchors Aweigh" and "The Caissons Go Rolling Along" in our honor.

Over a steep overgrown road we drove to the crest of a grass-covered mountain. No maps showed this road, a secret one used by the Japanese in wartime. Far below lay the capital city, in the wide, shallow valley of meandering rivers, the Tanshui and Chilung. Beside the latter, road and rails ran toward Chilung, the capital's port.

What did the future hold for this island, scene of a bloody postwar revolt, refuge of Nationalists, goal of Communists, prize coveted again by Japan, lying squarely between United States bases in the Philippines and Okinawa? Across the green land the rivers wrote great silver question marks.

So Much Happens Along the Ohio River

By FREDERICK SIMPICH

With Illustrations by National Geographic Photographer Justin Locke

I'VE been on the Amur, the Amazon, and the Río de la Plata; on the Tigris, Thames, Nile, Rhine, Euphrates, and Ganges; on the Yangtze, the Yellow, the Pasig; on all America's great streams; even on the River Jordan, from Galilee down to the Dead Sea. But I've never had a river trip before like cameraman Justin Locke and I have just made down the singularly fascinating Ohio. It's full of surprise and the unexpected!

From where the Ohio forms, at the confluence of the Allegheny and Monongahela Rivers at Pittsburgh (page 189), it flows south and west for 981 miles, to where it joins the Mississippi at Cairo, Illinois (map, pages 180-181). This noble stream's rich basin covers some 200,000 square miles, is home to some 20 million people, and includes 150 cities of more than 10,000 population.

Up and down this historic Ohio, Locke and I flew in planes. Along its winding course we drove in cars, and crossed it on old-fashioned ferries. We rode its powerful towboats that push gigantic barges of coal, new automobiles, oil, sulphur, steel, and other bulk cargo.

We rode its excursion steamers (page 210) and visited with theatrical folk who sing, dance, and play melodramas on its glittering showboats. We spent days in pilothouses with veteran skippers and ate many meals with deck hands, harking to their Munchausen river tales.

We talked with folks who live along its kaleidoscopic banks, from soap kings and steel barons to bankers and shanty-boat idlers—who act as if any garden truck growing near the river's edge, or any foolish frying chicken that ventures too close to the water belongs to them.

A Mysterious Inscription

Always, the unexpected. If Robinson Crusoe was upset when he found Friday's footprints in the sand, think how astonished that young Beale boy was at a mysterious inscribed lead plate he found in the mud while swimming near the Kanawha River. It was one of a half-dozen buried along this river in 1749 by the French explorer, Céloron de Blainville (Bienville).

Blainville planted them to prove he'd been here, and claimed this land for his king—just as the sons of Frenchman Pierre La Vérendrye

planted a similar plate near Pierre, South Dakota, in 1743. That plate lay on the wind-swept Dakota hills for more than a century and a half, till schoolgirl Hattie Foster found it.

This whole valley is dotted with oddly formed earthworks left by the Mound Builders, American Indians who built mounds for burial, defensive, and domiciliary purposes.* At Turpin site, near Cincinnati, Locke made pictures of scholarly grave robbers, busy with picks and whisk brooms, juggling the bones of men long dead in the name of science.

In centuries to come, maybe others will investigate the tombs at Arlington National Cemetery, or dig in that old Boston graveyard to learn the shape of the skull of Mother Goose!

From Stone Age Tools to Steel

Farmers hereabouts sometimes plow up smoothly polished stone tools made by these Mound Builders. By odd coincidence, men still make polished tools here; but they're machine tools now, made of steel, and in Cincinnati has grown up the greatest machine-tool-making trade in the history of civilization.

And this river, where the Mound Builders launched their canoes, has become the busiest cargo-hauling stream in all our 28,000 miles of navigable inland waterways (page 188).

For smoky leagues below Pittsburgh, factory chimneys now punch the dirty sky where once grew tall forest trees.†

"Smoke!" snorted a coed from Hiram College, Hiram, Ohio, one of a troupe with whom I had dinner on the showboat *Majestic* (page 179), then playing at Wheeling. "Besides sweeping up after every show, we girls do our own laundry. In one sudden squall the clothesline on our top deck broke and all our clean clothes blew away. We make our own beds, too, but every night that smoke settles down like fog. We get black!"

Her class in dramatics chartered this boat for the summer. In the company were 29 boys and girls, directed and chaperoned by

* See, in the NATIONAL GEOGRAPHIC MAGAZINE: "Indians of the Southeastern United States," by Matthew W. Stirling, January, 1946; and "Indian Village of Baum (Ohio)," by H. C. Brown, July, 1901.

† See "Pittsburgh: Workshop of the Titans," by Albert W. Atwood, NATIONAL GEOGRAPHIC MAGAZINE, July, 1909.



Robert Higgins

Touring Home State Ohio, Senator and Mrs. Robert A. Taft Pause for a Chat with Reporters

The Taft family has played a prominent part in national and international affairs since 1838 when pioneer Alphonso Taft came to the Ohio Valley (page 211). Senator Taft is the son of William Howard Taft, only American to be both President and Chief Justice of the United States. At Batavia, in Clermont County, the Senator and his wife held a "porchside chat" with news correspondents. Left to right are Russell McCormick, *Cincinnati Post*; Mrs. Martha Taft; Senator Taft; Bert Andrews, *New York Herald Tribune*; Glen Bayless, *Business Week* (standing); and Richard Forster, *Cincinnati Times-Star*.

Prof. Robert I. Pearce and his wife, of the Hiram College faculty. By this stage work students gain college credits.

After dinner we went up on the top deck, to watch student-actor Bill Reynard pound out *A Bird in a Gilded Cage* and other hoary ballads on the steam calliope.

Then the troupe's brass band took over with lively airs, and people swarmed down the riverbank, onto the showboat, to hoot, hiss, and howl at the villain in *The Drunkard*—all correct behavior at that popular old play-with-a-moral.

A Pioneer Highway

Hordes of cross-continent motorists know Wheeling because it stands on U. S. Route 40, the pioneer "National Road."

This was the first big highway Uncle Sam built west; it led, later, to Indianapolis and St. Louis, and now runs to California. Day and night, in pioneer times, it was crowded

with covered wagons, mounted horsemen, mail carriers, soldiers, and home seekers. Many walked, some driving livestock.

Wheeling people still walk, but not behind tired cows. Now they walk over country clubs or golf links, or about the breath-taking beauties of Oglebay Park.

In sumptuous suburban homes—far enough out in hills to avoid factory smoke—live old families; some have been in business here over 100 years. They, too, tell surprising tales about their river.

Early in 1811 Wheeling had a "pumpkin flood." Then thousands of pumpkins, washed down from farms upstream, scattered all over the town.

One Wheeling zero flood hour came on a gloomy March day in 1939, during the "Musical Steelmakers'" Sunday afternoon broadcast from high, dry Capitol Theater. Though worried by grim warnings of rising flood, 3,000 people were there.

Then a young soprano on stage, with the zeal of old-time revivalist singers, put her appealing voice into *River, Stay 'Way from My Door*. Spellbound, the great audience listened. Maybe the river did, too; anyway, sullenly but slowly it receded.

But it's the busy Ohio's value as a means of transport, rather than its history, which absorbs modern Wheeling: Here one giant operator of river barges is the powerful Wheeling Steel Corporation.

Its slick towboats look like "yachts of tomorrow" (page 183). It ships steel by water from here to Minneapolis, Chattanooga, or Houston, and overseas for the Thames or Tasmania. Odd items have been steel for Panama Canal locks and vaults of the Mitsui Bank in Tokyo. It has made barbed wire for ranches from Texas to Australia, and nails for lumber camps in Amazonian rain forests.

Commercial geography? Listen: This plant buys tin from Singapore; here it makes tin plate, which is thin sheet iron coated with tin, and ships that to Honolulu, in the Pacific, where tin cans to can pineapples and juice are made. Some of that same canned fruit product comes to Wheeling grocery stores, which means a second trip here for the tin.

Even that yellow smoke from its coke ovens is as full of tricks as Aladdin's lamp. From it come every color, flavor, and odor you can name. From it chemists help make TNT, paint, moth balls, carbolic acid; phenol for plastics, nylon for synthetic silk; rubber; even artificial sugar.

Deer swim the river. Pioneers shot them and rafted salted venison to New Orleans.



"Say, Mister Clown, Is That Your Real Face—No Foolin'?"

Little girls of Ravenswood, West Virginia, venture to the water front as showboat *Majestic* ties up. After the parade, to draw a crowd, the showboat's lusty steam piano plays *Little Annie Rooney* or *Over the Waves*. Its behemoth-like voice is audible miles away (page 177).

Deer, to get salt, hung around deer licks along the Ohio; early settlers got salt by evaporating water from salt springs.

Fabulous Salt Beds Underlie Riverbanks

Now fabulous industries grow from vast new-found rock-salt beds that underlie the upper Ohio Valley. For years men bored holes hereabouts for oil and gas. Exploring deeper, they hit this 120-foot bed of salt, at a depth of 6,800 feet. It is extracted now as brine, by forcing water down into the wells.

By electrolytic process, this is separated into various chemicals, especially chlorine.

This helps make vitamin pills, dyes, sulfa drugs; also, it is used in purifying water.

How versatile salt is! I paid my way into a show in Somaliland with a chunk of rock salt. At the dirty tent door was a barrel into which you dropped your "ticket"!

One ton of salt is worth about \$20. Think, then, what this astounding, more than 120-foot-thick Ohio Valley deposit is worth.

It's a newsreel of American life to sit up in the wheelhouse, binoculars in hand, and ride down the Ohio on a towboat. That's how I saw the upper river, aboard the *Neville* of the Union Barge Line. Capt. George McCulloch, my host, gave me his guest room—cabin and bath like ocean-liner quarters.

Through his "bull horn" loud-speaker the captain could yell at people on riverbanks. Once, passing a picnic party ashore, I took my hoarse duck call, made by the champion duck caller at Stuttgart, Arkansas, and "went like a duck" over that bull horn. It magnified the ducky voice till it sounded like frightful quacks from a drake big as a dinosaur—all to the huge delight of small boys at the picnic.

One day we saw a washtub, full of women's clothes and with a washboard standing in it, sailing gaily downstream. "What's the strangest thing you ever saw floating in the river?" I asked the pilot.

"That tub, I guess," he said. "Also, I've seen haystacks with chickens on 'em, houses, lumber, trees—and once we saw a fat sow, swimming. The boys roped her and sold her to a butcher at the next landing for \$30."

A "New Look" Chemical Plant

At Willow Island we passed the "new look" chemical plant of the American Cyanamid Company, more like the stately pleasure domes of a Persian palace than old-time factory architecture.

To see its famous River Museum we went ashore at Marietta, Ohio, oldest white settlement in Ohio, and first seat of government of the Northwest Territory.*

Its river relics, boat models, and fading documents reveal the saga of this great stream, just as Cairo's museum tells the story of Egypt. They showed us the model of one vessel built here more than a century ago to haul corn to Ireland during the great famine.

From Russell, Kentucky, and near-by Huntington and Kenova, West Virginia, coal moves in astronomical heaps. About old coal mines waste slate and mine refuse pile in drab, mo-

* See "Ohio, the Gateway State," by Melville Chater, NATIONAL GEOGRAPHIC MAGAZINE, May, 1937.



notonous ridges, bare and useless as Sahara sand dunes. At Huntington, too, is the giant works of the International Nickel Company, Inc., with voluminous output of Monel metal.*

At Ashland, Kentucky, we saw Government Lock 29, and the fine pool it forms. Ashland, with its rolling mills, Semet-Solvay coke plant, scrap-iron yards, and leather-belt factory, is the most important city in eastern Kentucky.

Hounds barked somewhere ashore in the dark as we passed Ripley, Ohio. "Same dogs that chased Eliza," joked a deck hand. "Here's where she crossed the ice, in *Uncle Tom's Cabin*."

At Parkersburg, West Virginia, the Little Kanawha flows into the Ohio. Here George Washington came in 1770, to locate lands awarded him by Governor Robert Dinwiddie of Virginia, for military service.† Here, too, one Robert Thornton claimed lands by "tomahawk entry"; that is, he just chopped notches in trees around the land he chose.

This town got fat from oil wells. Now it makes oil-field machinery, and Ames steam shovels, advertised as "the shovel that built America." This slogan is based on claims that Ames shovels, first made in Massachusetts, dug trenches at Bunker Hill.

Downstream is Blennerhassett Island. To this remote spot came that cultured Irish exile,

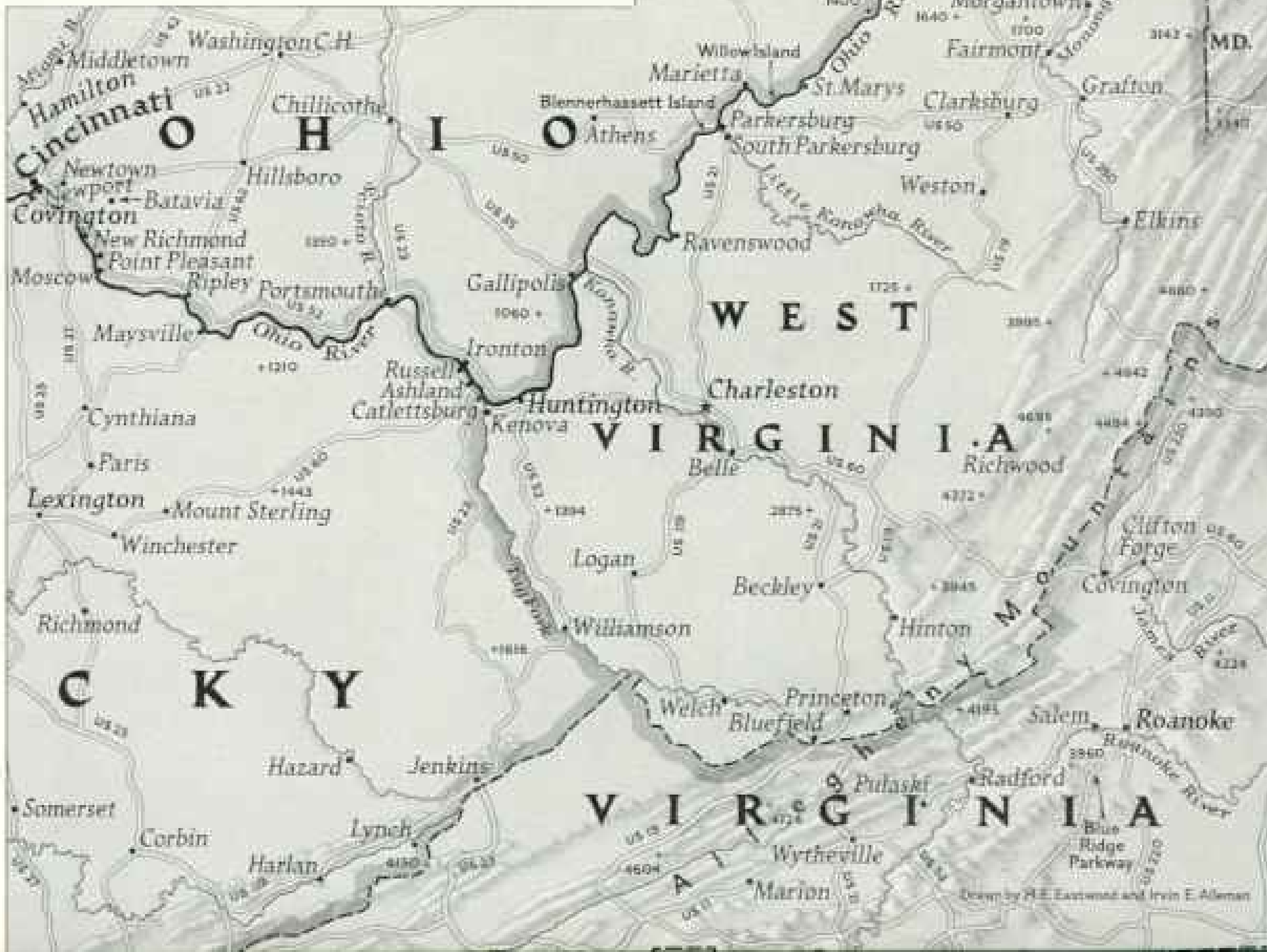
Harman Blennerhassett, to hide from his homeland's gossips after he had married his sister's daughter. Here he built his mansion, and entertained Aaron Burr.

A Contrast in Idioms

All signs of the romantic adventurer's once luxurious palace are now vanished. But some of Blennerhassett's furniture is preserved in the Campus Martius State Memorial Museum at Marietta.

* See "West Virginia: Treasure Chest of Industry," by Enrique C. Canova, NATIONAL GEOGRAPHIC MAGAZINE, August, 1940.

† See "Travels of George Washington," by William Joseph Showalter, NATIONAL GEOGRAPHIC MAGAZINE, January, 1932.



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

Though the Ohio Inundates Outlying Houses, Tell City Stands Safe and Dry Behind Its Walls

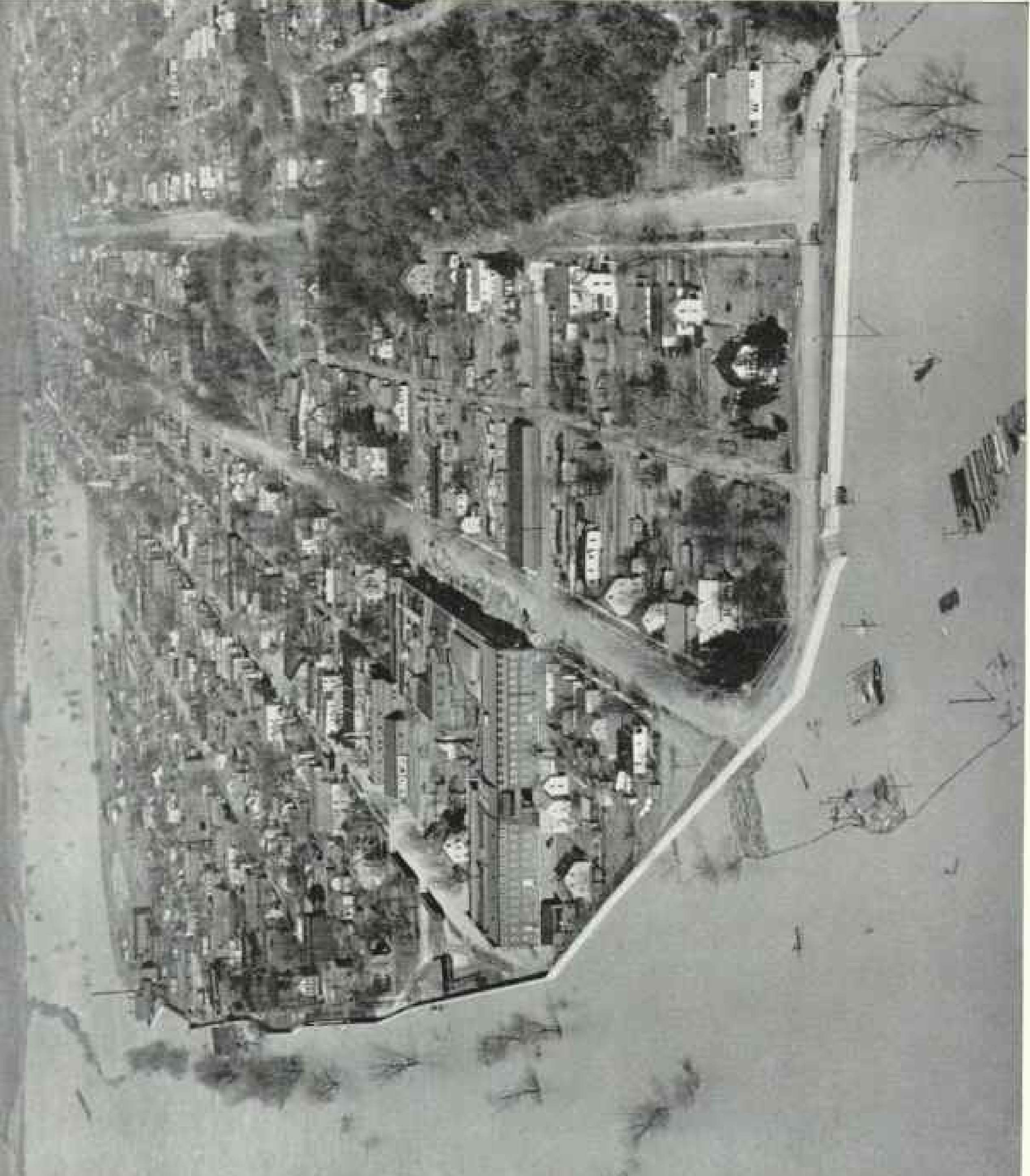
If the gates, through which streets lead, had not been closed, this Indiana town would have been nearly 4 feet under water in the March, 1945, flood.

In other less fortunate Ohio River cities flood damage has run into astronomical figures. Besides the danger of death from drowning and the damages to property, to clean up mud and slime and driftwood after big floods involves enormous cost and a lot of hard, dirty work. Sometimes dead animals must be removed from city streets.

Swiss, settling here, named the town for William Tell. Its merchants use an apple pierced by an arrow as trade-mark.

Liberty-loving citizens named streets Lafayette, Washington, Jefferson, etc. Showing respect for art and science, they named others Watt, Fulton, Humboldt, Schiller, Rubens, and Mozart.

Lafayette Courier-Journal

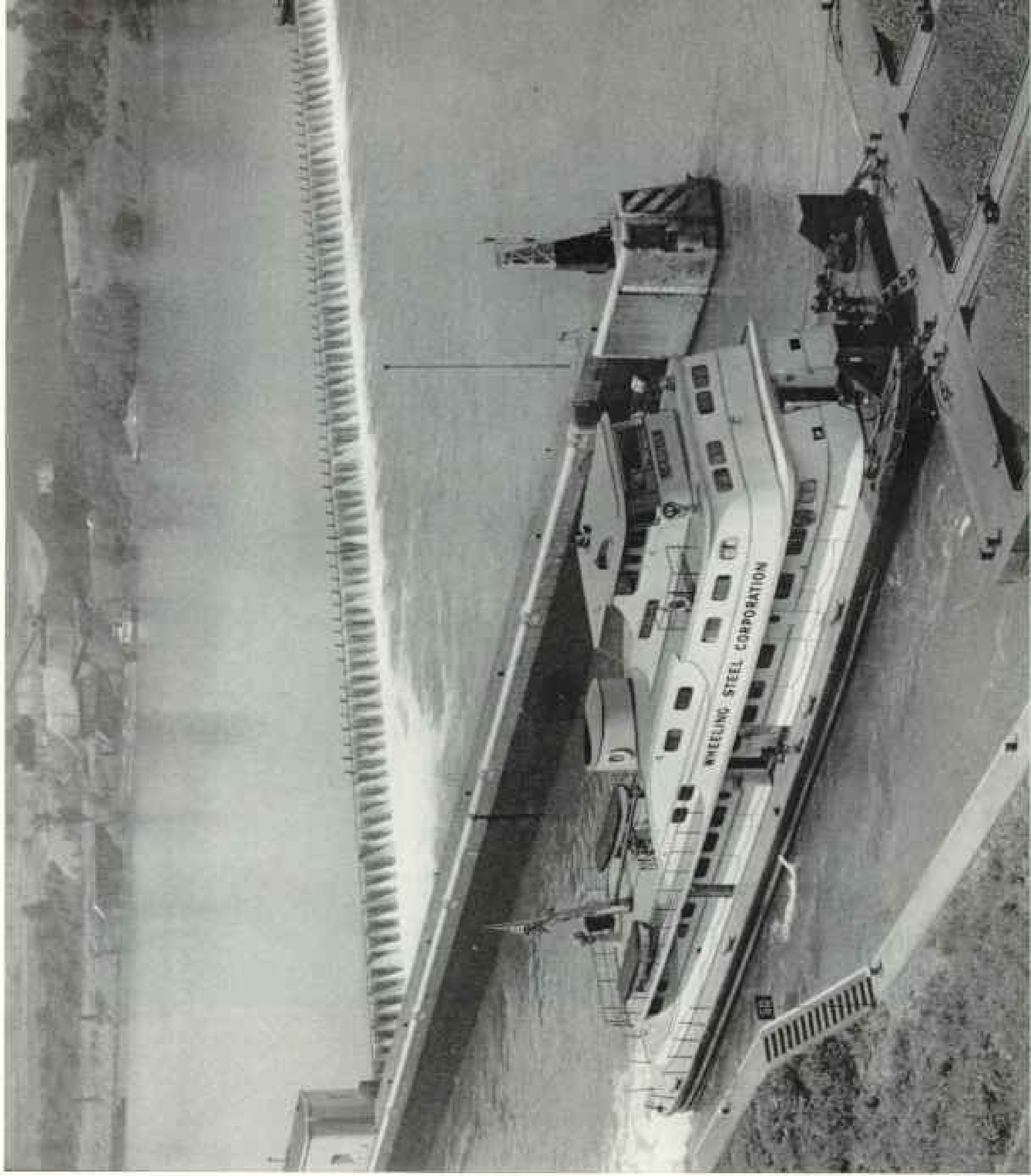


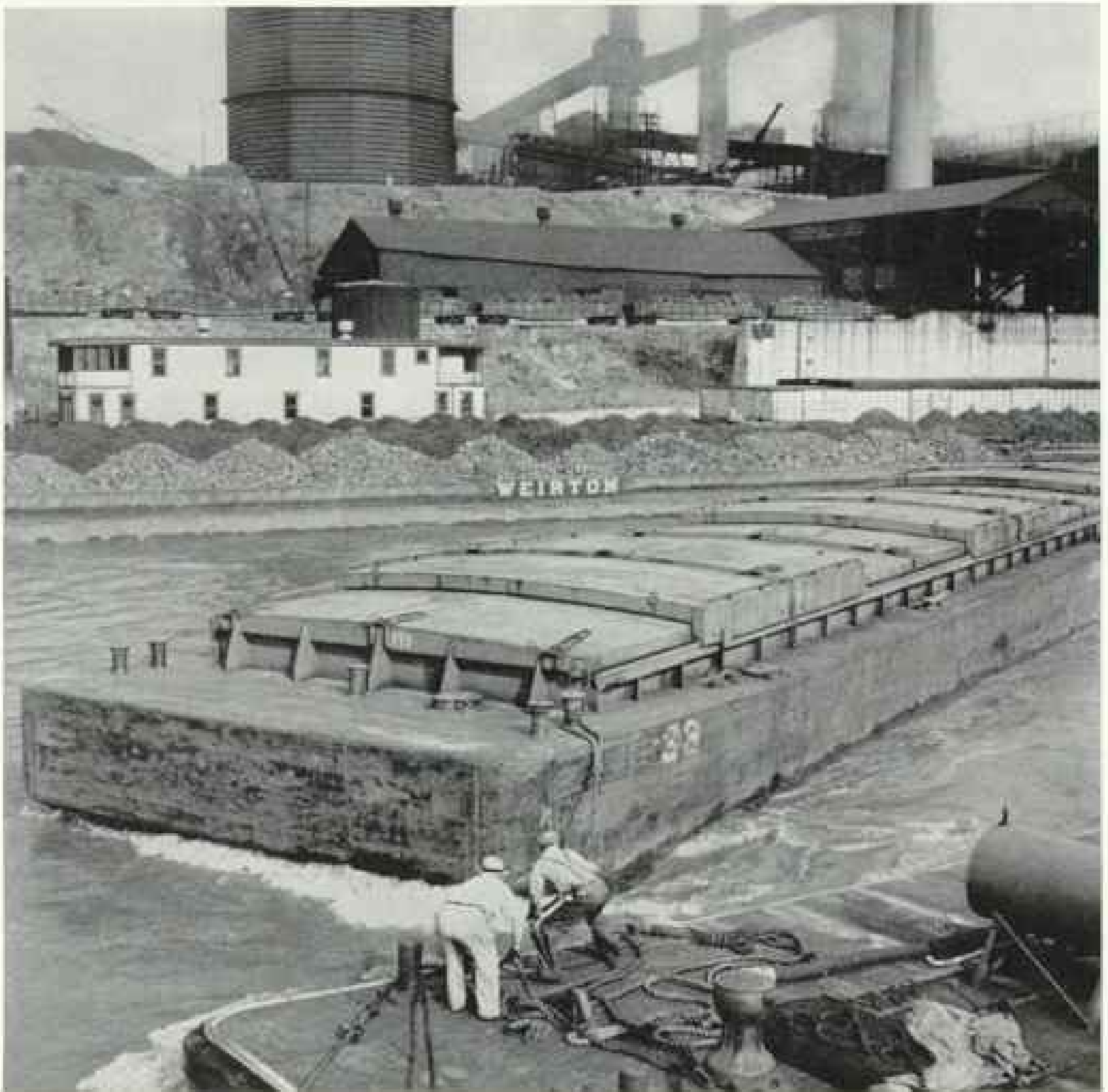
**Yachtlike Motor Ship
La Belle Pushes Her Coal
Barges Through a Lock
above Steubenville, Ohio**

Wheeling Steel's barge fleet moves mountains of coal from the Corporation's mines on the Allegheny to its steel mills on the Ohio; it also carries finished steel-mill products such as pipe, tin plate, roofing, etc.

This streamlined towboat has comfortable lounges, 11 staterooms, five bathrooms, a spacious dining room, and a modern stainless-steel kitchen. Two 500-hp Diesel engines turn the 145-foot vessel's screw propellers.

Slick, speedy, and ultramodern as these powerful towboats are, they still face the same dangers—sand bars, collisions, and explosions—that made steamboating such a high adventure in the halcyon days of Mark Twain. Radio, radar, lights, and channel markers have reduced these risks, of course; but still there are wrecks, men drown, and ships sink or burn.





Busham, from Standard Oil Company (S. J.)

"Watch Out—She's Coming Fast!" Cry the Crewmen as Their Towboat Picks Up a Barge

Skillful as a cowboy with a lariat, one deck hand has just tossed a line over the timberhead of the barge and is pulling it in at Weirton, West Virginia. Men must work fast, since such barges are heavy and hard to maneuver. Sometimes crewmen fall between barges and break legs or drown. Tows bound up or downstream drop barges, pick up others at landings, just as freight trains do from station to station.

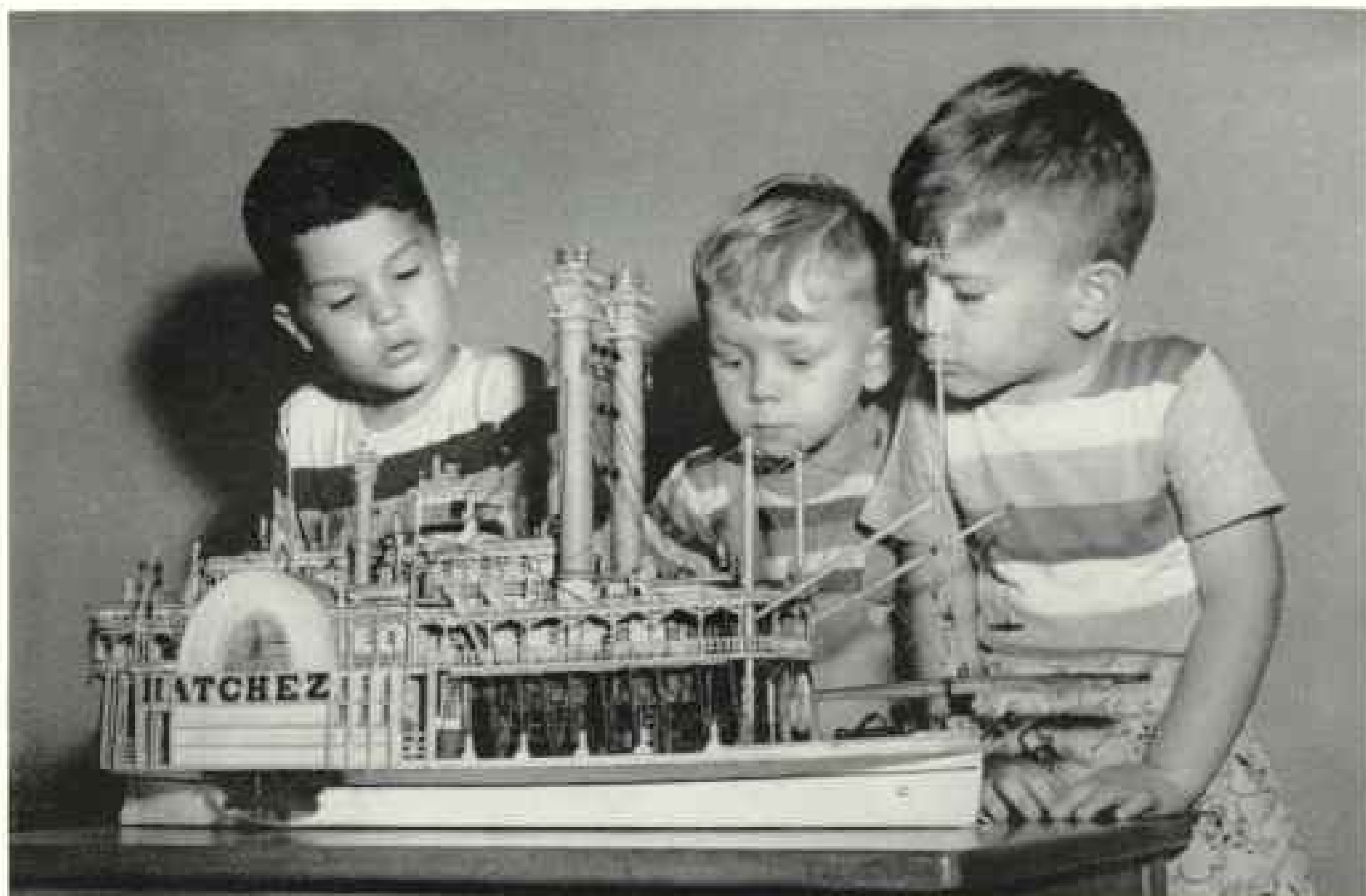
What struck me, crossing from West Virginia or Kentucky into Ohio and Indiana, was the difference in people's accent and idioms. On a Maysville, Kentucky, street corner one Saturday I heard a farm woman invite another to a Jesse James movie. "I'd sure admire it," answered the other. "But I got to get home and pull seven cows." I repeated that phrase to an Ohio schoolteacher; she didn't know that to "pull" a cow means to milk her.

Men born on riverbanks tend to stick there, though they may move up and downstream, from one river town to another. These river

towns breed a river-going group, too, just as seaports spawn sailors. Pilots told me, also, that rivermen usually marry river-town women.

The flood of 1937, which the late Col. Albert W. Stevens and I saw from the air, when all those whiskey barrels broke out of distilleries below Cincinnati and lodged in cornfields miles downriver, nearly ruined many small river towns, such as Moscow, Ohio.*

* See "Men Against the Rivers," by Frederick Simpich, NATIONAL GEOGRAPHIC MAGAZINE, JUNE, 1937.



Fascinated Small Boys Study a Model of the Famous Steamboat *Natchez*

The historic race between this palatial packet and the *Robert E. Lee* still lives in song and story. On June 30, 1870, the two steamboats left New Orleans for St. Louis in a race that was followed the world around. Neck and neck they pulled up the Mississippi, greeted by cheering river folk along the way. When the *Lee* reached St. Louis first on the Fourth of July, so great was her reception that she nearly capsized from the throngs crowding her decks. This model, built by the mate of the *Natchez*, is on display at the University of Cincinnati (page 211).

In near-by Point Pleasant is the cottage where Ulysses S. Grant was born; it holds his Bible, cradle, West Point trunk, and cigar case.

New Richmond is just downstream. Here that same flood wrecked 225 homes and swept 45 down river. Judge John W. Haussermann, "gold king of the Philippines," lives here. I knew him in Manila, where he made his fortune from Benguet Consolidated Mining Company. He telephoned from Baguio, Luzon, when he heard of the flood, to offer aid to this, his beloved old home town.

We rode under a magnificent suspension bridge at Portsmouth, Ohio; it connects that wealthy railroad center with Kentucky (page 192). From vast Norfolk and Western Railway shops, from steel mills, and factories that make paper boxes, shoes, and stoves, it has a fat pay roll. Like some other river towns (page 182), its concrete flood wall gives it a fortified look.

Mound Builders left their works here. Sight-seers also ask, "Where is the Julia Marlowe home?" It's an old house on Front Street; its first floor was once a saloon, run by the

actress's mother. Julia Marlowe (real name Sarah Frances Frost) lived here as a child, went on tour at twelve with a *Pinafore* company, later achieved world-wide fame in Shakespearean roles.

At Cincinnati we tied up beside a tow, just up from New Orleans with sulphur.

Dams Turn River into String of Lakes

After summer rains, boys build dams in rivulets to make little lakes. Army Engineers, on a bigger scale, do just that in the Ohio and its tributaries.

Maj. Gen. J. C. Mehaffey is Ohio River Division Engineer; with that river, and its main tributaries, he rules over 3,165 miles of waterways. This system threads through 14 States; on it are built 138 navigation locks and dams, 46 of them on the Ohio. They help balk floods and assure flow of commerce.

By clever means, all these Ohio dams but four "lie down" when the river is high, and boats sail over them. At low water the dams, on hinges, are stood up again, by manipulation of timber wickets. This turns the river into a string of "navigation pools." Then, to pass

from pool to pool, up or downstream, boats go through locks (pages 183 and 187).

The river used to get so low, before pools were formed, that boats stuck on sand bars. "I remember," said Capt. William S. Chandler, veteran pilot, "seeing farmers ford the river by horse and buggy just above Madison, Indiana.

"Then our boats drew only 3 feet; today craft of 9-foot draught are common; because of growth in freight hauling, engineers now are studying a 12-foot channel.

"We were informal as milk-wagon drivers in the old days," said Chandler. "We'd stop wherever a farmer ran out and waved his hat or a lantern, if it was dark; we'd answer with a whistle toot, and run in to the bank. From among the willows a man might stagger out under the weight of a live calf, a shoat, or a basket of peaches. In ten minutes we'd be off again.

"Often," added the veteran skipper, "we'd stop at 'hay landings,' such as Markland, Indiana, and take on a pile of hay—almost as big as our steamboat—for some city livery stable. We also ran Sunday excursions, with a chicken dinner thrown in, all for 50 cents!"

Barges and Towboats

Today's twin-screw, Diesel-powered towboats push 15 or 20 barges, which carry a dozen times as much freight as could ride a steamboat of the type Mark Twain steered (page 184). Downstream, they take steel, tin plate, rails, pipe, nails, bridge material, or coal, and bring upstream oil, gasoline, sulphur, or sugar.

Famed "Big Mamma," or the *Sprague*, was for 45 years the largest towboat inland waters ever saw. Captain Chandler, once her pilot, recalls handling tows up to 60 barges, each averaging 900 tons of coal. That was before locks were built. What he worried about then was making the channel between bridge piers without a smashup. And there are 53 bridges on the Ohio!

Hundreds of wrecks still lie on the river bottom. Cleaning out those that impede traffic is a job for Army Engineers. Despite buoys, lights, and navigation markers put out by the U. S. Coast Guard Service, this is still a tricky river.

In 1942 the towboat *G. W. McBride* wrapped itself around a bridge pier at Cincinnati, sank, and drowned 16 men. In 1947 the steamer *Island Queen* blew up and burned at Pittsburgh, with 20 lives lost. No wonder you find fatalism and superstition among rivermen.

A man sank on the Ohio River the day I

got to Newport, Kentucky. They couldn't find him. "Get one of his shirts," said an old river rat, "and throw it in where he went down." They did. The shirt floated downstream; suddenly stopped. "It just caught on a snag," scoffed some doubters. Anyway, police let down their grabhooks and brought up the dead man.

The true explanation probably is that the same eddy that caught the shirt had also pulled the man down.

All rivers seem to spawn superstition. I saw Chinese on the Hai at Tientsin refuse to aid a man who fell overboard, saying river devils had claimed him; hence, bad luck to interfere. If you're rowing on the Tigris with your wife and a fish jumps into your skiff, the boatmen grin and congratulate you. A sign, they say, that you will have a son.

From Cincinnati we went down to Cairo, Illinois, by the passenger boat *Gordon C. Greene*.

Again I haunted the wheelhouse with skipper and pilots. Using searchlights, we ran at night. When my colleague, Melville Bell Grosvenor, made this trip downstream on an LST his craft tied up at night. When they lay under overhanging riverbanks, cows and pigs came, stared curiously down at them, bawled and grunted.

During the war more than 1,000 deep-water vessels were launched from Ohio River shipyards for Army and Navy use (page 198).

This three-day trip to Cairo cost \$50—floating hotel rates. Rain came in torrents at Louisville; so nobody went ashore. Happily, it cleared when we went through locks at near-by Falls of the Ohio, and we made pictures.

Paducah a Walled City

Only town we stopped at in daylight was Paducah, Kentucky. I'd last seen it after bad floods. Then skiffs tied up at Irvin S. Cobb Hotel; and a drowned mule lay on a man's porch. Now Paducah, like ancient Damascus or Baghdad, is a walled city. When I lived at Baghdad, we shut city gates at night to keep out camel-stealing, man-killing nomads. Paducah also closes its gates; but to keep out rushing waters, not robbers.

Near Paducah, too, the Tennessee flows into the Ohio. Above its mouth rises the giant Kentucky Dam, forming a magnificent lake about 185 miles long.

At Cairo we said good-bye to the *Greene's* singing, bridge-playing guests. I returned the guitar I had borrowed from a Mexican boy in the ship's orchestra, and went ashore.



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Kolorchrome by Justin Locke

Lock Tenders Close Gates Behind the Stern-wheeler *Titan*, Bound up the Ohio

From Pittsburgh all the way downstream the Ohio River is controlled by locks and dams built by Army Engineers. The series of "pools" formed upstream from the dams, gives ample water for all-year navigation.



This Streamlined, Triple-deck Barge, Loaded at Cincinnati with New Cars and Trucks, Can Carry Up to 500 Vehicles at One Time
Here the vessel passes downstream, under the Central Bridge, bound for ports on the upper Tennessee River, big tributary of the Ohio. Cloud-scratching Cincinnati business center rises in background. Left to right: Union Central Life Insurance Building, Carew Tower, and white-capped home of Cincinnati Gas and Electric Company.

Pittsburgh's Golden Triangle Glitters at Night Like a Fairy City. Here Allegheny and Monongahela Rivers Meet to Form the Ohio
Navigation is heavy on both these Ohio tributaries, especially on the Monongahela (right). Tremendous downstream cargoes originate in these headwaters, in what Army engineers know as the "Emsworth Pool." At the tip of the peninsula stood Fort Duquesne. French troops built it in 1754 to control the Forks of the Ohio.

© National Geographic Society

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Reproduction by Justinia Laska





This Confused-looking Contraption Washes Dust from Blast Furnace Gas

From furnaces, unseen here, gas descends through the "downcomer" pipe and into the gas washer at left. This scrubbing prevents dirt from clogging pipes, combustion chambers, and stove flues in a Mingo Junction, Ohio, steel plant.



© National Geographic Society

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Kodachrome by Justin Locke

▲ Such Oxen Plowed and Hauled for Early Ohio Valley Settlers

This West Virginia yoke, in strange contrast to modern tractors, took part in a centennial celebration at St. Marys, on the Ohio. They drew lively attention from visitors, few of whom had ever seen these vanishing beasts of burden.

▼ Making and Decorating Pottery, One of Man's Oldest Arts

At the Harker Pottery, East Liverpool, Ohio, wheels apply muddy brown edges to dinnerware. This brown turns to bright gold in the kiln. Use of the wheel, age-old potter's tool, enables operators to apply colors more evenly.

Kodachrome courtesy Theodore E. Hill & Co.





A Modern Tom Sawyer and Huckleberry Finn Envy That Pilot Who Sits Proudly at His Wheel and Pulls the Whistle Cord

Downstream, under the suspension bridge at Portsmouth, Ohio, glides the stern-wheeler *John W. Hubbard*. She pushes her tow ahead of her. Such old-style craft are being largely superseded now by twin-screw, Diesel-driven towboats.

In Crash Helmets and Life Belts Speedboat Demons Tune Up Engines for Fourth of July Races at St. Marys, West Virginia

Few rivers have staged more sheer adventure and drama, or carried such motley craft. Indian canoes, pioneer flatboats, palatial packets, Civil War gunboats, World War II's landing craft, and latest twin-screwed Diesel towboats—the Ohio has seen them all.

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Photographs by J. J. Lecher





Kappa Kappa Gamma Girl, in Polka-dot Scarf, Is Now a Powers Model

She is Ann Andersen, pictured here before the Student Union at famed University of Cincinnati. In a campus museum are shown newspaper files from 1793, daguerreotypes, and letters and journals of the pioneers.

The Ohio and the Mississippi flow past Cairo, on its east and west flanks (page 199). Completely flood-walled, it hasn't been drowned out in decades. Standing as far south as Tunis, Africa, it is a lush cane and cotton center, and it plays golf at the Egyptian Country Club.

Here are two major highway bridges, one crossing the Mississippi to Missouri, and the other over the Ohio into Kentucky. Here, too, the Illinois Central Railroad crosses the Ohio on a fine bridge which is also used by the Gulf, Mobile & Ohio Railroad. Train, truck, bus, and automobile north-and-south traffic is heavy.

On the water front are a few old red-brick buildings dating from antebellum times when this was a busy port of call for the packet boats. At one time in a housing shortage many people lived on houseboats. There was even a floating hotel, and one big floating store which held merchandise as well as a bakery, butcher shop, barber shop, and even a "daguerrean artist."

In 1854, 3,798 steamers called here, and in one year more than 60,000 cattle rode up the river to Cairo from Texas.

Gen. U. S. Grant, early in the Civil War, had his headquarters here. Gunboats assembled here for duty in that fratricidal strife; and from here Grant's forces were sent out to fight the Battle of Shiloh.

"Cairo is a brisk town . . .," said Mark Twain in his *Life on the Mississippi*; but what Charles Dickens said about Cairo in his *American Notes* need not be repeated.

By both car and plane now, Locke and I worked our leisurely way back upriver.

Henderson, Kentucky, on high red bluffs, faces a mile-wide Ohio. During his eight years here Audubon, the naturalist, kept a store near his frog and turtle pond; later he ran a mill in the area. Today there is a bird refuge near here in his honor (page 201).

The front door of historic Lockett House still shows dents made by gun butts when Union soldiers tried to gain entrance. A romantic tale says they were called off by their captain, when he learned Mrs. Lockett was a former sweetheart.

Evansville, Indiana, near Henderson, links bustling north with the more leisurely life of rural Kentucky. Its busy Mead-Johnson river, rail, and highway terminal handles mountains of freight. From here once went flatboats of pork, furs, lead, salt, powder, etc. Today, from more than 200 factories, come refrigerators, cranes and steam shovels, bricks and tile, baby food, autos, bottle caps, uniforms, brooms, and paint.

Once our papers carried a strange story that came out of Rockport, river hamlet southeast of Evansville. There, from the mud, the skipper of a dredge hauled up a man who seemed turned to stone.

Woman Said Petrified Man Was Her Husband

That was back in 1902, not so long after P. T. Barnum's adventure with the famous Cardiff Giant. This "petrified man" also became a museum attraction. He wore a wedding ring. One widow claimed him as her long-lost husband who had, she said, been slain and thrown into the river. She went to court to try to get the ring.

Years later the dredge skipper confessed he had the "petrified man" secretly made in a stonecutter's shop, sunk in the river, and then "discovered" it.

At Owensboro, on the Kentucky shore, the 104-year-old Planters Hotel preserves a faded register with signatures of Jenny Lind and other famous folk. This is a busy tobacco-sales and factory center. It makes whiskey and light bulbs; lost some prominent men at the Battle of Tippecanoe; and saw its share of Civil War raids and skirmishes.

In the old courthouse at Brandenburg, a hamlet upstream from here, are records hinting at pioneer social ways. One item says that though a poor boy named Henry Dawes is apprenticed to a Mr. Turnstall to "learn the mystery of carding and spinning," his master is bound to give the boy meat, drink, and clothes, and see that he is taught reading, writing, and the "rule of three."

It was at Brandenburg that Confederate raider Brig. Gen. John Hunt Morgan commandeered two steamboats to ferry his men across to Indiana. From there they set off on those historic "Morgan's raids."

Jeffersonville, Indiana, was nearly all under water in the 1937 flood. Here the Army maintains an enormous Quartermaster Depot. About 2,000 steamboats were built here, some for Yukon River trade. From here crowds of people cross the river bridge every day to work in Louisville, Kentucky.

Unique, in prison history, was Indiana's first penitentiary, built here and leased out to private operators. Its first lessee was killed in the Alamo, at San Antonio, Texas, along with Davy Crockett. Now it's a soap factory!

Hoosier history began along the river in this quiet region of singular beauty, where farmers still eat groundhogs, turn hand grindstones to sharpen their scythes and axes, and pour rain water over wood ashes, in a hopper, to get lye



"Swat It, Sis! You Can't Miss a Ball That Big!"

But it's only a standard-size softball, hung on a thread so the camera could create this illusion. Batter is Miss Nancy Fuller. Thousands frolic and play games on Sundays and holidays in Cincinnati's vast parks.

for soapmaking. Nailed to fence posts, at one chicken farm, we saw eight dead hawks and a dead crow. "I killed 'em and hung 'em up to scare off any more," said the farmer. "But it don't work. Still they come and grab my chickens."

Abe Lincoln lived hereabouts, split rails, rafted cargo down to New Orleans, and read books by firelight. His mother, Nancy Hanks, died in southern Indiana.

At Madison, Indiana, I talked with the *Courier's* editor, who showed me his paper's 100th anniversary edition. Early as 1828, Madison had a paper mill. Some Hoosier weeklies had grotesque names: *Coon Skinner*; *Broad Axe of Freedom*; *Grubbing Hoe of Truth*. Till 1830, Madison was this State's richest, biggest city.

Visitors drive leagues out of their way to

see Madison's James F. D. Lanier Home, one of the most scenic mansions that overlook the whole length of the Ohio (page 203).

Rabbit Hash; Population, 30

Rabbit Hash, Kentucky, population 30, has no railroad, no bridge, no ferry. "No, we're *not* a dying town," says the man who runs the country store and who sold me a wild-animal trap. "We got 30 people now, same as we had generations ago. . . . Our odd name? They say, after a high flood, all we had left to eat was tired rabbits that crawled up the riverbank. From cold left-over rabbit we made hash; hence, Rabbit Hash."

Down the river from here is Vevay, Indiana, founded by Swiss wine makers. In her cellar a fine old lady of French-Huguenot descent (now Mrs. James S. Wright) showed



In Cincinnati's Taft Museum the American Delphinium Society Stages a Flower Show. Great paintings hang now in this former home of the Charles Phelps Tafts. Center, *Mrs. John Weyland and Her Son John*, by Sir Joshua Reynolds; smaller portraits are by Sir Henry Raeburn (page 211).

us a giant wine cask, installed in 1817. Hung on her parlor wall is a framed certificate stating that one Isabelle Ramsey Todd was a studious, well-behaved pupil. Isabelle was a cousin of Mrs. Abe Lincoln, and was Mrs. Wright's grandmother.

"When Morgan's raiders threatened us in 1863," said Mrs. Wright, "my aunt took a basket dinner down to our home guards' camp. For a keepsake, she scooped up some beans and put them in this bottle. Here they are. We've had them 87 years."

One Vevay pioneer's will said not to pay more than \$2 for his coffin, and to let mourners at his funeral drink all his stock of wine.

Keeping River Water Pure

Everybody thinks his own pet river the "most beautiful." You hear that about the

Hudson, the upper Rhine, many streams. Various honest writers have called this Ohio most beautiful. Even Charles Dickens admired it! But now it's less clean and pure than when the French called it "La Belle Rivière."

Into it many cities dump their sewage; and waste acids and effluents from mines, tanneries, distilleries, and soap, steel, and chemical plants. Upstream from Vevay, near Lawrenceburg, you see an example of this. There drainage from a distillery turns a once-sparkling creek into a ditch of dead water, so foul not even tadpoles live in it.

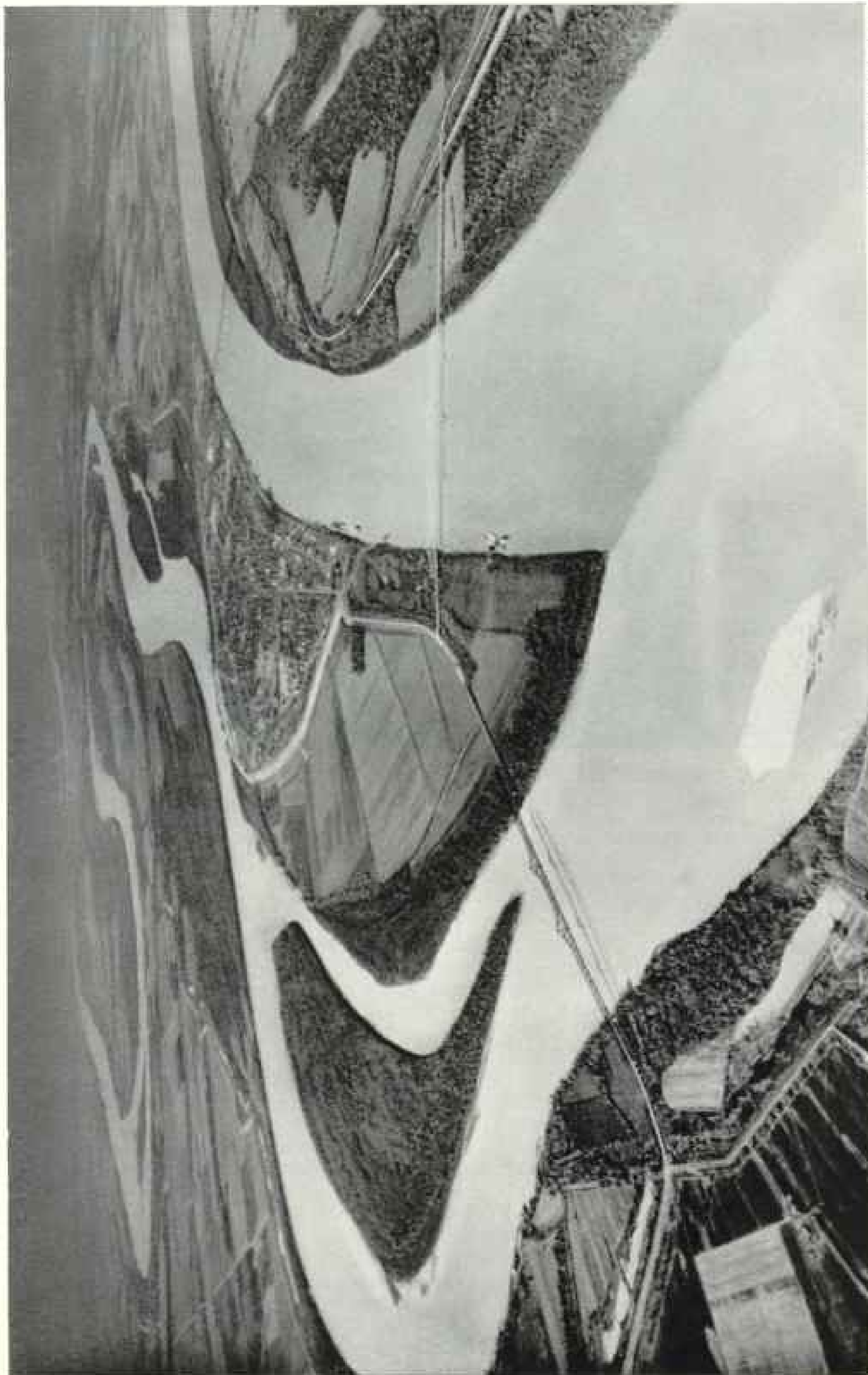
"Downstream from factory outlets," a skipper told me, "I've seen crawfish crawling out of the water to escape the acid; and I've seen fish 'piping' with their snouts half out of the water, trying to get a fresh breath."



U. S. Navy, Official

Crowds Cheer and Men on Her Deck Grab the Rails for Safety as an LST Is Launched Sidewise at Pittsburgh During World War II

More than a thousand naval vessels, from 127-foot LSTs to tiny landing craft, were built on the Ohio River. This huge Landing Ship, Tank, throwing up geysers at her launching, is almost ready to cruise 1,550 miles downstream to New Orleans and then proceed to the front. Her crew of Naval Reserve officers and men, many of whom had never been to sea, got their first shipboard training as the craft was ferried downriver to salt water.



Cairo Association of Commerce

The Ohio, Flowing in from Upper Right, Pours into the Muddy Mississippi, Left, a Short Distance Below Cairo, Illinois

That white line enclosing Cairo is the huge earthen levee which, since 1858, has saved the city from disastrous floods. From the earliest days of American history, this city squeezed between two mighty rivers has played an important role. First, Marquette passed this way in 1673; then La Salle and George Rogers Clark, Gen. Andrew Jackson camped here in 1813, and Gen. Ulysses S. Grant used the city as a base to capture Forts Henry and Donelson and then Vicksburg.



In Sunbonnets and Stovepipe Hats Amused St. Marys Folk Share in Their Centennial

Special music was written for this pageant. Visitors also joined in the singing of folk songs popular in the days of *Oh! Susanna*; there were square dances, too, with callers and old-time fiddlers. Long ago Governor Patrick Henry of Virginia granted the land on which the West Virginia town now stands. This happy group—later to act its part in the 1849-1949 historical pageant—laughs at the antics of ancestors in the days of coonskin caps, log cabins, and oxcarts (pages 191 and 204).

He showed me a photograph of a solid raft of dead fish.

Some river cities chlorinate their drinking water so much that people complain it "tastes like medicine."

In revolt against this stream pollution, citizens in the Ohio Basin work now in grim earnest to clean up dirty waters.

After talking about it for 50 years, Congress in 1948 passed a law to deal with the situation—the Barkley-Taft Water Pollution Control Act. It empowers the U. S. Public Health Service to work with the States in cleaning up our rivers. Eight States in this Basin have signed the Ohio River Valley Water Sanitation Compact, and are reshaping their laws.

Now any boy who throws a dead cat into a stream, or any factory that turns waste into the rivers can be prosecuted; cities, too, can be brought into court if they fail to treat their sewage properly.

Unpleasant this task is, but necessary to give the people good drinking water, good fishing, bathing, and boating, and let them enjoy the rivers as their forefathers did.

Forgetting the dead fish, we turned downstream again from Lawrenceburg to cross the bridge from Jeffersonville, Indiana, to Louisville, Kentucky, famous for beautiful women, whiskey, its Derby, and all that gold stored at near-by Fort Knox.

The bangtails were not running on our visit; all we saw were some 75 pictures of famous race horses on walls of the Brown Hotel, in whose hospitable lobby a bellboy caught a fish during a high flood.

Louisville, too, was born of the river.

Here a monument marks the site of Fort Nelson, built on orders from George Rogers Clark, which for a time sheltered Louisville's first settlers. The young town was later named for Louis XVI.



"Look, Elvera! An Iceland Falcon, Painted by Audubon over 100 Years Ago!"

Mrs. Arch Shelton, curator of the John James Audubon Memorial Museum, near Henderson, Kentucky, shows a young visitor some pages of the great ornithologist-painter's bird book. These mallard and falcon pages are from the J. Bien & Company elephant folio of Audubon's *Birds of America*, published in America in 1860. Of French provincial architecture, this Kentucky memorial houses a large collection of the work of the naturalist (page 195).

Here, at Louisville, are the Falls of the Ohio. Until a pioneer canal, with locks, was built with slave labor in 1830, boats could not pass up and downstream except during high water; at other times, all craft had to be unloaded and cargo portaged around the falls to other boats.

Now U.S. Government Dam No. 41, one of the largest on the Ohio, easily lifts or lowers passing craft in a rise or drop of 37 feet.

Lifesaving Station at Falls

So dangerous are these falls that since 1881 the U.S. Coast Guard has maintained a Lifesaving Station here.

White fences frame famous bluegrass horse farms along the highway from Louisville to Covington.

Near Carrollton lies scenic Butler State Park.

Upstream past Carrollton, the day we were

there, went the 46-foot schooner *Seven Seas*, a real "dream ship" owned by a Boston sales engineer. On board he had his wife and four children. They were making the cruise from Boston to Pittsburgh, via the tip of Florida, and had been months on the way. They had sold their Boston home to pay for the boat, and planned to sell their craft at Pittsburgh and buy a house there with the proceeds.

Church steeples, rising thickly on its green sloping hills, make Covington look much like an old Rhine city. Unique among its industries is the making of prison cell blocks and X-ray machines for the whole world.

Dan Beard, of Boy Scout fame, lived here. Over a suspension bridge, completed in 1867 by John A. Roebling, of Brooklyn Bridge fame, crowds of Kentuckians cross to work each day in Cincinnati.

"It's always easier to find a job in Cincin-

nati than in any other big city I know of," a truck driver told me.

Served now by eight railroads, this is a tremendously busy river port.

Its magnificent \$41,000,000 Union Terminal is one of earth's most overwhelming architectural feats. It even has a game room, to divert those waiting for trains. Murals on its vast concourse walls dramatize the romance and adventure of civilization's westward march. So spacious is it that here even dog races might be run.

Cincinnati is the largest inland bituminous-coal trading center in the United States. One printing firm advertises that it makes "399 miles of envelopes a day."

From Tokyo to Timbuktu, when men shuffle and deal, the chances are they're playing with cards made in Cincinnati.

"In 1948 Americans alone bought about 57 million packs of cards," said M. A. Follman, president of the United States Playing Card Company. "About four-fifths of all our people play or have played cards. Today most players are between 20 and 30. Many youngsters learned while in the Army or Navy.

"New games usually have their genesis in old, established ones," added Mr. Follman. "Within the past 25 years contract bridge has become the leader. Its principles go back 400 years, in England.

"Whist began in the 17th century. From it came bridge, in 1896, and in 1904 came auction. By 1930, contract was the leader. The whist family is older, but it's doubtful whether it will ever reach the universal acceptance of many variations of poker, which lend themselves to individual play, as do those of the rummy family. In this latter group gin rummy was followed by Oklahoma, and now by Canasta."

I saw an old photo of a Cincinnati waterfront house where Stephen Foster clerked about the time he wrote *Oh! Susanna*. In some such now shabby old buildings the city's most significant activity had its beginnings. That was the making of machine tools—tools to make other machines.

Here worked those skilled pioneers who made their own tools with which to build guns, sawmills, and gristmills, and bore cylinders for steamboat engines. Thomas Carlyle called man the "feeblest of bipeds," but as a "tool-using animal" he can grind mountains into dust and knead red-hot iron as if it were soft paste.

Frederick V. Geier, president of the Cincinnati Milling Machine Company, says as early as 1800 a Cincinnati gunsmith was advertising his skill. By 1814 a steam engine

here was running a mill to grind flour and weave cloth. Shipyards in 1818 built the *Eagle* and the *General Pike*, first all-passenger steam packets on the Ohio River.

"Today," says Mr. Geier, "Cincinnati is the world center for making milling machines, lathes, and planers; drilling, grinding, and cutter-sharpening machines; shapers, and boring mills. Such machine tools give men the mastery over power and metals."

Lawyer Charles P. Taft showed me daguerreotypes, made in 1848, with dozens of steamers crowding the river front. First Panama Railroad locomotives were built here. One early toolmaker, George A. Gray, Jr., fitted plates on ironclads built here; he also made a rapid-fire gun and demonstrated his model to Abe Lincoln, who said men were already being killed fast enough. Later, this gun, as the Gatling, was adopted by the British.

From Cincinnati go tools that make many of the machines the whole world uses, from South African gold fields to the sheep-shearing sheds of west Texas.

Ideas, Too, Float Down This River

Cincinnati's mind was early on art and science because of the high intellectual quality of so many pioneers.

In 1806, when Jared Mansfield was named surveyor general of the United States, instruments were sent to him here to survey the Northwest Territory. With these he made astronomical observations. Later, in 1843, Cincinnati established the first observatory founded by public subscription.

From this city's now century-old Literary Club went Ainsworth R. Spofford to be Librarian of Congress. Meteorologist Cleveland Abbe went from here to set up our Weather Bureau at Washington, D. C.

For 121 years Ohio Mechanics Institute, at Cincinnati, has set the pace and kept pace with new types of craft education. It has sent hordes of trained men to meet calls from all this city's enormous list of factories, which make many things, from soap and beer-barrel bungs to television sets and overalls.

Sensibly, the University of Cincinnati (pages 194 and 207) joins classroom theory with actual shop or office experience. After his freshman year a student can study eight weeks, then work eight weeks, for pay, preferably in his chosen vocation.

Advent of many Germans affected this city's culture and character. It once had four German newspapers; for years German was taught in public schools. The elder Nicholas Longworth, who had developed vast vineyards on



Historic Lanier Mansion Faces the Beautiful Ohio at Madison, Indiana

Built by James F. D. Lanier, of a Huguenot family which fled France after the Edict of Nantes, this palatial home is now a State memorial. Visitors admire its circular staircase, period furniture, and landscaped gardens.

← Dressed Up Like Her
Great-Grandmother

Ruth Varner, of St. Mary's, West Virginia, formed part of a tableau on a float that appeared in the parade at the town's centennial celebration. That old-fashioned gown she wears, even the umbrella, were made by her mother.

It may be 19th-century design, but the graceful yoke, minute button trim, and frill of lace still find their way into fashion; as for the ruffled parasol—many like it were carried with summer frocks in 1949!

Angel-faced Tots →
"Tool" a Fancy
Pony Cart

Like Louisville and its other Kentucky neighbors, Cincinnati is happily horse conscious. It has its own race meets; for it, particularly, the Kentucky Derby is a Roman holiday.

"The Whip" here is 5-year-old Jerry Glenn escorting 4-year-old "Cookie" Dr. Lott. They won second prize in the Pony Fancy Turnout class at Cincinnati's Junior Saddle Horse Show May 15, 1949, at Newtown, Ohio.

© National Geographic Society

Illustrations by Justin Locke



"You Can Go as Far as You Like with Me on This Merry Merry-Go-Round!" . . . Under the "Flying Saucer" Neon Lights

Lively music, galloping, gaily-painted horses—and a tummy full of pop and peanuts! Cincinnati children have fun at spectacular Coney Island, a riverside pleasure park with such amusement features of its Long Island namesake as aerial acrobats, swings, thrill rides, swimming, and band concerts. Neon lights, pancake-shaped (right), help illuminate park tounds when crowded at night by thousands of cars.

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Illustrations by Justin Liebs





In Perfect Rhythm Ice Skaters Glide About the Vast Arena of Cincinnati Gardens

This is Donna Atwood and Bobby Specht of the "Ice Capades" show. Miss Atwood, though only 24, has been the star of the show for eight years. At 15 she captured the National Junior Women's amateur skating title. Hockey, basketball, and boxing bouts are also held in this new amusement center.



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Photographs by Justin Locke

^ Cincinnati University Students Burlesque Black Magic Tricks of Medieval Times

Wires, steeped in flowers of sulphur, are ignited and plunged into a flask of oxygen. Scintillating sparks fly, because oxygen supports combustion. In a chemical show Edwin Schlesselman explains this "mystery" to Justin Auer (left). Red and purple fountains (right) are hydrochloric acid and ammonia, respectively.

v Famous Singers from the "Met" Appear in Open-air Summer Opera at Cincinnati Zoo

Eugene Conley, right, makes up as Faust; Italo Tajo, left, curls his hair as Mephistopheles. In the background, members of the chorus dress for their appearance in *Faust*. For decades Cincinnati has enjoyed Nation-wide fame as a musical center; its symphony orchestra was established in 1895.





At Neville Island, near Pittsburgh, Shipbuilders of Dravo Corporation Side-launch a New 175-foot Hopper Barge for Hauling Coal

Since white pioneers felled trees and built their first crude flatboats, literally thousands of craft, from gunboats and palatial packets to powerful towboats and even ocean-going vessels, have been built along the Ohio. Dravo in 1948 produced a barge or towboat on the average of one every 58 hours around the clock.

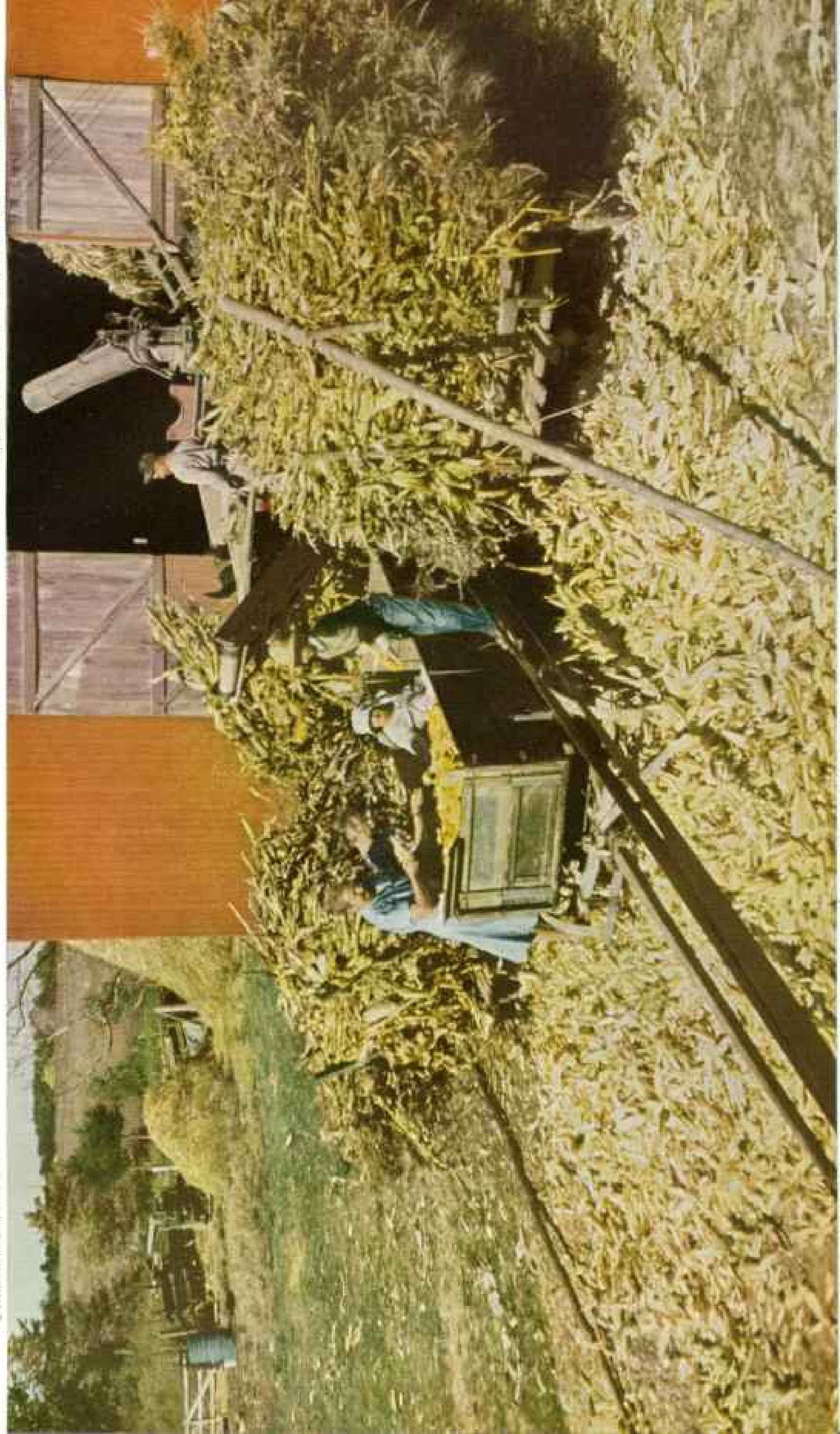
Hoosier Women Help Menfolks Shuck Corn and Store Fodder for Winter Feed, near Corydon, Indiana

First, the ripe corn is cut and shocked in the field, with leaves left on the stalks. Then, hauled to the barn, the corn is shucked by a machine. All leaves, bits of shucks and stalks are shredded, and then blown inside the barn for winter forage. On many larger farms mechanical corn pickers are used.

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Photographs by H. Harold Davis, courtesy Indianapolis Courier-Journal





Excursion Crowds Gaze in Fascination at the Big Churning Stern Wheel

these Rhinelike river hills, encouraged many Germans to migrate here. Today their influence survives chiefly in music (page 207). You see this in that great chorus of the biennial May Festivals, first conducted by Theodore Thomas, the Symphony Orchestra, established in 1895, and in the Conservatory and the College of Music.

As if cut from Paradise itself, Eden Park rises above the city and encloses the Cincinnati Art Museum. Here are timeless works of Titian, El Greco, Murillo, Van Dyck, Rembrandt, Corot, Whistler, Duvenceck, Sargent, Picasso, and others.

Priceless Cincinnati newspaper files, from 1793; diaries kept by pioneers; faded old letters; pictures of early steamboats and the city water front; some 50,000 books and pamphlets—all these and more are preserved by the Historical and Philosophical Society of Ohio in a fireproof library on the University campus (page 185).

To amuse and instruct children, Cincinnati's Museum of Natural History often packs some of its most striking exhibits in cases and takes them from school to school.

In this museum nothing attracts more attention than the amazing collection of South Pacific arts and crafts, presented by Mr. and Mrs. Julius Fleischmann.

The Taft Family

History often links noted men with certain rivers: Caesar with the Rhine, Capt. John Smith with the James, Washington with the Delaware.

Here at Cincinnati, beside the Ohio, the Taft family grew up. Though this family stemmed from Uxbridge, Massachusetts, it was from Vermont that pioneer Alphonso Taft came to the Ohio Valley. He rode down this river to Cincinnati in 1838 and went ashore to establish a home for the family that has since played such a high role in American political life.

These Tafts are to Ohio what the Adams family was to New England, or the Washingtons, Randolphs, and Lees were to Virginia. Alphonso came from a family of carpenters, farmers, and self-made men. He walked from Vermont to Yale, and worked his way through.

In his new Ohio home he practiced law; learned shorthand from Benn Pitman himself; became Secretary of War and then Attorney General under Grant; and served as American Minister to the courts of Vienna and St. Petersburg.

William Howard Taft, one of his sons, worked briefly as a reporter for Murat Halstead's Cincinnati *Commercial*; in turn he was

Solicitor General of the United States, U. S. Circuit Judge, Governor General of the Philippines, Secretary of War, President, and, later, Chief Justice of the United States. No other American was ever so exalted.

Another son of Alphonso was Charles Phelps Taft. He was elected to the 54th Congress in 1894. He was part owner of the Chicago Cubs, and for years published the Cincinnati *Times-Star*. He originated the use of leased wires for distributing news, and gave an endowment of one million dollars to the Cincinnati Symphony Orchestra.

He and his wife also gave their 30-room, 19th-century home to the city. It is now known as the Taft Museum (page 197). In its exquisite period rooms are paintings by Goya, Henry Farny, Turner, Gainsborough, Lawrence, Reynolds, Romney, Corot, Rembrandt, Millet, and others.

Horace Dutton Taft, another son of Alphonso, founded the well-known Taft School for boys, now at Watertown, Connecticut.

Peter Rawson Taft was yet another son. His son, Hulbert, now is editor and president of the *Times-Star*. A fifth son, Henry W. Taft, was long a member of the noted New York law firm, Cadwalader, Wickersham, and Taft.

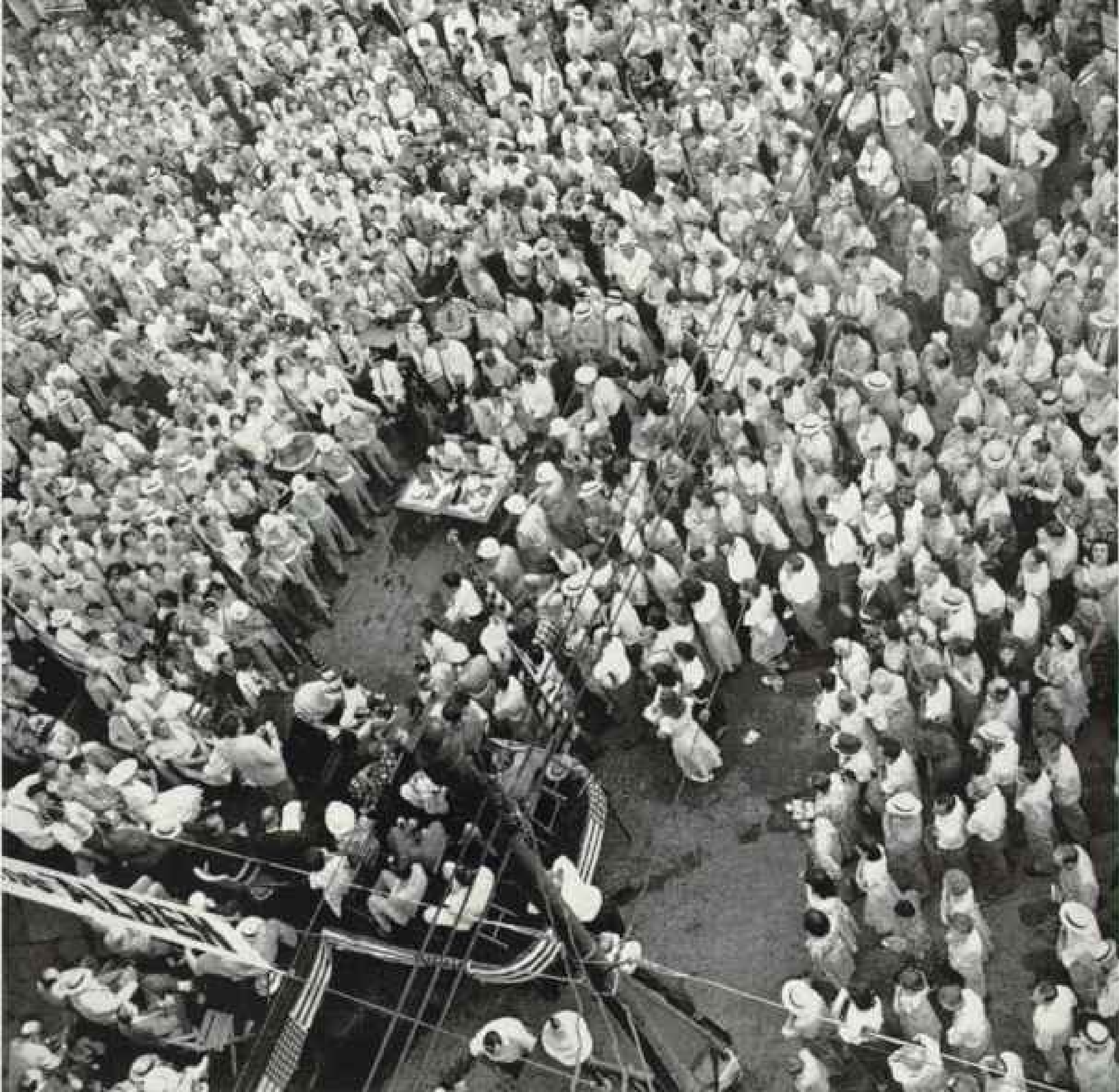
Sturdy, straightforward United States Senator from Ohio, Robert Alphonso Taft, is a son of former President Taft (page 178). His younger brother, Charles P. Taft, is a lawyer and public-spirited citizen of Cincinnati. At his tree-shaded Walnut Hill home, over an apple and within sound of his young son's cage of frolicking pet hamsters, we talked about Manila, after the "days of the empire." I had edited a paper there when William Howard Taft was Governor General and "little Charlie," his son, galloped a pony about the Luneta beside his father, also on horseback.

Later, President Taft named me consul to Baghdad. When I went to present my compliments and thank him, he said: "You wrote some editorials about my Philippine policies when we both lived in Manila. . . I should send you as consul to Hades, if we had consulates down there. Anyway, I'm sending you to the next hottest spot I know—Baghdad, on the scorching plains of Mesopotamia."

President Taft served on the Board of Trustees of the National Geographic Society for many years and wrote many articles for *The Magazine*.

All the Tafts went to Yale.

This city was and is home to writers of note. Harriet Beecher Stowe gathered material here for *Uncle Tom's Cabin*. Here, too,



Joe Mitchell from Paducah Sun-Democrat

All Paducah Turned Out to Greet Home-town Vice Presidential Nominee, Alben Barkley

Over 4,000 thronged the streets to see Governor Earle C. Clements and Paducah leaders pay honor to the Kentucky statesman upon his return from the Democratic Convention on July 19, 1948. A native of the Bluegrass State, Mr. Barkley was sent to Congress in 1913 as a Representative from Kentucky's First District. In 1927 he was elected to the Senate and began the first of four successive terms.

William H. McGuffey wrote several of his long-popular *McGuffey's Readers*. Alice and Phoebe Cary, writers of spindle-legged verse, came from an old Cincinnati family. Lafcadio Hearn, George Randolph Chester, Thomas Buchanan Read (who wrote *Sheridan's Ride*), and Washington McLean of *Enquirer* fame all lived and wrote here.

Two good Ohio River books, *Flowing South* and *Sycamore Shores*, were written by Clark B. Firestone of the Cincinnati *Times-Star*.

"From canoe and flatboat to steamboat times," Mr. Firestone told me, "home seekers by thousands floated down this river. Some

settled on lands along the Ohio, some went on down the Mississippi; still others went up that big river and on up the Missouri, from whence many took the Santa Fe and Oregon Trails to the Southwest and the Pacific coast."

George Rogers Clark went down the Ohio and up the Wabash with his Virginians, to help gain for our Union the whole vast Northwest Territory. Nine Presidents of the United States have come from the Ohio Valley, five from the Cincinnati area. To a singular degree this now thickly populated Ohio Basin has influenced our Nation's social and political thinking and growth.

Kunming Pilgrimage



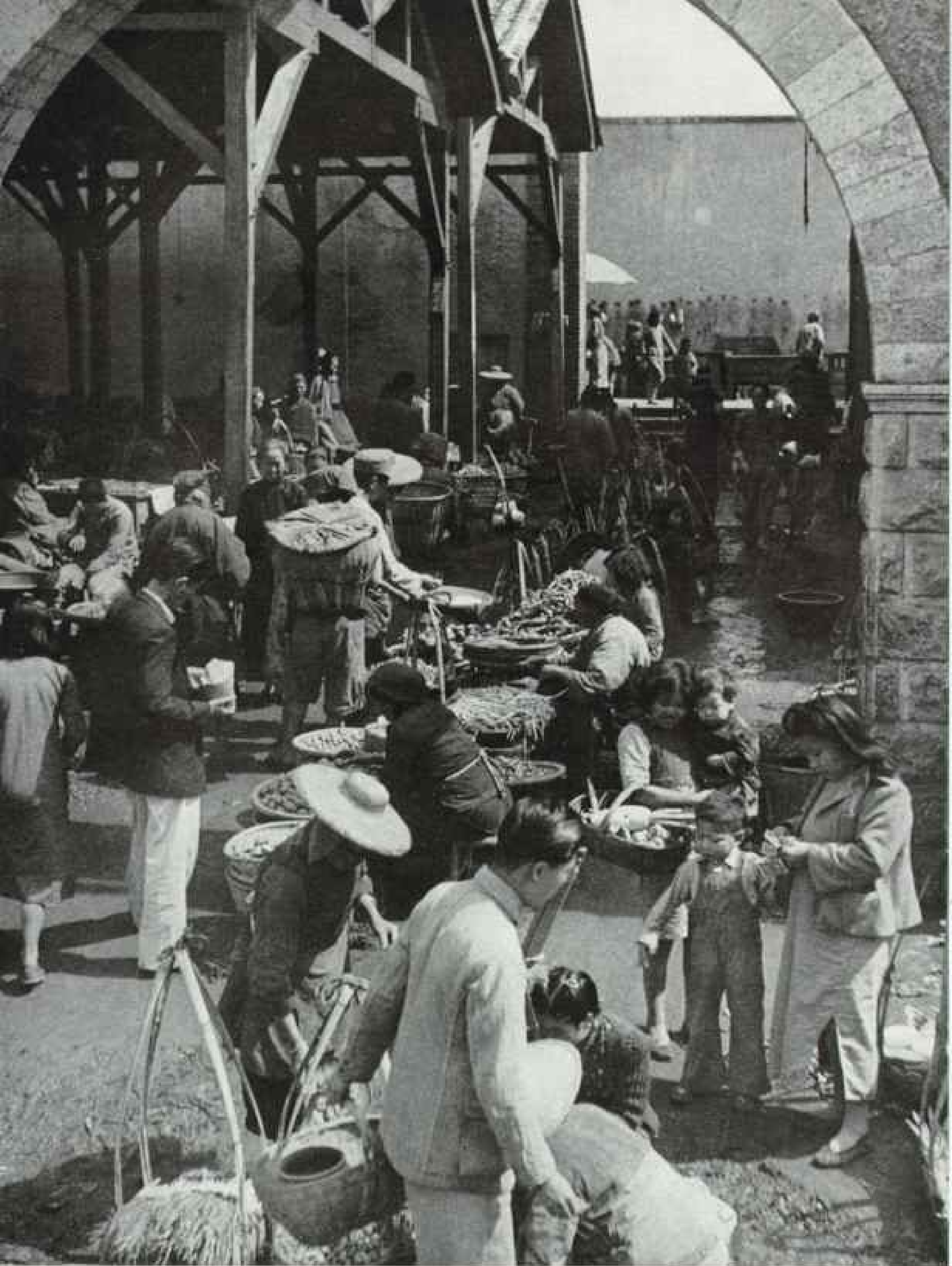
Footsore Pilgrims, Some with Babies in Arms, Climb to Yunnan's Mountaintop Shrines

They celebrate the Chinese New Year by hiking to Buddhist temples outside Yunnan's capital. Kunming in war-time welcomed American trucks and cargo planes going to China's aid across Burma Road and "The Hump." Now Chinese Communists may put the road into reverse with delivery of weapons to rebels in Burma and Indo-China.



From the Topmost Temple, Burning Incense Gathers Like Mountain Vapor

Entire families make the days-long trek. Here the pilgrims, many of whom live in mile-high Kunning, get a breathless view from a loftier level (page 226). Far below, the pilgrims' path threads the earth.



Kunming Market Does Business in the Mud. A Girl (Right) Pays with Inflation Bills

Collapse of the Nationalist Government's currency brought Yunnan's outlawed silver coins back into circulation. Kunming people made paper fans out of million-dollar notes and sold them for three cents American.



▲ "Pincushions" Bristle with Incense Sticks;
Buddhist Hands Fold in Prayer

Oil essences and sawdust are mixed to make the incense fragrant and combustible. These sticks were offered for sale on a roadside. The fingers in meditative posture represent a saint. Buddhist art observes many other finger positions; each has a name. Various religions recognize the sacredness of the hands.

▼ An Elderly Monk Raps a Temple Bowl,
Sounding the Call to Prayer

Most Chinese monasteries were established on mountains to propitiate the flood- and drought-bringing "dragons" dwelling there. Agriculture thereby was "regulated" by the monks. This brass bowl receives fictitious paper money for burning as a sacrifice to the gods. Left: incense sticks.





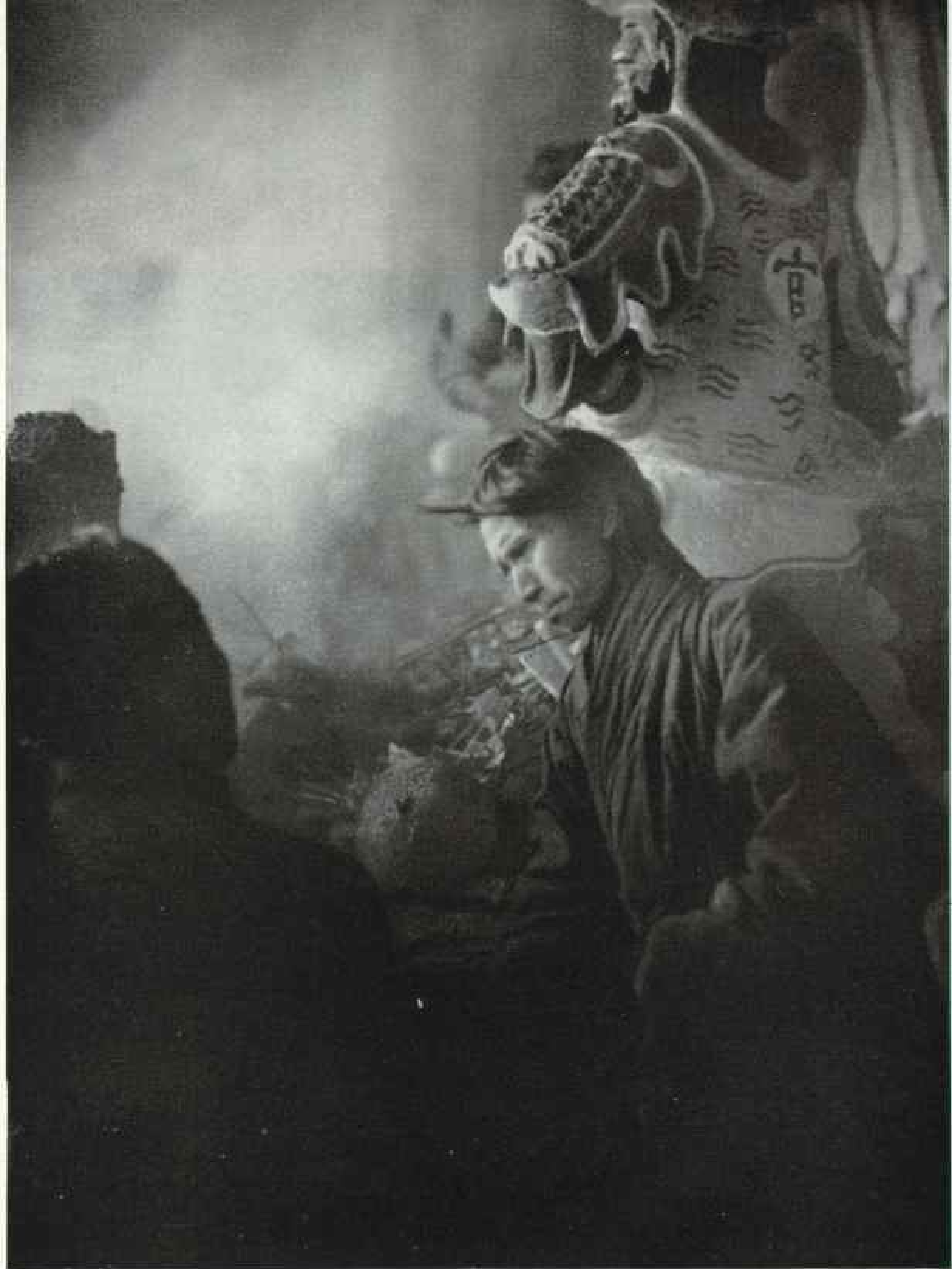
A Youthful Monk Selects Incense Tapers to Be Lighted with His Oil Lamp

Since early times men have considered perfume pleasing to their gods. Jews and Egyptians burned frankincense; American Indians, copal and tobacco. In China incense is used in temples and before ancestral tablets.



Demon Chaser and Dragon, Equally Ferocious, Guard a Temple of the Western Cloud

This 20-foot figure stands watch on West Mountain. For a color picture of his twin, see the August, 1946, NATIONAL GEOGRAPHIC MAGAZINE—"Kunming, Southwestern Gateway to China," Plate I.



A Scowling Fortuneteller Reflects the Misfortunes Seen in His "Vision"

In a temple thick with incense smoke, the clairvoyant's patrons select papers bearing cryptic messages. These he interprets. Beside him, a sphere of cooked rice resembles a ball of twine.

Vendors and Beg- gars Camp on the Trail of the Pilgrims

Here alms seekers, taking advantage of an occasion when every pious pilgrim feels generous, while heart-rending pleas, "Have pity, have pity," they cry. They follow their calling from temple to temple as each one celebrates its holy day.

Hucksters, too, sell food, incense, and paper "money" for burning at sacrifices.

Many American servicemen knew Kunning as a throbbing wartime base. A few going back in peacetime found it returning to prewar backwardness. Buildings painted by the United States Army were fading. Airfields to which flyers hauled immense loads of gasoline and munitions were crumbling.

Underdeveloped Yunnan is believed to contain more natural resources than any other Chinese province. Huge deposits of coal, iron, tin, lead, and copper await power, machinery, and engineering skill.

John Garment from Pix



Two Soldiers Marvel at Gilded Statues on a Temple Wall

Chinese ten centuries ago carved the beautiful Temples of the Western Cloud on West Mountain and connected them with winding paths and stone steps. One steep gully was cut from the mountain side, with here and there a window hewn from the rock. Legend says the entire passageway was the work of a single monk.

Some twenty temples house such treasures as Chinese literary classics and images of gods and demons. Tile work, ornate doors, and granite columns testify to the builders' skill.

In this West Mountain temple some 500 plaster figures are crowded into two rooms. They represent minor saints in the Buddhist pantheon.

On the right, a pilgrim burns incense at a roadside altar. The illustrated tablet, which teaches a moral lesson, is dedicated to a man noted for his filial piety, one of the traditional Chinese virtues.





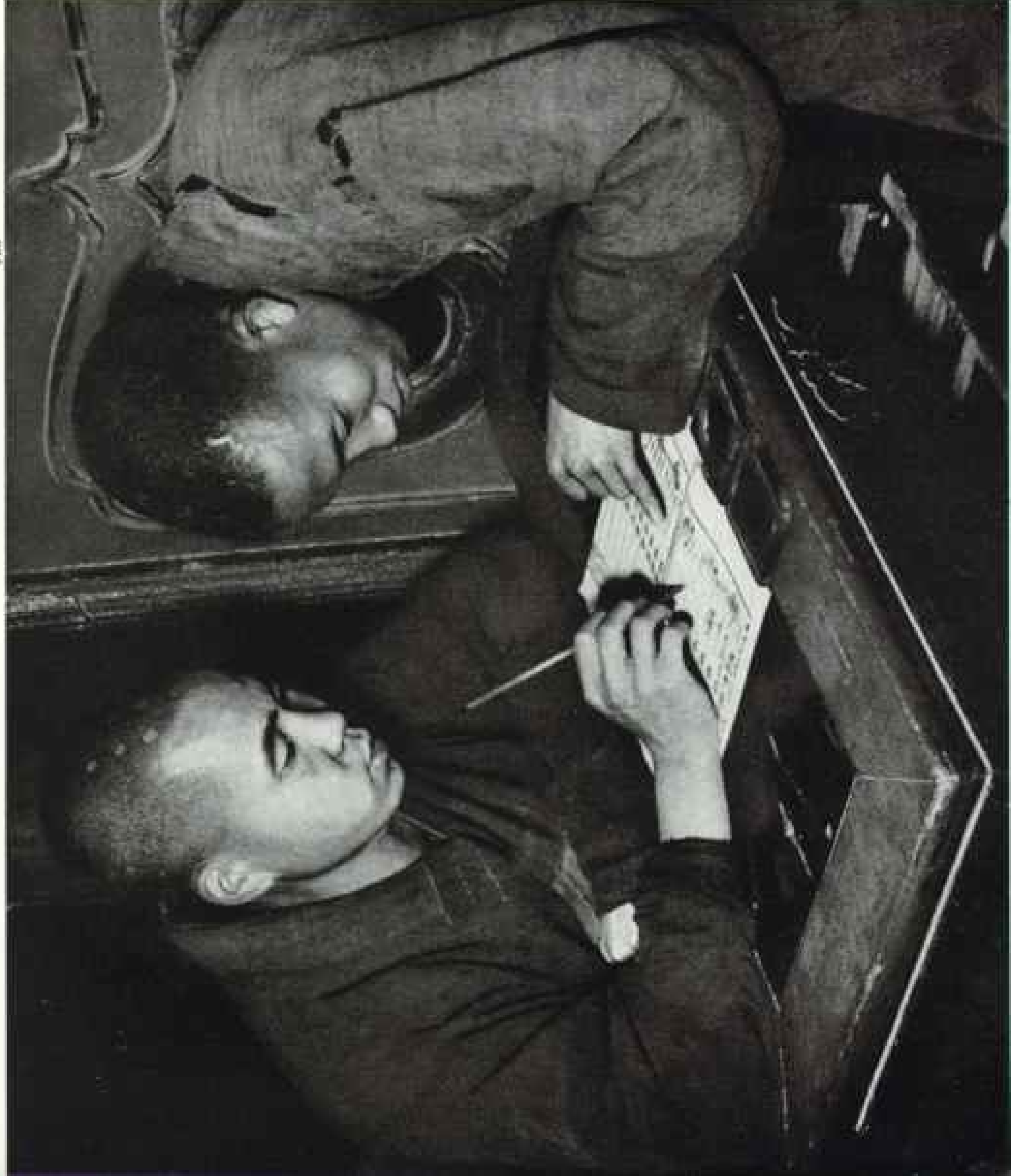
Humanity's Crosscurrents, Treading a Mountain Trail, Pass Like Hurrying Streams of Ants

Chinese have fun on their religious holidays; they undertake pilgrimages with a festive spirit. In many cases Buddhist excursions are directed to the Taoists' holy places.

Tonsure Marks, Branded onto Shaven Heads with Burning Incense, Proclaim the Calling of Monks and Novice

On the left, two members of the fraternity make entries in the monastery's books. They wear the robes of poverty. Head scars represent vows.

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John Gutmann from P14



John Gutmann from P. 11

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Spectacles and Whiskers Dignify an Herb Doctor

The old man's placid face reflects confidence in his "medicine shop" (sign in rear). He sells roots, seeds, bark, and many kinds of pills. Others like him specialize in bloodletting.

On the left, a pilgrim pauses at a Taoist temple to thrust a rice offering into the mouth of a primitive stone lion. Next he will visit a Buddhist temple.

Taoism and Buddhism are mutually tolerant; in many respects they are a blend. In some villages they borrow each other's gods. At various shrines their temples are neighbors.

Two Generations—a Novice and His Abbot

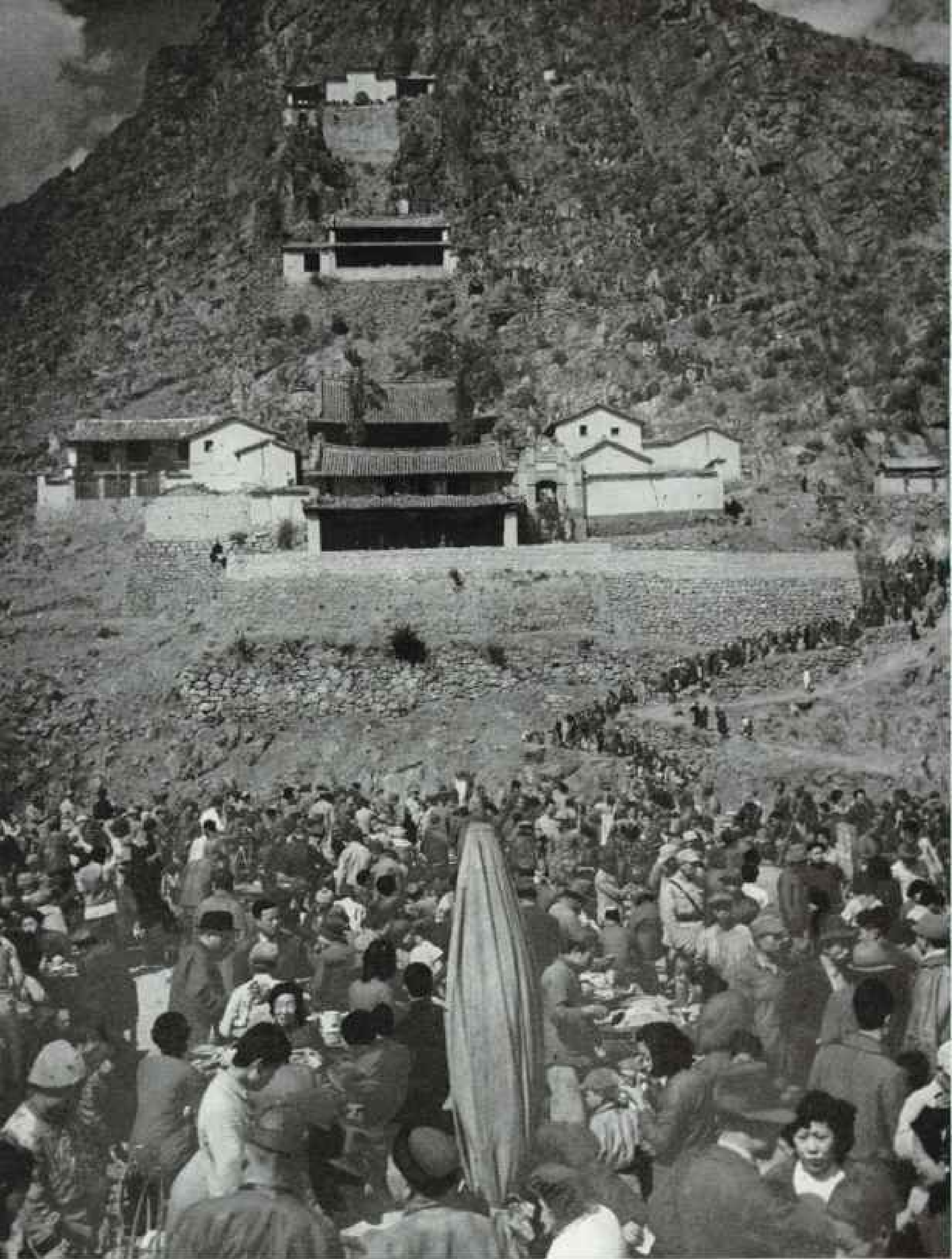
In their mountaintop retreat these two renounce the world in the hope of becoming saints and gaining salvation in Nirvana. Their way of life requires strict obedience to the Buddhist "ten commandments," of which the first forbids the taking of any life, even that of an animal.

On the right, pilgrims young and old attain the mountain's topmost temple (page 226). Its steps are guarded by a stone lion. An incense urn is marked by the Nationalist Party's star and the ideograph "wisdom."

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John Gutman from P14





A Serpentine File of Human Insects Staggers to Pilgrims' Goal, the Last Three Temples
Many here rest at a picnic ground before scaling the last half-mile. Among them, a few modernized Chinese have come merely as sightseers. Pilgrims pause at each pagoda to perform devotions.

Exploring Ancient Panama by Helicopter

BY MATTHEW W. STIRLING

With Illustrations by National Geographic Photographer Richard H. Stewart

THE time was approximately the year 1450; the place, the central cordillera of the Isthmus of Panama, a short distance east of what is now the Costa Rican border.

The great cone of the long-dormant volcano, Chiriquí, towered 12,000 feet into the tropical air. At the bottom of the crater was a deep, clear lake. The upper part of the cone, where it penetrated into the cold zone, supported a sparse growth of stunted vegetation.

Lower down, the slopes of the mountain were cloaked with a lush tropical forest, except for small patches where enterprising Indians had cleared the jungle with their stone axes so they could grow corn, beans, and pumpkins. In the valleys around the base of the mountain were much larger clearings. Clusters of oval huts with steep, conical palm-thatched roofs marked the villages of the natives.

From the summit of the cone on a clear day an Indian could look to the south and see the blue Pacific. Turning to the north, he could see the waters of the Caribbean.

In this well-watered region the rich volcanic soil supported a dense and prosperous population. The climate of these valleys, from 3,000 to 6,000 feet high, was cool and pleasant.

Earthquakes Ruin Prosperous People

The Indians of this salubrious region were a tall and handsome people. Normally they used little clothing. On special occasions or when traveling, the women wore fringed skirts of woven cotton which reached from the waist to the knees; men donned ankle-length robes of fringed cotton. They painted their faces and bodies in bright red, blue, and white designs.

The more prosperous wore beautiful ornaments of gold in the form of birds, frogs, and monkeys, or large disks hung on the breast.

For several centuries the Indians had tilled their fields. The women made beautiful pottery vessels, some of the most shapely in all the New World (pages 238 and 239).

Then, one day, came calamity—a savage earthquake shook the entire region. It was followed quickly by others even more violent.

Eventually came a convulsion greater than all the rest. The side of the crater was breached, and the waters of the lake rushed out in a great avalanche of mud and enormous

stones. Tearing down the mountainside, the flood destroyed or buried everything in its path.

The Indians fled a desolate waste of sterile ash and naked tree trunks. They never returned.

By the time Nature had restored the forest and the rains had leached out the ash layer to a thin deposit that would permit cultivation of the soil again, a much greater catastrophe came. The Spaniards had arrived and begun the conquest of the people who so obviously were rich in gold.

Goal of Latest Panama Expedition

Such is the story we found written in the geological and archeological records of the Chiriquí highlands where the National Geographic Society-Smithsonian Institution expedition to Panama conducted most of its field work during the winter and spring of 1949.*

The preceding winter we had spent four months digging in the Azuero Peninsula, on the Pacific coast of Panama. This year we had planned to focus our investigations on the prehistory of Panama, in the Province of Veraguas and in the highlands of Chiriquí (map, page 229).

Especially were we interested in a Chiriquí locality called Barriles, where Dr. Alejandro Mendez had secured for the National Museum of Panama a number of amazing life-size statues of unusual artistic merit and strange design.

His other discoveries were several remarkable four-legged *metates*, or corn-grinding stones, beautifully carved and decorated and of enormous size. Of equal interest were large urns with boldly incised designs, painted red or orange, representing curiously stylized birds

*The 1949 National Geographic Society-Smithsonian Institution Expedition to Panama is the latest in a comprehensive study of pre-Columbian cultures in Middle America. For accounts of previous expeditions, see the following NATIONAL GEOGRAPHIC MAGAZINE articles by Dr. Stirling: "Exploring the Past in Panama," March, 1949; "On the Trail of La Venta Man," February, 1947; "La Venta's Green Stone Tigers," September, 1943; "Finding Jewels of Jade in a Mexican Swamp" (La Venta), November, 1942; "Expedition Uncovers Buried Masterpieces of Carved Jade" (Cerro de las Mesas, Mexico), September, 1941; "Great Stone Faces of the Mexican Jungle," September, 1940; "Discovering the New World's Oldest Dated Work of Man," August, 1939.



There's More to This Hole in the Ground than Meets the Eye!

Out of sight, a digger works steadily toward an Indian tomb and pottery cache near Soná, in Veraguas Province. The weapons carrier (background) was loaned by Caribbean Air Command headquarters at Albrook Air Force Base, Canal Zone.

and animals. Since this pottery differed so from that of the surrounding Chiriquí culture, I felt reasonably sure that at Barriles there must have been a local civilization quite distinct from any Middle American culture yet studied.

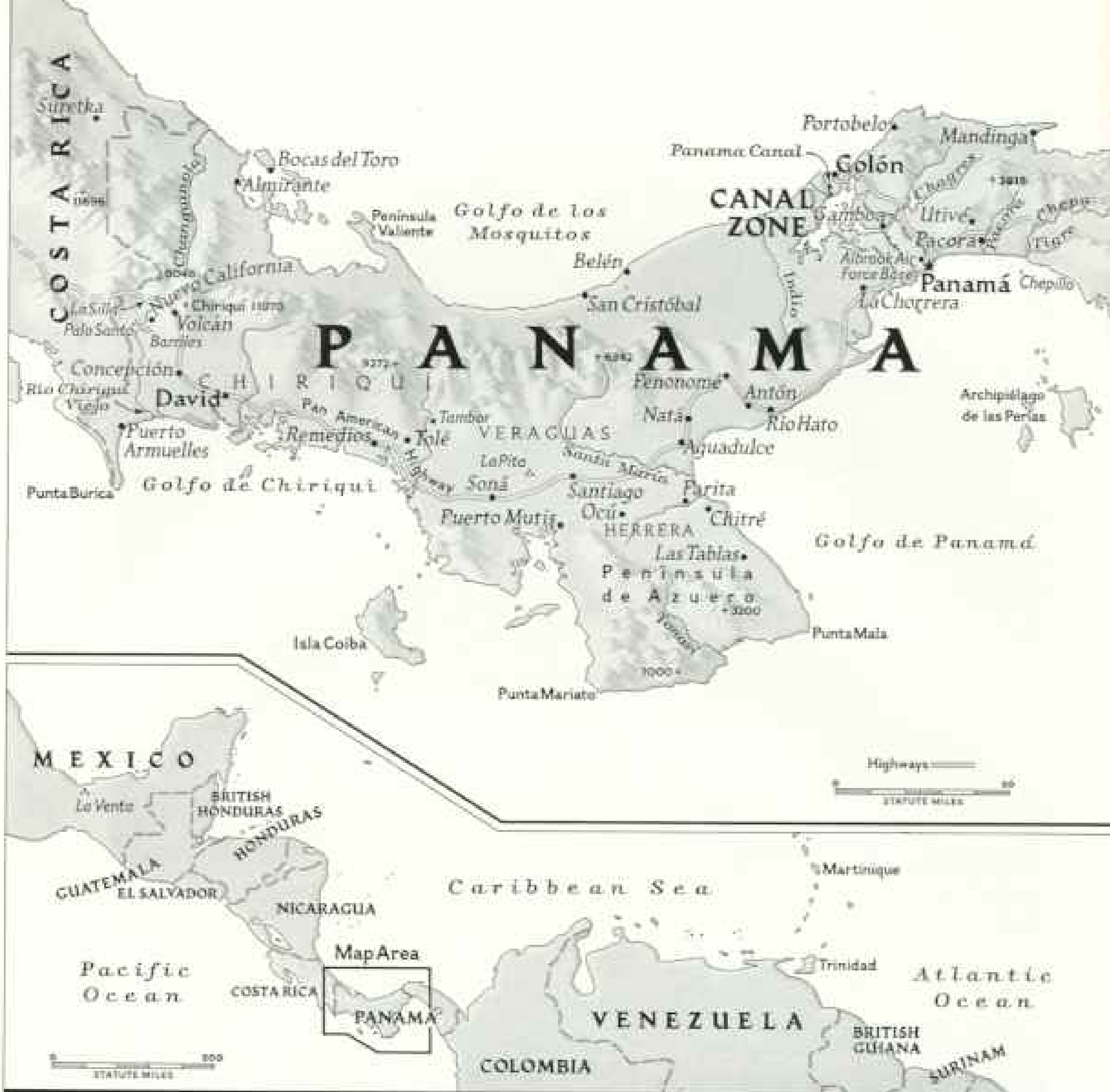
When I arrived in Panama the first week in January, I was accompanied by my wife, Marion, and Richard H. Stewart, staff photographer of the National Geographic Society. At the invitation of Maj. Gen. Willis H. Hale, then commanding general of the Caribbean Air Command, we made our headquarters at Albrook Air Force Base in the Canal Zone.

General Hale gave us valuable cooperation,

Among other things, he lent us a weapons carrier. With this sturdy three-quarter-ton truck we were able to explore many otherwise inaccessible spots.

Information Comes via Guam

Just before leaving for Panama I received a letter from Dr. Philip Drucker, who had accompanied me on several expeditions to Middle America. He was writing from the South Pacific, where he was temporarily serving with the Navy. In Guam he met a fellow officer who, while on jungle maneuvers in Panama, had seen some mounds in a patch of savanna in the deep jungle bordering the



Drawn by Harry S. Oliver and Terin E. Adams

By Helicopter, Truck, and Dugout Canoe, Archeologists Cover a Broad Sweep of Panama's Buried Past

Principal finds of the 1949 National Geographic Society-Smithsonian Institution expedition were at the foot of Chiriquí volcano, near the Costa Rican border. East of the Canal Zone, at the mouth of Rio Tigre, ancient village sites were surveyed from Air Force helicopters. At Utivé the party encountered a yellow fever outbreak. Tombs at La Pita, in Veraguas Province, yielded pottery, stone, and metal relics. Expedition headquarters were at Albrook Air Force Base.

Rio Tigre, which is a tributary of the Chepo.

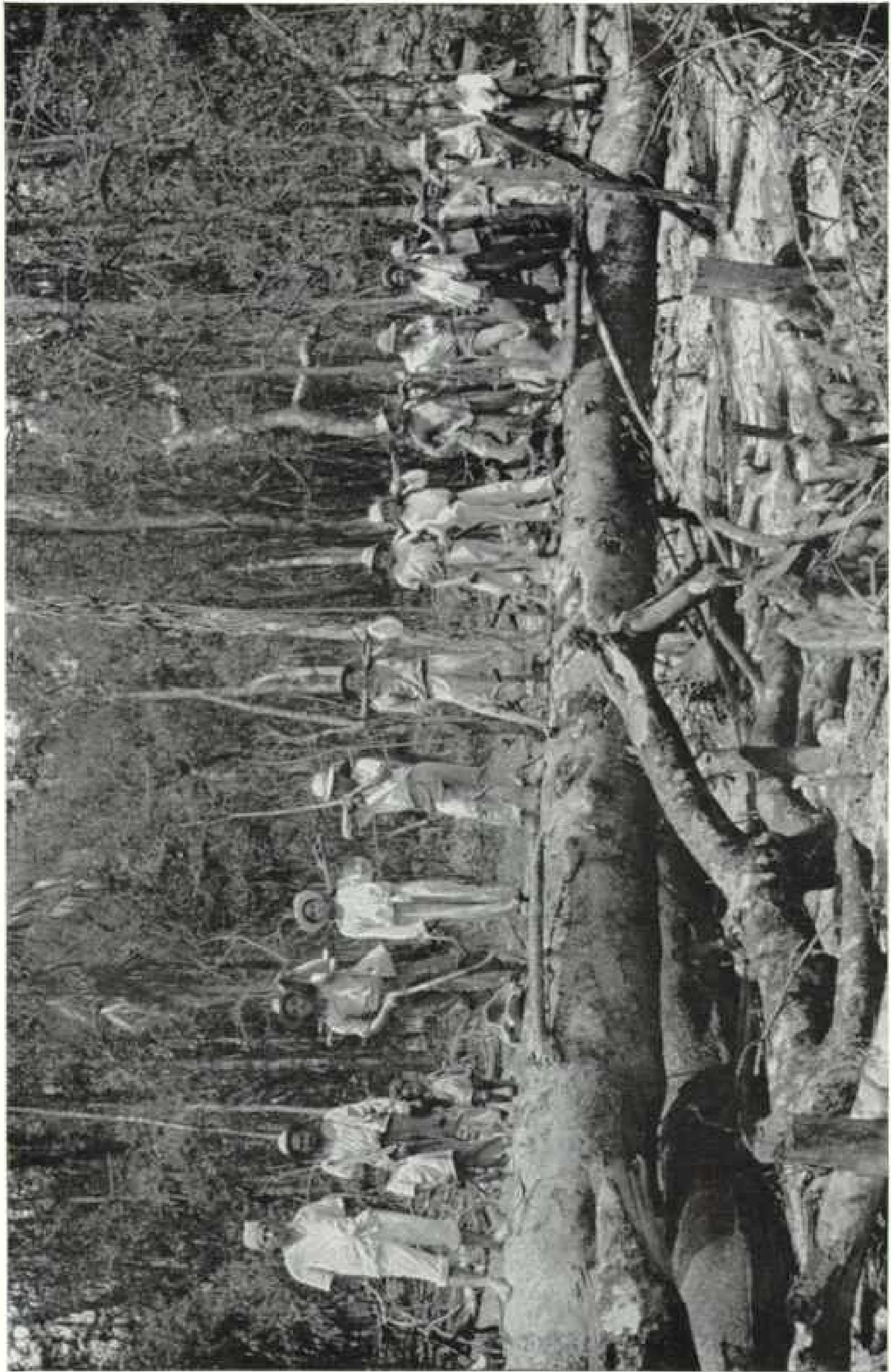
Since mound structures are rare in Panama, I determined to visit the Tigre. The map and officer's description indicated that such a trip would involve considerable time and effort.

I was discussing this with Capt. Langdon Tennis at Albrook, when he suggested, "Why don't you use a helicopter? I am sure that General Hale will arrange it for you."

And so he did. The very next morning two Sikorsky helicopters of the First Rescue Squadron were waiting for us (page 242).

A vertical take-off for the first time in one of these "eggbeaters" is a strange experience. Their ease in handling made them ideal for our purpose. We skirted the Panamá City water front at low altitude and for an hour and a half followed the beach, looking for shell mounds.

Whenever I spotted something that seemed worth investigating, I would signal the pilot and he would hover over the spot. In this manner we finally came to the mouth of the Chepo and then followed up this large stream.



A Fallen Tree Serves as Footpath for Expedition Workmen Trooping Through Western Panama's Vine-hung Woodland

Near this spot in Chiriquí Province, the Stirlings (right) excavated a hilltop site where an early Central American tribe buried its dead. Some pick-and-shovel experts traveled with the expedition; others were recruited in villages. One man brought his two children along.



Picks and Shovels Bite into Panaman Earth to Uncover Relics of Indians Who Vanished Five Centuries Ago

Workmen start a trench near Barrietas, launching archeology's first study of a culture earlier than those of near-by regions. Looters had combed the site for valuables. Six inches down, diggers found a layer of volcanic ash from a pre-Columbian eruption. Tombs six feet deep yielded large carved *metates* (corn-grinding stones).

The region near the mouth of the river is all mangrove swamp, but after a few miles we saw considerable areas of savanna grown with tall grass. From them projected a number of small conical hills. I was certain that these must be the "mounds" of which I had heard and that they were of natural formation, in spite of their curious appearance and the fact that they rose from perfectly flat ground.

I signaled to our pilot, Lt. Wilson T. Botner, to land. Descending vertically to the level of the top of the vegetation, he beat down the grass with a blast of air from the rotors so that the ground beneath was visible. Then, settling cautiously to make sure that there was not soft mud under us, he set the ship down gently. The rotors stopped and we stepped out into grass almost as tall as ourselves (page 242).

In a minute Lt. John R. Peacock, with Dick and Marion in the other machine, landed a hundred feet to one side of us. We were directly at the base of one of the round hillocks. We climbed the mound and verified our surmise as to its natural origin.

Broken Pottery on Ground

However, on the surface we found a number of pieces of broken pottery, showing that these elevations had been utilized by the ancient Indians, probably as places of refuge during the rainy season when most of the flat ground was flooded.

We flew a few more miles up the river where the land was higher to examine some modern clearings with palm-thatched huts. Dropping low, to the consternation of the Indians living there, we could see the wooden mortars and household goods in the yard. Chickens and pigs fled madly in all directions.

Not wanting to frighten the villagers, we turned back downstream to the mouth of the river and flew south over the sea to Chépillo Island, three miles beyond the river's mouth. On this little island is a picturesque fishing village which we examined at close range, then circled low around the rim of the island, looking for shell mounds.

Flying slowly back to the mainland or hovering at low altitude over thick jungle, one can easily see through the trees. Any structure or feature on the ground below is plainly visible. Flying in a plane over the same jungle, the ground is completely hidden from sight.

I thought what a wonderful aid to archeologists the helicopter would be in searching for jungle-covered ruins in such regions as the forests of Guatemala and southern Mexico.

Occasionally we halted in mid-air while

Richard Stewart made still and motion pictures. He would indicate to the pilot the angle from which he wished to shoot. The machine would be held stationary in that spot while he leisurely worked his cameras.

After about five hours, we returned to Albroom. To have made the same trip by canoe and on foot would have taken us more than a week.

After our return from Panama, we learned to our great sorrow that Captain Tennis had been lost with several companions in a flight over the Caribbean off Costa Rica.

Yellow Fever Outbreaks Reported

Before starting our work in Chiriquí, I had planned a small exploration trip in the region of the upper Pacora River, about 20 miles northeast of Panamá City. A mahogany cutter had told us of having noticed archeological remains there several years before. Since nothing whatever was known of the archeology of this part of Panama, we decided to investigate at once.

Two days before we were due to start, the Panamá papers came out with headlines, "Yellow Fever Epidemic Breaks Out on Upper Pacora." Several stricken natives had been brought to Panamá and had died. Their ailment was discovered to be yellow fever, the first cases reported in Panama in many years.

Since tales of the terrible epidemics of the early Canal-building days were still remembered by the old-timers, there was considerable excitement. All of us had been vaccinated before leaving Washington, so we decided not to alter our plans.

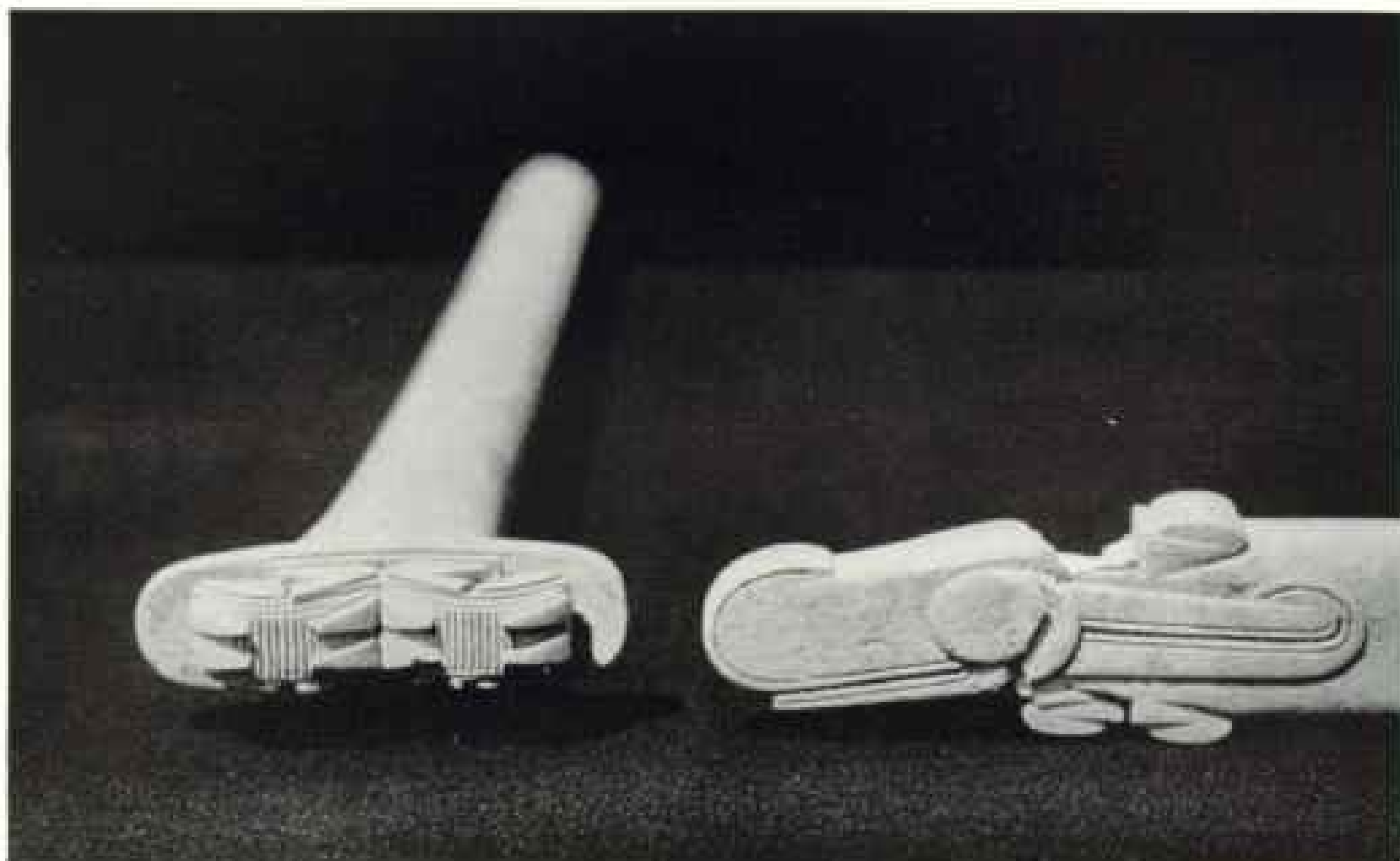
Dr. Herbert Clark, of the Gorgas Memorial Laboratory, told us we need not worry, as the jungle type of yellow fever is transmitted by forest mosquitoes that live in the treetops and are more abundant in the wet season. As the wet season had ended a month ago, there was little danger.

Rounding up our guide, the mahogany cutter, we had him vaccinated. The next day we set out in our weapons carrier for Utivé, a village in a patch of savanna at the foot of the jungle-clad mountains.

Our guide located two friends, and we set out on foot for the archeological site. On one hand the dense forest rose steeply to the high mountain ridge. The land on the other side consisted of two broad, flat natural terraces on which were numerous stone piles.

We drove our weapons carrier down the steep declivity and set up camp.

We were awakened in the morning by the guttural roaring of a troop of howler monkeys on the mountain slope above us. Soon our



Batons, Made of Ivorylike Manatee Bones, Bear Fanciful Alligator Designs

Dr. Stirling, on his 1948 expedition, found these finely carved relics, apparently symbols of authority, in a burial mound near Parita, in Herrera Province. Many clay urns containing human bones were uncovered at this site. With one skeleton was a necklace made of 800 human teeth.

crew, recruited from the village the night before, appeared and began digging our first trenches through the ancient village site.

The next day, while the workmen were building a palm-thatched shelter, we got word another car was approaching Utivé. It turned out to be our friends, Dr. Graham Fairchild and Dr. Harold Trapido, from the Gorgas Memorial Laboratory in Panamá, and Dr. Pedro Galindo, of the Panamanian Government's Department of Health and Sanitation, in quest of information on the yellow fever outbreak.*

They were amazed to learn that the natives who had died of yellow fever had come from Utivé, rather than Pacora.

Mosquito Hunters Go to Work

Col. Norman W. Elton, of the Gorgas Hospital, joined the group (page 245). A portable gasoline motor and generator were set up on the trail by our camp. Strings of mosquito traps with bright electric lights were installed high in the treetops.

Scientists were busy climbing trees and gathering the big parasitic bromeliads, pineapple-like plants that collect water and serve as breeding places for mosquito larvae, tree frogs, and other small forms of jungle life. It was always fascinating to watch the dis-

section of one of these plants and to see the miniature zoo that it contained.

Yellow fever occurs in two forms. The serious epidemics are of the type known as urban yellow fever.

In the New World the mosquito known as *Aedes aegypti* becomes a carrier through biting a human afflicted with the disease. Once started in this manner, an urban epidemic may spread rapidly. The breeding habits of *aegypti* make it relatively easy to control, and this control, plus the use of vaccination in danger areas, has practically eliminated epidemics.

Jungle yellow fever is a virus infection identical with the urban variety. It is transmitted by mosquitoes, among them the species known as *Haemagogus*, which gets the infection ordinarily through monkeys.

Haemagogus, a high flyer, is found usually in the high jungle canopy. However, unlike the malaria mosquito, *Haemagogus* is a day feeder. Sometimes when natives fell trees in making their clearings in the jungle, or in lumbering operations, they may be bitten and infected.

* See, in the NATIONAL GEOGRAPHIC MAGAZINE for February, 1944: "Life Story of the Mosquito," by Graham Fairchild, and "Saboteur Mosquitoes," by Harry H. Stage.

The danger is that these infected persons may then be bitten by the low-flying *aegypti* and thus start a real epidemic unless control measures are put into effect quickly.

Dr. Galindo hired three men to sit up in tree tops to catch mosquitoes. When they came down, he put chloroform on their pants legs and caught the dazed mosquitoes in tubes. When he caught his first *Haemagogus*, he was jubilant, and treasured it in a little box, as if it were an emerald.

The yellow fever cases at Utiwé were undoubtedly of the jungle variety.

Our scientists seized the opportunity to conduct further research at a known focus of infection, and to prevent the start of an epidemic. To this latter end, all the inhabitants of Utiwé were vaccinated and all the houses thoroughly sprayed with DDT.

The natives, dubious at first, were happy when they discovered that the chemical not only eliminated the mosquitoes but also killed the rest of the abundant insect pests in their houses.

In spite of these diversions, archeological work continued without interruption. We found stone axes, knives, whistles, grinding stones, spindle whorls used in making thread, and pottery in abundance (page 235).

Vessels of many forms and sizes were represented, and all were of types new to us. Painted pieces were very scarce, although a few were decorated with simple red and black geometric designs.

The principal decorations were stylized life forms modeled in low relief on the bodies of the vessels. These were skillfully executed and elaborate in design. Recognizable were birds, turtles, frogs, monkeys, and alligators.

Our two weeks at Utiwé were packed with action. We came to know and like its people. We danced on the earthen floors of their palm-thatched houses at night, to rhythms produced by native musicians.

Back at Albrook once more, we made preparations for our main task—excavation of the site at Barriles in Chiriquí.

Our weapons carrier loaded with canned goods and supplies, we set forth on the familiar road to the west. During the war, when Army engineers worked on the western extension of the Pan American Highway in the mountains near the Costa Rican border, they built a comfortable headquarters building near the little native settlement called Nuevo California. Later, this was taken over by the Boy Scouts of the Canal Zone for use as a vacation camp.

Since it was not in use, we rented it for our field headquarters.

The camp, the most luxurious of all our expeditions, boasted a large living room with a huge stone fireplace, four bedrooms, a kitchen, and a storage room.

Charlie Williams, a tall, lean Trinidad Negro, came with the camp as cook.

Charlie cooked on a wood stove in a small outbuilding. This stove also heated water for a shower, which was in a stall alongside. He made very good biscuits using an inverted dishpan to hold the heat like an oven.

Nights were cool at our Nuevo California camp, 4,000 feet high. Strong winds blow steadily during February and March, across the open plains near the base of Chiriquí volcano.

A number of retired Americans, attracted by fine climate and beautiful scenery, have built homes in the Chiriquí Viejo Valley.*

Glenn Lewis and his wife, Mae, who have a beautiful home on the bank of the river, kept our table supplied with fresh rainbow trout, fresh vegetables, and fruit from their garden. Lewis gave generously of his time in guiding us to archeological sites.

Mr. Senn, the postmaster, was born in Switzerland and spent many years in Java before coming to Panama. One of the first settlers in the Volcán region, he knew more about it and its inhabitants than anyone else.

The Barriles "dig" lay only four miles south of camp, but 1,000 feet lower. It required more than half an hour in our weapons carrier to cover this distance over a rough and dusty logging road.

Sometimes, when the wind blew extra strong at night, we found the road blocked with fallen trees.

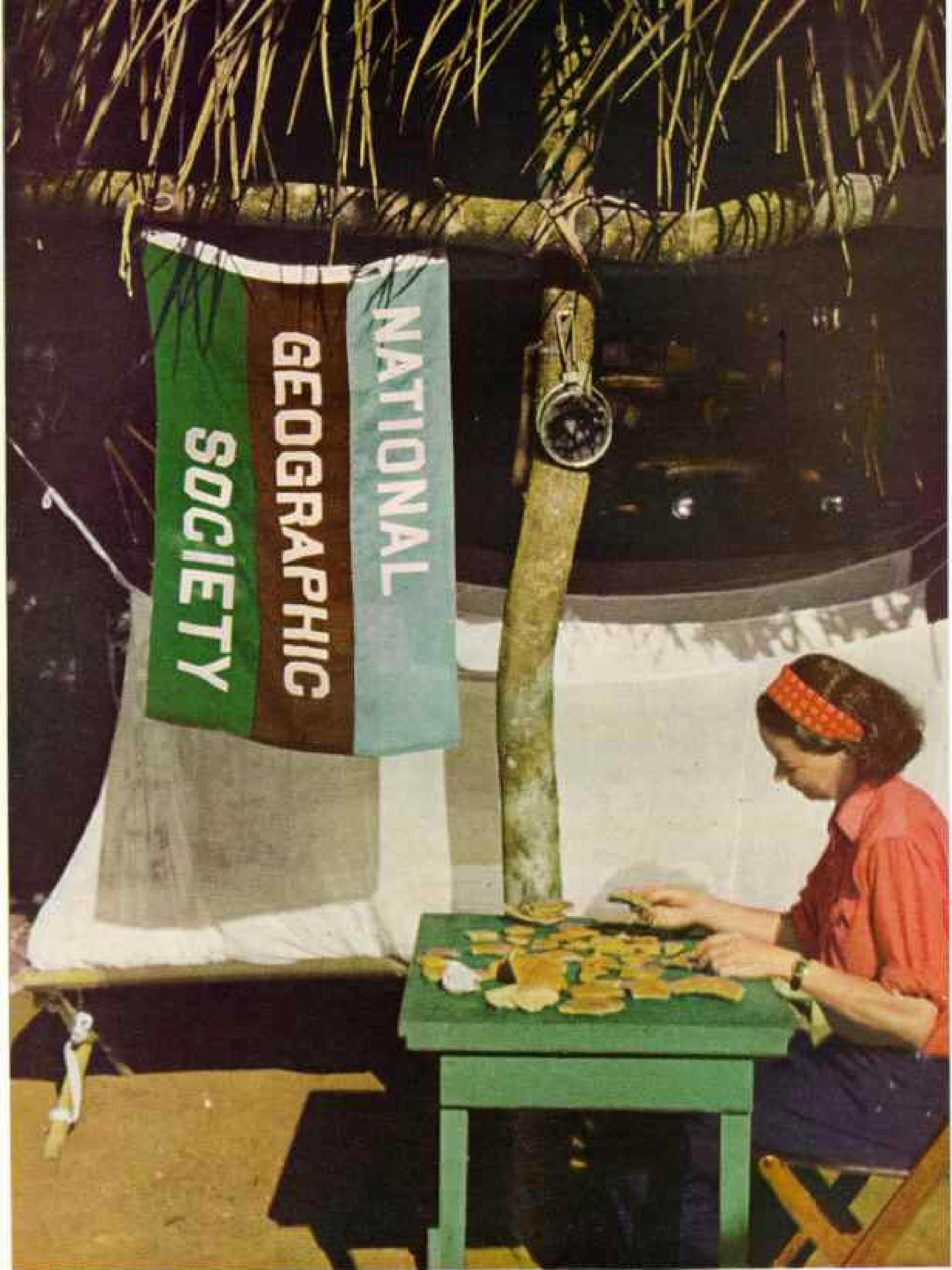
When the trunks were too large, we built detours around them. One forest giant fell in such a strategic location that the necessary detour added ten minutes to our trip each way for the remainder of the season.

Strange Carvings on Rock

The archeological site is located on a fairly level elevation by the side of a clear little stream. The ceremonial center consists of a raised area about 50 yards long and 30 yards wide. At the east end of this rise is a large natural rock covered with carved petroglyphs in the form of spirals and irregular radiating lines terminating in cup-shaped depressions.

Local legend had it that this was an aboriginal map. The lines were trails leading to the depressions which represented tombs rich in gold. No gold has been found at

* See "Panama, Bridge of the World," by Luis Mardel, NATIONAL GEOGRAPHIC MAGAZINE, November, 1941.



Patiently She Puts Together Jigsaw-puzzle Fragments, Links with Panama's Colorful Past

Mrs. Marion Stirling, wife of the leader of the National Geographic Society-Smithsonian Institution archeological expedition, reassembles broken pottery in a camp near Utivé, about 20 miles northeast of Panamá City.



Along Panama's Swift, Crystal-clear Chiriquí Viejo River Archeology Gives Way to Angling

Dr. Stirling (right) and Capt. Lester Snell, United States Air Force, caught fighting rainbow trout in this mountain stream near the Costa Rican border. The river is a favorite with American fishermen from the Canal Zone, about 200 miles eastward.

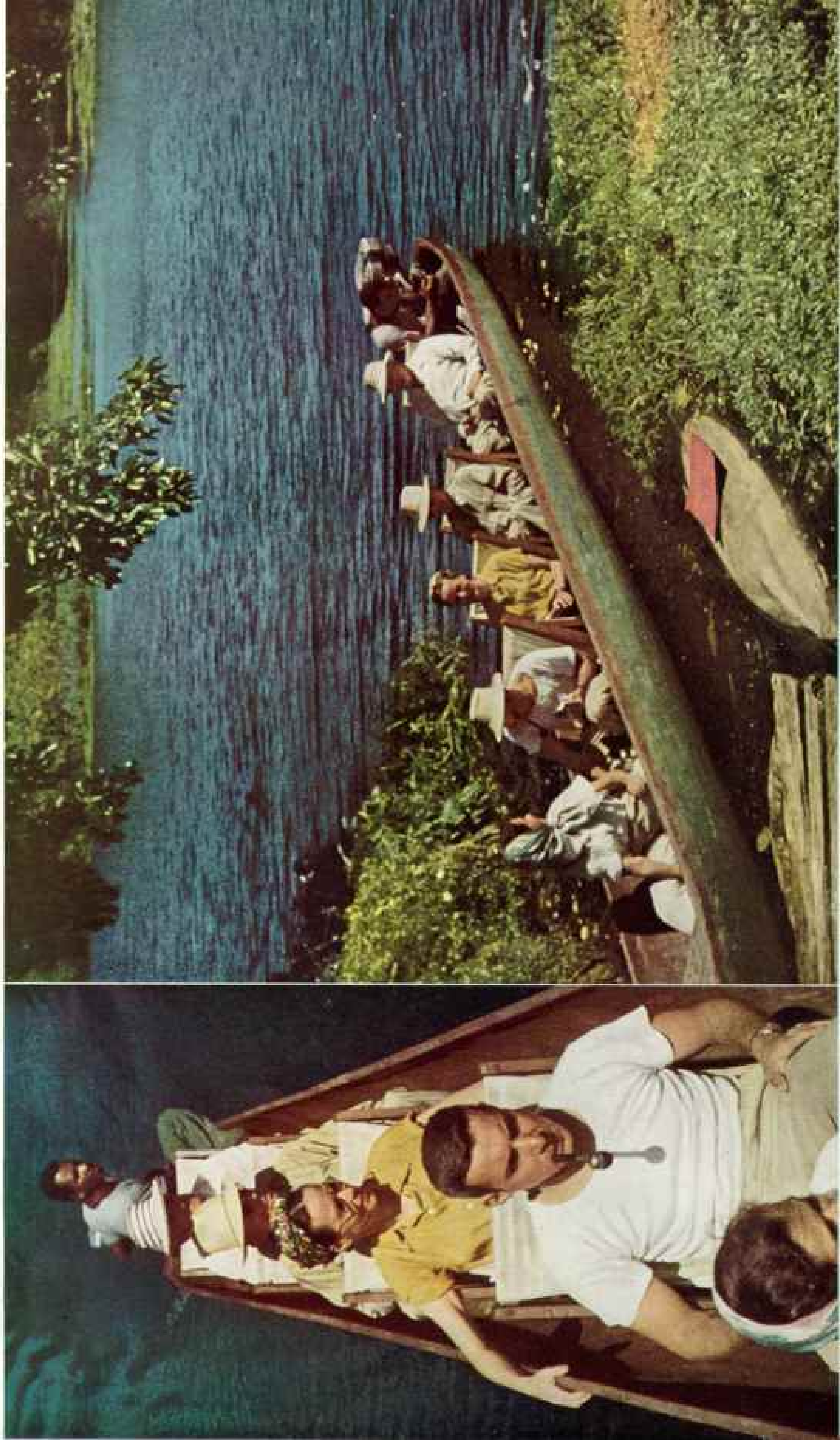
In an Outboard-powered Dugout, Friends Take the Stirlings for a Cruise on the Winding Chagres River

From Gamboa, where the Chagres empties into the Panama Canal, the party traveled upstream to inspect archeological sites and visit a Gorgas Memorial Laboratory research station. Bow to stern: Gloriaella Calvo, Dr. Harold Trapido, Mrs. Stirling, Dr. Herbert Clark, and the Panamanian "engineer."

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Photographs by Richard H. Steiner





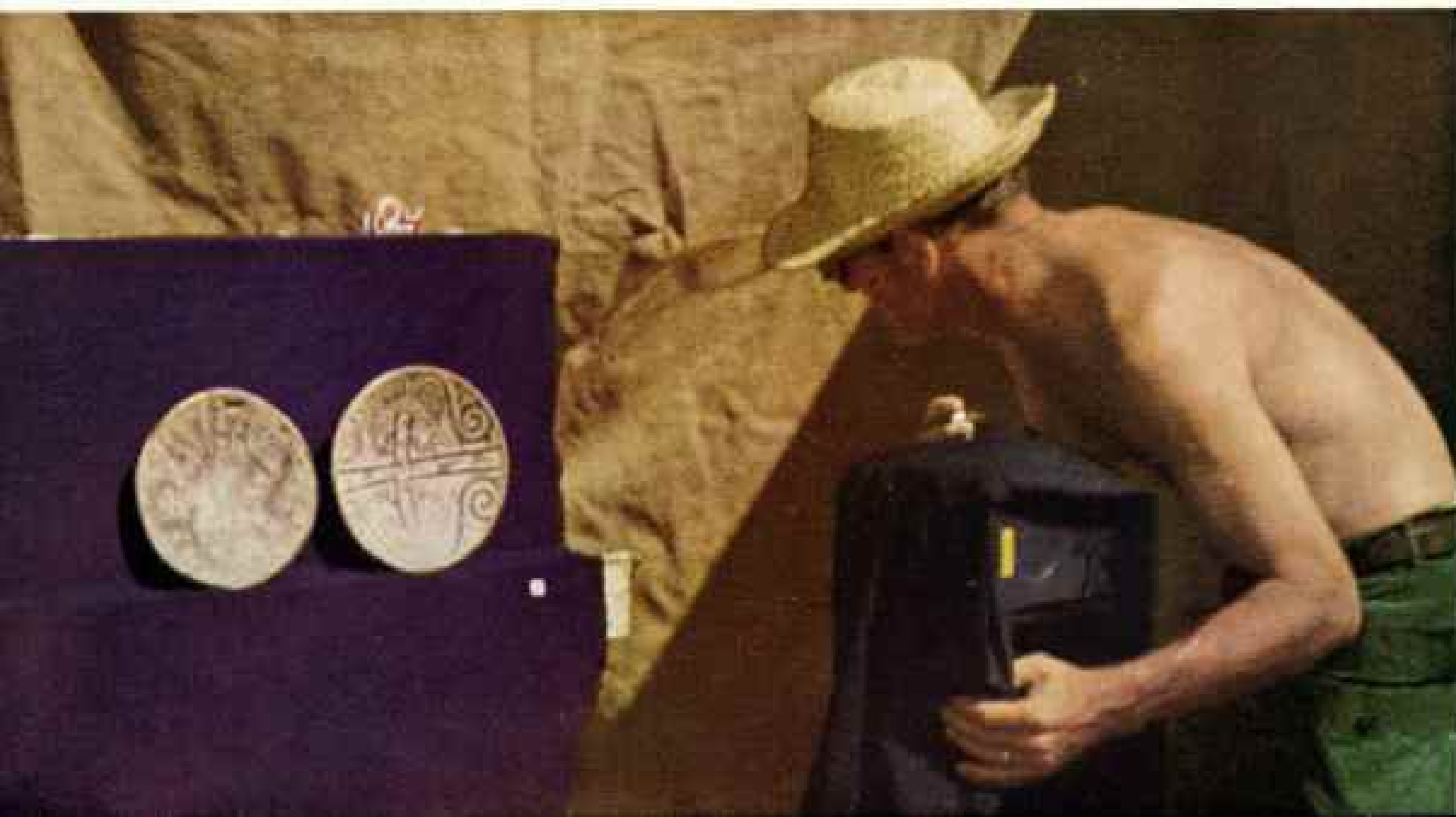
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Kidachimies by Richard H. Stewart

Indian Relics Dug from Panama Soil Tell of Life in America Before the Spaniards Came

Dr. and Mrs. Stirling (upper) scrape dirt from pedestal and tripod vessels found in tombs at Hacienda La Pita, between Santiago and Soná in Veraguas Province. National Geographic staff photographer Richard H. Stewart (lower), veteran of many Central American expeditions, trains his camera on bright-hued plates unearthed near Parita. Such pottery (opposite page) was buried with pre-Columbian Indian dead. Bowls, jars, and plates bear fanciful designs, such as sacred king vulture (lower right), doves, frogs (left, second from bottom), and crocodiles. Also found in the graves were grinding stones, stone axes, copper chisels, and carved manatee ribs. The 1948 and 1949 Panama expeditions added about 100 trunks full of archeological treasures to the Smithsonian Institution collection in Washington, D. C.







A Deep Tomb in Veraguas Province Yields Grinding Stones, Decorated Bowls, and Ornaments of Gold and Carnelian

Dr. Stirling enters a narrow shaft leading to a burial chamber 15 feet below the surface at Hacienda La Pita. Mrs. Stirling cleans pottery already recovered. Crude hexagonal basalt columns (right) were found in many Indian graves; their purpose is unknown.

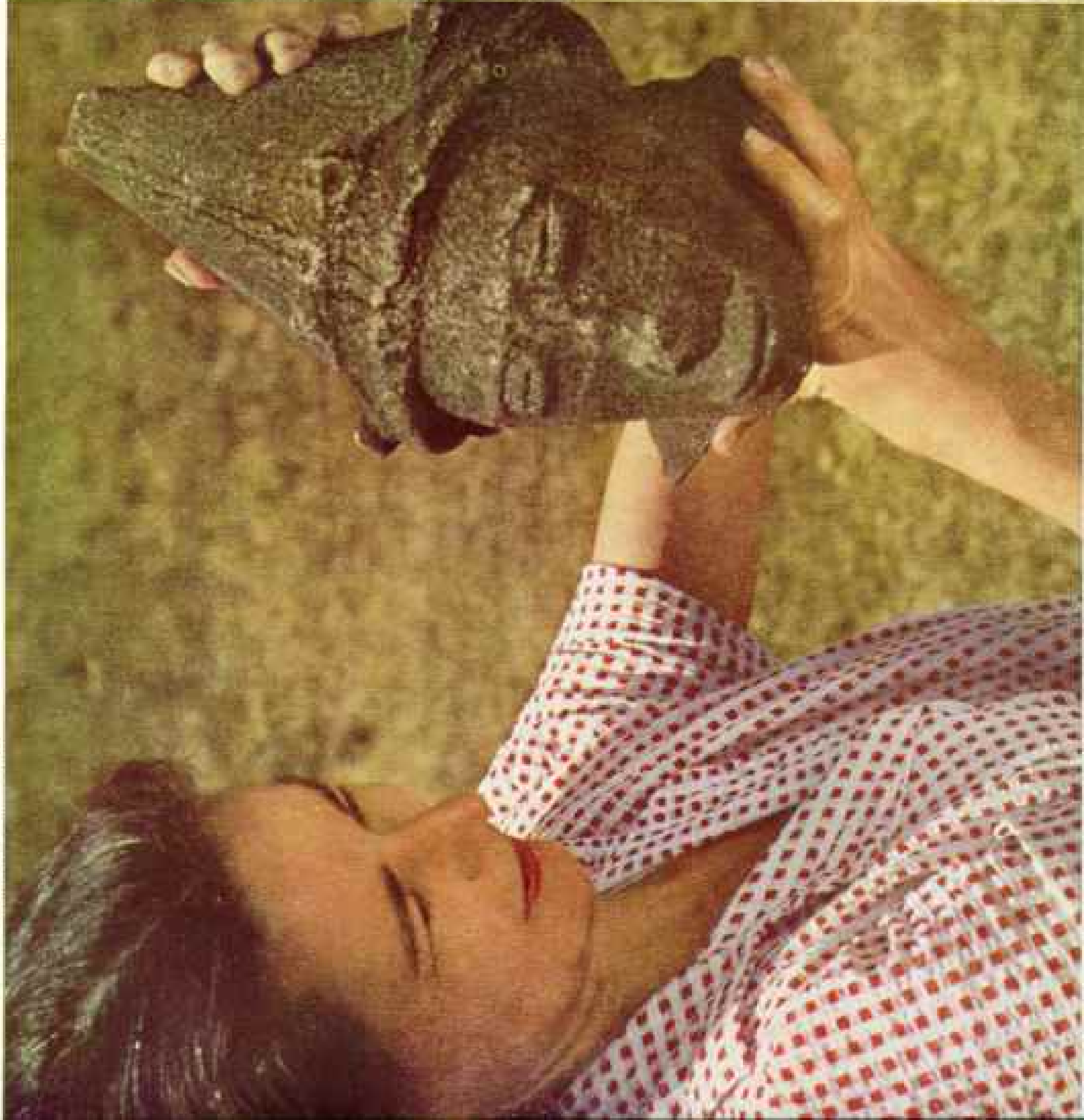
Conical Hat, Dated A. D. 1250, Suggests the Latest from Paris; an Insect-trapping Plant Opens Wide for Unwary Prey

Mrs. Stirling holds a stone head found near Barriles, Chiriqui Province. It matches a basalt body already on exhibition in the National Museum, Panamá City. Gloriella Calvo admires a pelican flower (*Aristolochia grandiflora*) at the Gorgas Memorial Laboratory's Chagres River field station.

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Photographs by Richard H. Howart





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Kodachrome by Richard H. Stewart

↑ Archeology Takes Wings: Helicopters Cut Out Weeks of Foot Travel

With Dr. and Mrs. Stirling aboard, an Air Force search-and-rescue Sikorsky hovers over a mound, once an Indian village site, near the Rio Tigre. The expedition is believed to be the first to make such use of the versatile "eggbeaters."

✚ For Nimble 'Copters, a Swamp Serves as Well as Hard Ground

After a feathery landing in tall reeds, the Stirlings check their position on a map with Lt. Wilson Botner (left) and Lt. John R. Peacock (right), pilots of the First Rescue Squadron, and Capt. Langdon Tennis, of Albrook Air Force Base.



Barriles, although the individuals represented in the stone statues appear to be wearing gold ornaments.

At the west end of the central rise the stone statues mounted on pedestals had been erected in a transverse line. When discovered, all had been thrown down and broken, apparently by a later group of Indians (page 227).

Our excavations revealed four primary soil formations. The first is a surface layer, about six inches thick, of a dark-gray sandy humus. Under this is a compact layer of volcanic ash and pumice, also about six inches thick (page 231). This ash lays over a 3-foot layer of rich black soil which marked the occupation period of the site. Beneath this, the base formation is a compact yellow clay.

Broken fragments of pottery were scattered all through the black soil. This seems to indicate that the site was occupied for a long time, since only six inches of soil have accumulated since the eruption of the volcano.

In the ceremonial center our excavations revealed several rectangular floors or foundations of massive stone slabs and boulders, and a number of caches of pottery vessels.

The pottery at Barriles was well made and often elaborate. Most of the ware was unpainted or painted with a single color, red or black incised designs being common.

The only two-color ware was a rare combination of red and bright lemon yellow. Many of the vessels were mounted on tripod legs in the form of bird, animal, or human figures. Rims of vessels were often decorated with grotesque appliqué animal forms, and less frequently the bodies of large urns were ornamented with frog figures in high relief.

Interiors of many bowls were painted by the so-called "lost color" technique. Designs were laid on in wax, and red or black paint then applied. When the wax was removed, a negative painted design remained.

In size, vessels ranged from miniatures no more than two inches in height to three-foot urns. A number of large urns were excavated in the vicinity of the ceremonial center. All were covered with lids consisting of inverted bowls. One such covered urn, of exceptionally hard, thin ware painted red, was excavated at a depth of five feet.

The entire site covered an area about 400 yards square. Tombs were found scattered throughout this area. They consisted of shafts sunk into the yellow clay base in which were hollowed out circular chambers six or seven feet in diameter. These were easy to excavate, since they were filled with the soft black soil of the site, which contrasted sharply with the hard yellow clay.

One elaborate tomb consisted of three slab-lined chambers connected by tunnels and having but a single entrance shaft. There was nothing whatever in it.

At Barriles there were seldom any pottery vessels in the tombs. The usual offerings consisted of corn-grinding stones with three or four legs. Some of them were very large and elaborately carved and decorated.

About the time Barriles was occupied, there apparently existed a religious cult which extended from Veraguas in Panama through Costa Rica and into Honduras. The cult's colossal grinding stones must have been features of a special ritual.

We worked for two months at Barriles, and then began excavations in some of the cemeteries left by the Chiriquí Indians, who were the region's last pre-Columbian inhabitants.

Indian Cemeteries Excavated

Ever since the time of the Spaniards, these tombs have been looted, since many of them contained gold and the pottery is some of the most pleasing found in the New World.

The cemeteries are almost always located on the summits of high ridges or on the rims of steep declivities that fall away to a running stream.

Tombs vary from 5 to 15 feet in depth. They are circular chambers hollowed out at the base of a cylindrical shaft and lined and covered with flat limestone slabs. The limestone covers make it easy for the native gold seekers to locate the tombs. Over one previously looted tomb that we excavated at Palo Santo, a large finca near Nuevo California, we removed a cover consisting of about two tons of limestone slabs.

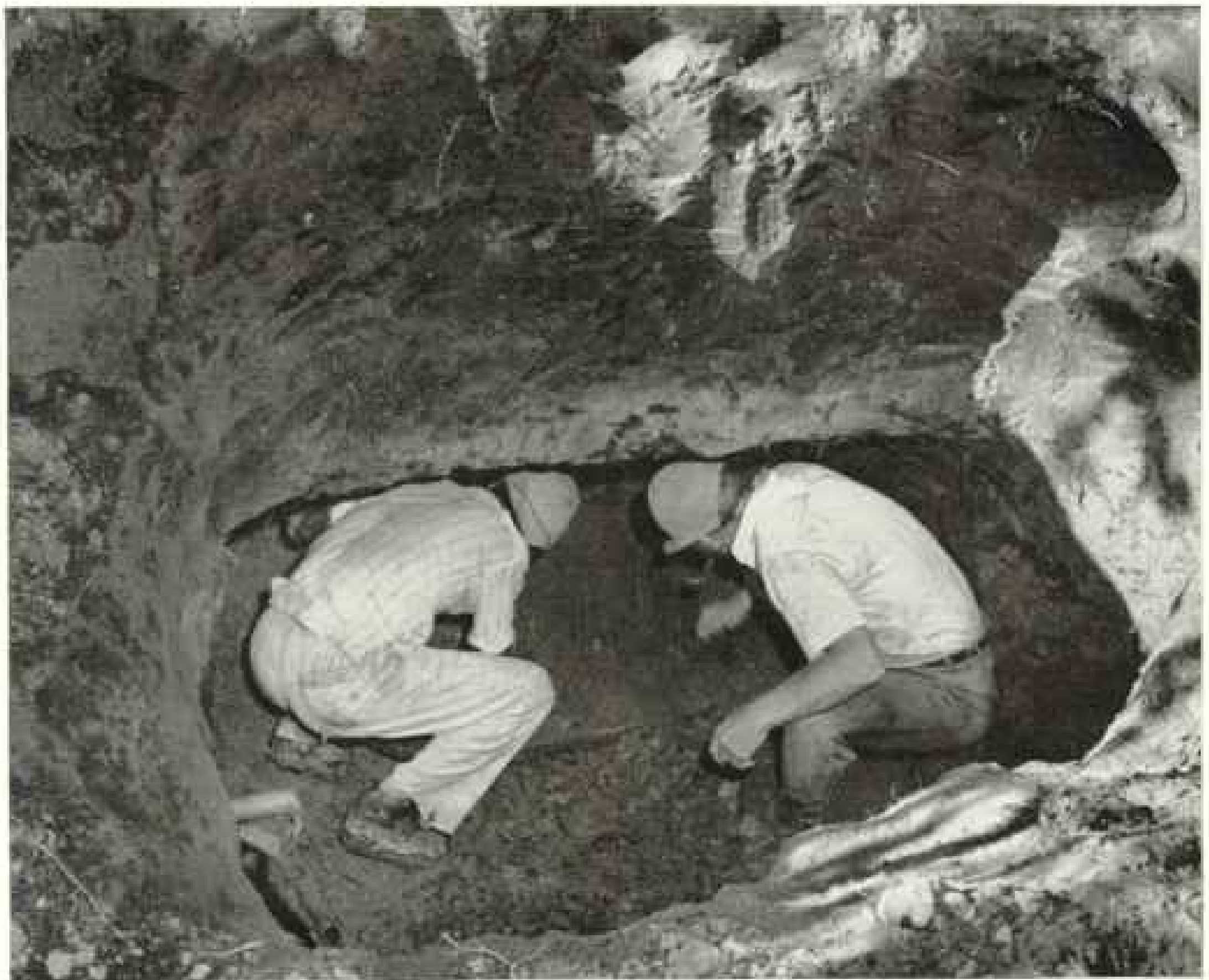
There was one excursion we wished to make before returning to Panamá. Luis Hartman, the "Daniel Boone" of Panamá, had described archeological remains, similar to those at Barriles, located in the rough mountains near the Costa Rican border.

On this trip we were joined by our friend Ben Grauer, of the National Broadcasting Company, who in previous years had visited our camps in Mexico.

Sending horses ahead, we took a jeep as far west as it is now possible to go in that direction on the Pan American Highway. The road soon began climbing steeply toward the pass called La Silla, "The Saddle."

A few miles beyond Nuevo California we noticed that some wag had planted a sign reading "City Limits of Los Angeles."

At the Saddle, where the descent began, our horses were waiting with two of our workmen whom we had selected as guides.



In an Indian Chieftain's Last Resting Place, Workmen Uncover a Huge *Metate*

This corn-grinding stone, one of many removed from tombs near Barriles, is five feet long and weighs about 100 pounds—too large for practical use. Carvings on its basalt surfaces represent monkeys, parrots, and humans. Near-by ground yielded much pottery.

The region beyond the Saddle is wild and rugged jungle. In a valley between the Saddle and the border a group of Swiss established a small colony, where they now raise cattle and make cheese.

At the end of a long day's ride through beautiful mountain scenery we found lodging at the home of one of the Swiss, Werner Omlin, who, with his Panamanian wife and three healthy red-haired children, had established his clearing in the mountains far beyond the original colony.

The next day we set out for the near-by home of the fabulous Luis Hartman, who as a young man had come to Panama from Czechoslovakia, via New York, Philadelphia, and South America. Fascinated by the wild jungles, he became a bushman, hunter, and prospector.

Whenever someone built a house within a day's horseback travel of his location, he would pack his belongings and move to a

new, secluded forest spot to build a new home.

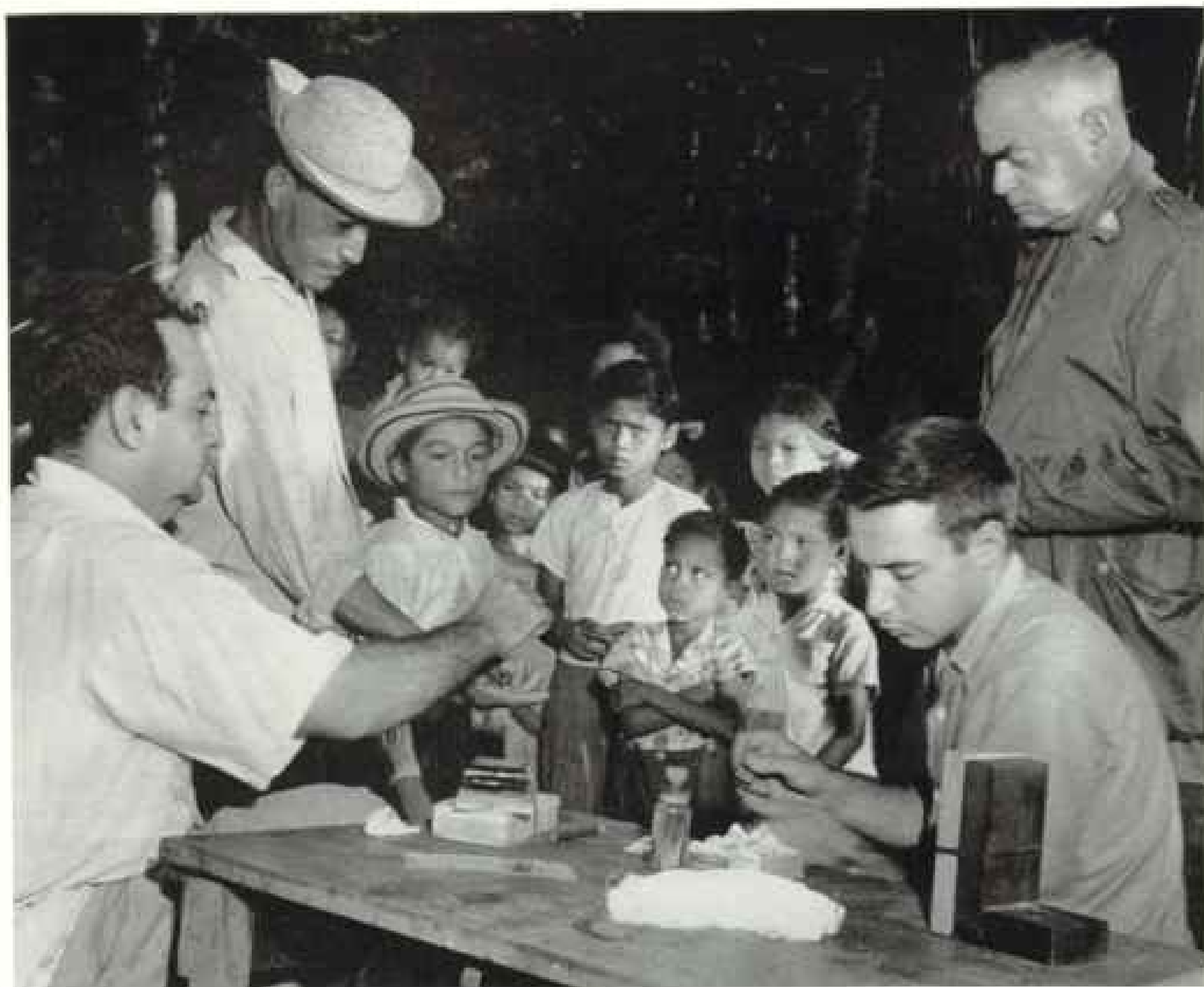
With his first wife, he raised a family of 11 children, all of whom he delivered himself. This large brood he educated himself, among other things teaching them to speak English.

In Panama, whenever we asked for information on the wild region of Chiriquí, our informants would tell us to the best of their ability, and then invariably wind up saying, "But, to be sure, you had better ask Luis Hartman."

As a young man, Hartman spent some months searching for the legendary Estrella mine. He later panned for gold in various streams in the Republic.

With an intense liking for all phases of natural history, he was always interested in locating archeological sites and speculating upon early peoples. Although he was without archeological training, I was amazed at the accuracy of his deductions.

As we approached the hilltop site of Hart-



Brown Faces Record a Solemn Event: Inoculation Against Yellow Fever

Soon after arrival, the expedition found Utivé the center of a yellow fever outbreak. To the ramp came (left to right) Dr. Pedro Galindo, Government sanitation expert; Dr. Harold Trapido, of the Gorgas Memorial Laboratory at Panamá City; and Col. Norman W. Elton, of the Gorgas Hospital, Canal Zone. They gave immunization shots and captured disease-bearing mosquitoes and monkeys for study (page 234).

man's current home, we encountered a perspiring youth with the carcass of a large mountain lion draped over his shoulders. He told us he was one of Hartman's sons and that he would soon join us at the house.

We found Hartman at home. A small wiry man with jet-black hair and beard, he is possessed of unusual energy.

He spent the day showing us the interesting archeological sites he had found in the vicinity and presented us with a large collection of pottery vessels he had unearthed.

On concluding our work in Chiriquí, we closed our season by excavating a site of the interesting Veraguas culture, on the finca La Pita, owned by Don Marcos Robles. This site also consists of a cemetery of deep tombs entered by cylindrical, well-like shafts (page 228). We were assisted here by Juan Gratticos of Soná, one of the best-informed men in Panamá on Veraguas archeology.

Excavating these deep tombs with their narrow entrances required skill. It was also physically difficult work. Here we paid the men \$1 a day and food. Rice, beans, and meat three times a day was the menu.

Some Tombs 30 Feet Deep

Locating the tomb entrances on the surface requires a keen eye. In some instances the top of the shaft fill is marked with stones. In others there is a slight depression where the fill has sunk a little. More often there is no indication other than a slight difference in the texture of the disturbed material marking the fill.

The deepest tombs at La Pita were around 16 feet, but Gratticos knew of some in Veraguas almost 30 feet deep. Sometimes we encountered long hexagonal columns of basalt in the shafts or in the chamber below (page 240).



A. Utivé Kibitzer Shoulders Woven Basket and Yankee Machete.

On his way to the fields to gather vegetables, this Panamanian boy pauses to watch the archeologists at work. His horn-handled blade was made in Collinsville, Connecticut. Its use ranges from killing snakes to felling trees.

When the workman estimates that he is about 14 inches from the bottom of the chamber, the shovel is set aside and work is continued with a machete. As offerings are encountered, the earth is cleared from around them before being removed, so that their position can be determined.

We excavated more than 20 tombs at La Pita, and as a result were able to obtain a fine cross section of tomb types for the area and also a splendid collection of pottery, stone, and metal artifacts representative of the Veraguas culture (pages 238 and 239).

Our best find was Tomb 15, which contained more than 50 pottery vessels, some of exceptional beauty. There were also 76 polished stone axes, and a necklace of polished carnelian

beads attached to a large chest ornament of the same material. There were six pottery whistles, all in perfect working condition, made in the forms of birds and animals, and 26 flint arrowheads.

There were two four-legged corn-grinding stones, one particularly fine with carved decorations and exceptionally long legs in the form of crocodiles. There was a disintegrated ornament in the form of a king vulture, made of some base metal plated with gold; a number of hollow gold beads, a nose ornament, and a fine human figure of solid gold.

No trace of human bone remained in the tombs, but in several of them tapir bones and skulls had been placed in the shaft fill. These were fairly well preserved. Tombs such as No. 15 give us more than a hint of the rich culture that once flourished here.

Our friend, Don Alejandro López, showed us many interesting archeological sites in the Santiago area and presented us with some fine archeological specimens from his collection.

Here he had found an ancient cemetery with tombs containing intricately carved corn-grinding stones, but no pottery vessels. This cemetery is located in a curiously mineralized area, littered with brightly colored stones and petrified trunks of trees. Instead of the usual basalt columns, these people had used petrified logs as their tomb markers.

Tired, but well satisfied with our results, we returned to Panamá with our weapons carrier loaded with our collections. Here we spent a final week at the National Museum studying its fine collections and conferring with the director, Dr. Alejandro Mendez, whose assistance had done so much to make our work successful and pleasant.

Strange Courtship of Birds of Paradise

BY DILLON RIPLEY

Associate Curator of Zoology, Peabody Museum of Natural History, Yale University

IT WAS a warm bright morning in the jungle of New Guinea. I sat in my small shelter of branches and waited. Everything was still and quiet.

Suddenly, with quick, darting flight, a coal-black bird flew into a tree directly over a patch of cleared ground roughly 5 feet in diameter and 30 feet away from me. It was a male six-plumed bird of paradise and this was his courtship dancing floor. Even at that distance I had a flash of his china-blue eye and the patch of silvery feathers over his bill (pages 257 and 273).

The bird sat quietly for a time, and then called—a sudden harsh croaking sound. He called several times, becoming more and more agitated.

Finally, looking tensed, with tail and wings held rigidly outstretched, he left his perch and started down in a series of short flights from branch to branch. He seemed to move with trained precision, as if his course was charted by long usage. The last few branches were very close, and on these he hopped, stiffly and with little sidewise flirts of the tail.

Once on the ground, he darted from side to side so fast that the eye could barely follow. In a moment it was over, and the bird flew straight off with one last croak.

I did not see the object of his affections, but one of my collecting boys reported seeing a bird dance while a female coolly watched from a tree overhead.

Evidently these dancing places are used for a long time. The horizontal branches on which the male bird alighted on his prescribed course down to the ground were deeply scored with the marks of claws.

Trapping Takes Days of Patience

As an ornithologist, I had come to study various species of the birds of paradise, whose courtship displays are the most curious and striking in all the world of birds. My camp was on top of Bon Kourangen, which appropriately means "Paradise Bird Mountain," in the Tamrau Mountains of northwestern Netherlands New Guinea.

Seeking a closer acquaintance with the six-plumed member of this fabulous family, I suggested to my Papuan boys that they try to trap it. I offered them five guilders a bird, equal then to about two and a half dollars, a phenomenal price to them.

At first there was a hushed silence, and then

a shout of approval. At least 10 men looked about knowingly, smiled and nodded, then darted off to pack up their belongings. In 15 minutes they had all hit the trail, some of them with their wives.

A half-hour later, to my distress, seven were back again, smiling a bit vaguely.

"What on earth is the matter?" I asked. "What are you coming back for?"

"Oh, Tuan," one of my gun boys said, "these ones don't really know how to trap the birds. They only thought so when they heard you make that big talk. And then they were excited about the money."

Two days later, however, two of the men returned with six-plumed *kourangen*, and an all-but-incredible story. They told me they caught the birds by waiting a couple of days under a tree, holding one end of a noose. The noose was draped over a branch where the birds were in the habit of perching. Then the man waited. If his wife was with him, she would steal up at intervals to give him food.

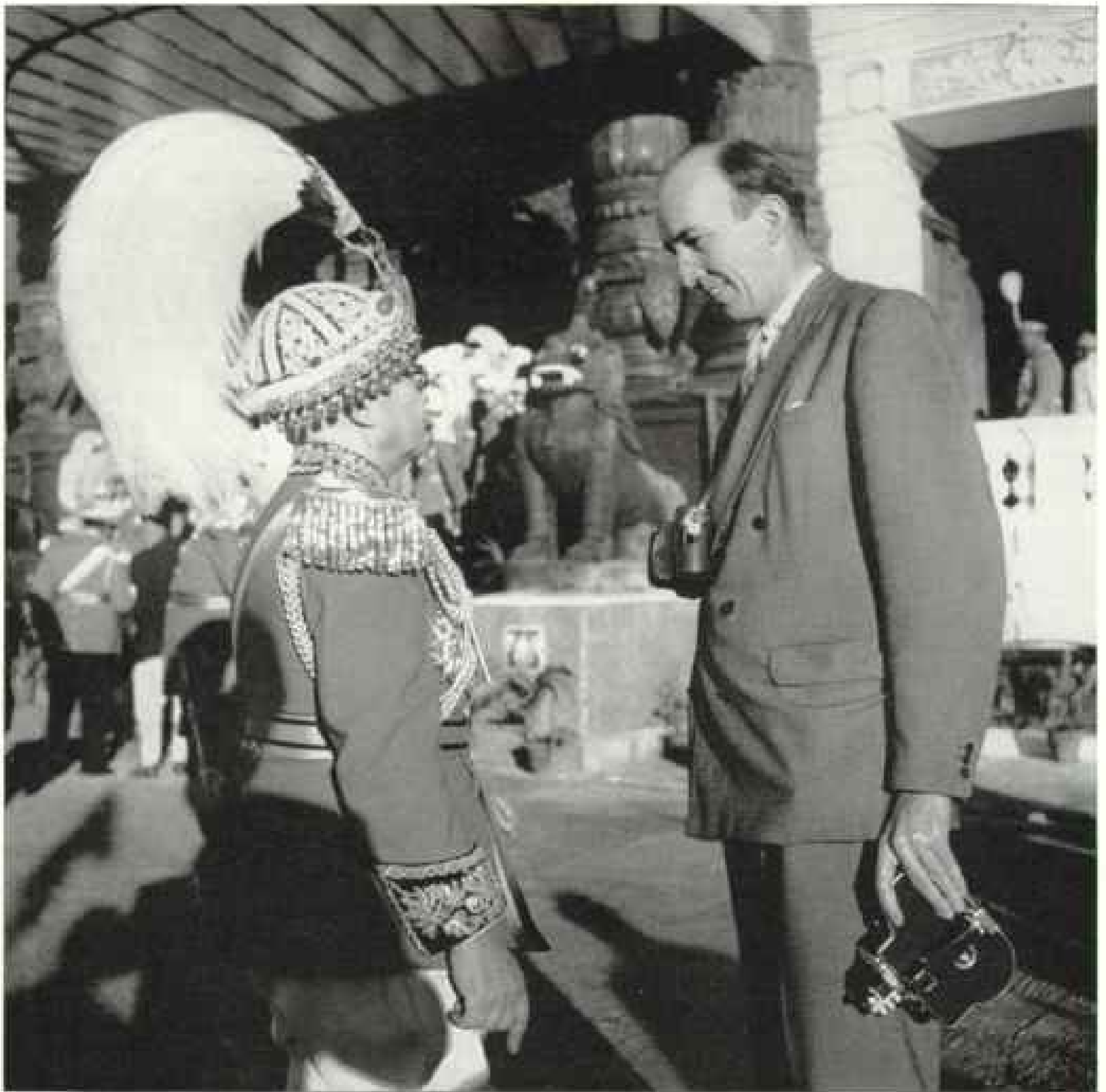
In all, five of these birds were trapped during my stay on the mountain, and, much later, one reached the United States alive.

I saw the spectacular sicklebill, or long-tailed bird of paradise, only twice (pages 259 and 274). One was a male sitting high up on the bare branch of a huge dammar, or gum tree. Evidently there was a female near, as he was displaying. The butterfly feathers stood out on each side. The tail was partially spread.

Suddenly he gave his call, a loud penetrating whistle, sounding like the syllable "whick." It was a note I had heard often ringing over the steep valleys in the mountains. Then he turned and made a nose dive straight for the ground, a hundred feet below. At the last instant he braked with wings and tail and doubled back to the branch again, all in one graceful motion.

The birds of paradise belong to a single region of the world, the Papuan, comprising New Guinea and neighboring islands (map, page 268). Their nearest relatives are the crows.

Certainly the plainest of the paradise birds look a bit like small glossy crows. These are the manucodes, a group of five species of blackish birds clothed in shiny iridescent feathers of simple shape. However, that is just the beginning. From there the paradise birds branch off into a variety of unique forms.



National Geographic Photographer Volkmar Westael

Paradise Plumes of the Nepalese Court Are Treasured Like Crown Jewels

All were taken many years ago, before the killing of paradise birds was outlawed about the time of World War I. Four or more interwoven flank plumes of the Greater Bird of Paradise rise from the gem-encrusted crown of Commanding General Kaiser Shamsber Jang Bahadur Rana, here chatting with the author, Dr. Dillon Ripley, ornithologist and leader of the 1948-49 National Geographic-Smithsonian Institution-Yale University Expedition to Nepal. Each plume would be worth at least \$30 or \$40 today. The General, younger brother of the present Maharaja (page 269), was recently Minister to the United States.

The latest classification places the number of species of paradise birds at 41. This does not include the closely related family of bowerbirds, of which there are 20 species.

In spite of its size and inaccessibility, New Guinea has been fairly well explored, and it is doubtful that there are many more new or unknown birds of paradise.

As recently as 1935, an Australian patrol officer, camping on the slopes of Mount Champion at an altitude of 8,200 feet in the central mountains of New Guinea, saw pairs of para-

disse birds flitting through the moss-covered trees around his camp. The male birds had two ivory-white, extended tail feathers about two feet long "which made flicking sounds as the birds trailed them through the air."

Tail Feathers in Native Headdresses

Three years later a bird collector working for the London Zoo procured tail feathers of this strange bird; natives had been found wearing them in their headdresses. So exciting was the discovery that in 1939 two nearly



Frederick E. Crakett

With Paradise Bird Plumes in His Hair, a New Guinea Swain Comes to a Dance

In the prow of his outrigger canoe he has brought a drum and an orchid (*Dendrobium*) which is common in the low coastal mangrove area where the Lesser, Twelve-wired, and King Bird of Paradise are found. From a Lesser came his plumes for this festive occasion at Noebou, Netherlands New Guinea. More primitive natives alongside wear more ornaments, fewer clothes.

simultaneous scientific descriptions of this "new" bird of paradise were published.

But, unfortunately for these scientists, it was later determined that the mysterious white-tailed species had already been reported by a German expedition in the early 1920's. Only females and immature males had been found; but the bird had been described and named. It was the white-tailed, or ribbon-tailed, bird of paradise, one of the most remarkable species (pages 266 and 273).

No one knows for certain when the first paradise bird reached Europe, although there is a definite record in 1522. The yellow-

orange plumes of the gorgeous greater and lesser birds of paradise were certainly known to the Chinese, who had traded in the seas of the East Indies for centuries before the Portuguese arrived in the Moluccas early in the 16th century.

In the headdresses of the Janizaries at the Turkish court, Pierre Belon, an early French naturalist who traveled in the Middle East before 1550, noticed plumes which he thought came from the mysterious phoenix, the immortal bird of legend; these were presumably paradise plumes. In 1598 John van Linschoten, writing of birds which had arrived in

Holland from China, called them "avis paradiseus."

Traders reported the birds lived in the air, always turning toward the sun, and never alighting on the earth till they came to die. They also said that the female laid her eggs in a hole in the male's back, and that the birds drank dew as it "fell."

The birds were supposed to have no feet, but an English scientist, John Latham, writing in 1782, exposed this pleasant nonsense by describing the method the Papuans used to preserve the skins of the birds they captured and sold. It was this mutilation of the skin which gave rise to the legend.

"The whole trouble they were at on this occasion," he wrote, "was merely to skin the bird, and, after pulling off the legs, coarser parts of the wings, etc., thrust a stick down the throat into the body, letting an inch or two hang out of the mouth, beyond the bill; the whole packed in a bamboo casing to protect the plumes.

"On the birds drying, the skin collapsed about the stick which became fixed and supported the rest. They had then no more to do than to fit this into a socket in the turban or elsewhere."

Latham described how the grandees of India, China, and Persia ornamented themselves and even their horses with these plumes, and continued: "The Dutch got them chiefly from Banda . . . to which place the natives of Aroo [the old spelling for the Aroe Islands, south of New Guinea] bring them by way of traffic."

By the time the British naturalist Alfred Russel Wallace arrived in New Guinea and near-by islands in the 1850's, the trade in plumes of birds of paradise had reached considerable proportions.

In his fascinating book, *The Malay Archipelago*, Wallace described how the natives of the Aroe Islands built shelters high up in the forest trees near the communal dancing grounds of the greater bird of paradise and then shot the birds with a bow and arrow, "the arrow having a conical wooden cap fitted to the end as large as a teacup, so as to kill the bird by the violence of the blow without making any wound or shedding any blood."

Occasional birds were caught alive by means of gutta-percha or birdlime, or by snares of various types. The first to be taken to Europe alive were probably the two males of the lesser bird of paradise which Wallace took home to England in 1862.

The paradise bird plume trade reached its peak in the eighties and nineties of the last century. Nearly 50,000 plumes a year were

exported, principally to Paris for capes, hats, and other extravagant accessories of the feminine fashions of the time.

Every year, just after the birds had molted and assumed their new bright plumage, swarms of Papuan and Malay hunters would venture into the deepest forests and most inaccessible interior of New Guinea. Along the shores, at such places as Hollandia, Manokwari, and Sansapor, temporary boom settlements would open up, thronged with Chinese, Arab, and Malay traders. The rivalry was great, prices fluctuated considerably, and it could be a dangerous game.

By the 1920's the paradise trade was forbidden. Nowadays many of the species which were becoming rare have made a good comeback.

It is still possible to buy paradise bird plumes in Paris, but these are old skins, bought before the ban was imposed. A friend of mine found old trade skins of 21 different species of paradise birds in feather dealers' shops on a trip to Paris before the war. Let us hope that the fashion of wearing these plumes will never be revived.

Swamp Bird Wears 12 "Wires"

It is characteristic of the paradise birds that each species has a rather definite range, whether it be the mangrove swamp forest at the edge of the sea or the high, cold mountain forest above 11,000 feet.

The mangrove and sago swamps are the home of the twelve-wired bird of paradise, a lovely thing a little bigger than a starling (pages 256 and 272).

Four or more species of paradise birds are commonly found in the lowland jungles. Among these are species of the plume birds of the old days.

The commonest are the greater and the lesser birds of paradise, only slightly different in size and shape (pages 252 and 253). Both are about the size of an overgrown bluejay, with yellow heads and mantles composed of short plushy feathers.

The display of these birds in flight is made startling by the soft plumes which rise from the flanks and cascade over the back and tail.

The birds make loud gonglike calls. To hear this ringing "ong-ong-ong," and to see two or three males floating off through the green jungle, the sun catching and tinting their cascade of plumes, is a fantastic and arresting vision.

One of the rarest members of this group is the high-mountain Archduke Rudolph's blue bird of paradise, named after the tragic figure of Mayerling (page 251).



At Courtship Time New Guinea's Blue Bird of Paradise Dances Hanging from a Limb

Paradise birds, once hunted for women's hats, are protected. Males (center and right) grow plumes and "wires"; females (left) are plain. Walter A. Weber painted these 16 plates for the NATIONAL GEOGRAPHIC MAGAZINE.



Showy Decorations Vary in Color Among the Races and Species of "Plume Birds"

Bright-red and orange-plumed birds (left and center) are subspecies of the Greater (page 252). Deep-crimson plumes mark a separate species, the Graybreasted (right).
Painting by Walter A. Weber

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WALTER A. WEBER



Painting by Walter A. Merrill
Corkscrew-shaped "Wires" Trail from the Tail of the Male Red Bird of Paradise, Found on Waigeo Island, Near New Guinea

Emperor of Germany's Bird of Paradise Starts His Display Right Side Up and Concludes It Upside Down

Literally heels over head in love is this New Guinea mountain species, the only one besides the Blue (page 251) that indulges in topsy-turvy wooing.

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Painting by Walter A. Weber





MARINA WILSON

Painting by Walter A. Weber

Twelve-wired Birds of Paradise Make Spectacular Love with Bright-colored Mouth and Feather Fan, but Get the Cold Shoulder

Six-plumed Birds of Paradise, or "Flagbirds," Have Astonishing Sets of Wirelike Feathers Springing from the Back of the Head

In courtship display the wearer of these bizarre adornments can shift them entirely around and point their feathery tips forward toward his wireless ladylove.

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Illustration by Walter A. Welber.



WALTER A. WELBER



Two of the Tiniest Birds of Paradise Have Some of the Oddest Adornments

That ruby gem, the male King (one of top pair), has small green rackets on the ends of long tail wires. Wilson's (lower pair), with curled tail feathers, is sometimes called Cross of Christ because of the markings on its pate.



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Painting by Walter A. Weber

To Win a Mate, a Sicklebill Raises False Wings as if Doing His "Daily Dozen"

Trying to impress the female (left), the bird opens his yellow-green mouth. In flying, his two-foot tail serves as brake and rudder. Usually, false wings are hidden. At right a rival shows the true wings.



The Lesser Superb Folds His Wings, Raises Iridescent Shield and Black Cape

When courting, this coal-black bird of starling size transforms himself by erecting the two ranks of leathers and opening his vivid mouth. Despite wind resistance, cape and shield can be held partly erect even in flight.



WALTER A. WEBER

A Thin Sapling Is the Ballroom Floor of the Male Magnificent

His yellow cape spread wide, the Magnificent Bird of Paradise dances up and down a sapling, advancing and retreating toward the female. Earlier he stripped the area of vegetation. Tail feathers are curving wires.



WALTER A. WEBER

A Bird to Make You Rub Your Eyes—Wallace's Standard-wing

A. R. Wallace, the bird's discoverer, observed that it differs "most remarkably from every other." He found it in the Moluccas, isolated by water from other Paradise Birds. The four white plumes can be lowered at will.



King of Saxony's Bird of Paradise Wears the World's Most Extraordinary Plumes

From the head of an otherwise inconspicuous bird of robin size spring amazing two-foot feathers that look like strips of celluloid on which small pennants fly. These marks of distinction are not given to the female (left).



WALTER A. WEEN

Arched Wings Are Extended Suddenly with a Dull Plop as the Magnificent Riflebird Displays His Gorgeous Neckpiece

D'Alberty's Bird of Paradise, the Short-tailed Sickiebill, Seems an Abbreviated Version of Its Relative (Page 259)

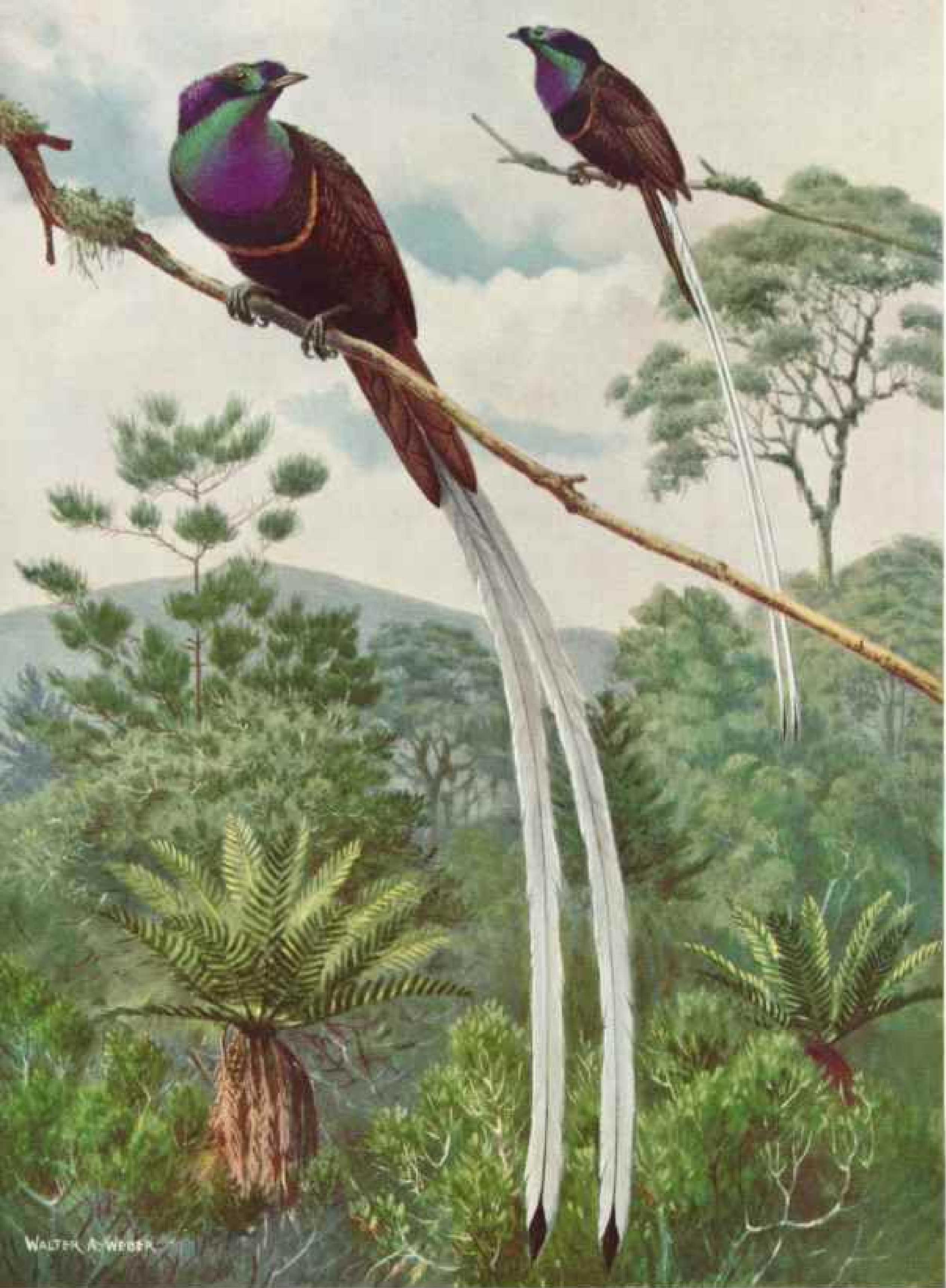
This dweller in mountain solitudes is rare and little known, but in display the male is believed to extend his fans of breast feathers upward around the neck.

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Illustration by Walter A. Wood



WALTER A. WEBER

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Painting by Walter A. Weber

Ribbon-tailed Birds of Paradise Trail Twin Feathers Two Feet Long

White tail feathers make a striking sight as their owners flit among trees and ferns of his New Guinea mountain home. Few men have witnessed the spectacle, for this species is most rare.

I think the prettiest bird of the lowland jungle is the king bird of paradise, a little fellow smaller than our own robin and colored a rich ruby red (pages 258 and 274).

Once I saw a male displaying to a female who sat, supremely oblivious, preening her plumage. The male was maneuvering up and down a vine and the trunk of a near-by tree with as much dexterity as a nuthatch or a woodpecker. From time to time he moved in a series of stiff, awkward hops which apparently marked the height of his rendition.

At these moments he seemed to go rigid all over in a paroxysm of excitement. At the same time he made a snapping noise with his bill.

The sight was reminiscent of the climax of a turkey gobbler's display when he quivers and trembles and runs forward a step or two, dragging his wings on the ground and making a little hissing noise.

Little is known about the actual nesting habits of the bird of paradise family. Few nests have been found in the wild state, although in 1938 and 1939 Dr. A. L. Rand, then with the Archbold expedition (page 270), made some interesting observations on one of the species of manucodes and on the rather dull-colored MacGregor's bird of paradise.*

Gay Blades Disdain Domestic Life

In these duller-colored species, in which the male and female resemble each other closely, they seem to share the duties of incubation and care of the young.

This is in complete contrast to the brightly colored forms in which the male does an elaborate display. The female simply comes to the male's dancing ground to mate with him, and then goes off about her own business. The males of these species are really bachelor birds who don't care a fig about domestic life.

There are several records of paradise birds nesting or attempting to nest in captivity. The little red king bird of paradise nested in

the zoo at Batavia, Java, but the young later died in the nest. In Soerabaja, Java, the lesser superb bird of paradise laid eggs in 1938, but—possibly being ignorant of these matters—the female simply laid the eggs while sitting on her perch, with the result that they all smashed to the ground.

My friend K. S. Dharmakumarsinhji, of Bhavnagar State, in India,† was able to raise a young male greater bird of paradise. However, the bird later escaped from his aviary, and my Indian friend has so far not been able to repeat his triumph. Another young male bird of this species has recently been reared in the zoo in Calcutta.

No doubt in future years more paradise birds will be kept in captivity, not only for their beauty—which surpasses that of almost any other group of birds—but also to give mankind a chance to study their quaint and little-known habits and their erotic displays.

The brilliant display of male birds of paradise to their ladyloves is part of a complicated ritual which serves to reveal sexual maturity and readiness to breed. It also has the function of stimulating the female and developing her responses so that the breeding cycle of both birds may be coordinated. Many species of these birds tend to meet at communal courtship grounds, as prairie chickens do in this country, or the blackcock in Europe.

Why did birds of paradise develop such elaborate ritual patterns? Some scientists believe that only by these complicated and highly specific displays have the various species been prevented from hybridizing among each other.

Even at present many wild birds of paradise have been collected which show traces of hybridization among different species and even genera. Thus it may be that if these strange creatures did not possess such elaborate displays, hybridization would be even more frequent among species that live in neighboring territories.

Blue, or Archduke Rudolph's, Bird of Paradise, Page 251

Of all the species of the genus *Paradisaea*, the most striking is *rudolphi*, the blue bird of paradise. It is found in the Owen Stanley Range and the Herzog Range of eastern New Guinea at altitudes of 6,000 feet and more. Virtually nothing is known of its habits in the wild state, and the local Papuans display a strange reluctance to catch it, probably for some superstitious reason.

The first to be captured alive was taken in 1907. Since then a number of others have reached England and America. The display has been described by Dr. Lee S. Crandall, the General Curator of the Bronx Zoo in New York City. This

species and *gahnelmi* (page 255) are the only two which are known to hang suspended upside down in display. It may well be, however, that the almost unknown but closely related species, *decora*, of the D'Entrecasteaux Islands off eastern New Guinea, performs in the same way.

Rudolphi starts by sitting quietly on his perch

* See "Unknown New Guinea," by Richard Archbold, NATIONAL GEOGRAPHIC MAGAZINE, March, 1941.

† See "Life with an Indian Prince," by John and Frank Craighead, NATIONAL GEOGRAPHIC MAGAZINE, February, 1942.



Drawn by Harry S. Oliver and Irvin E. Allen.

Birds of Paradise Live in Wild New Guinea, No Heaven to Men of World War II

Only one place in the world—this lonely, island-dotted area crossed by the Equator—is home to these birds of strange and beautiful plumage and curious courtship. Here both the author and the artist have studied paradise birds in the wild. New Guinea forms the principal home, but species are found on some neighboring islands and Australia's Cape York Peninsula. Such place names as Hollandia, Wakde, Biak, and the Admiralties recall landings in the grim campaign against the Japanese. The inset shows the United States of Indonesia, set up by the Hague agreement of November 2, 1949.

and calling. Then, slowly and with care, he lowers himself backward. When he is hanging straight down, he shakes suddenly, throwing out his plumes on each side. As he gently rocks his body from the hips, he makes the plumes dance and flutter, and occasionally he shakes himself still harder to make the plumes stand out farther.

All the while the bird sings in a low monotone, head tilted to one side to observe the effect, if any, of this bizarre courtship performance.

Among the *Paradisaea* group of species there is a definite progression from the display of the greater bird of paradise (pages 252 and 253), which crouches on its branch and vibrates its plumes above its back, to Count Salvadori's bird of paradise, in which the plumes are agitated in a veritable frenzy while the bird moves restlessly about, finally to tilt forward until the body is almost perpendicular.

The third stage would seem to be that of the Emperor of Germany's bird of paradise (page 255), which starts in an upright position but soon bends over until it is upside down. The final stage is the blue bird, which doesn't even start its display until it is hanging head down.

Greater Bird of Paradise, Pages 252 and 253

The first of the birds of paradise to become known to the Western World was the greater, named *Paradisaea apoda* by the Swedish systematist, Linnaeus, in 1758. Trade skins seen in Europe had been prepared without the legs, giving rise to the idea that the bird was "apoda"—footless.

The typical greater bird of paradise is found in the Aroe Islands, south of New Guinea. Six

additional subspecies, or geographical races, occur along the coasts of New Guinea, from the Mimika River, in the south, around to the eastward along the coast as far as Huon Gulf and up to the Uria, a tributary of the Ramu River on the north coast. One of the races of this bird has been known to hybridize with a race of the lesser bird of paradise, a fact which shows the close relationship between the species.

Little has become known of these birds since the time of Alfred Russel Wallace. His description of the dance of the courting birds, first published in 1869, is as good today as it was then.

The birds, he said, dance "in certain trees . . . which have an immense head of spreading branches and large but scattered leaves, giving a clear space for the birds to play and exhibit their plumes. On one of these trees a dozen or twenty full-plumaged male birds assemble together, raise up their wings, stretch out their necks, and elevate their exquisite plumes, keeping them in a continual vibration. Between whiles they fly across from branch to branch in great excitement, so that the whole tree is filled with waving plumes in every variety of attitude and motion.

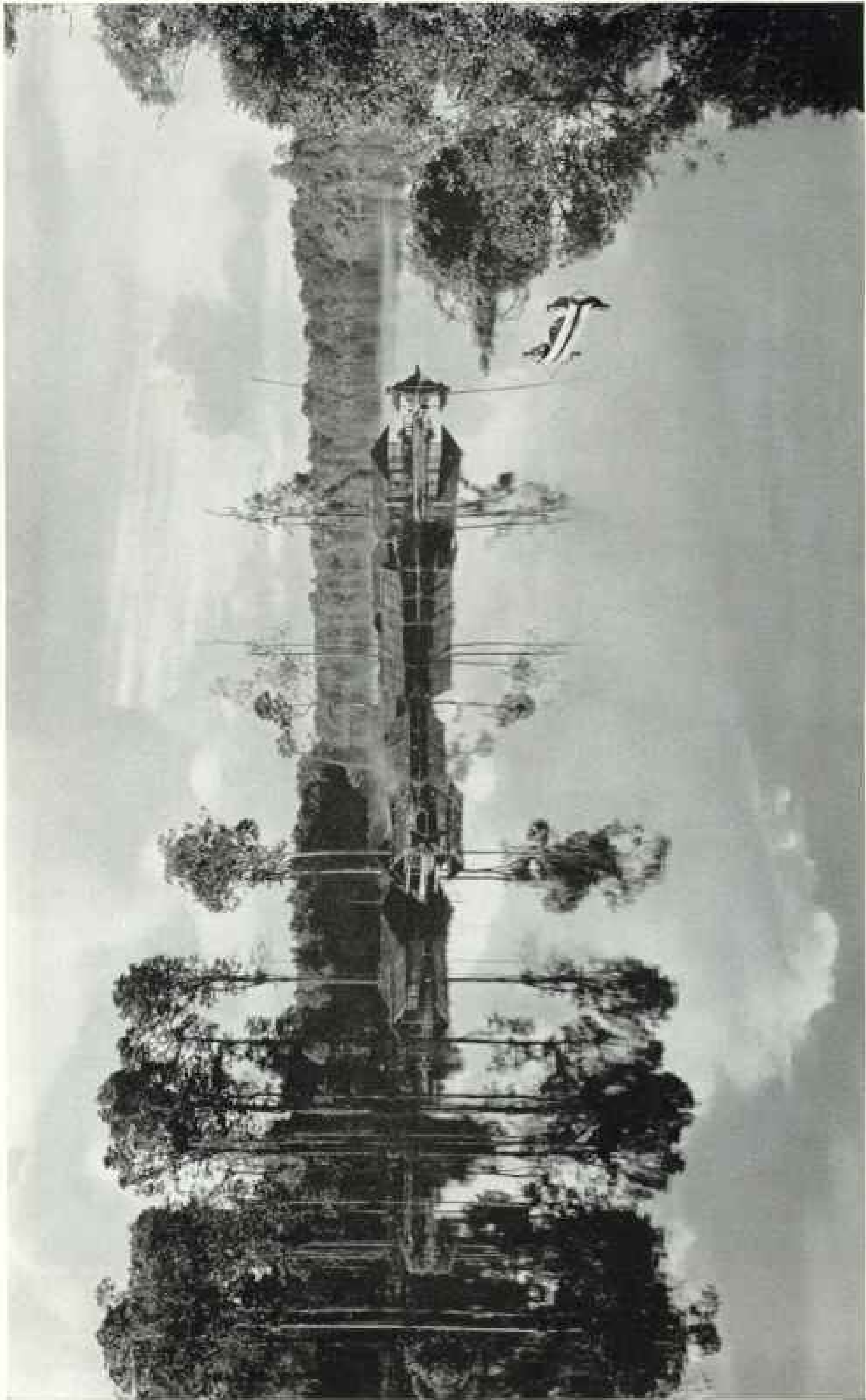
"The bird itself is nearly as large as a crow, and is of a rich coffee-brown color. The head and neck is of a pure straw yellow above, and rich metallic green beneath. The long plummy tufts of golden-orange feathers spring from the sides beneath each wing, and when the bird is in repose are partly concealed by them. At the time of its excitement, however, the wings are raised vertically over the back, the head is bent down and stretched out, and the long plumes are raised



National Geographic Photographer Vilhjar Wentzel

Bird of Paradise Plumes Add Color to the Glittering Court of Nepal

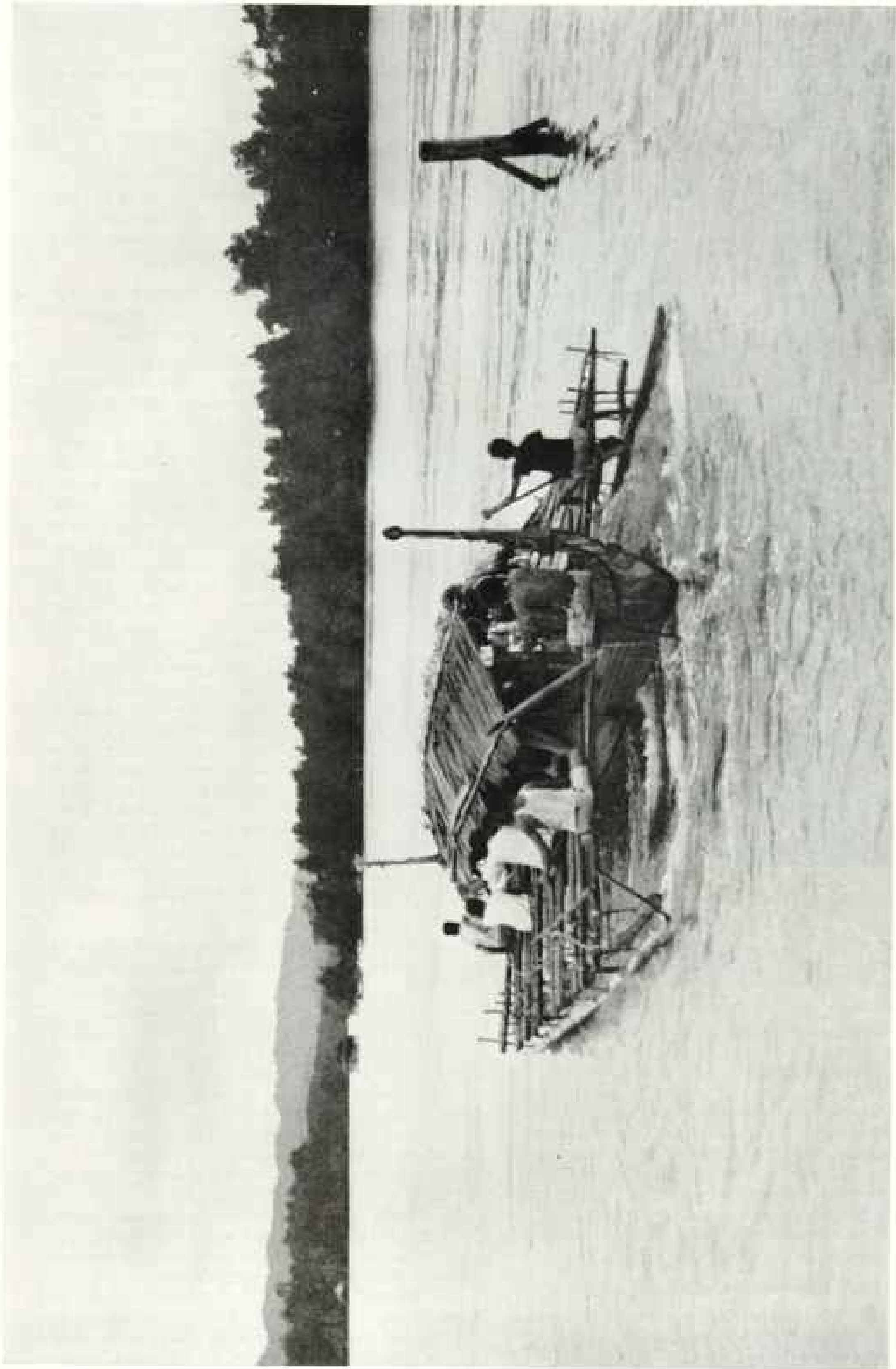
This sequestered country between India and Tibet is the last kingdom on earth in which the brilliant feathers of New Guinea's paradise birds still are worn as a symbol of royalty. At least six plumes of the Greater Bird of Paradise (pages 252 and 253) have been cleverly interwoven to form the shimmering panache above the jeweled crown of the King, to whom the United States Minister, Loy W. Henderson, is presenting a member of his staff. A similar but smaller adornment surmounts the Maharaja-Prime Minister, Sir Mohun Shamsber Jang Bahadur Rana.



Richard Archbold

Scientists Studying Paradise Birds of New Guinea's Lowland Forests Must Cope with Floods Like This

Though Bernhard Camp was built on a 50-foot bank above an arm of the Idenburg River, monsoon-swollen waters rose so high they flooded it completely. The camp, named for Prince Bernhard of the Netherlands, was one of the Netherlands New Guinea bases of the American Museum of Natural History expedition described by its leader, Richard Archbold, in "Unknown New Guinea," in the March, 1941, *NATIONAL GEOGRAPHIC MAGAZINE*. Hereabouts Dr. A. L. Rand, assistant leader and ornithologist, collected lowland species of birds of paradise. Nomadic natives, five feet tall, armed with daggers of cassowary bone, roam this region in dugout canoes.



In Such a Paddle-power "Sidewheeler" the Author Traveled Geelvink Bay, Netherlands New Guinea, in Search of Paradise Birds
This narrow, high-sided, seagoing canoe, with paddlers perched on the double outriggers, was photographed by Dr. Ripley from a similar craft off Black Island, later a battleground in World War II. Ahead is one of the houses of Korido, perched on piles like homes of ancient Swiss lake dwellers.

F. Dillon Ripley



New York Zoological Society

Bronx Zoo's Twelve-wired Is Old Enough to Vote

Two or three years old at the time, he arrived at the New York institution on August 2, 1929, and now has lived longer in captivity than any other bird of paradise. The Twelve-wired gets its name from the dozen black wirelike feathers that make it look equipped for radio reception (page 256).

up and expanded till they form two magnificent golden fans striped with deep red at the base, and fading off into the pale brown tint of the finely divided and softly waving points.

"The whole bird is then overshadowed by them, the crouching body, yellow head, and emerald-green throat forming but the foundation and setting to the golden glory which waves above. When seen in this attitude, the bird of paradise really deserves its name, and must be ranked as one of the most beautiful and most wonderful of living things."

Red Bird of Paradise, Page 254

A beautiful species of the lesser bird of paradise is the red (*Paradisaea rubra*) from Waigeo Island, off northwestern New Guinea.

In this species the feathers of the male's head are raised above the eyes in two low, hornlike projections. The plumes are red with white tips, which are stiff and curved forward at the ends. The corkscrew-shaped tail wires are flattened and broad, like narrow strips of metallic ribbon.

Emperor of Germany's Bird of Paradise, Page 255

Another species of the lesser is the Emperor of Germany's bird of paradise (*Paradisaea guiljelmi*), which is a mountain bird, in contrast to most of the other members of the genus. It is found in the eastern New Guinea mountains of the Huon Peninsula, and was first captured alive in 1931. The species is rare in zoos and even in museum collections.

The green feathers of the head spread down over the breast to make a beautiful shield, and the white ornamental plumes have long, widely spaced barbs, giving a lacy, delicate appearance. Like the blue bird of paradise (page 251), the male hangs upside down at the height of his courtship display.

Twelve-wired Bird of Paradise, Page 256

The common name of this bird (*Seleucidés ignotus*) derives from the male's 12 wirelike feathers which in courtship extend along the flanks, six to a side, well clear of the tail.

The male's upper body is black with a purplish gloss. Throat and breast are covered with a velvety shield which has greenish iridescence along the edges of the black feathers. The rest of the under surface is bright sulphur yellow, fading in captivity or in a stuffed bird to white.

In display the male erects throat and breast feathers to form a fan not quite completely encircling the head. The wires become stiffly pointed forward, around and beneath the body.

For several months I had a captive pair of these birds, the male in brilliant plumage, the female dull brown barred with black, as in most of the species. They were in adjoining cages,

and the male spent his time feeding the female through the wire. Every time he passed her a small bit of fruit, he seemed to leave his bill open purposely afterward, as if to impress her with the greenish color of the lining. Both birds had an amusing habit of tossing the food into the air and then catching it again to eat it, the bill sometimes making a loud snap.

The twelve-wired bird of paradise is found all over coastal New Guinea and the neighboring island of Salawati. It is the one bird of paradise which frequents sago palm swamps and brackish mangrove areas near the sea.

Dr. Francis Henry Hill Guillemard, in his account of New Guinea in the 1880's, reported that the natives caught twelve-wires for him by slipping up to their roosting places at night and putting a cloth over the quarry's head. This story seems no harder to believe than the one my boys told me about catching six-plumes by hanging a loop of string over a branch (page 247). Either catching paradise birds is incredibly simple, if you are an agile Papuan, or else they still know how to tell good stories in New Guinea.

Six-plumed Bird of Paradise, Page 257

These birds are so named because of the six long barbless plumes that stand straight away from the back of the male's head. Each plume is tipped with a small racquet.

Six-plumed birds of paradise are mountain dwellers, about as big as a magpie, belonging to the genus *Parotia*. They are found all over the main island of New Guinea at altitudes never lower than about 3,000 feet, and usually considerably higher.

In color they are very uniform. Adult males are always velvety black, with a small metallic shield of feathers, glinting bronze, green, and amber in the sun, on the breast. Just behind the bill, on the crown of the head, there is a small tuft of feathers which varies from silver to gold among the different species. These stand erect when the bird is excited. Females are always dull brown with black harring, as are young males.

The bill is short, as is the tail in all except one species. *Walmesi*, from the eastern mountains, has a tail as long as the body.

The six-plumed makes strange harsh cries. When mine were first caught in the Tamrau Mountains, they shrieked so incessantly that I could hardly bear it. It was worse than the squealing of a hundred stuck pigs. When they screamed in this way, the jungle was still, as if all the birds and animals were waiting and listening, and there were never any answering calls. A more normal call has been described as "prat prat" and is heard very early in the morning, almost the first of all bird calls.



National Geographic Photographer Harold Walker

At Last the Rare Ribbon-tail Greets the Public

None had been seen alive outside New Guinea's central highlands until 1948 when E. J. L. Hallstrom, of Sydney, Australia, flew in and obtained this and other males for his suburban Sydney aviary. He feeds them fruit, grated carrot, boiled egg, ground-up dog biscuit, meat-meal, and meal worms. Feather "trains" are two feet long (page 266).

My birds were always excited during a storm, and often called loudly if there was thunder. There is an old legend among the Malays that to see the six-plumed bird of paradise is to be protected against thunder and lightning.

In spite of their curious dance (page 247), which is part of the display of the male to the female, there are several records of hybrids occurring in nature between the six-plumed and two other genera of paradise birds. However, these hybrids are undoubtedly very rare, probably sterile, and only serve to accentuate the need of some mechanism, display or otherwise, to keep the paradise birds from interbreeding.

King Bird of Paradise, Page 258

During the war GI's became acquainted with the jungles of New Guinea for the first time. If by chance they ever saw a bird of paradise, it may well have been the king. This little ruby gem, about six inches long, is found all over the lowlands of New Guinea up to 2,500 feet, on the neighboring Aroe and western New Guinea islands, and on Japen Island just south of Biak in Geelvink Bay (page 271).

The species (*Cicinnurus regius*) is divided into six slightly varying subspecies. All have brilliant red upper parts, white abdomen, small green-tipped fans concealed under the wings, and two wirelike tail feathers ending in small metallic-green racquets. The legs are light violet-blue.

When the male displays, the feathers under each wing stand out from the sides like small shields.

All of the races are distinguished by a prolongation of the feathers on the front of the head, almost reaching the end of the short yellow bill. Like other brightly colored birds of paradise, the males have dull-plumaged mates and young.

In young males the strange tail feathers have an interesting way of developing, as if to presage the coming of the fully developed racquet tail of the adult. Although all brown, like the rest of the bird's plumage, the two central tail feathers become prolonged and slightly curved. The shaft is nearly, but not quite, a naked wire; small traces of the vanes of the feather remain on each side along the shaft.

Strangest of all, when the adult male molts and starts growing new tail feathers, these appear at first in a tightly curled sheath which looks like a miniature pair of spare tires carried on the rumble seat.

The Malay name for this bird is *keping keping*, which means "money bird" and undoubtedly refers to the old days of the plume trade. It is possibly the same king bird Pliny reported in his *Natural History*. It was said to live somewhere in "India," and its plumage was as red as a glowing coal. This red plumage was supposed to give divine protection in combat when worn on the hat or arms.

Wilson's Bird of Paradise, Page 258

One of the strangest of all birds of paradise is the little Wilson's (*Diphyllodes respublica*), found only in the lower hill forests of the islands of

Batanta and Waigeo off the west coast of New Guinea's Vogelkop, or "Bird's Head," peninsula.

Its Malay name is *kapala krait*, or "cross head." The top of the head is bald, and the skin is rich cobalt blue with a strange pattern, a sort of double cross of minute black velvety feathers. The rest of the bird is of equal brilliance. The male has a sulphur-yellow mantle and pure red back and wings. Breast plumes are dark metallic green, and there are two curled projecting tail feathers.

Nothing is known of the habits or courtship of the Wilson's, although it presumably behaves in much the same way as the magnificent, *Diphyllodes magnifica*, its close relative on the mainland of New Guinea (page 261).

Georg Stein, a German bird collector who worked on Waigeo in the 1930's, observed the Wilson's, but had only fleeting glimpses of it as it flew away in the forest. Some day perhaps a good field student will bring back the first real observations on these curious little birds.

An amusing sidelight on the name *respublica* was given by Charles Lucien Bonaparte, Napoleon's nephew, who for a time resided in the United States. Bonaparte, the ornithologist who first described the species, was tired of the fact that so many birds of paradise had been named after royalty, or at least nobility, and so decided to name his new bird after "the Republic." He went on somewhat sourly, however, to note that the Republic was somewhat less than perfect, owing to the machinations of "so-called Republicans." He concluded that "even though a paradisaean Republic does not exist, at least there is now a *Paradisaean respublica*."

Sicklebill, Page 259

The largest birds of paradise are the sicklebills, which consist of the genus *Epimachus* divided into two species. One, *fastosus*, with its geographical races, occurs in the mountains of northern and western New Guinea; the other, *meyeri*, with two races, is found in southern and eastern New Guinea.

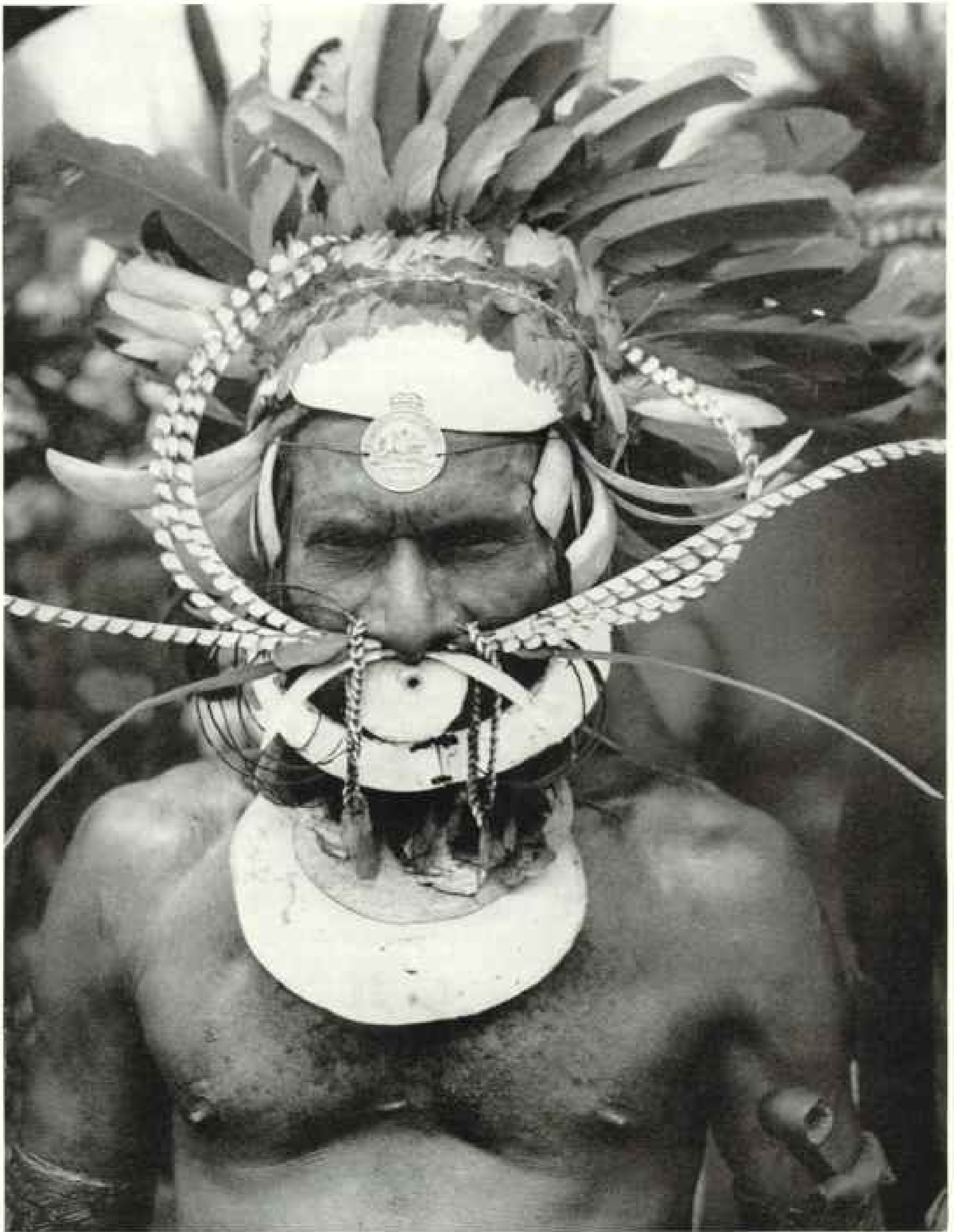
These birds never seem to live below about 5,000 feet. Records of their occurrence as high as 8,500 feet are not uncommon.

As the name indicates, the bill is about three and a half inches long, thin, and curved. This genus and another one, *Drepanornis*, are the only really long-billed birds of paradise.

The most striking feature of the male's coal-black and lustrous plumage is the pair of "wings" which arise from the flanks and are often concealed by the true wings. When the bird displays to its soberly colored mate, these sets of soft metallic-tipped feathers can be spread out so that they appear to be auxiliary wings.

A number of sicklebills have been kept in captivity, both in England and in the United States, and on one occasion a pair made a nest and laid an egg in New York's Bronx Zoo.

Dr. Crandall, the General Curator, recently described the display of the Zoo's male bird, which differs from all displays previously described in



Not Blown from Camera Lens

Tomba, a New Guinea Chief, Wears Many Hundreds of Dollars' Worth of the World's Strangest Feathers in His Nose

Those strings of pennants grow on the head of the rare bird of paradise named for the King of Saxony (page 263). There are eight, and the photographer estimates their value as \$280 a pair. Smaller curved nose plumes are from the Magnificent (page 261). This Government-appointed Wahgi Valley chief wears his badge of office on his brow. Shell ornaments include strings hanging from wooden nails in his nose.

that the "wings," or shields of metallic-tipped feathers, are joined together at the top over the head at the climax of the display. At the same time the male rapidly moves his outer tail feathers in a scissorlike motion. Then the bird opens his long bill, which is framed in the center of this lustrous shield of feathers, to reveal the startling yellow-green lining of the mouth.

The first sicklebills in captivity were a pair captured by Walter Goodfellow, naturalist and explorer, in 1909 in New Guinea. They were taken to Scotland and kept alive for a time in the first large private collection of these birds, maintained by Mr. E. J. Brook at Hoddon Castle.

The sicklebill is still today one of the rarest and most exotic appearing of all the birds of paradise (page 247).

Lesser Superb Bird of Paradise, Page 260

Outstanding among the small birds of paradise is the lesser superb (*Lophorina superba*), found in all the mountains of New Guinea from about 3,000 feet up to at least 6,000 feet. In size it is comparable to a wood thrush or a starling.

The male is coal black, with two sets of plumes—one a breast shield of glossy metallic green-black feathers, the other a cape of velvety-black feathers which can be raised over the head. In display the two sets of feathers are erected so as almost entirely to surround the head. The bird looks as if head and bill were sticking through the bottom of a saucer.

So strong is the muscular attachment for erecting these ranks of feathers that it is possible for this bird to fly from one perch to another with the cape and breast shield partly raised. I saw one do just this in an open bit of jungle in the Tamrau Mountains.

As in many other species, the male opens his mouth in courtship to display the colorful inner surface. The female is dark brown, banded with black on the paler brown underside.

Like the six-plumed (page 257), the superb makes harsh shrieking calls at times, although the noise is not quite so ear splitting. The two species are obviously closely related, and there are several records of hybrids between them.

The superb has more records of hybrids with other species than any other bird of paradise. Four species are known to cross with it. Besides the six-plumed, these are the magnificent, the wattled (*Paradisgalla*), and the riflebird (*Craepodophora*). The females of all these species are roughly similar in size and color pattern, and the ranges and breeding seasons of all overlap.

Magnificent Bird of Paradise, Page 261

This bird (genus *Diphyllodes*) is closely related to the king (page 258), so closely, in fact, that a large number of hybrids have been recorded between the two genera. The females of the two are closely alike in form and coloration. Another close relative is the Wilson's (page 258).

Mostly brown on the upper surface, the male magnificent has a wide cape of bright-yellow feathers spreading out from the back of the neck.

The breast is rich lustrous green, and there are two tail wires as in the king, although slightly different in shape.

This bird is found in the rolling lowlands and mountains up to about 4,000 feet, all over New Guinea and the western islands.

Dr. A. L. Rand, of the Chicago Natural History Museum, has written of watching the male build his display ground, a task which occupies most of his time during the breeding season. From an area of forest floor, 15 feet or more in diameter, all leaves, twigs, and small plants are removed by the bird bridegroom-to-be. Saplings are usually plucked clean of leaves, and often stripped of their bark, so that they are dead or dying.

On the rim of this display ground the bird sits for hours at a time, preening his feathers and calling at intervals. The female visits him there, and mating takes place, accompanied by an elaborate ritual of display on the part of the male. The cape of yellow feathers is stretched and erected until it surrounds the head. The green breast feathers are spread and flattened and the tail vibrated.

Occasionally the male pecks at the female and then opens his short bill to expose the yellowish-green color of the inside of the mouth.

Sometimes, according to Dr. Rand, the young male bird, which is dull-colored like the female, comes to the display ground and rather pathetically attempts to display when the adult male is away.

Standard-wing Bird of Paradise, Page 262

Alfred Russel Wallace discovered this strange bird in 1858 on the island of Batjan, more than 200 miles west of New Guinea in that intermediate archipelago known as the Moluccas.

Through the graciousness of the sultan of this small wild island, Wallace had been given a thatched hut to live in while he collected specimens of the unknown fauna of the virgin forests, mysterious and inviting, which covered the whole land.

"Just as I got home," Wallace wrote, "I overtook Ali returning from shooting with some birds hanging from his belt. He seemed much pleased, and said, 'Look here, sir, what a curious bird,' holding out what at first completely puzzled me.

"I saw a bird with a mass of splendid green feathers on its breast, elongated into two glittering tufts; but what I could not understand was a pair of long white feathers, which stuck straight out from each shoulder. Ali assured me that the bird stuck them out this way itself, when fluttering its wings, and that they had remained so without his touching them.

"I now saw that I had got a great prize, no less than a completely new form of the bird of paradise, differing most remarkably from every other known bird. The general plumage is very sober, being a pure ashy olive, with a purplish tinge on the back; the crown of the head is beautifully glossed with pale metallic violet, and the feathers of the front extend as much over the beak as in most of the family. The neck and



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Golden-orange Plumes Adorn Papuans for a Feast and Dance

On their bushy heads, two of these Netherlands New Guinea natives wear flank plumes from males of the Greater Bird of Paradise captured on courtship dancing trees (page 252). For their own dance, several men have brought drums. The small hand drum in upper center is decorated with black plumes of the cassowary, large flightless bird of New Guinea. Cloth sarongs are trade goods from Java.

breast are scaled with fine metallic green. . . .

"The four long white plumes which give the bird its altogether unique character, spring from little tubercles close to the upper edge of the shoulder or bend of the wing, . . . and can be raised at right angles to it, or laid along the body at the pleasure of the bird. The bill is horn colour, the legs yellow, and the iris pale olive. This striking novelty has been named by Mr. G. R. Gray of the British Museum, *Semioptera wallacei*, or 'Wallace's standard-wing.'"

Semioptera wallacei has subsequently been discovered on the near-by islands of Halmahera and Obi, where it occurs as a slightly different geographical subspecies. This is the westernmost species of the true birds of paradise, separated by a long stretch of water from its nearest kin. It is probably related to that branch of the paradise bird family which contains the king and the magnificent, but it is different enough to deserve a separate generic name.

How this aberrant branch of the paradise birds ever reached the Moluccas is one of those mysteries of bird distribution in the East Indian islands which make study of this area so fascinating. That the group is an ancient one goes without saying. It is possible, of course, that the original stock of the family became dispersed through the islands west of New Guinea in an early island-building phase, when some of the

groups now separated by sea were connected, or very nearly so, by land.

Only one other species is more cut off from the main stream of paradise bird evolution than Wallace's standard-wing, and that is a small jet-black bird which may not be a paradise bird at all, but which has set some ornithologists speculating. It is called *Lamprolia victorinae*, and it lives in the mountains of the Fiji Islands, about 1,900 miles southeast of New Guinea.

No one seems to know what the true relationship of this bird is. If by chance it is a bird of paradise, what a fascinating problem it poses. How could this or any other forest-haunting bird of paradise make the perilous journey from island to island across the wastes of ocean? Certainly the birds of paradise are one of the most complex and fascinating of all the families of birds.

King of Saxony's Bird of Paradise, Page 263

Surely there is no stranger bird in appearance than this one, *Pteridophora alberti*. Unfortunately, it is one of the least-known birds of paradise. No specimens have ever been captured alive, and no studies of the bird in its native haunts have ever been made. It is found only in a rather restricted area in the central mountain ranges of New Guinea, probably never lower than 5,000 feet.

No bigger than a robin, the male has a lustrous

black head and brownish back. Underneath it is paler buffy brown.

If this were all, it would be hard to know that the bird was a member of the paradise family. But from the back of the head spring two long feathers, the like of which is not found anywhere else in the bird kingdom. These feathers, if feathers they can be called, are about two feet or more in length, and consist of a white shiny shaft with small pennants of blue and white depending from it. The effect is curiously like celluloid (page 275).

It would be fascinating to watch these strangely garbed little birds to find out what they do with these feathers and in what way they show them off to their lady friends.

Magnificent Riflebird, Page 264

The magnificent riflebird (*Craspedophora magnifica*) is one of the few species of paradise birds which extend outside of New Guinea; it is found also in the Cape York Peninsula, Australia.

This species is somewhat less showy than many of the others. It is mostly black, with two patches of burnished metallic feathers on the neck and breast and on the top of the head. Two small tufts of rather disintegrated hairylike feathers of a brownish cast spring from the sides of the breast, but they are not prominent as in so many of the other species. The display, however, is one of the most exciting of all.

The loud call of this bird is one of the commonest sounds of the lowland jungle in New Guinea; it can be heard for several hundred yards. The call is two-syllabled, the first an ascending note rather drawn out, a sort of "whic-k"; the second a short descending note abruptly reversing the scale. Every time I go into the bird room of the Bronx Zoo in New York and hear the loud call of their magnificent riflebird, I am transported automatically to the New Guinea jungle.

As in almost all birds of paradise, the female is brown on the upper surface, in this case a rich reddish brown; the undersurface is a pale ashy color, closely barred throughout with narrow, wavy black bands.

D'Albertis's Bird of Paradise, Page 265

One of the least-known species is *Drepanornis albertini*, also called the short-tailed sicklebill. Its home is along the north coast of New Guinea, as far as the mountains of the southeastern part of the island.

A highland species, it lives at altitudes of 4,000 to 8,000 feet, although there is an allied species,

D. braijna, in the lowlands of the north coast. Both are closely related to the larger, long-tailed sicklebills (page 259).

Albertini seems to be a solitary bird, like the sicklebill, but is less common in its range than that relative. It is apparently a rare bird, most difficult to find.

Dr. Ernst Mayr, one of the few to see this species alive, tells me it has a remarkable call, a loud single-syllabled note which can be heard for long distances.

Ribbon-tailed Bird of Paradise, Page 266

Astrapia femina is the most sensational member of the gorgeted birds of paradise, a group of black, short-billed birds with long tails; rather closely related to the sicklebills (page 259).

There are five species of *Astrapia*, all from the high mountains of New Guinea, where they are found up to about 11,000 feet. They have metallic ruffs of feathers on neck and breast. Tails are long and sometimes quite broad, but the ribbon-tail with its trailing white streamers is the most striking of all.

The sight of a male flying off through the tree ferns in the jungle, long white ribbon feathers floating behind, must be like something from another world of fable and fantasy.

Ribbon-tails are apparently quite tame in the wild state, as shown by the ease with which they were first seen when white patrol officers and gold prospectors went into their territory a few years ago (page 248). They live in the most inaccessible areas of the headwaters of the Sepik River and the mountains near Mount Hagen.

Only in the years just before the recent war and subsequently has this area been accessible to planes. Now there is a good landing strip in the valley near these mountains. In early 1948 Mr. E. J. L. Hallstrom,* a businessman from Sydney, Australia, managed to fly in and persuade the local Papuans to capture some male ribbon-tails. These birds are now in his aviary near Sydney, the first to be seen outside of their own high, far-off mountains (page 273).

Princess Stephanie's bird of paradise, a species of the gorgeted, is one of the few birds of paradise known to have nested in captivity. This is the more remarkable because specimens have been brought alive from New Guinea only twice. A pair nested three times at Hoddon Castle, in Scotland, laying a single egg on each occasion.

* See "Sheep Airlift in New Guinea," NATIONAL GEOGRAPHIC MAGAZINE, December, 1949.

INDEX FOR JULY-DECEMBER, 1949, VOLUME READY

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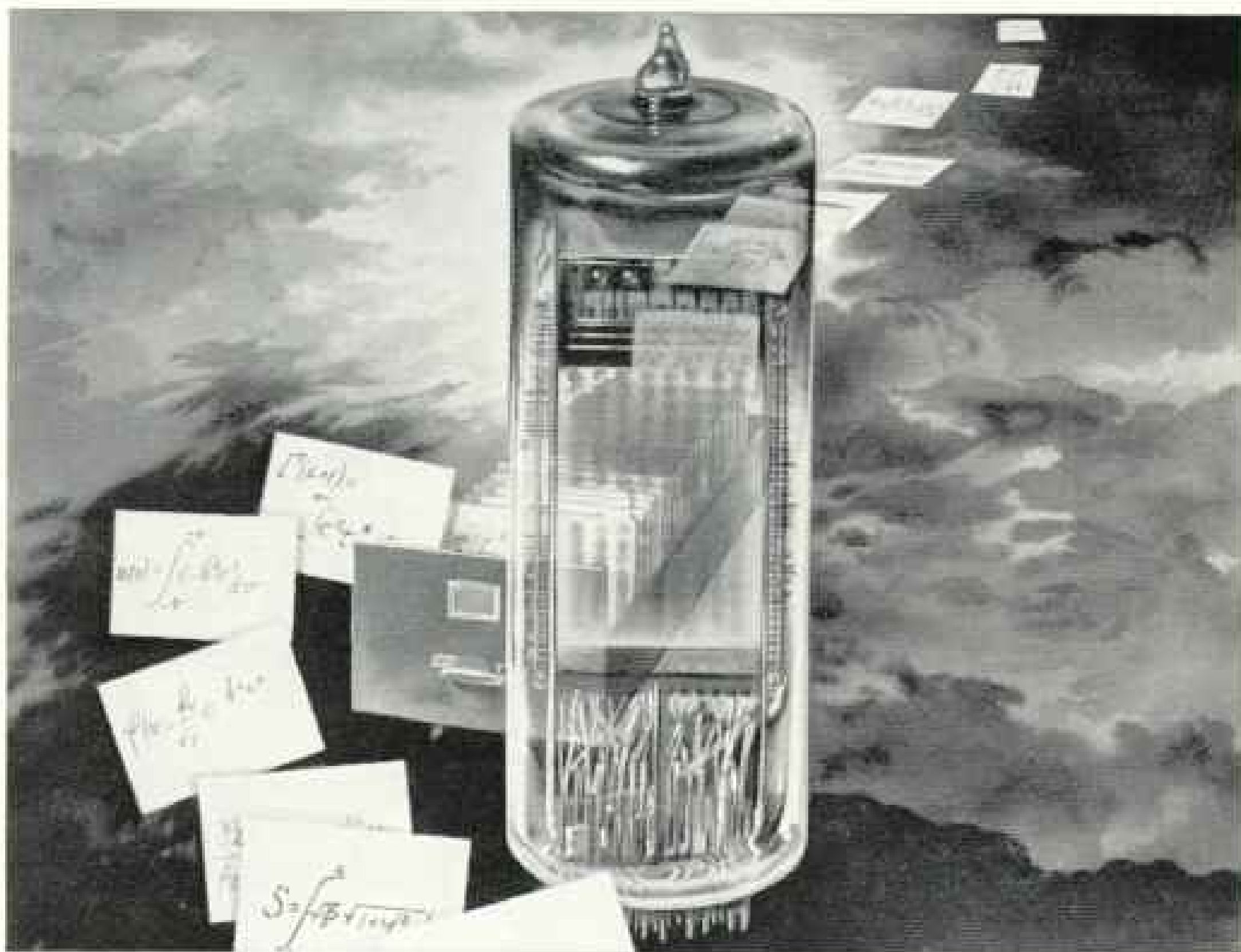


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Like all Budd-designed, Budd-built equipment, this train illustrates a principle—that better products are made of ideas as well as steel. This was true of the all-steel automobile body which Budd originated and which has made Budd the largest in-

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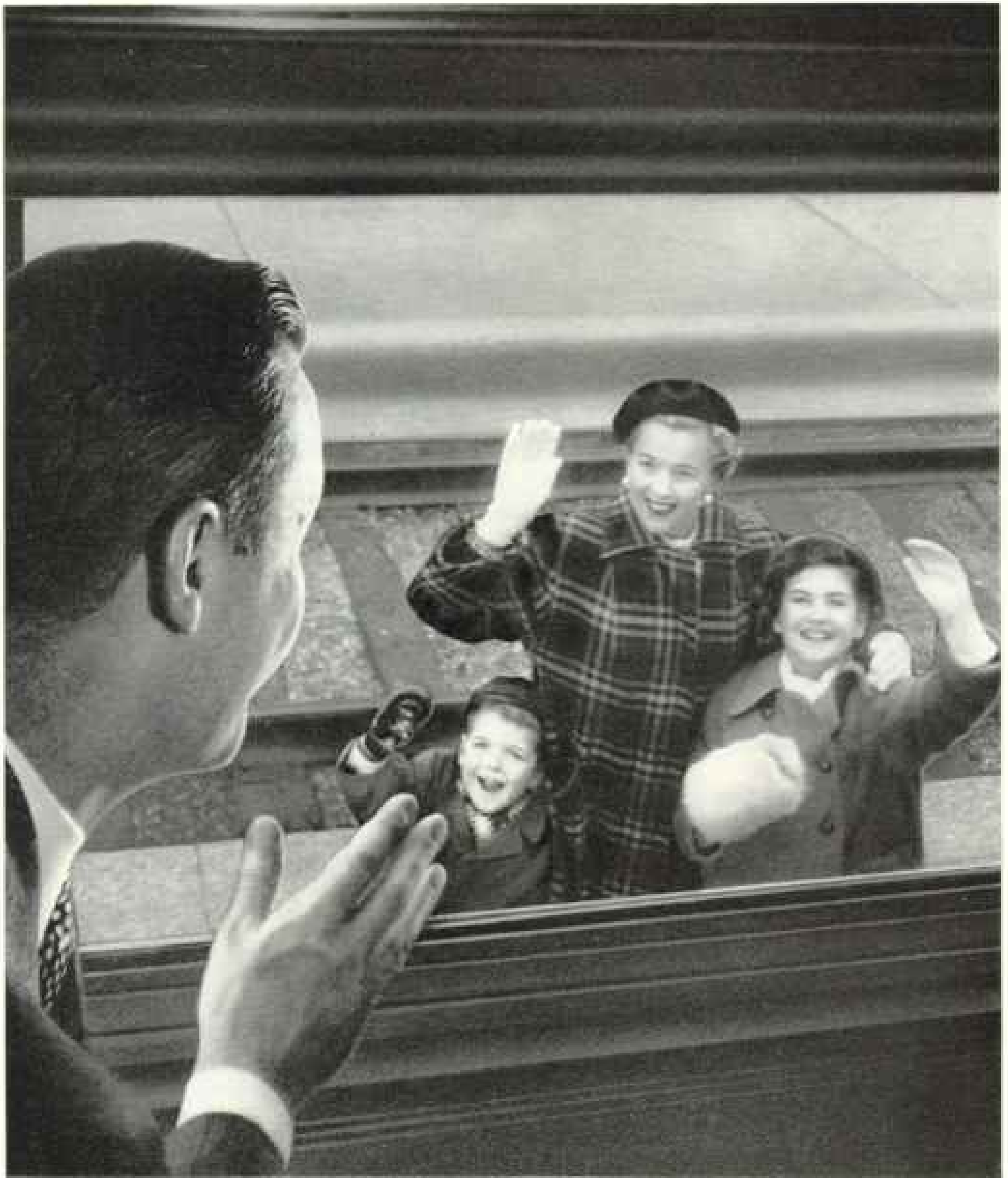
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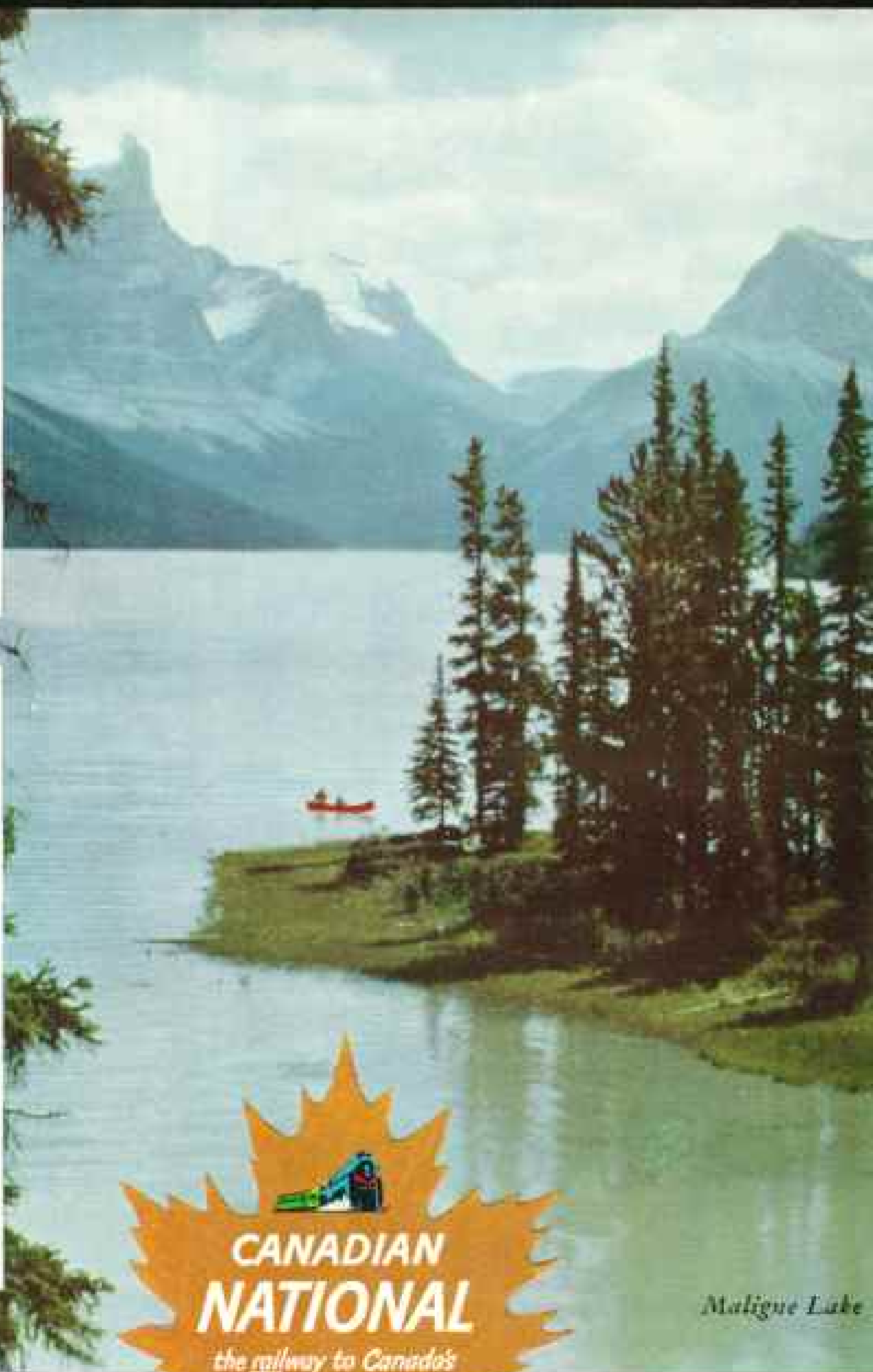
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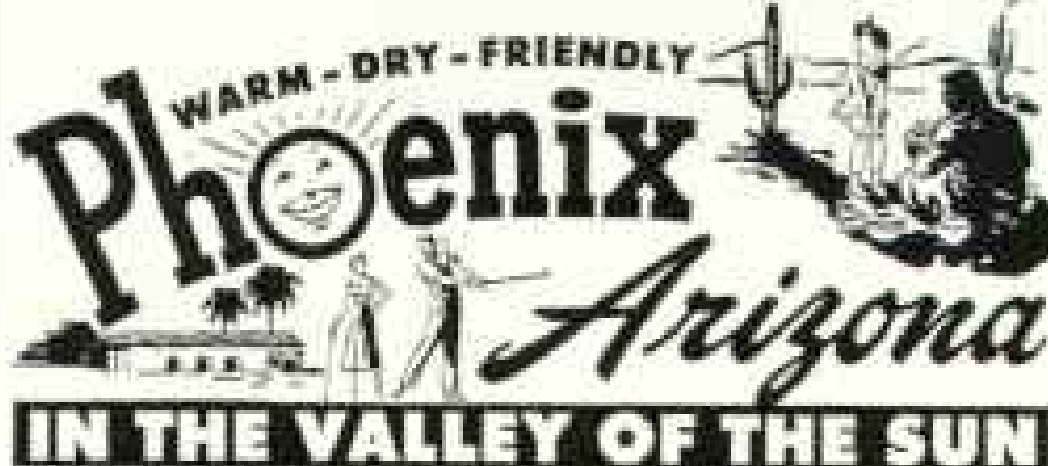


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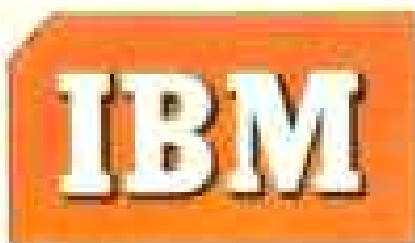
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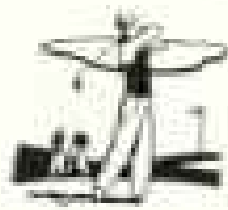
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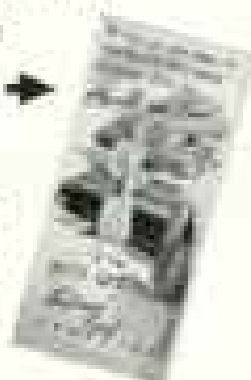
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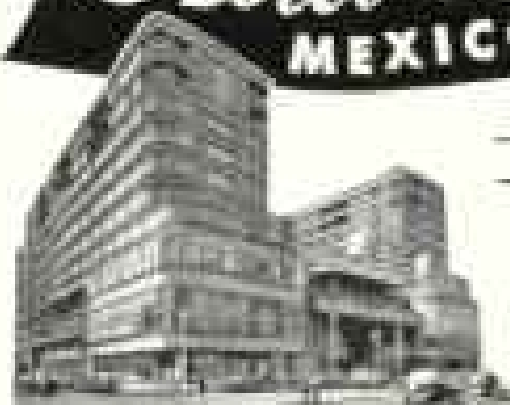


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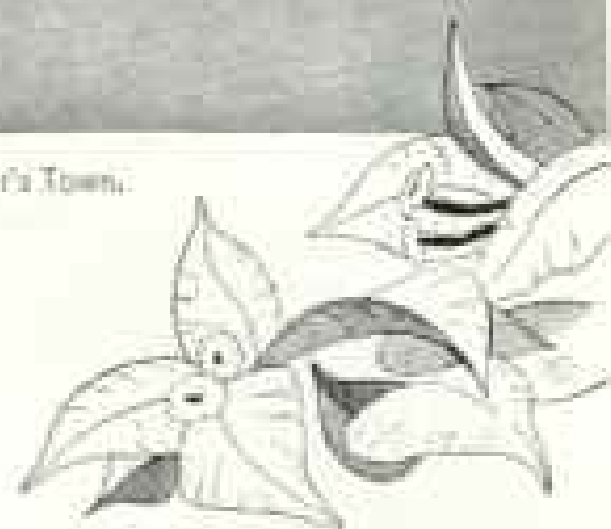
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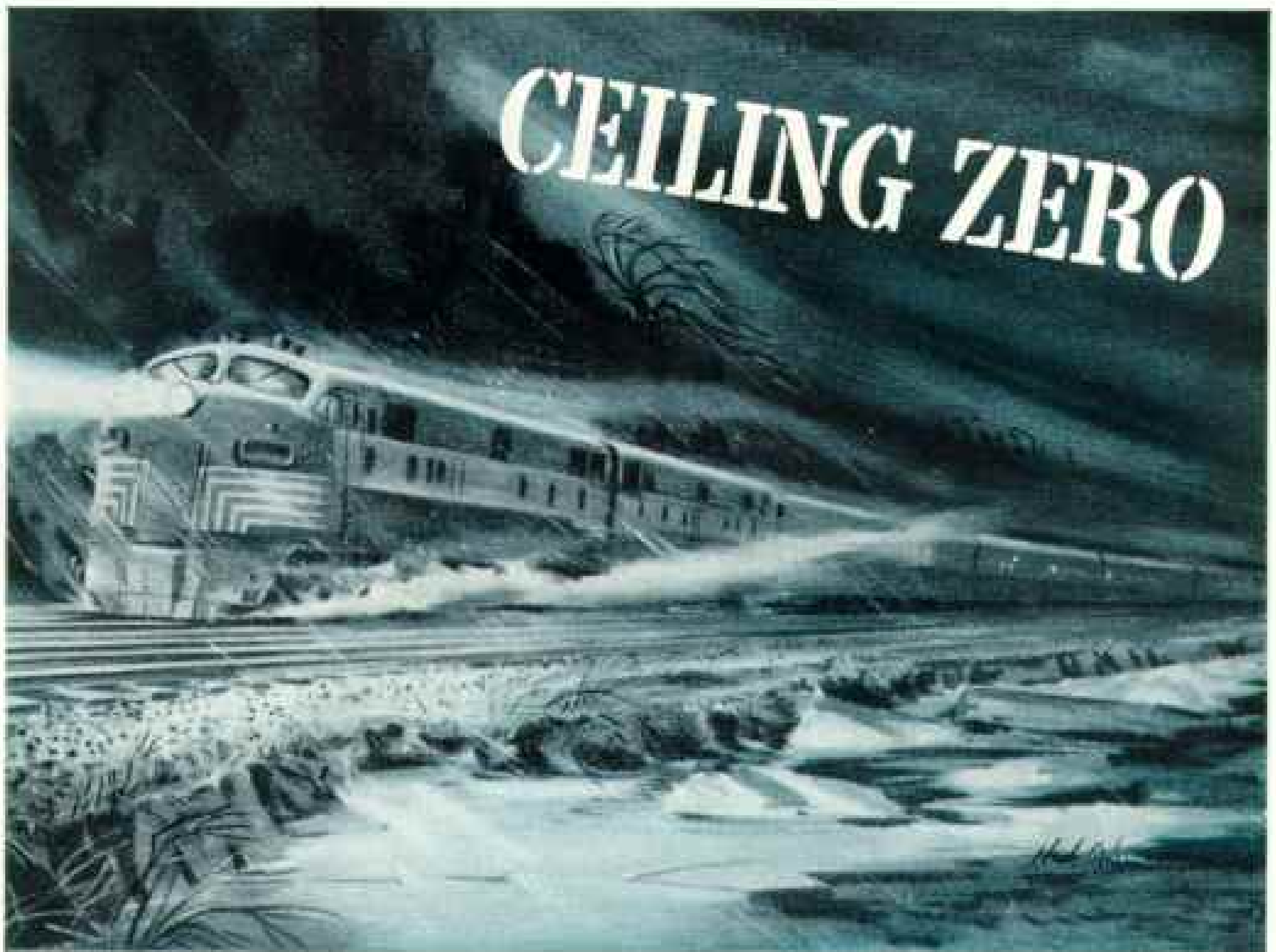
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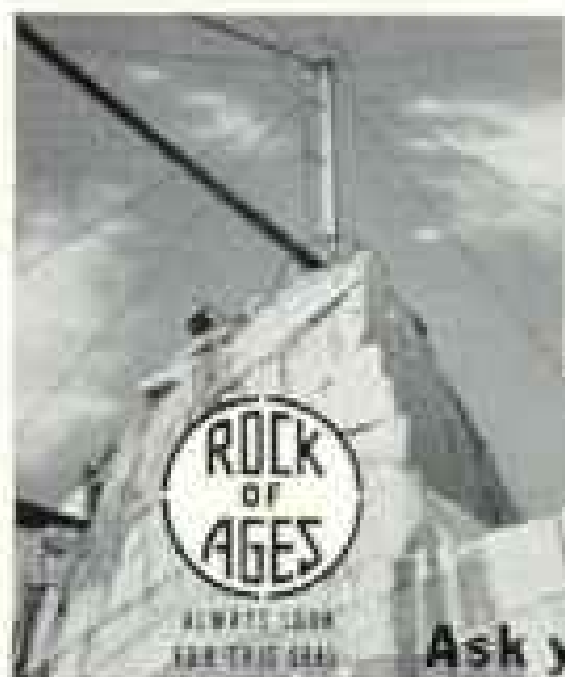
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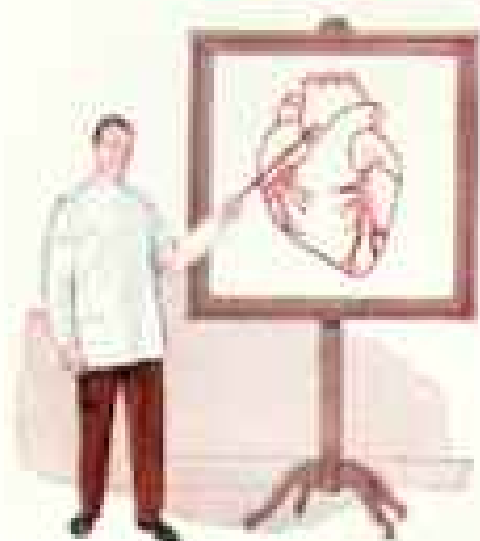


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The heart is the hardest working organ in the body. It beats about 100,000 times a day, and in the course of 24 hours pumps more than 2600 gallons of blood through the blood vessels.

The heart's ability to function normally may be affected if it is subjected to prolonged or excessive strain, or if it is attacked by disease. Fortunately, doctors now can

do more than ever before to help the heart if trouble appears.

Heart disease is the leading cause of death in our country, and the proportion of deaths from this cause has been increasing. Authorities point out, however, that this increase may be a reflection of the fact that, due to medical progress, more and more people are reaching the later years of life when heart ailments are most likely to occur.

What medical science is doing . . .



Today, medical science has many new tests for the heart.

One such development is called *angiocardiology*, in which an opaque solution is injected into the blood stream. By means of X-ray, the doctor then can study the chambers of the heart, the major blood vessels in the chest, and the lungs.

Another technique, in which a

small tube is inserted through an arm vein into the chambers of the heart, provides information about the amount of blood the heart is pumping.

There are also new exercise tests which furnish knowledge about how the heart functions under strain. These and other advances give the doctor more accurate methods of diagnosing heart trouble than have been possible heretofore.

What YOU can do . . .



Specialists say that there is a great deal the individual can do to help keep his heart sound and strong.

Following the doctor's suggestions about a daily routine of healthful living may help to avoid heart ailments, or to limit their effect.

It is also important to have regular physical examinations by a doctor. Such check-ups generally

insure that if heart trouble should occur it will be discovered early, when modern methods of treatment will help most to control it.

Under good medical care, most people with heart ailments can learn to adjust their lives to the work-capacity of their hearts. By so doing, they are often able to enjoy long and happy lives of nearly normal activity.

Research on diseases of the heart is increasing. To aid in this work, 148 Life Insurance Companies support the Life Insurance Medical Research Fund which makes grants for special studies in diseases of the heart and blood vessels.

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After stowing away the supplies—with a layer of dry grass on the bottom and a deerskin on top—the sod was replaced. Then, each hide full of dirt was tossed into the river to wash downstream, leaving not the slightest sign of any digging to give the hiding place away.

Having supplies handy on the return trip was a matter of life and death to explorers. And building a *cache* was just one of the special skills their leaders had to have to keep the party safe.

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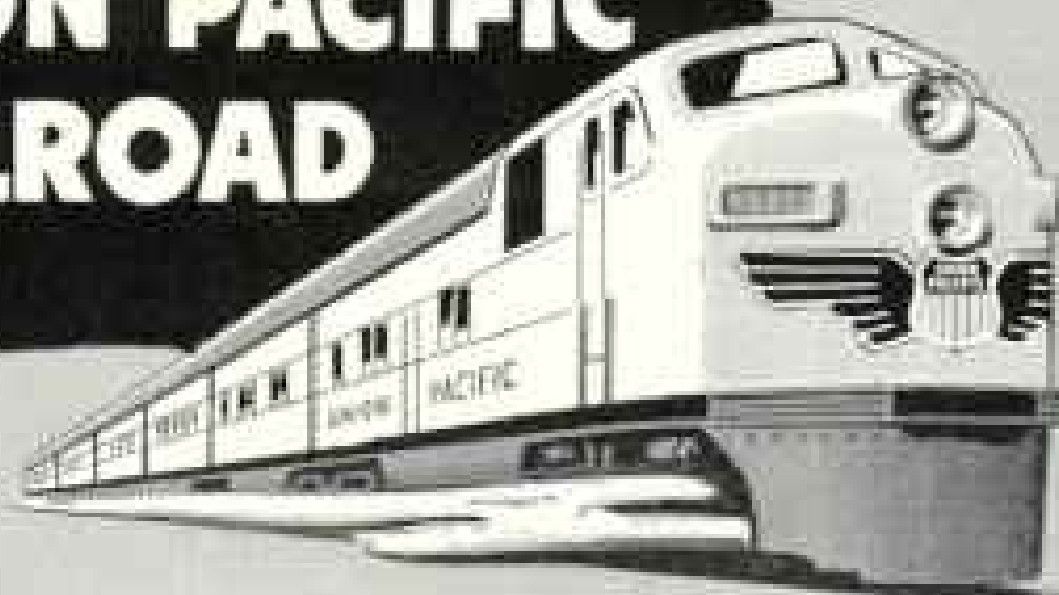
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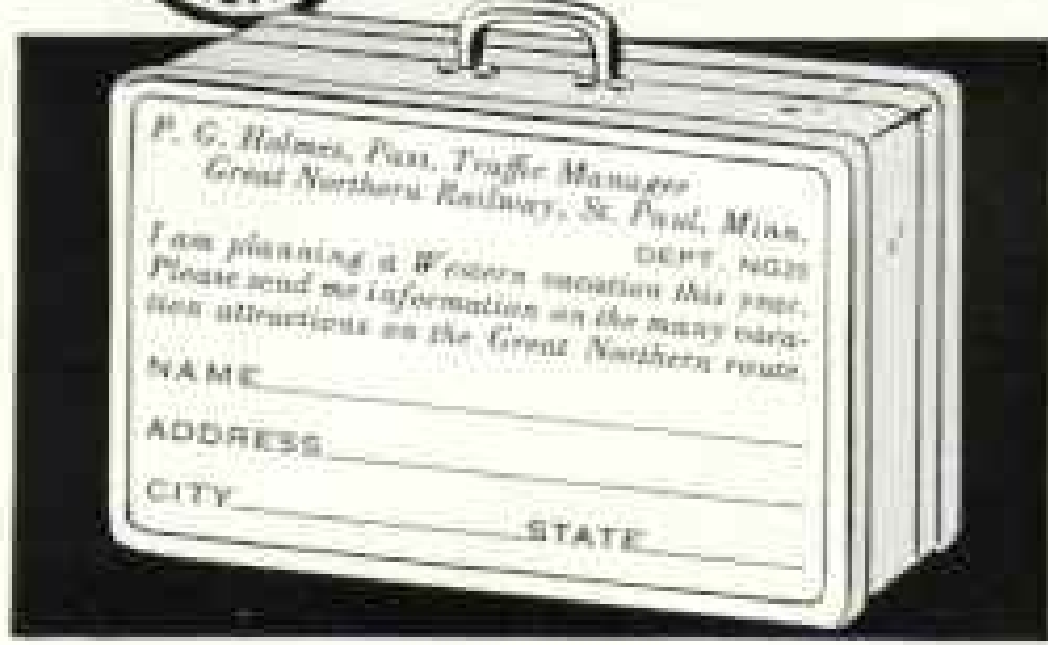


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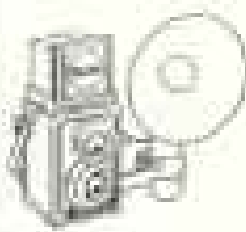
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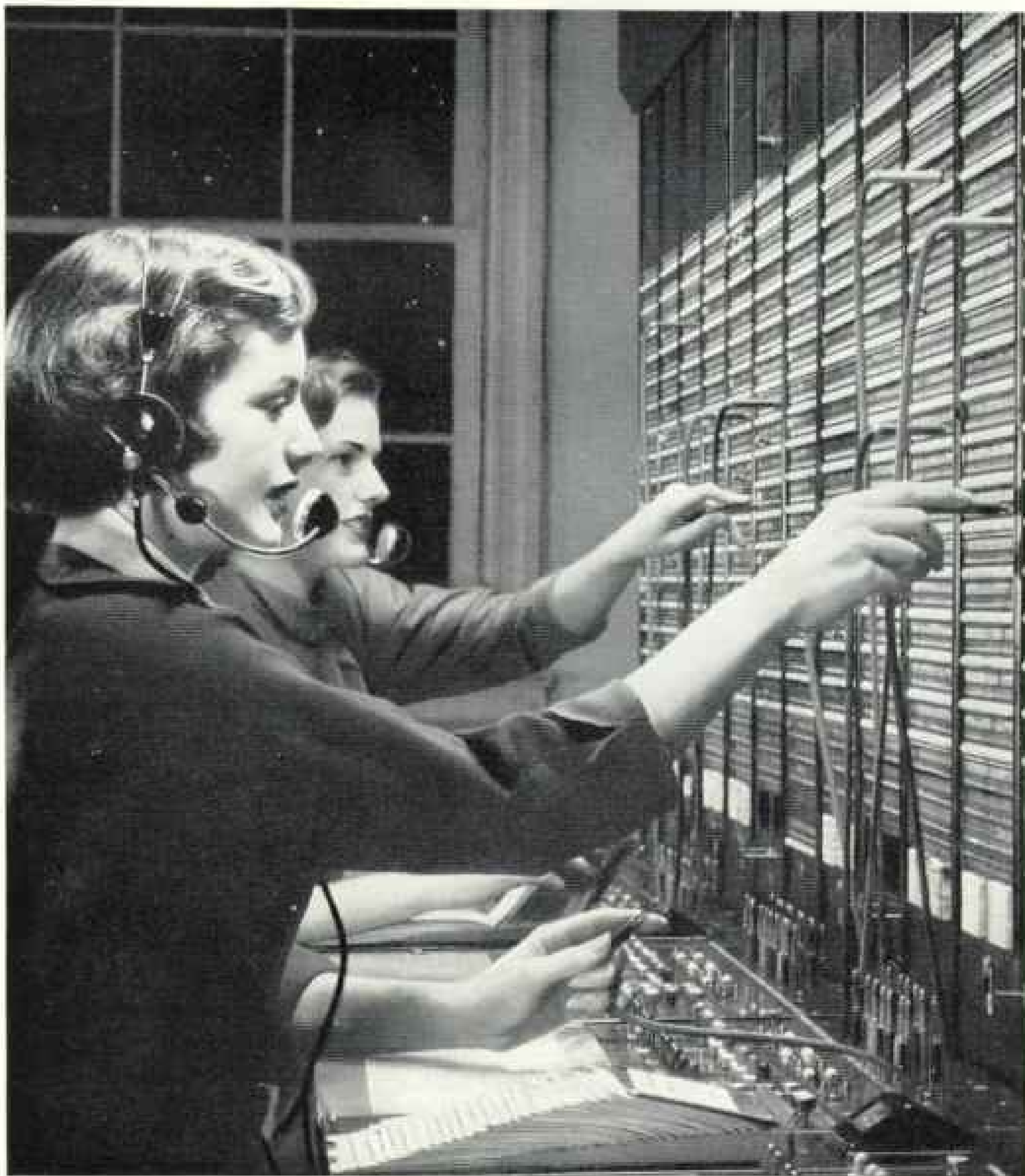
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2-50

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SERVICE THAT NEVER SLEEPS . . . Whatever the need or the hour, the telephone is on the job—ready to take you where you want to go, quickly and dependably. Telephone service is one of the few services available twenty-four hours a day—weekdays, Sundays and holidays. Yet the cost is small—within reach of all . . . **Bell Telephone System.**

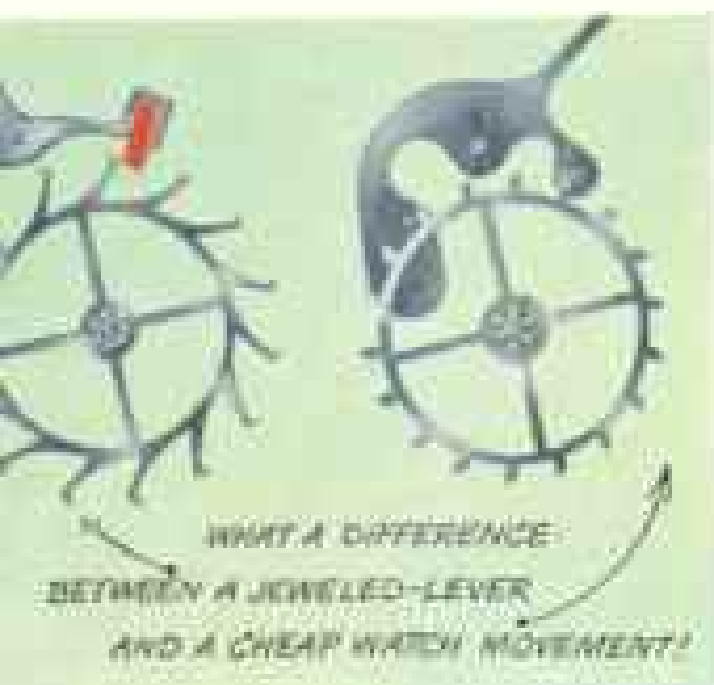




1. When you give a watch to someone you love, it's a constant reminder of you and of the importance of time. And when you give a watch with a quality Swiss jeweled-lever movement, you can be sure that your gift not only leads in beauty but in dependability and downright value. So—don't be fooled by so-called watch "bargains" — you usually get just about what you pay for!



2. See water- and shock-resistant, self-winding and calendar watches, chronometers and chronographs. Features like these are what make fine Swiss watches such treasures of lasting pride.



3. Your watch ticks 432,000 times a day. These impulses are transmitted far more accurately through the jeweled pallet in a jeweled-lever watch than through the metal pin in a cheap watch.



4. The smartest new watch fashions are made possible by fine Swiss movements. Always—it's the movement that counts—be sure your new watch has a quality Swiss jeweled-lever movement.



5. Your watch can be serviced economically, promptly, if it has a Swiss jeweled-lever movement. And, when you buy, rely on a trusted jeweler for the best Swiss watches in your price range.

For the gifts you'll give with pride—let your jeweler be your guide

The WATCHMAKERS OF



SWITZERLAND