VOLUME CII
NUMBER FOUR

THE NATIONAL GEOGRAPHIC MAGAZINE

OCTOBER, 1952

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With Map and 31 Illustrations
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Articles and photographs are desired. For material The Magazine uses, generous remuneration is made.

In addition to the editorial and photographic surveys constantly being made, The Society has sponsored more than 100 scientific expeditions, some of which required years of field work to achieve their objectives.

The Society's notable expeditions have pushed back the historic horizons of the southwestern United States to a period nearly eight centuries before Columbus crossed the Atlantic. By dating the ruins of the vast communal dwellings in that region, The Society's researches solved secrets that had puzzled historians for three hundred years.

In Mexico The Society and the Smithsonian Institution, January 16, 1939, discovered the oldest work of man in the Americas for which we have a date. This slab of stone is engraved in Mayan characters with a date which means November 4, 291 B. C. (Spinden Correlation). It antedates by 200 years anything heretofore dated in America, and reveals a great center of early American culture, previously unknown.

On November 11, 1935, in a flight sponsored jointly by the National Geographic Society and the U. S. Army Air Corps, the world's largest balloon, *Explorer II*, ascended to the world altitude record of 72,395 feet. Capt. Albert W. Stevens and Capt. Orvil A. Anderson took aloft in the gondola a ton of scientific instruments and obtained results of extraordinary value.

A notable undertaking in the history of astronomy was launched in 1949 by The Society in cooperation with the Palomar Observatory of the California Institute of Technology. This project will require four years to photomap the vast reaches of space, and will provide the first sky atlas for observatories all over the world.

In 1948 The Society sent seven expeditions to study the sun's eclipse on a 5,320-mile arc from Burma to the Aleutians.

The National Geographic Society and the Royal Ontario Museum in 1951 explored and measured newly found Chubb meteor crater, 11,500 feet in diameter, in northern Quebec.

The Society granted $25,000, and in addition $75,000 was contributed by individual members, to help preserve for the American people the finest of the giant sequoia trees in the Giant Forest of Sequoia National Park of California.

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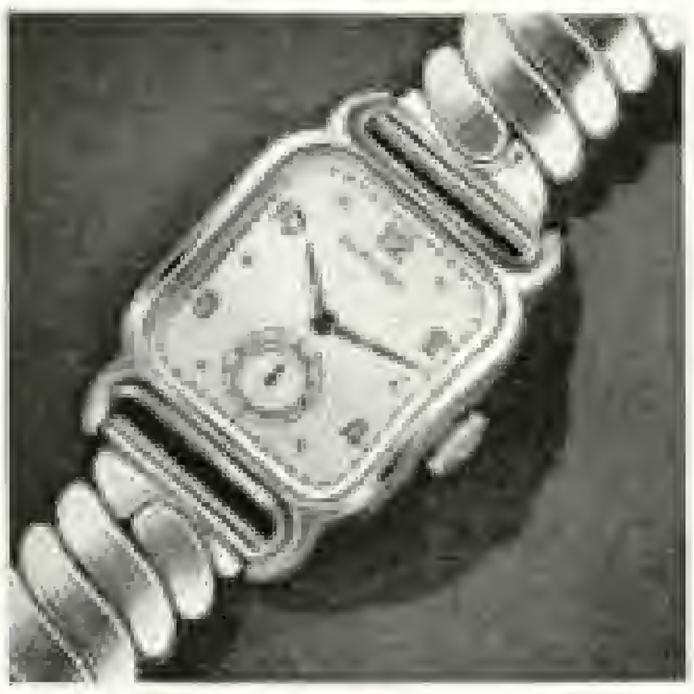

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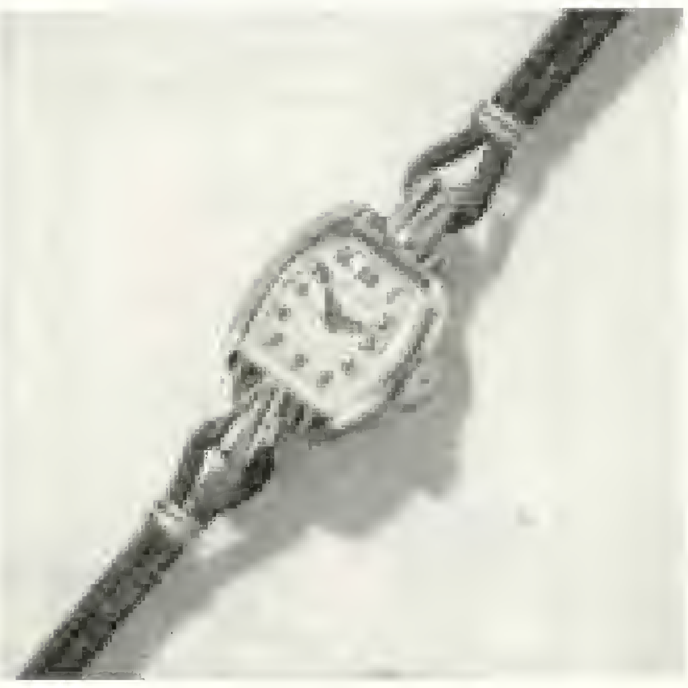

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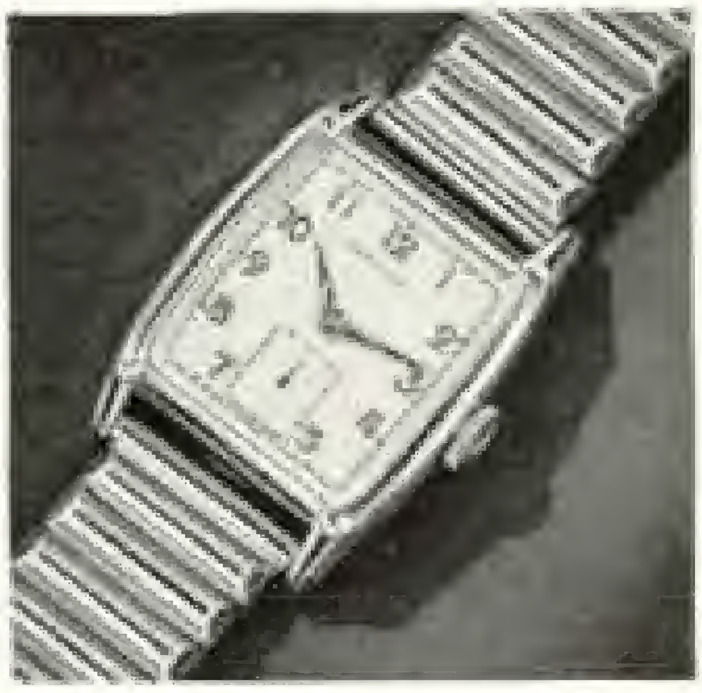

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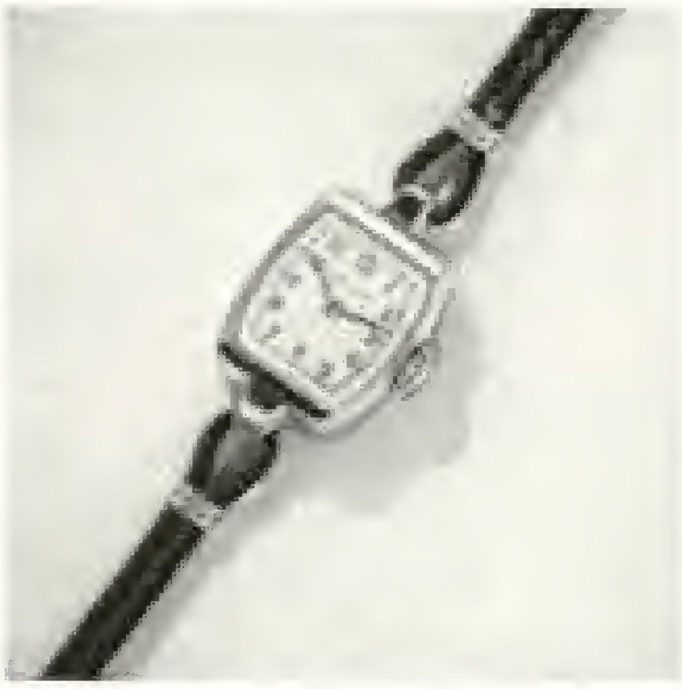

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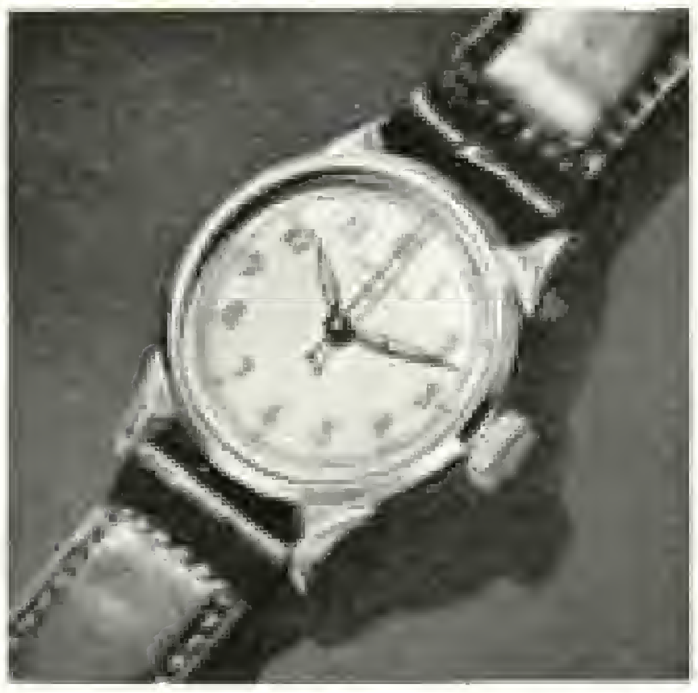

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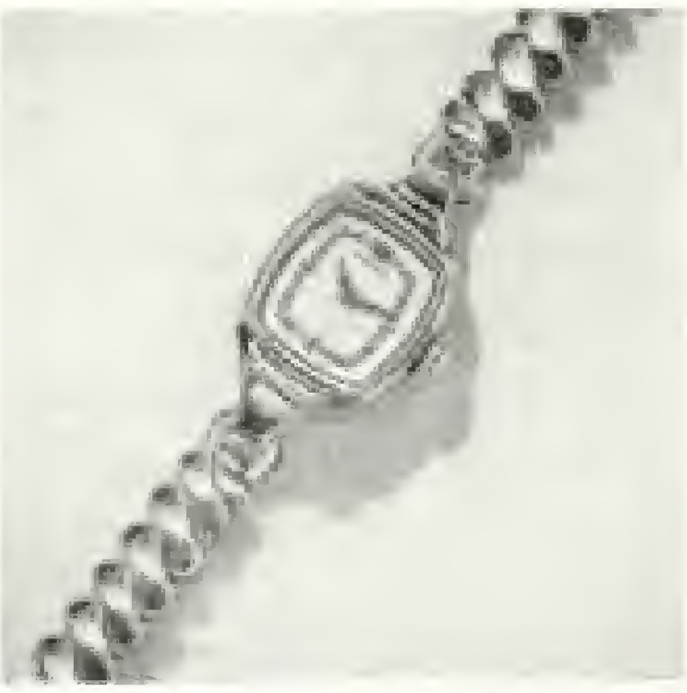

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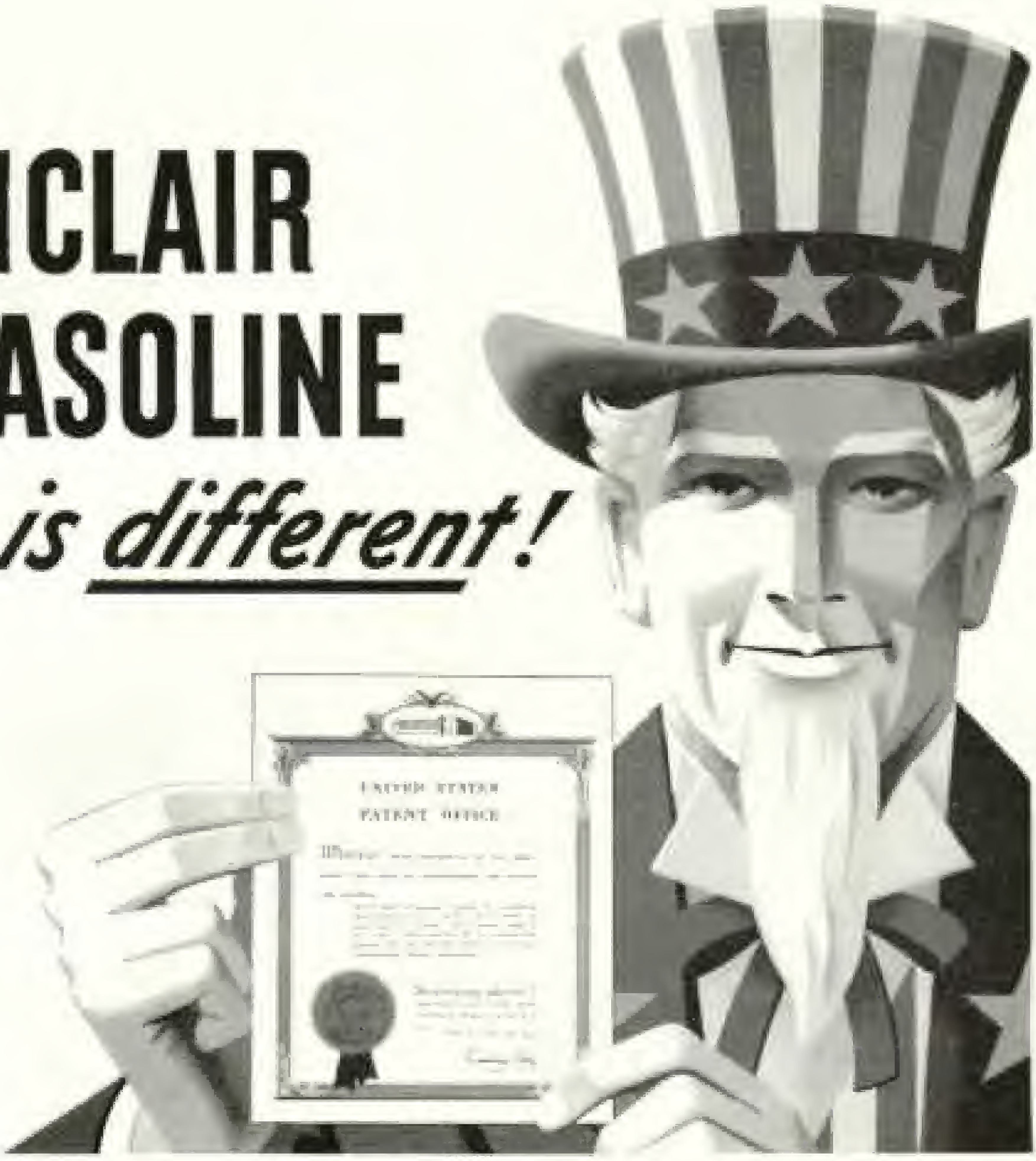

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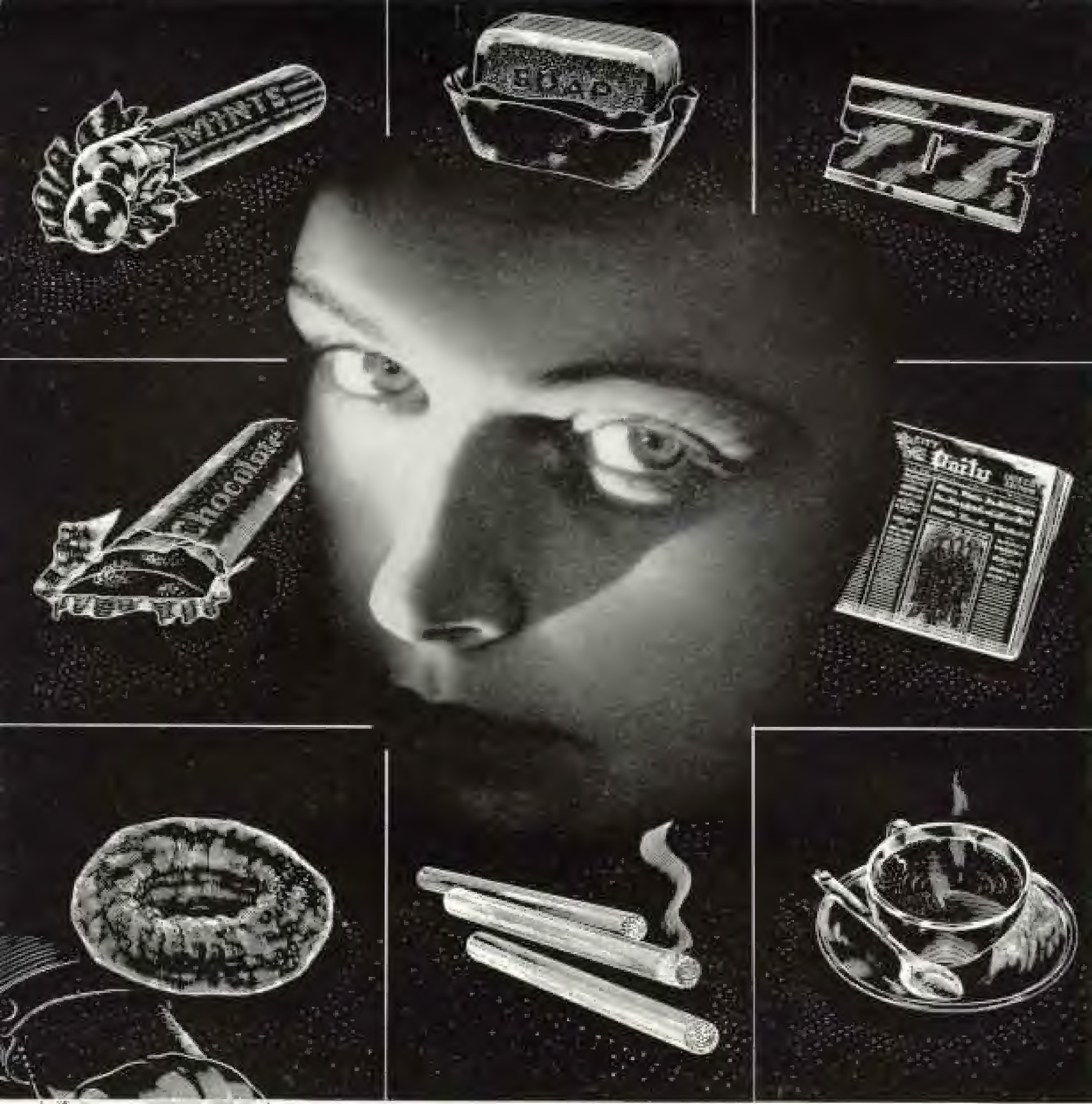

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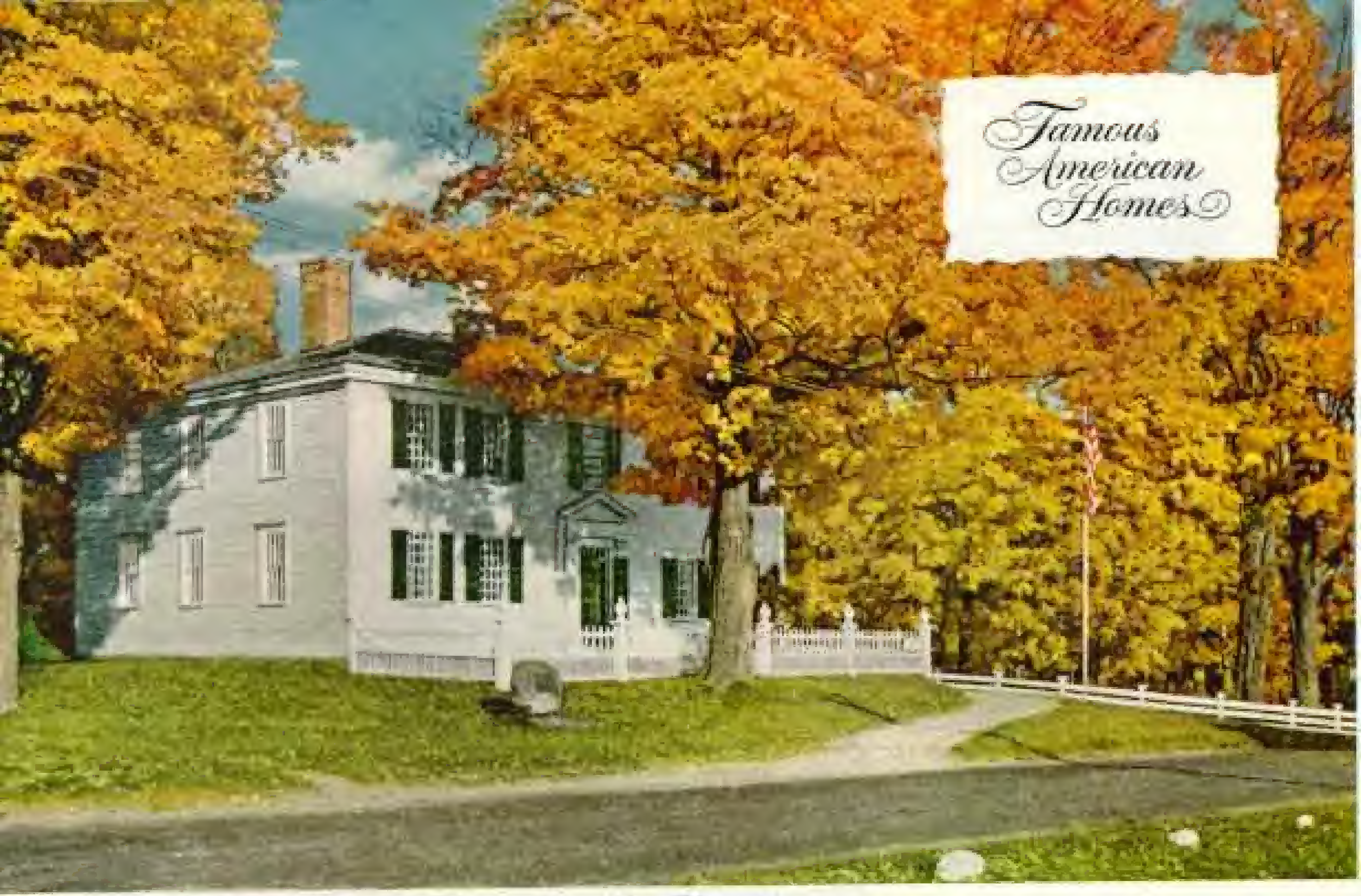
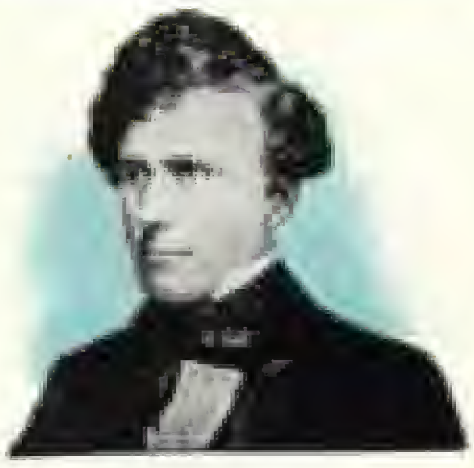
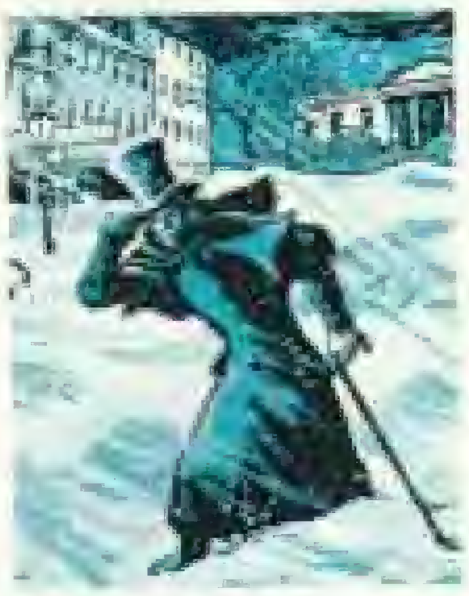


Home of Franklin A. Pierce, Hillsborough, New Hampshire



"Young Hickory" of the Granite Hills

Handsome, genial Franklin Pierce, in the eyes of one of his biographers, was the "most charming of all the Presidents" but had "too winning a personality for the position." Among many instances of his consideration for others is a story telling how, while President, he struggled through six-foot snowdrifts to inquire about Mrs. Jefferson Davis who was gravely ill. Almost anyone else, it was explained, would have lacked the personal interest required to complete such an arduous mission.



Pierce's political career began in his native New Hampshire. He apparently had no presidential aspirations and originally was not regarded as "timber" by his party. However, Nathaniel Hawthorne, his classmate at Bowdoin College and lifelong friend, claimed that his elevation to the Presidency never seemed an accident to his intimates.

When elected to the Senate, Pierce was the youngest member. He was an eloquent speaker but was dwarfed by such oratorical giants as Clay and Webster. Because of his wife's poor health and dislike of life in the Capital, he resigned before his term had ended in 1842 and returned to his law practice, declaring that he was permanently retiring from public life.

In the 1852 election campaign there were several strong candidates but on account of factional rivalries the Democratic convention became hopelessly deadlocked until Pierce was entered as a "dark horse" and nominated. Hailed as Young Hickory of the Granite Hills, in the election he defeated Whig candidate General Winfield Scott.

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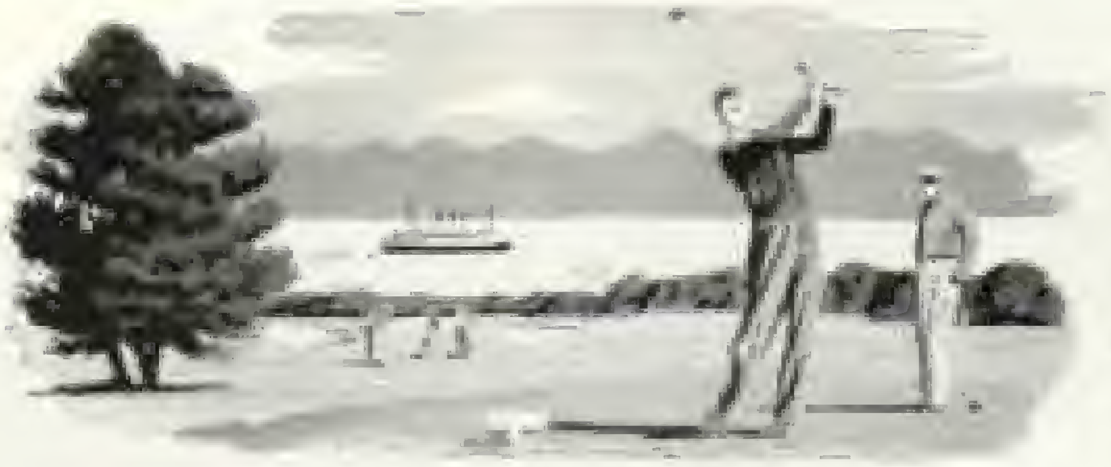

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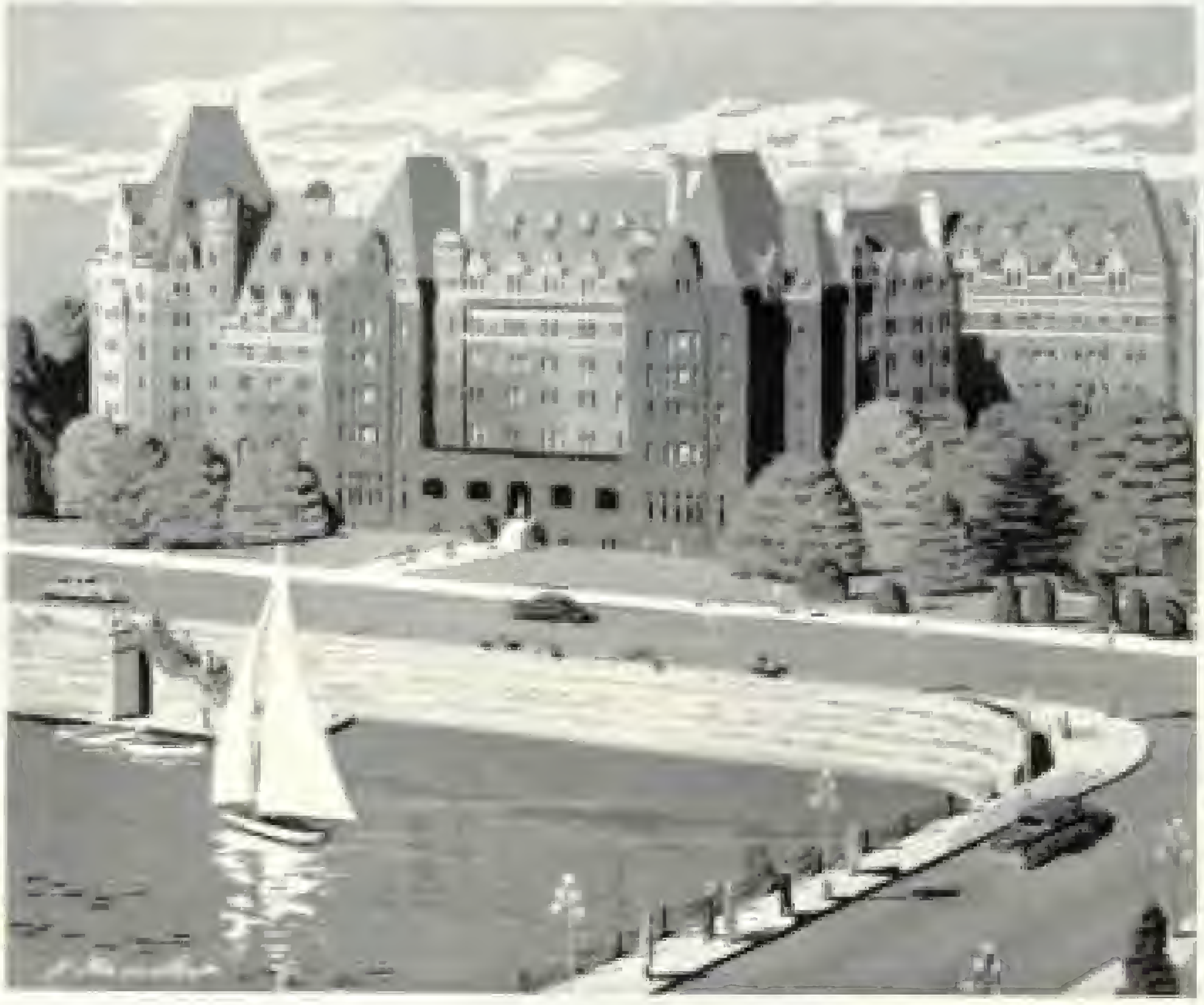

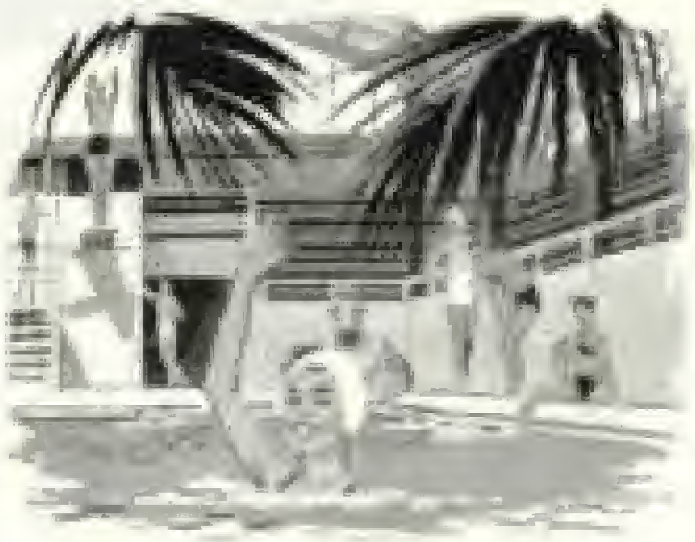

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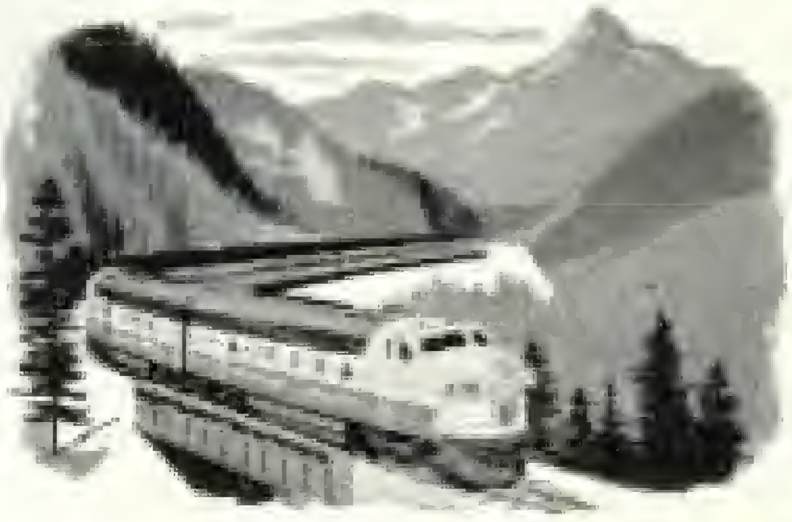

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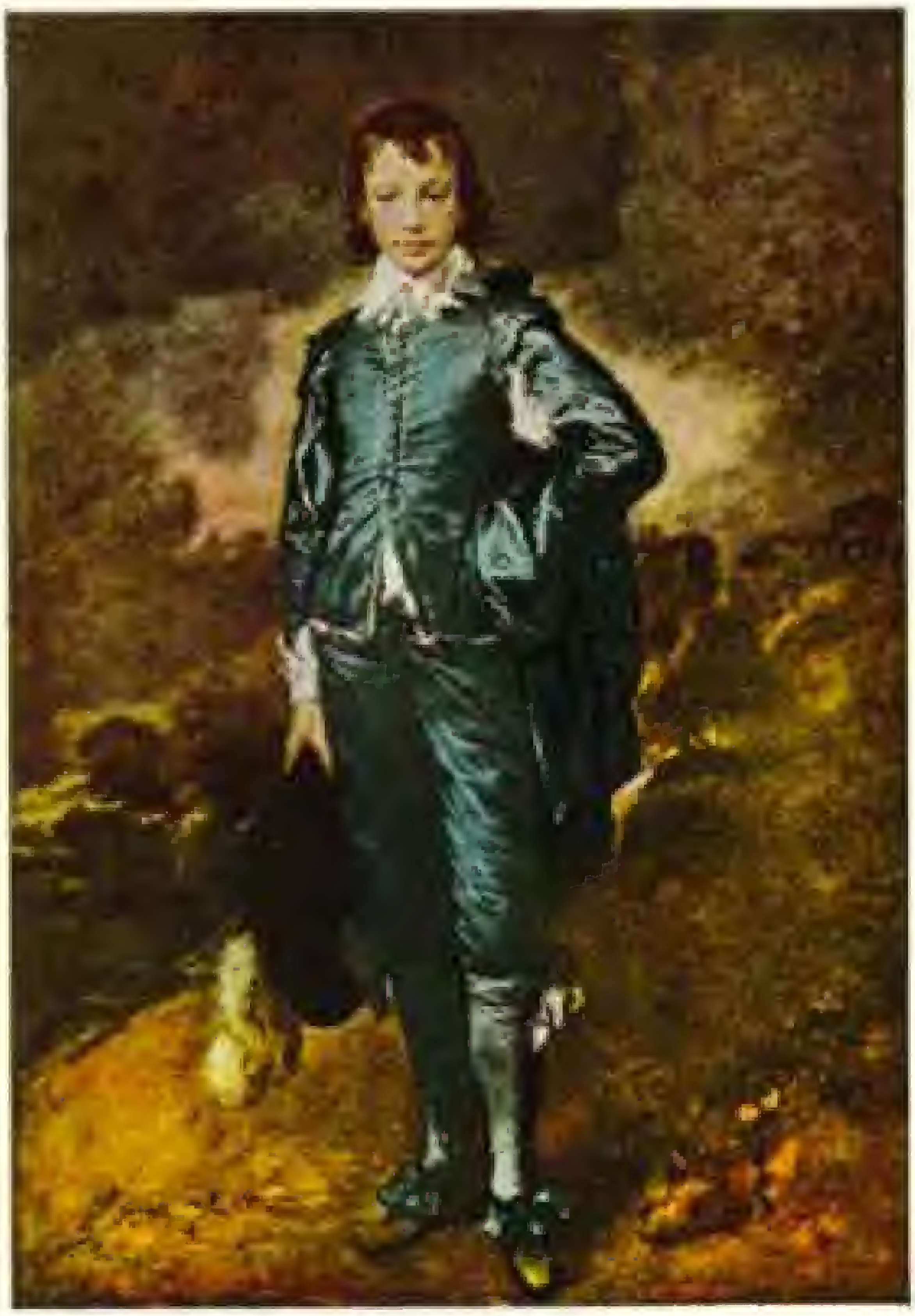

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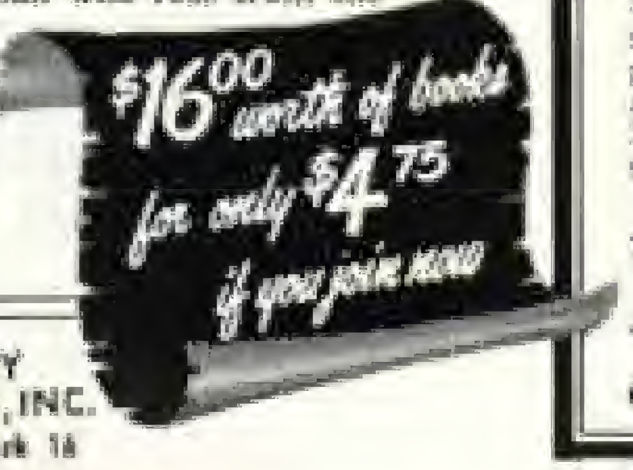

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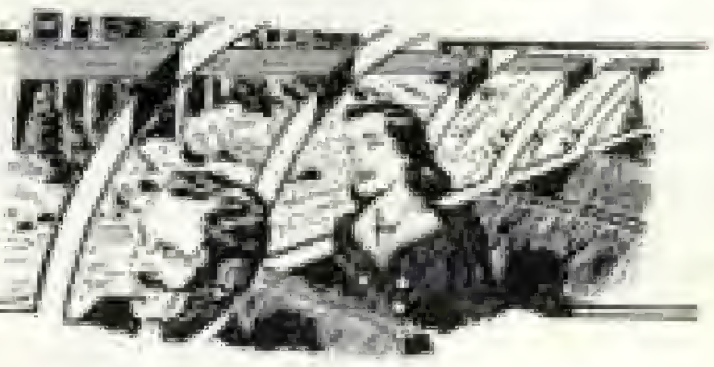

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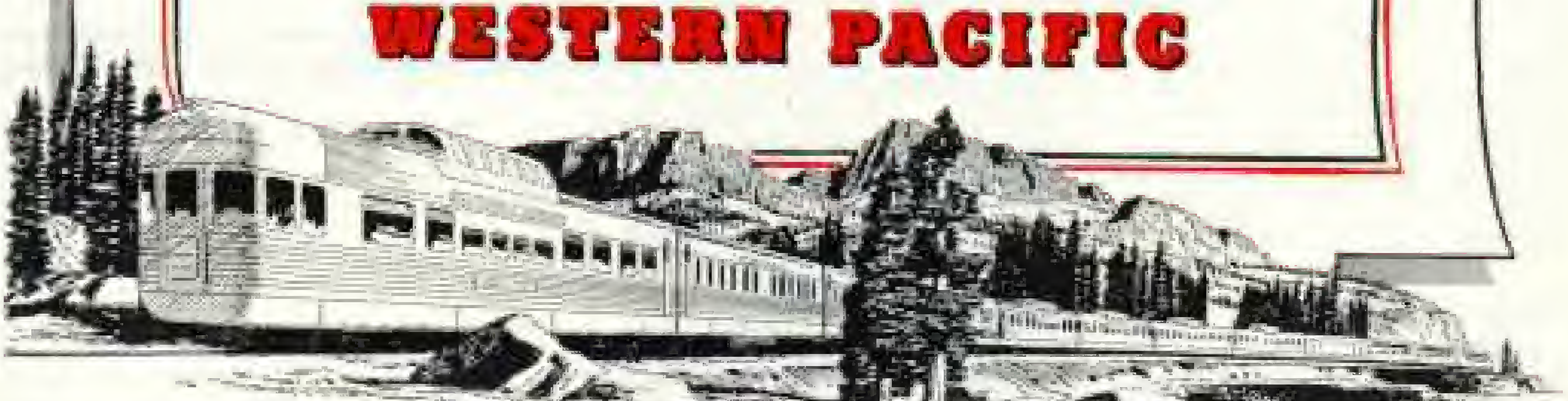

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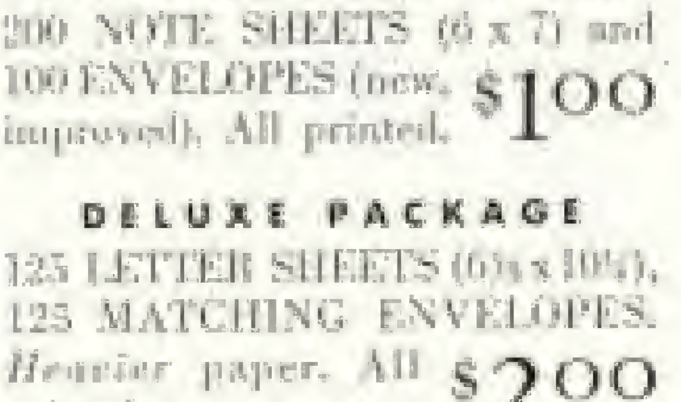

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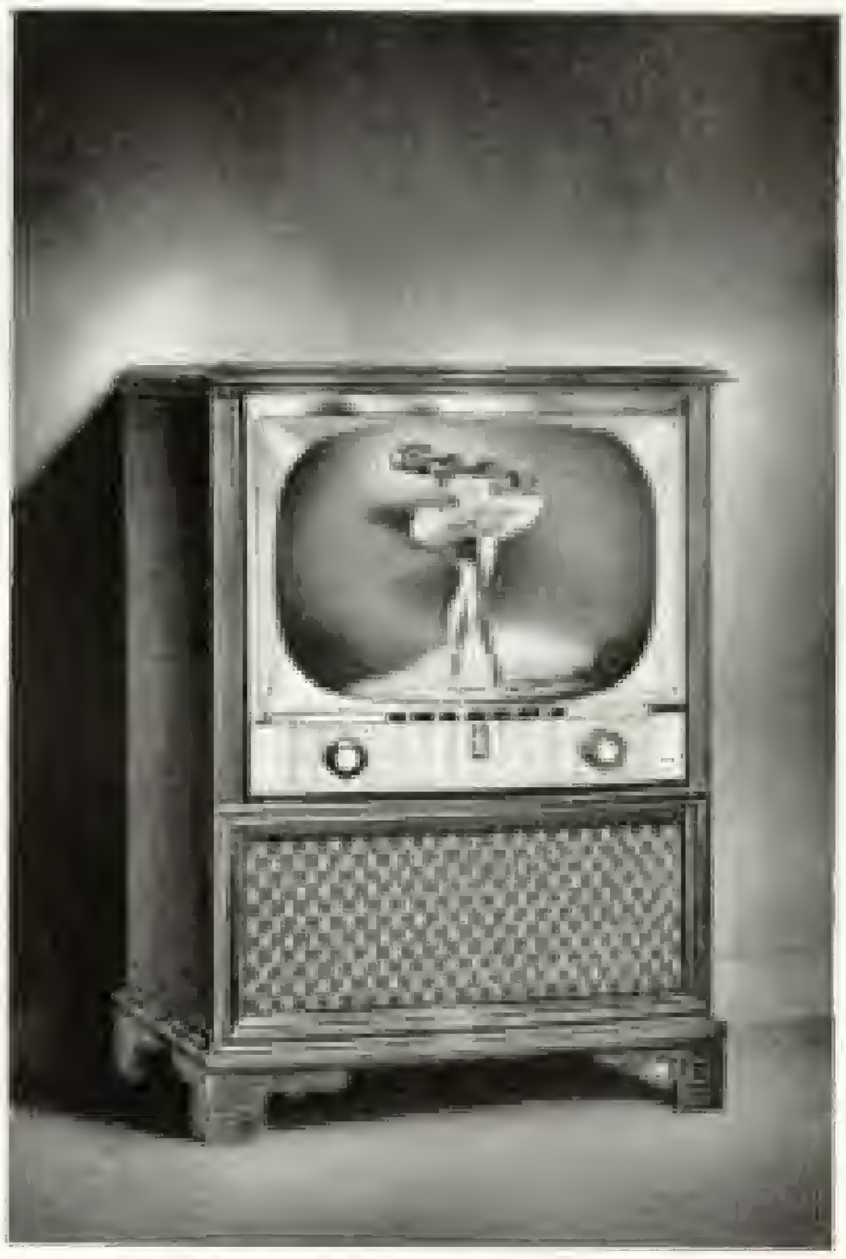

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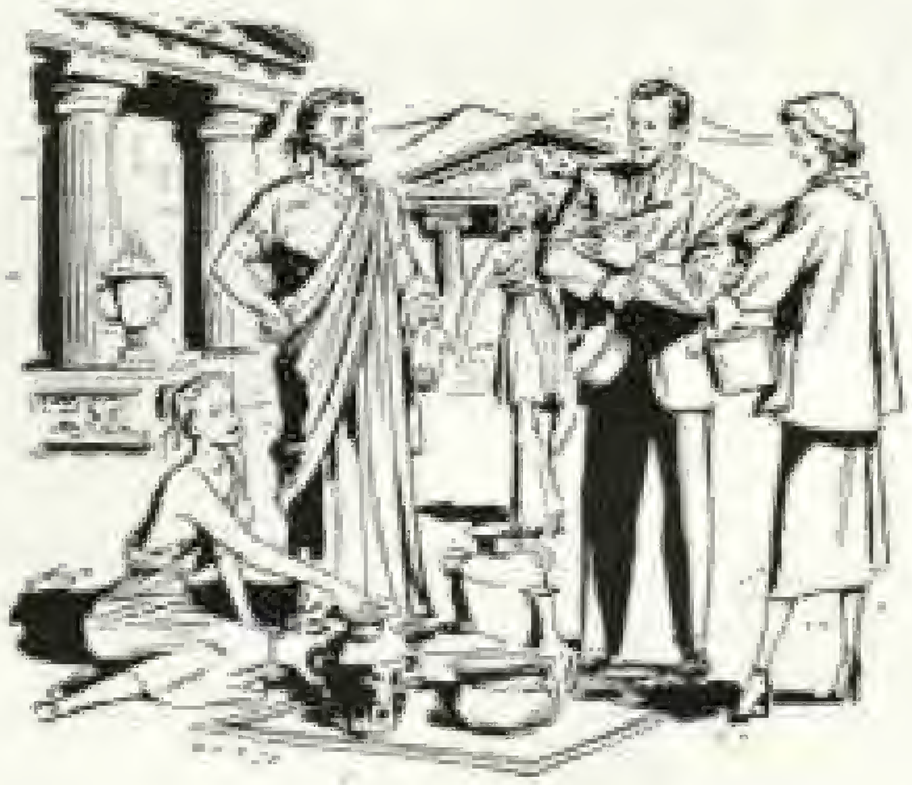

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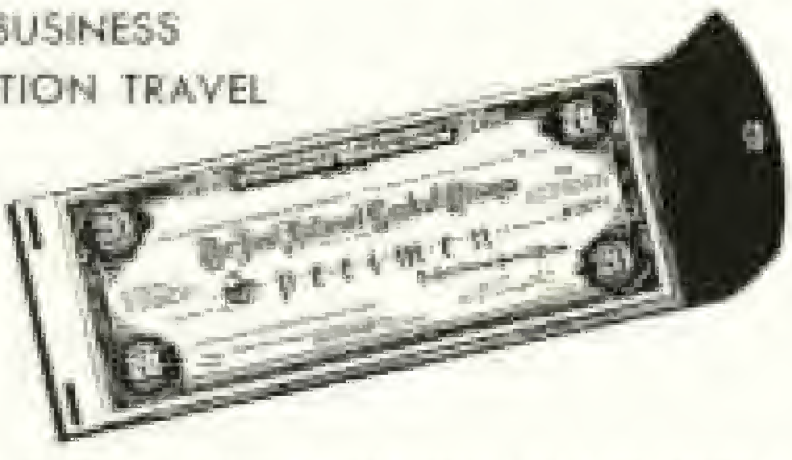

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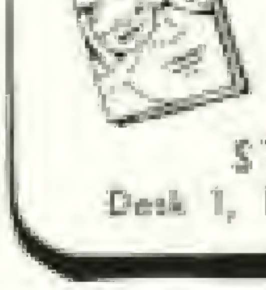

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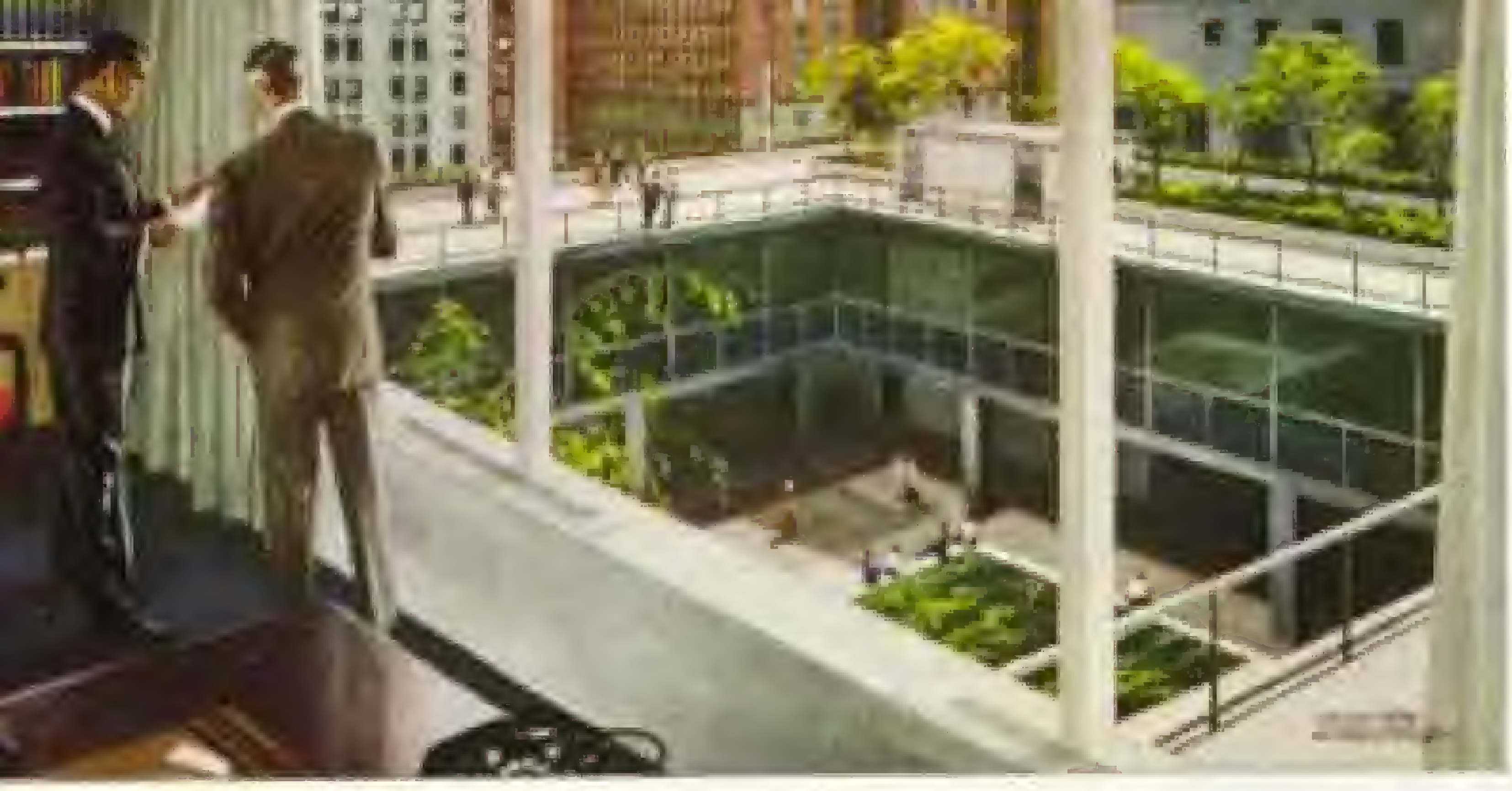

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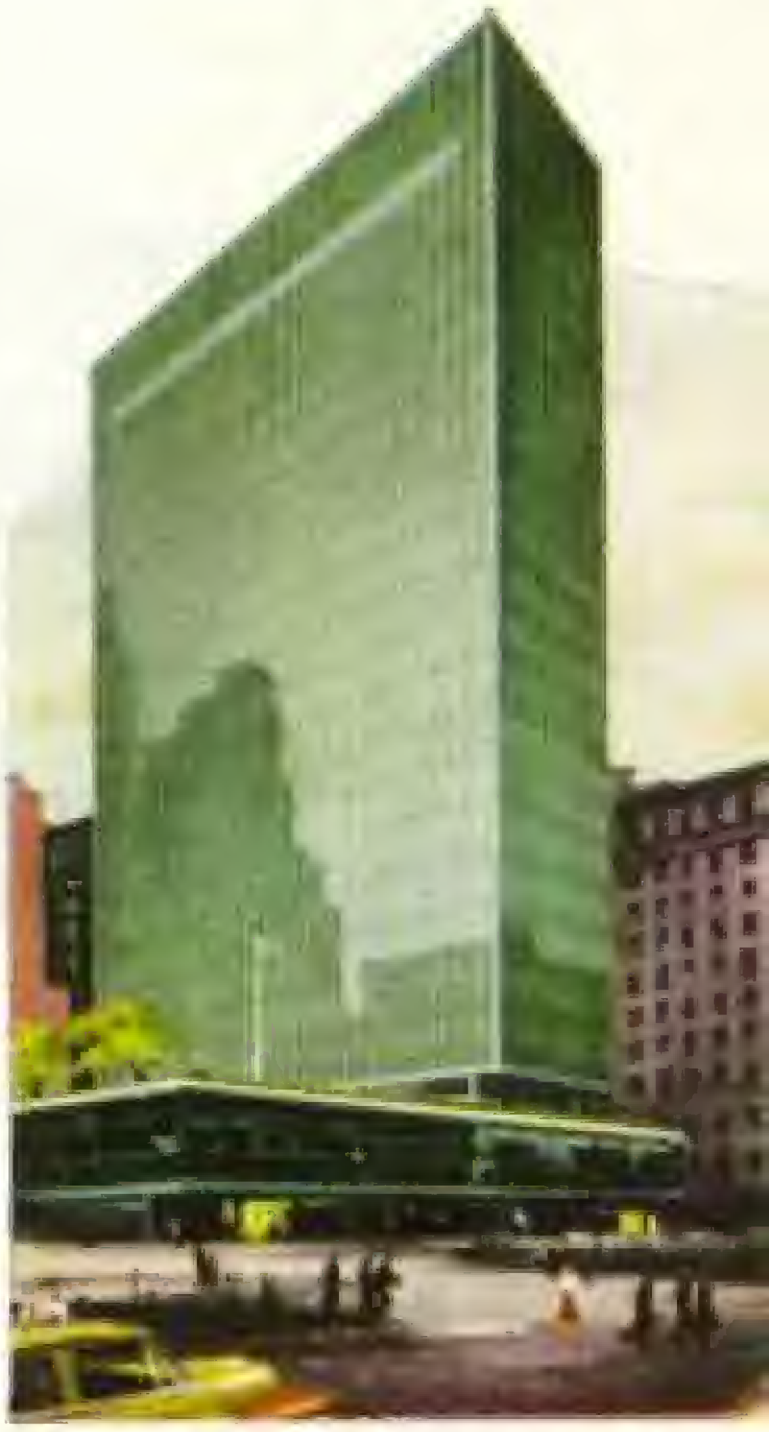

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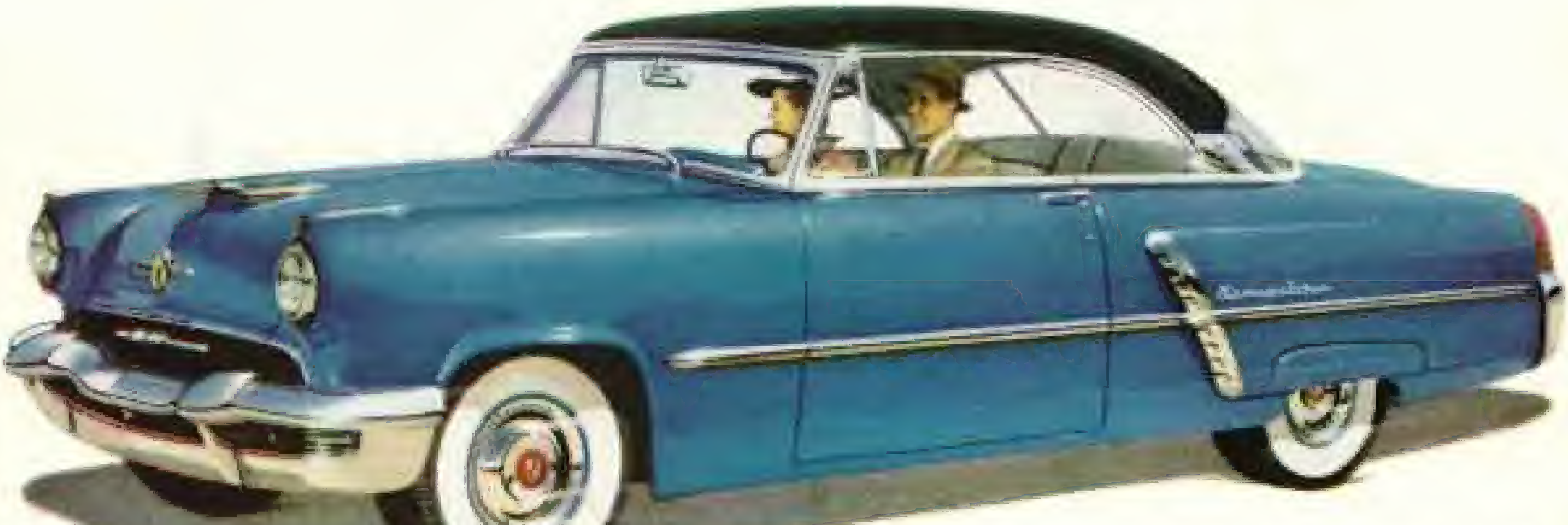

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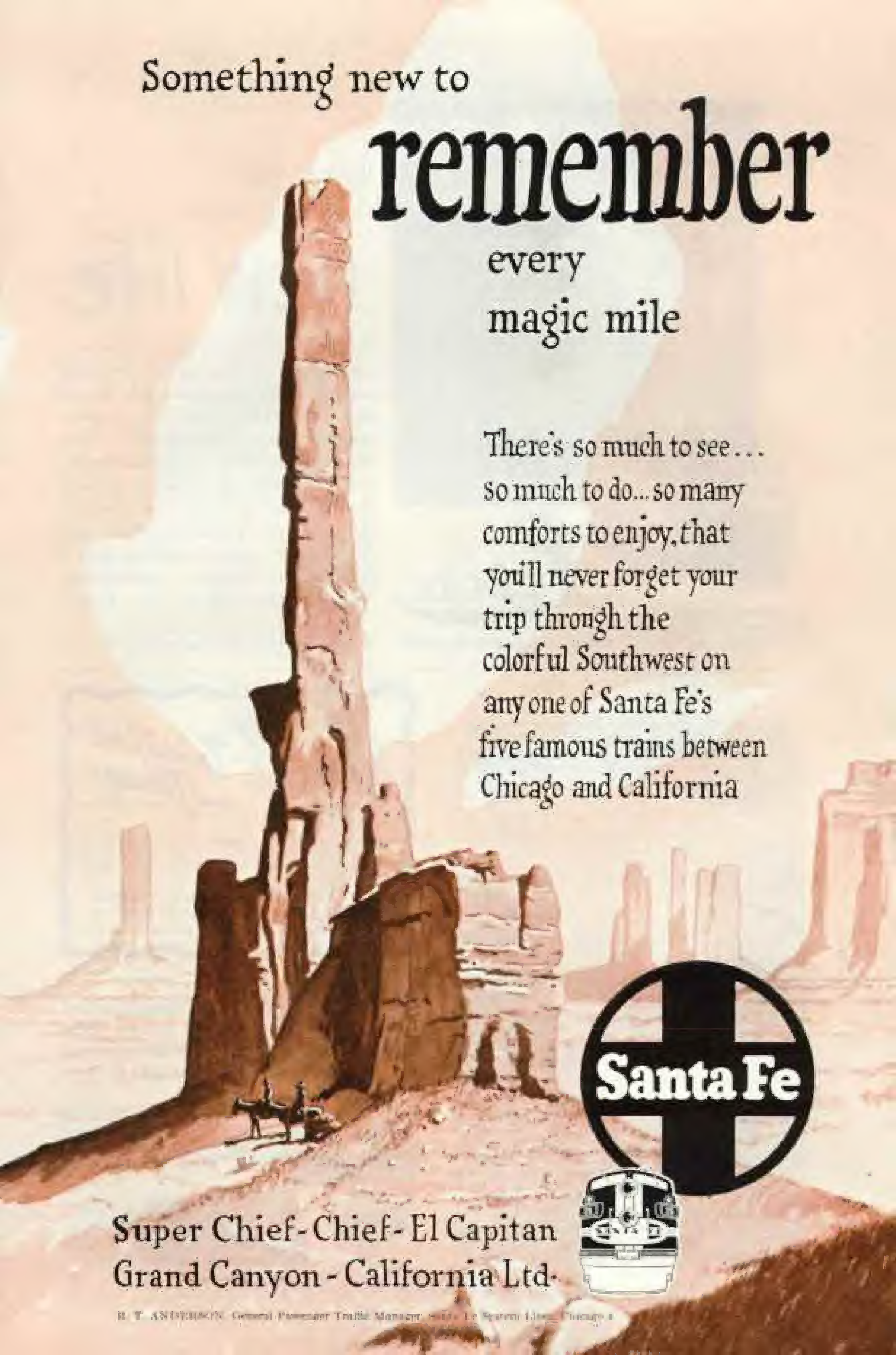

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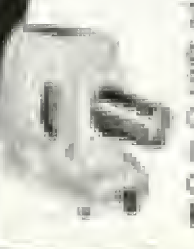

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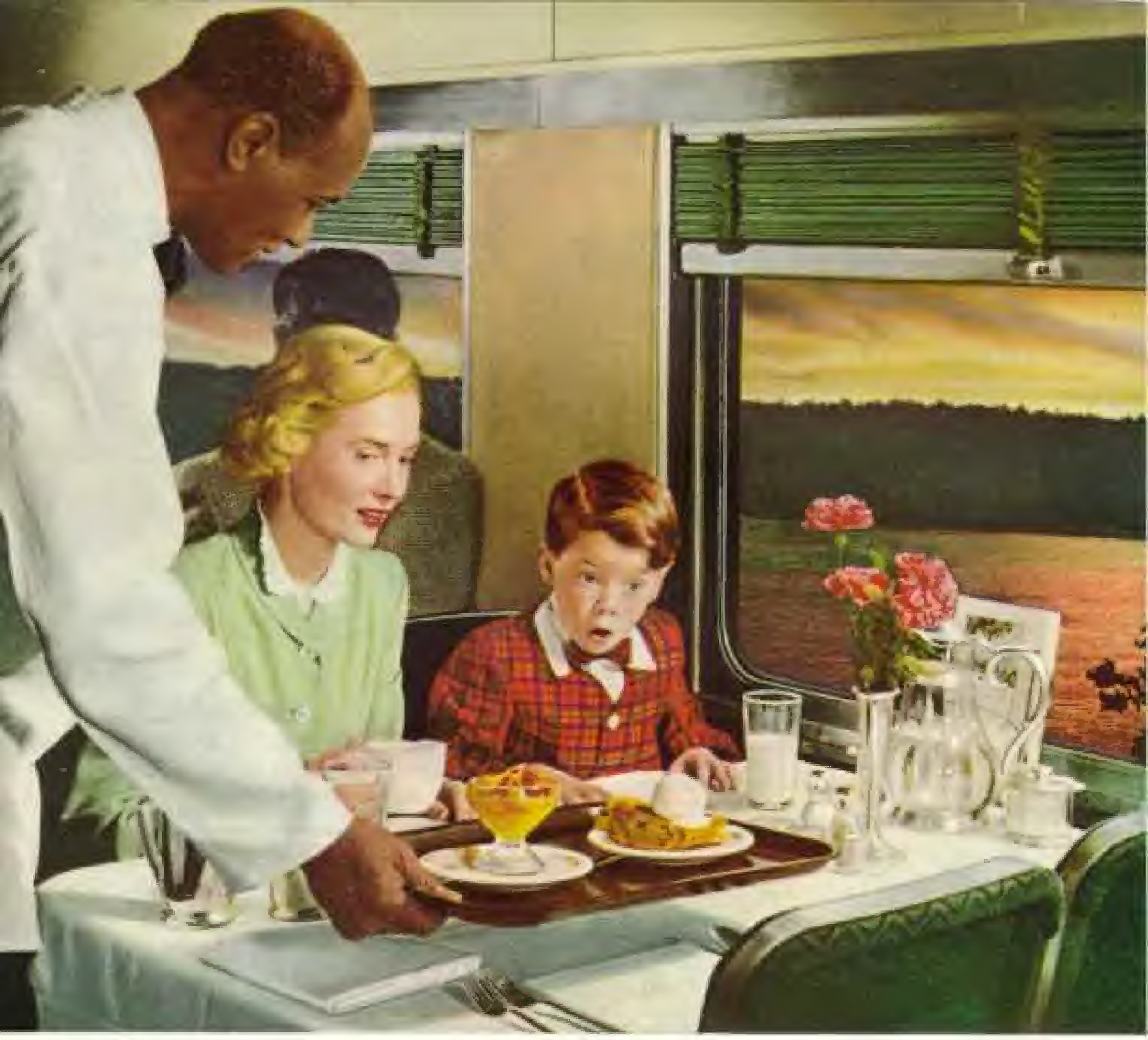

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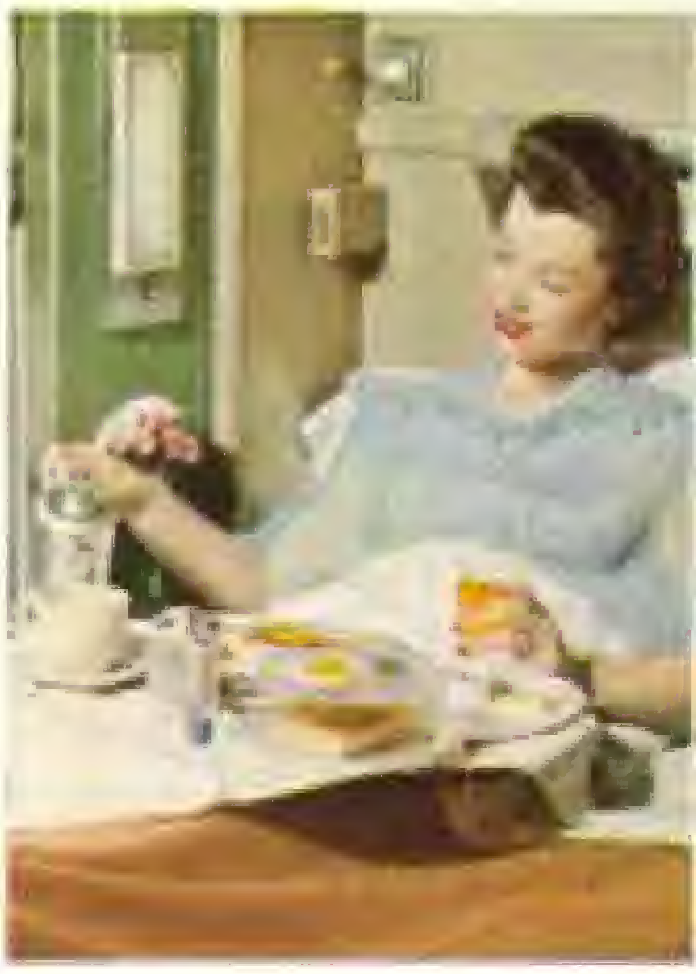

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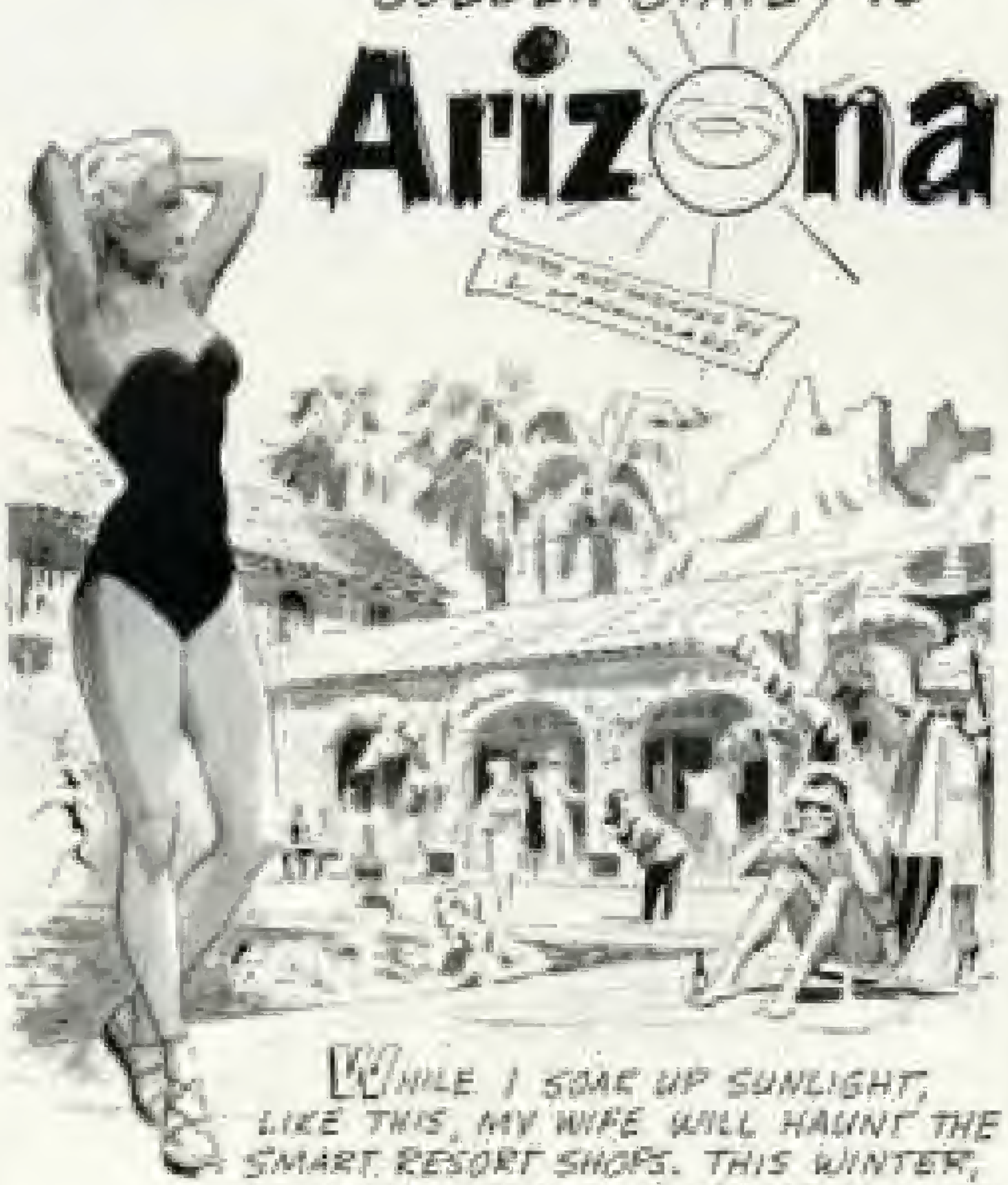

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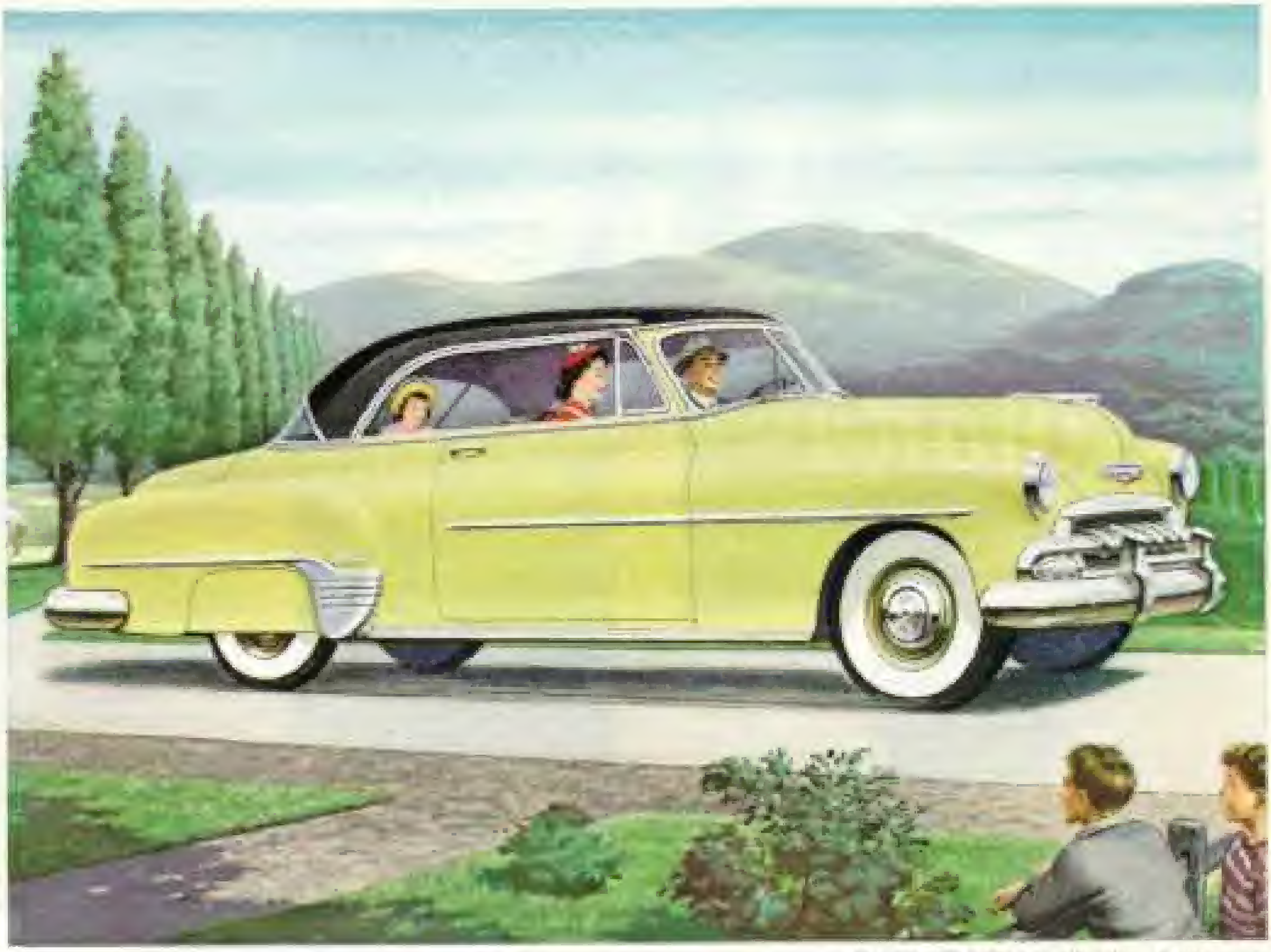

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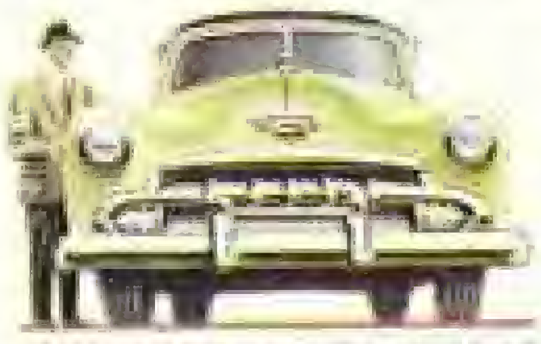

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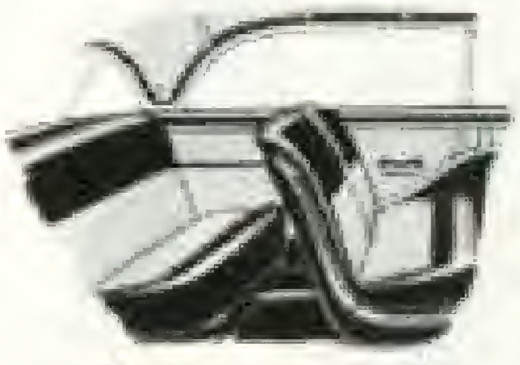

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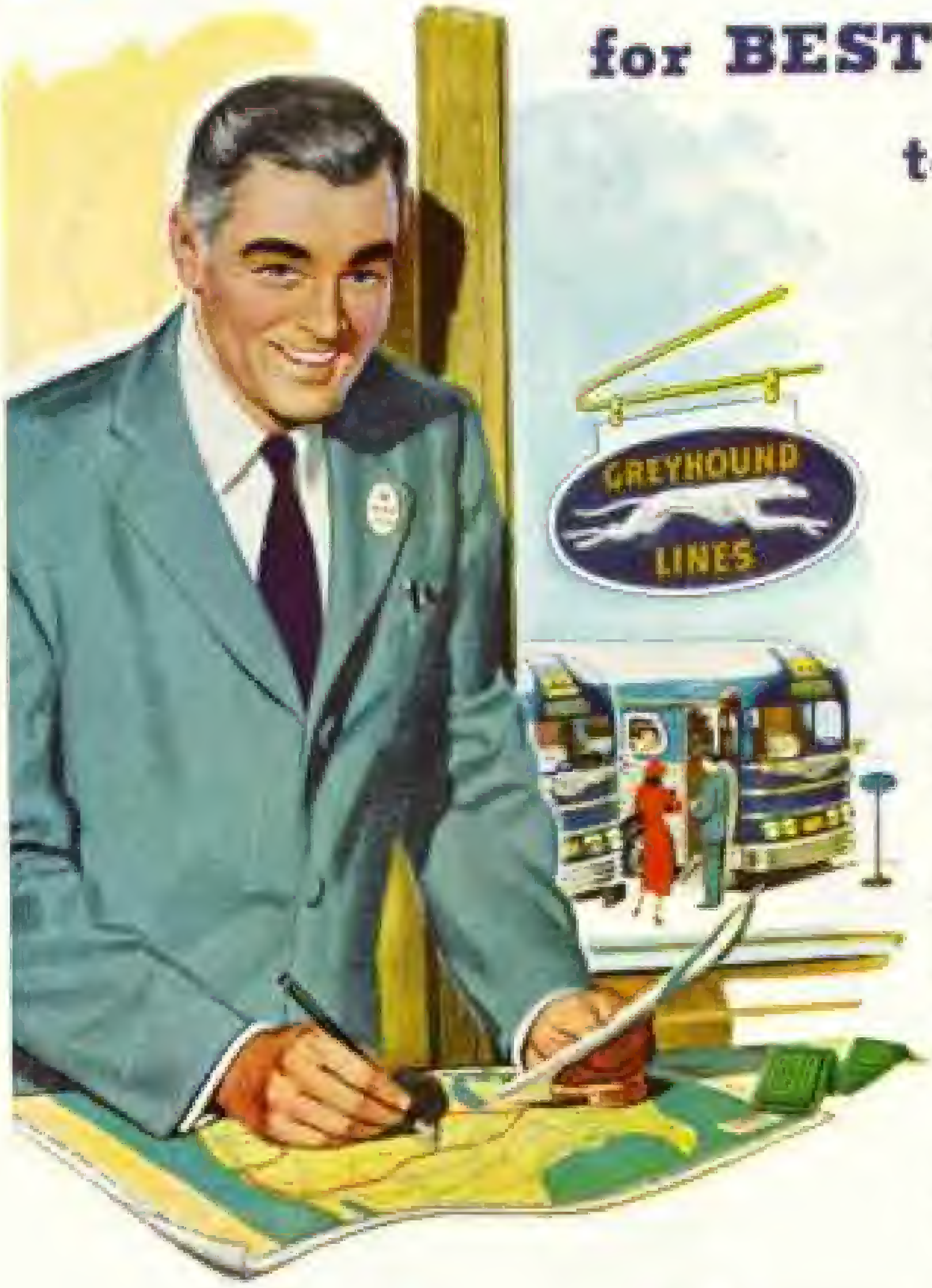

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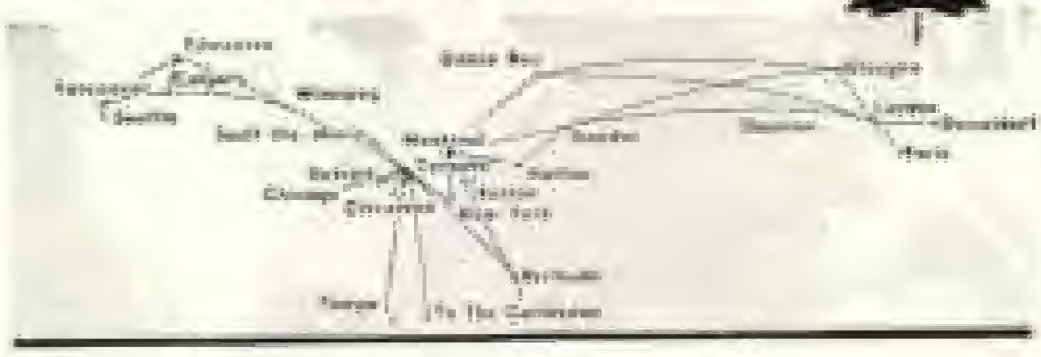

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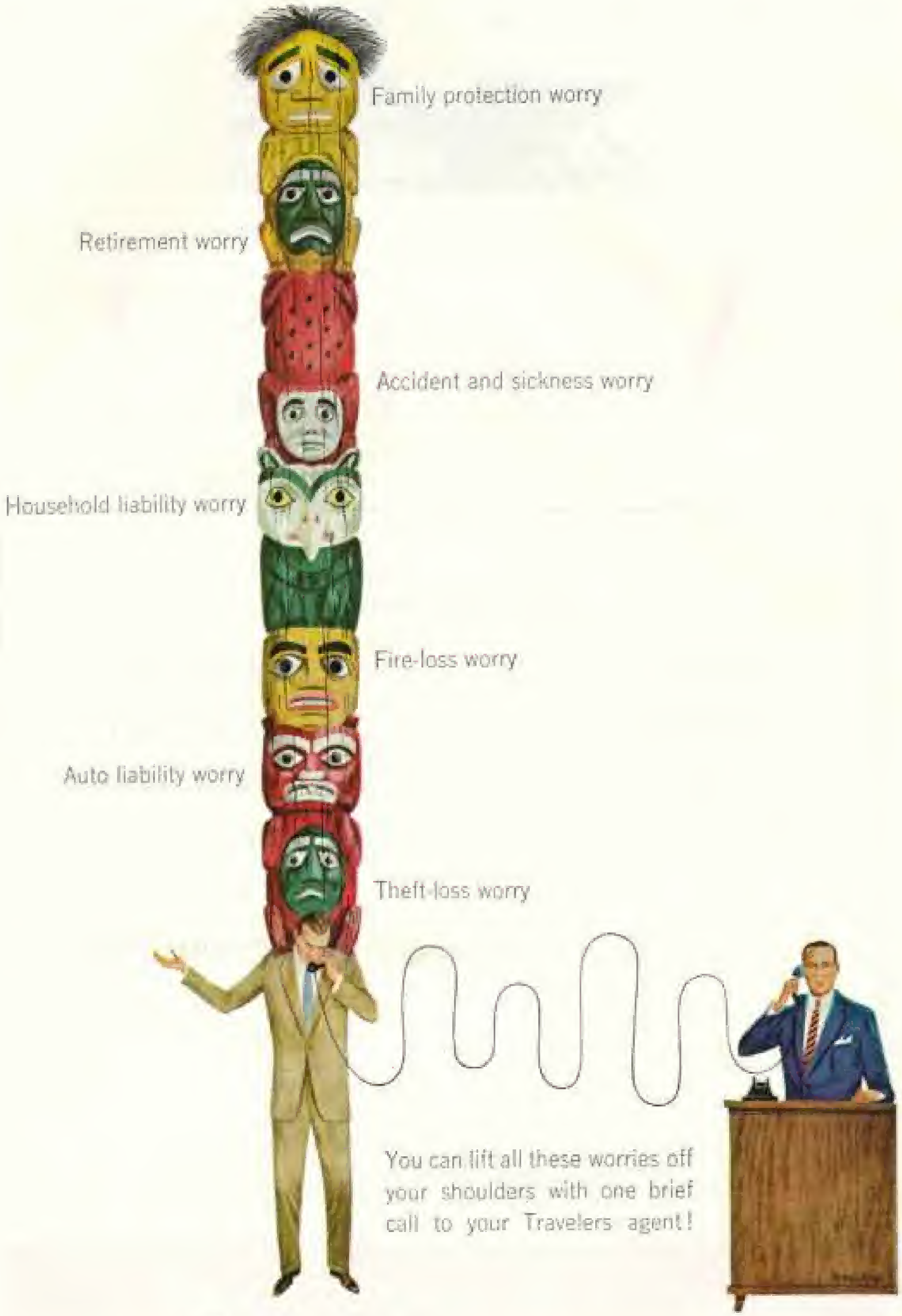
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Fish Men Explore a New World Undersea

By Capt. Jacques-Yves Cousteau

THE best way to observe fish is to become a fish. And the best way to become a fish—or a reasonable facsimile thereof—is to don an underwater breathing device called the Aqualung. The Aqualung frees a man to glide, unhurried and unharmed, fathoms deep beneath the sea. It permits him to skim face down through the water, roll over, or loll on his side, propelled along by flippered feet.

No cables or hoses connect the Aqualunger to the upper world. No heavy armor weights him down. Tanks strapped upon his back feed him compressed air in amounts carefully regulated to equalize the pressure within his body to the pressure of the sea without. In shallow water or in deep, he feels its weight upon him no more than do the fish that flicker shyly past him.

Meet the Fish—in His Own Home

For scientists who would explore the fauna and flora of the middle depths, the Aqualung offers unique advantages. It provides an opportunity to study marine life right in its own environment. Dredges and nets can snatch specimens of this life up to the harsh light of day. But only by on-the-spot investigation can biologists determine precisely at what level these creatures live, under what circumstances, and in what relation with their neighbors.

Such firsthand observation comprises all the difference between examining slain animals at a taxidermist's and observing them at large in their own woods and meadows.

In the winter of 1951-52 I took a group of scientists eager to exploit these capacities of the Aqualung on a voyage through the Mediterranean to the Red Sea. The object of our expedition was twofold: to study this area's rich undersea life, and to photograph it in its true colors. I think we can say that, on both scores, we succeeded beyond our expectations.

But let me tell you first a little about the Aqualung itself and how it came into being. I have been, all my adult life, an officer in the French Navy. As such, I sailed the Seven Seas—and swam in all of them. Yet I swam and dived as a blind man. Not until 1936 did a pair of sea goggles open my eyes upon a new, neglected kingdom.

From that moment I never looked back. With my companions, Frédéric Dumas and Philippe Tailliez, I dived the year round in warm and icy waters. I learned to perform the expert's surface dive, by which a man can descend 50 or 60 feet in a few seconds. I learned to kill fish with a spear, a crossbow, a cartridge-propelled harpoon, even—as I proved in a bet with a skeptical friend—a knitting needle.

Yet always I rebelled against the limitations imposed by a single lungful of air. I wanted to go deeper and stay longer. Accordingly, my friends and I began to tinker with various oxygen-rebreathing devices.

We built two homemade models that used oxygen and tried them out; we tested other variations. But the more we studied our problem, the more convinced we became that a better answer lay in the use of compressed air.

Evolution of a Valve

We knew there would be no particular difficulty in getting compressed-air cylinders to take below and in devising tubes to conduct the air to the diver's mouth. The task that confronted us, however, was to get a regulator valve which would automatically feed the compressed air to the mouthpiece in ratio to the diver's depth.

Journeying to Paris in December of 1942, I took our problem to a brilliant Parisian

J.-Y. Cousteau, P. Tailliez, F. Dumas

Fish Men from the Sunlit Surface Swim Down to Ali Baba's Cave Off Cassis, France

Capt. Jacques-Yves Cousteau, co-inventor of the Aqualung, an automatic breathing device, led an expedition in 1951-52 into the Mediterranean and Red Seas. One object was to give scientists equipped with the lung an unprecedented opportunity to study underwater life. Submerging 120 feet, Captain Cousteau filmed these Aqualungers heading for a grotto rich in sponges and fish. Filtered sunlight sufficed for black-and-white pictures down to 200 feet. For color, flash bulbs of fantastic power were required (page 471). Seen against the glowing sea "sky," the divers' air bubbles look dark. Tanks of compressed air give men the freedom of fish, but danger lurks on their return unless they pause for decompression (page 448).

engineer, Emile Gagnan, of Air Liquide Cie., France's largest commercial gas firm.

"This is the kind of gadget we need," I explained to him. "Do you think we could ever design one?"

Gagnan grinned. He reached up to a shelf behind his desk and brought down a small plastic object. "Something like this?" he asked.

"Perhaps. What is it?"

"A valve I made for those infernal natural-gas tanks we've had to put on our cars. Same kind of problem, you know."

We went to work. In three short weeks we had blueprinted and built a "lung" which utilized an adaptation of Gagnan's automatic regulator. Then one chilly spring morning we took it to the Marne River outside of Paris.

While Gagnan sat comfortably on the bank, I waded into the muddy water and submerged. Failure. As long as I lay horizontally in the water, the lung worked beautifully. When I stood up, however, air escaped with loud bubbles, wasting great quantities of my supply. And when I lay head down in the water, I had trouble getting air out of the regulator.

Disconsolate, I crawled out of the water. We got back in the car and drove sadly to Paris. Yet we were closer to the solution than we knew.

We had arranged the intake and exhaust tubes on the lung in such a way that one was six inches higher than the other. Could this mere half-foot difference in altitude be causing the trouble? Back at Gagnan's laboratory, we arranged intake and exhaust tubes at the same level and tried another test. The new system proved not only practicable but a sound basis for an exclusive patent.

Not till the summer of 1943, however, were we able to give our breathing device—which we christened the "Aqualung"—its first real sea trials. With Dumas and Tailliez I took the Aqualung by very gradual stages to greater and greater depths. Together we made more than 500 separate dives. It was autumn before we attained 130 feet. Then in October, Dumas, in one carefully planned and attested plunge, swam down to 220 feet.

Mine Sweeping by Aqualung

Quick to grasp the Aqualung's advantages, the French Navy requested me, after the Liberation, to train a team of divers. I gathered around me a group of young naval officers and seamen and established what we called the Undersea Research Group.

Day after day, Tailliez, Dumas, and I conducted underwater classes. We trained our men to dive with Aqualungs to 20 or 30 feet, take them off, exchange them with one another, and put them back on. Our intention was to rid them of any fear of the deep, to train them for emergency action, and to develop in them confidence in the safety and easy handling of their new "gills."

The work of the Undersea Research Group was not all research. We removed live torpedoes from a sunken German submarine. We found sand quarries under the sea, to be used in building an airfield. We checked the performance of a special type of Air Force practice bomb when dropped into the water.

On one occasion we went down and explored a sunken German barge loaded with armed magnetic mines capable of virtually wiping out the city of Toulon itself. The mines, incidentally, are still there, but the area has been "fenced off"; as yet, no way of safely de-arming them has been found, since they are sensitive to nearly anything—a magnetic field, metal, pressure, sound, or heat.

In 1948 the Government had officially declared the roadstead at Sète, in southern France, cleared of mines. This did not prevent one ship, two years later, from being blown up.

The Navy took over the operation, and I organized a section of 20 demining divers. Exploring westward from the harbor entrance, we found a rocky shelf 35 to 45 feet down in very turbid water. Underneath, German "Katy" mines had been devilishly placed in such a way that mine-sweeping hooks and paravanes could not get at them.

Rigging a special 75-foot diving tender for the job, we sent four teams of divers below in half-hour shifts. In five weeks we located 14 mines, put charges on them, fired them, and cleared the whole area. The Navy estimated that, with conventional heavy-suit diving equipment, this job could never have been done.

I was eager, however, to see our invention turned to more peaceful and productive use. One use to which it was clearly suited was undersea color photography.

Our first organized effort in this field took place in the spring of 1951 aboard chartered boats in the Mediterranean. It was, I think, a highly successful voyage; our diving cameramen produced still pictures of the depths with a precision and a fidelity to the actual colors of the twilight sea that were quite unprecedented.

But I was not satisfied. I wanted to acquire a floating laboratory, workshop, and diving platform more nearly adapted to our needs than rented ships with makeshift arrangements could provide. Also, I wanted to widen the Aqualung's scope of usefulness by making it available to oceanographers, marine biologists, and geologists for on-the-spot study of life far beneath the surface.

For this reason, I was delighted to be able to acquire at Malta an American mine sweeper which had been designated as war surplus. Taking it to the Chantiers Navals d'Antibes, on the Riviera, we put it in dry dock, stripped it down virtually to hull and engines, and completely remodeled it.

To finance work of this magnitude, we needed and received very substantial assistance from British and French individuals and firms, and from my friends in the shipyard itself. The French Navy also provided important help. Without all their enthusiasm and generous support, the *Calypso*, as we named our new home afloat, would never have gone down the ways (page 449).

Calypso Sails for Red Sea

The mine sweeper was equipped with sonar apparatus. To this we added a new aluminum flying bridge, a diving platform off the stern, an interior diving well (by which Aqualungers could descend through still water, and to which they could climb again into the heated ship without exposure to cold air), and a false prow containing portholes for underwater observation.

Finally, on the evening of November 24, 1951, after taking on last-minute supplies at Toulon, the *Calypso* glided down the harbor, outward bound for the reefs and underwater realms of the Red Sea. At 11 knots, guided by its automatic pilot, our ship moved briskly

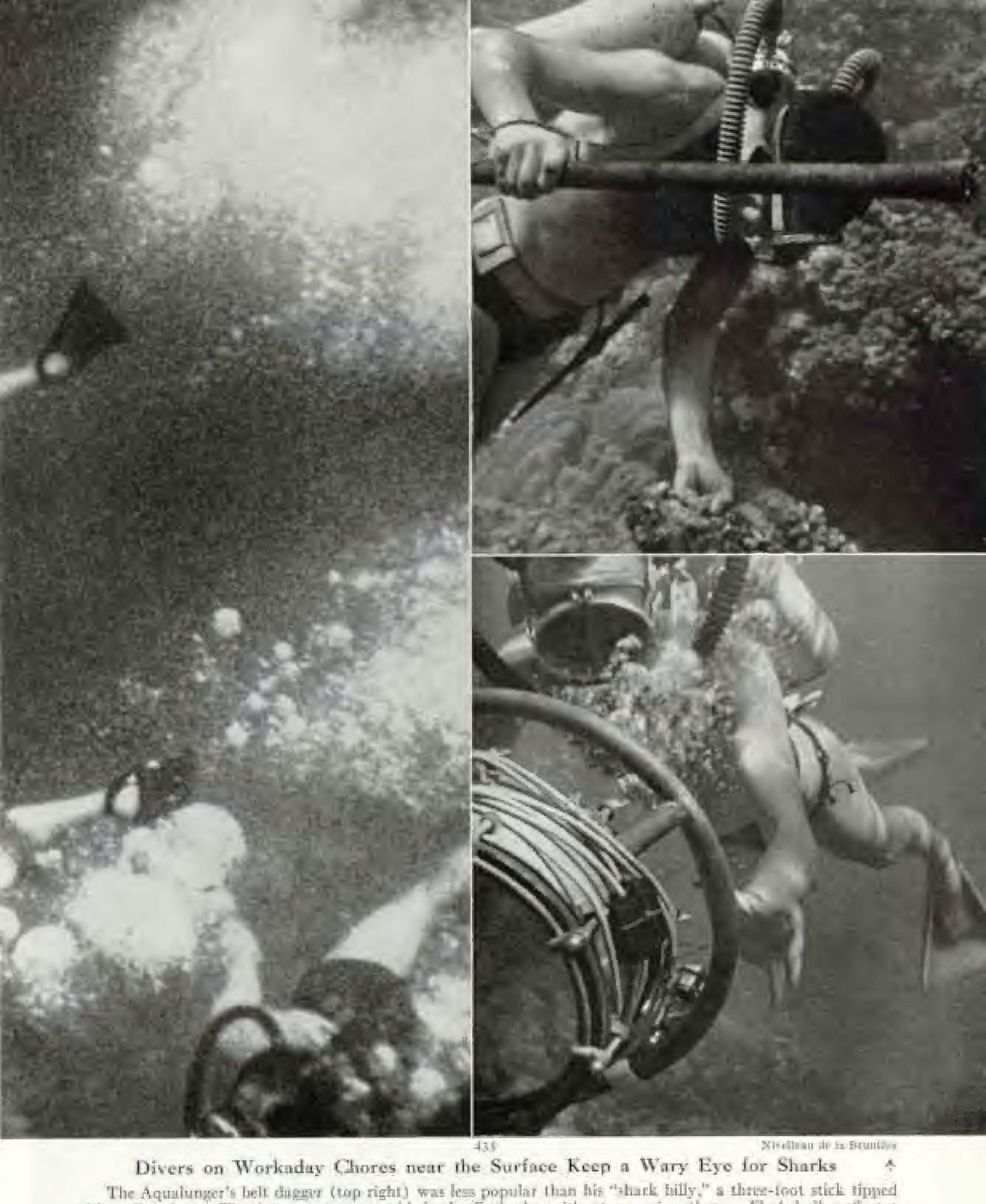
J.-Y. Cousteau, P. Tailliez, F. Dumas

Ninety Feet Down, an Aqualung Leader Signals a Right Turn for His Undersea Troop

Enemy of subsurface swimmers is undue exertion. Moving in a dense element, Aqualungers must learn to be languid. They use no arm strokes, but, kicking foot flippers, content themselves with a lazy crawl beat. More strenuous motion would drain their energy.

and unerringly toward Cap Corse (map, page 438).

For nearly three days the weather held clear and calm, a condition which allowed us to rest a little and to batten down the cargo carefully. Each of us stood a watch, either on the bridge or in the engine room. Lt. Jean Dupas, an Army parachutist on detached duty, shared the deck watch with our photographer, Jacques Ertaud; Dumas teamed up with Gustave Cherbonnier of the Museum of Natural History in Paris; our Belgian friend, Jean de Wouters, with Bernard Callame, deputy director of the laboratory of La Rochelle; François Saout, my executive officer, with Dr. Nivelleau de la Brunière.



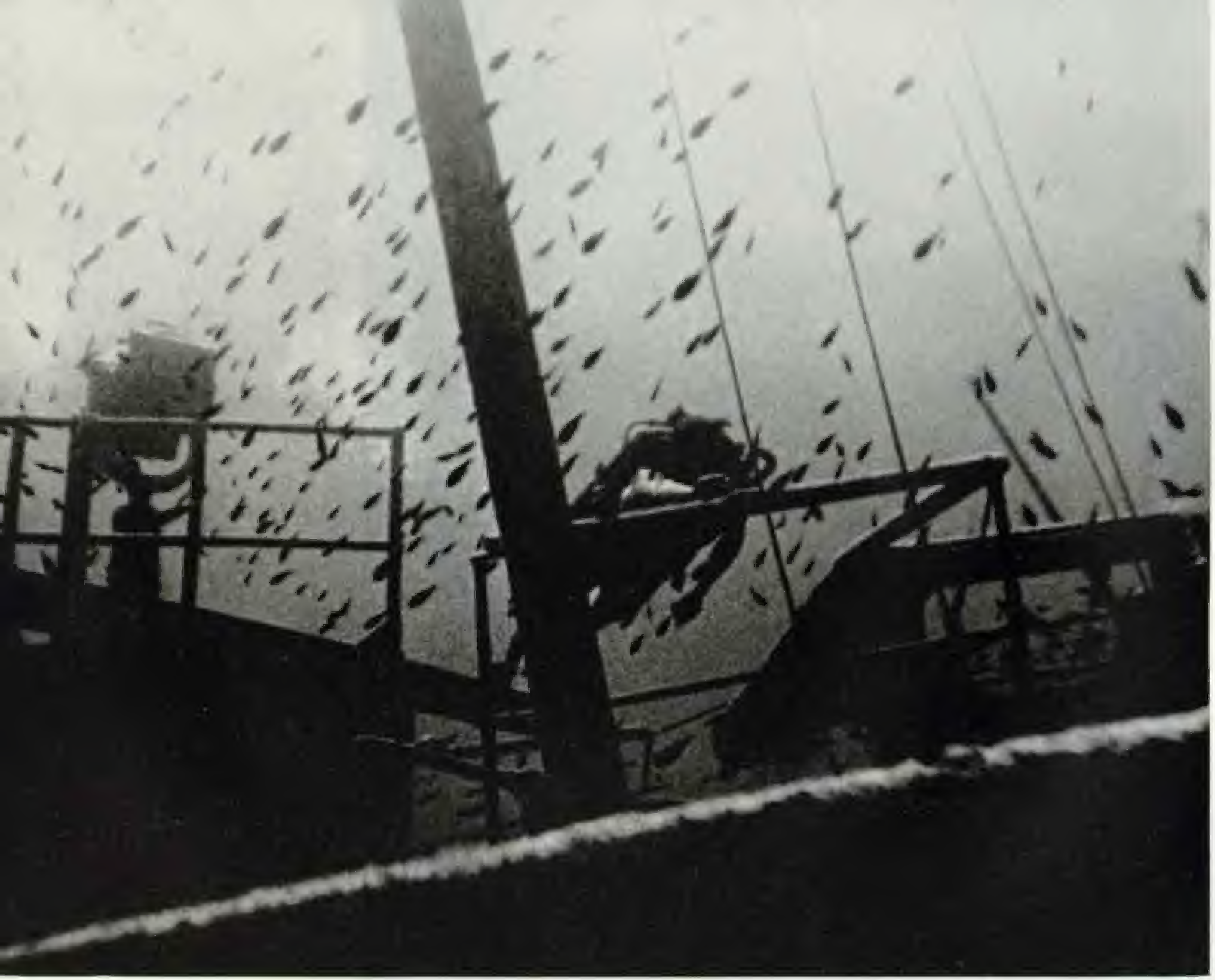
Nivelleau de la Brunière

Divers on Workaday Chores near the Surface Keep a Wary Eye for Sharks ↑

The Aqualunger's belt dagger (top right) was less popular than his "shark billy," a three-foot stick tipped with nail points. The latter weapon could fend off sharks without angering them. Flash-bulb reflector (bottom) has its own Aqualung to keep it pressurized.

The biologist, Claude Mercier, and the geologist, Wladimir Nesteroff, were assigned to the black gang with First Engineer René Montupet and mechanic Octave Leandri. In the galley, volcanologist Haroun Tazieff worked ardently with boatswain Jean Beltran. My wife, Simone, served as nurse, secretary, and assistant to Fernand Hanen, the cook.

During the afternoon of November 27 the weather changed for the worse, and after several stormy gusts the wind passed to the northeast, sweeping down from the Balkans upon the Ionian Sea. With each heave the prow leaped out of the water, sometimes even to the bilge keels, and plunged deeply into the following wave. Shaken up in its drums,



A Flippered Diver in a Rain of Fish Tours a Sunken Boat

Sunk by French sailors in November, 1942, the submarine net tender *Polyphème* came to rest in 60 feet of Mediterranean water off Hyères. Nearly a year later, Captain Cousteau in his newly invented Aqualung swam along its quiet decks. He found the rigging still taut, the rails only lightly encrusted with marine formations.

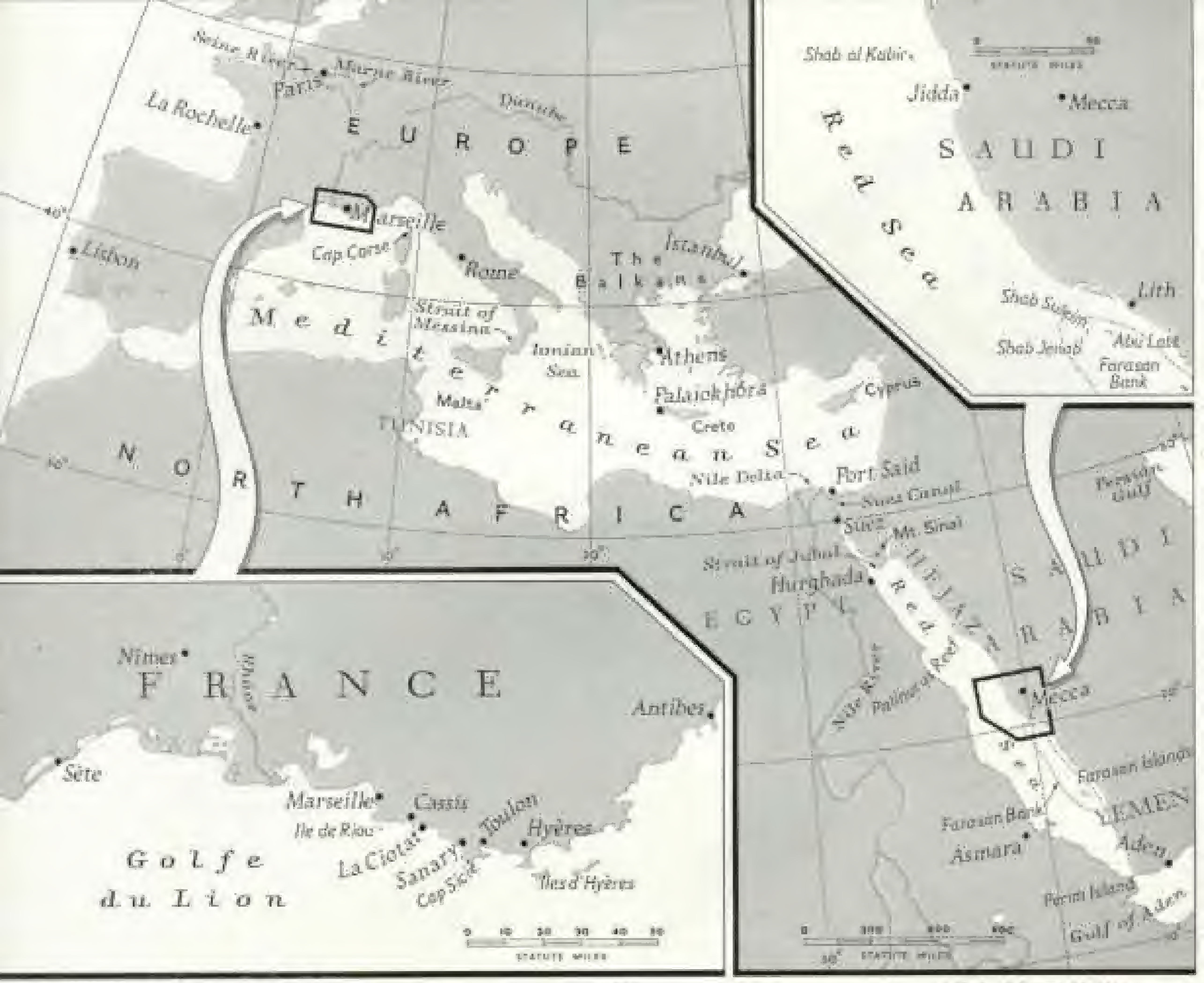
Sole tenants of the wreck were schools of fish which southern Frenchmen call *castagnoles* (sea bream).

← Octopus Performs an Underwater Rumba

Mediterranean octopus, a far cry from imagination's strangler, is actually a small, shy creature prized for its flesh (page 454).

When a diver picks up an octopus, the animal tries to escape, and, if it succeeds, it departs by jet action, using water in place of burning fuel. At the same time it emits an inky smoke screen (left). To elude pursuit, it may suddenly drop and camouflage itself against the bottom. Finally tired by chase and handling, the octopus becomes submissive to "dancing" (right).

J.-Y. Cousteau, P. Tailliez, F. Dumas


Seine River
Paris
Marne River
Danube
La Rochelle
EUROPE
Marseille
Lisbon
Cap Corse
Rome
The Balkans
Istanbul
Mediterranean Sea
Strait of Messina
Ionian Sea
Athens
Malta
TUNISIA
Palaiokhóra
Crete
Cyprus
Nile Delta
Port Said
Suez Canal
Suez
Mt. Sinai
Strait of Jubal
Hurghada
NORTH AFRICA
EGYPT
HEJAZ
Red Sea
Nile River
Palinurus Reef
SAUDI ARABIA
Persian Gulf
Mecca
Farasan Islands
YEMEN
Farasan Bank
Asmara
Aden
Perim Island
Gulf of Aden
STATUTE MILES
Shab al Kabir
Jidda
Mecca
SAUDI ARABIA
Red Sea
Lith
Shab Sulein
Shab Jenab
Abu Latt
Farasan Bank
STATUTE MILES
Nîmes
Rhône
FRANCE
Antibes
Sète
Marseille
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Ile de Riou
La Ciotat
Toulon
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Sanary
Cap Sicié
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0 10 20 30 40 50
STATUTE MILES

A National Geographic Map

***Calypso's* Divers Spied Out Underwater Wonders in Mediterranean and Red Seas**

Using their newly invented breathing devices, the Frenchmen groped among the ocean's grottoes and sunken ships off their own southern coast (lower inset). Then last winter they led a scientific expedition to study marine life in the Red Sea around Abu Latt Island, off Saudi Arabia (upper inset).

the fuel oil picked up dirt and gradually clogged the conduits and filters.

As a crowning misfortune, the transfer pump broke down. We ran on one engine at a time, and then both of them failed. A great sea heeled the ship to an angle of almost 45°.

But the *Calypso* rode it out, and, shortly afterward, Montupet managed to get one engine started.

Through the "Big Ditch" to Jidda

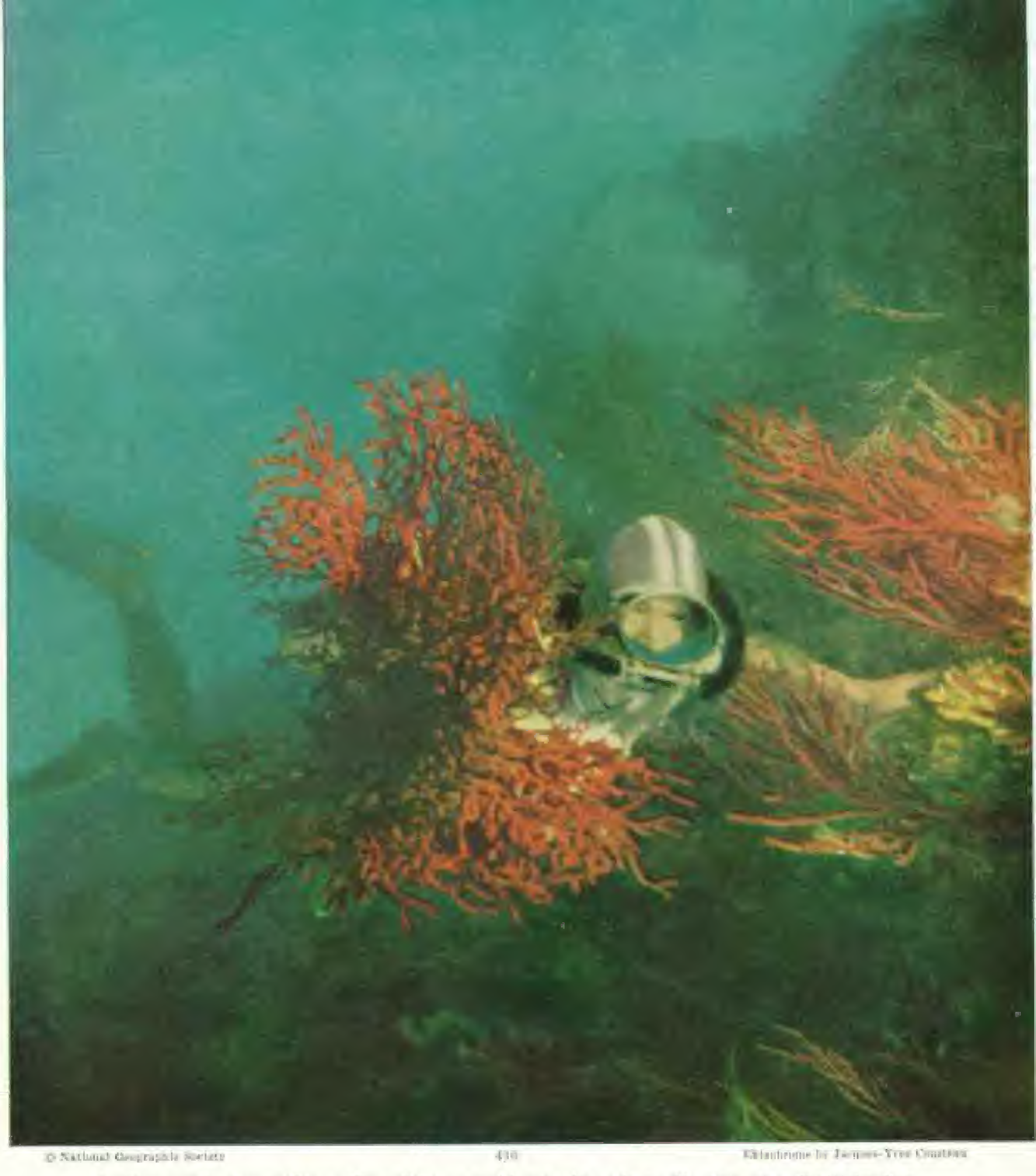
When the storm had subsided, we cast anchor in the cove of Selino Kastelli (Palaiokhóra), on the southwest coast of Crete, while Montupet worked on the filters to prevent any repetition of the engine breakdown. Careful inspection revealed no serious damage to the rest of the ship, though the cargo in the forward hold had been badly shaken up.

Once we got under way again, our echo sounder told us we were sailing over the end of the Nile Delta, which raises the sea bottom for more than 60 miles off the coast. During the night the first flying fish fell on deck. We placed it in Cherbonnier's bed as an initial specimen for his collection.

At dawn on December 5 we passed through the Strait of Jubal, with Mount Sinai, to port, a mauve patch on a rosy sky. To starboard, at Hurghada, behind serried ranks of coral reefs, lay the important Marine Biological Station of the University of Egypt. Leaving it in our wake, we made the Arabian coast near Palinurus Reef and steamed along it toward Jidda, which was to serve as our supply base (page 455).

Taking a fresh supply of food and water aboard, we weighed anchor at night, timing our course to reach the first reefs at daybreak. I was in the crow's-nest before dawn, scanning the southeast. Far away I saw a long white line: the breakers of Shab Jenab, among the first of the coral barriers of the Farasan Bank. This bank skirts the coast of Hejaz and Yemen for more than 300 miles.

As we edged cautiously past these treacherous barricades, we encountered everywhere



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Ektachrome by Jacques-Yves Cousteau

A Man-made Lung Gives This Diver an Hour's Permit to Explore the Twilight Sea

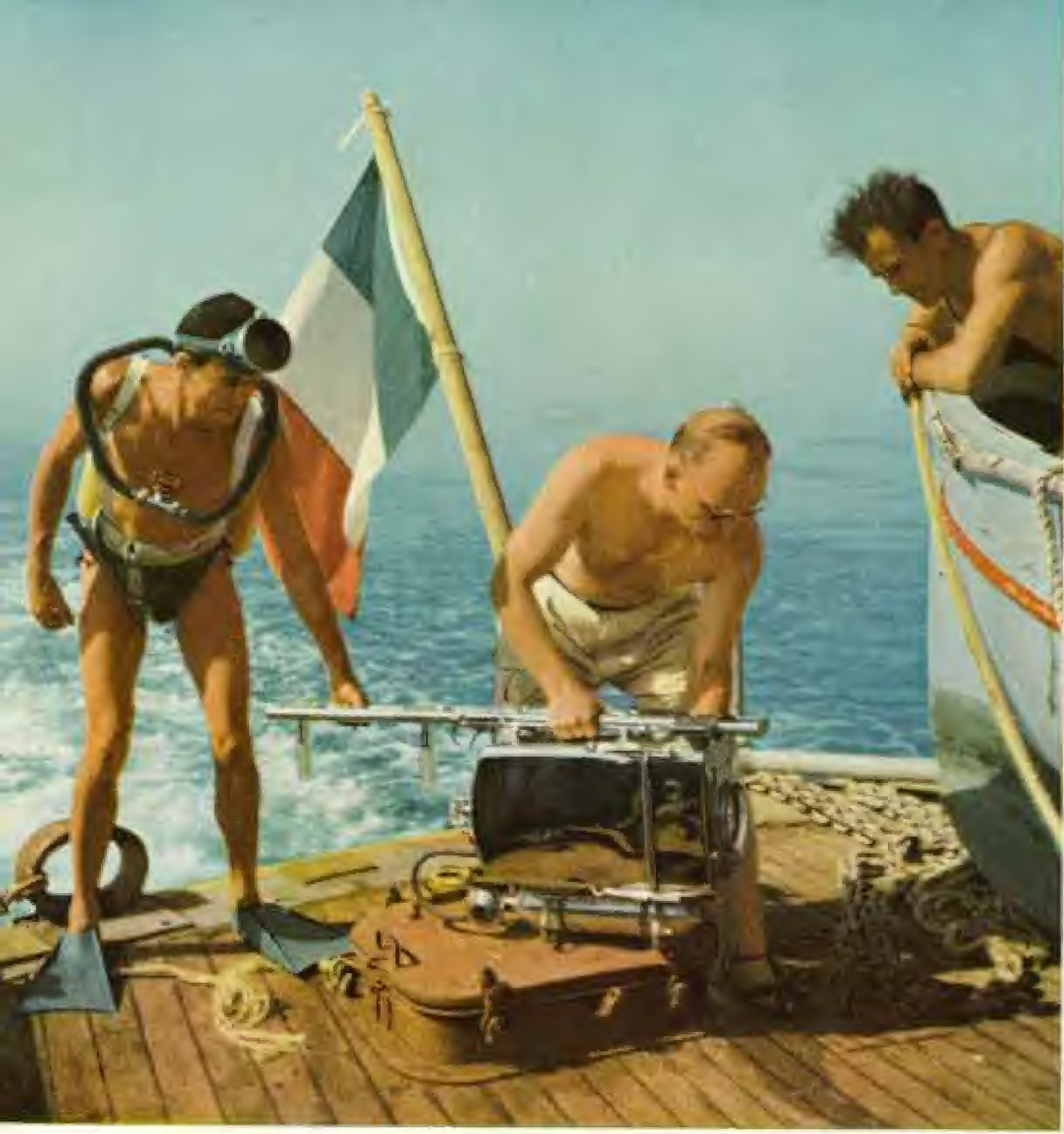
At 132 feet below the surface, atmospheric pressure on the body is 73.5 pounds to a square inch—five times as much as at sea level. But to diver Frédéric Dumas, skimming past coral branches in his Aqualung, pressure is no problem.

From the tanks strapped to his back, compressed air flows by tube to his rubber mouthpiece. Inhaled, it raises pressure within his body to that of the surrounding sea. Result: he feels no more discomfort than a fish in water or a man on the beach.

Dumas served as chief diver and deputy commander of a 1952 oceanographic expedition through the Mediterranean and Red Seas. Capt. Jacques-Yves Cousteau, French naval officer and co-inventor with Emile Gagnan of the Aqualung, headed the project.

Use of the Aqualung permitted Cousteau and his men to study at leisure the life of reef and grotto down to some 200 feet. It also made possible for the first time the photographing of that life in the true colors of the deep. Flashlights of intense brilliancy illuminated the twilight zone, and specially housed cameras recorded a vivid pigmentation never seen before even by the resident fish.

Dumas, here exploring a reef half a mile off France's La Ciotat, gathers an armload of giant gorgonians (corals) for examination. Their strong pigmentation, dimmed at this depth, will stain his hands bright red. Foam-rubber diving dress insulates him from cold water.



Deep-sea Camera Is Built to "Breathe" by Aqualung

With built-in air ballast to give it buoyancy, and with a baby Aqualung attached to prevent its leaking and collapsing under pressure, the Bathygraf 35-mm. movie camera can function at any depth. A diver holds it ahead of him by pistol grips, which he revolves to change aperture and focus.

Joint inventors of this apparatus are M. Girardot (in sunglasses, left), and Captain Cousteau (right), adjusting his pressurized Rolleiflex.

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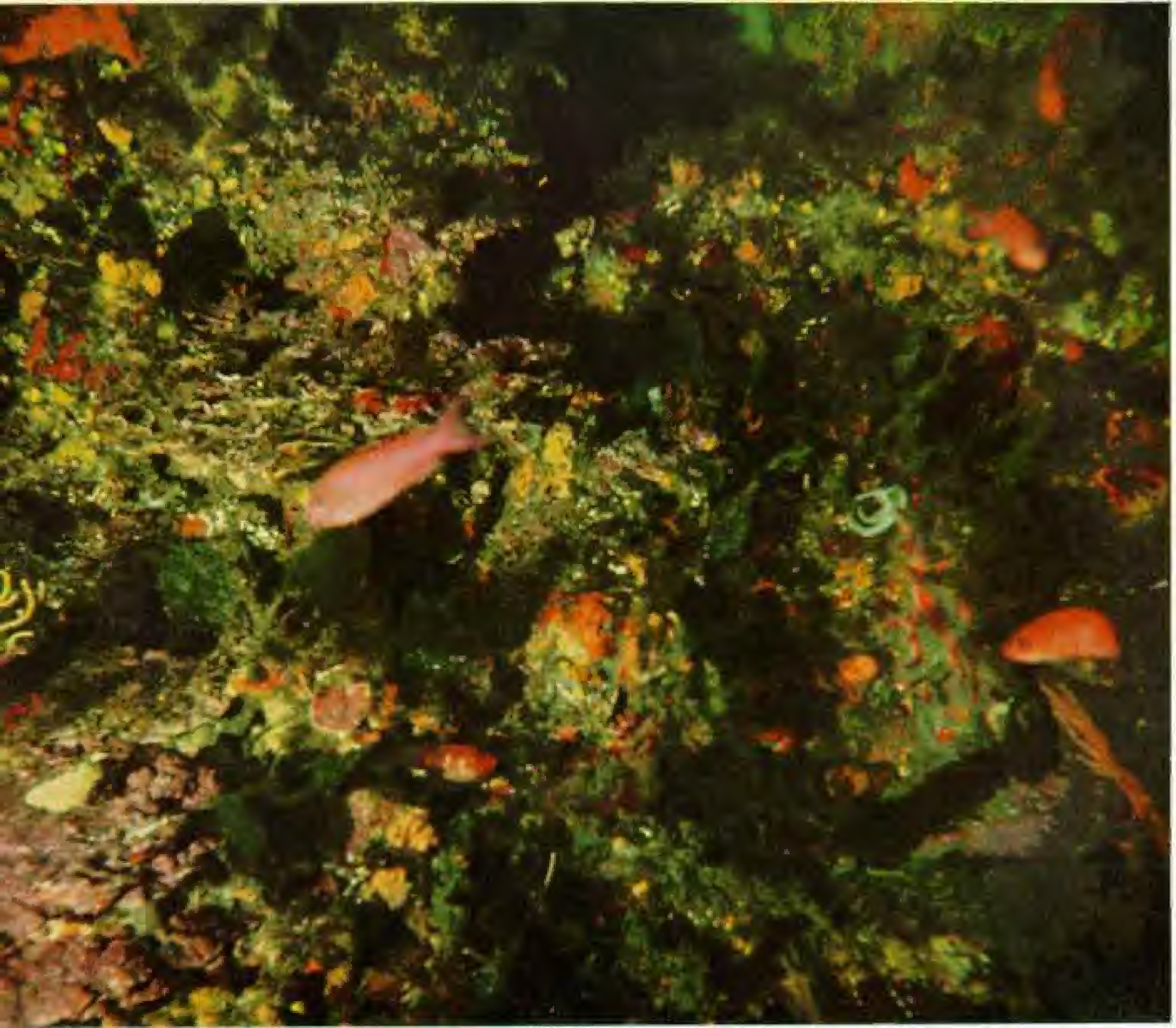


Rosy Damsels Swim Past a Sea Wall Dense with Marine Life

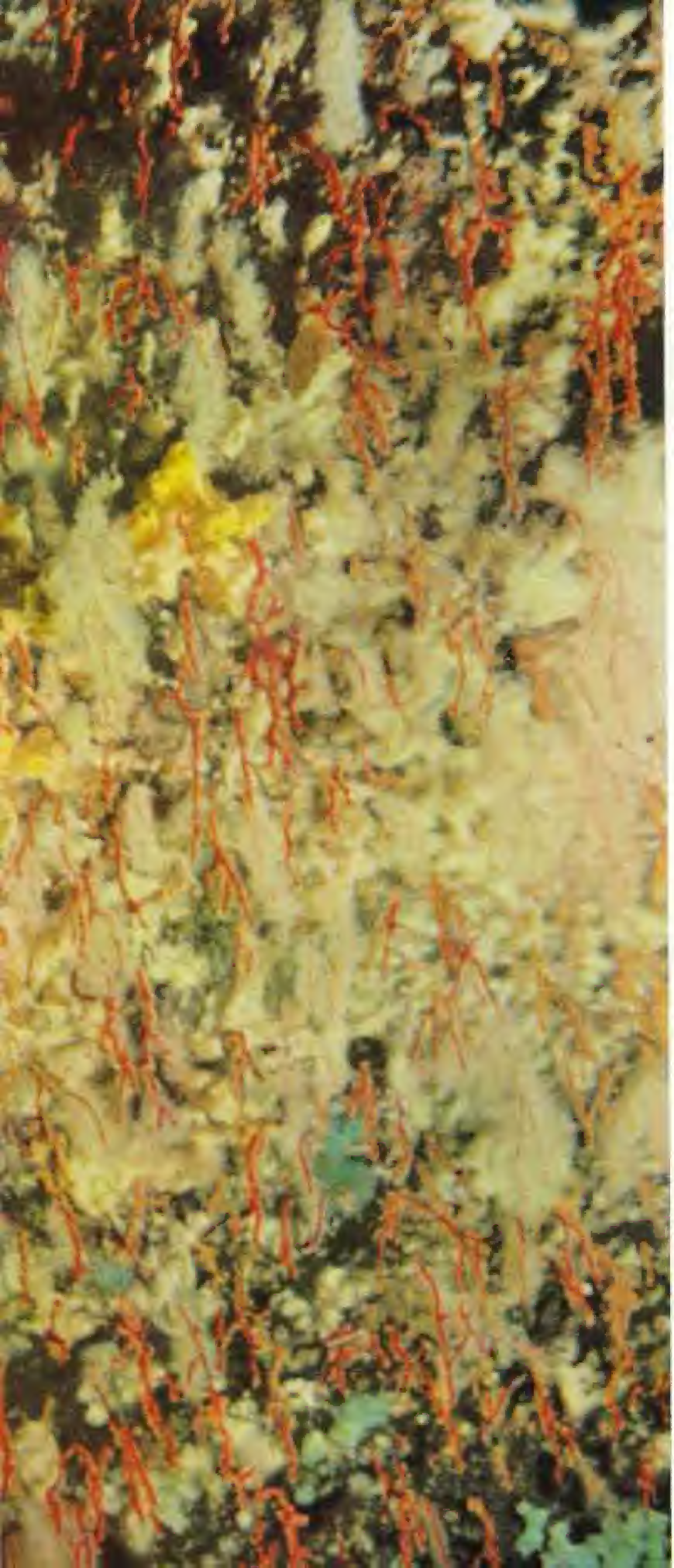
Explosives detonated in the crevices of this Mediterranean cliff, 130 feet below Cap Sicié, revealed a biological blanket of living and dead organic matter more than six feet thick. Little damselfish, brightly hued at this depth, are cousins to the drab variety found near the surface.

Groping in sunless waters, neither men nor fish had ever witnessed the brilliancy of this scene until the French expedition turned on its flashlights.

To make photographs in the dense twilight sea, with its quintillions of suspended particles and microscopic organisms, only the most powerful flash bulbs sufficed. Cousteau's men used the "slow peak" type. Though each bulb gave off more than 400,000 candle power, it could light up only a 5-foot radius. With an 8-bulb simultaneous flash, the camera's color range was extended to a scant 12 feet.

These lemon-sized bulbs could resist pressure down to 300 feet, but water seeped into their sockets. Varnishes proved useless as insulation; shoemaker's wax worked but gummed up hands, feet, the reflectors, the deck, and even the ship's dachshund (page 463). Finally Cousteau designed several watertight reflectors to house the bulbs and attached miniature Aqualungs to equalize pressures so that housings would not collapse.

Ektachromes by Jacques Ertaud and Jacques-Yves Cousteau



Downy Coral Blossoms Hang from Grotto's Wall Like Christmas Tinsel

On this 60-square-foot sea wall, about 70 feet below Cassis in the Mediterranean, grow strands of *Corallium rubrum*—jeweler's red coral. Less fully developed than the ruddy coral branches of lower depths, these twiglike forms appear only in dimly lit waters of Mediterranean and Japanese seas. Downy bluish-white "caterpillars" are open coral "blossoms." Disturbed, these "flowers of the sea" retreat, leaving bare red branches. Small yellow sponges stud the cliff.

Scientists and divers believed until very recently that marine life was most vividly colored near the surface, and that pigmentation grew more pallid with depth. Then, in 1948, Captain Cousteau and his companions dived by Aqualung down to a Roman galley sunk in 130 feet of water off Tunisia.

From its deck he brought up three marble columns—part of Sulla's Grecian loot. Daylight appeared to illuminate them well enough on the bottom, where they seemed dull gray and green. But Cousteau was astounded to find that at the surface their biological encrustation glowed with violent reds and oranges.

Determined to overcome this capacity of deep-sea water to screen out the more brilliant colors, Cousteau rigged up a floodlight projector and took it below. There, with an underwater camera, he captured on film hues hitherto completely unsuspected.

In the years following this discovery, Cousteau and the French Navy's Undersea Research Group, headed by Commandant René Chauvin, strove to perfect their photographic process. Typical of their troubles was the experience with an imploding reflector (imploding: the opposite of exploding). When a diver took it to 60 feet but failed to turn on its pressurizing valve, the box's thick glass plate suddenly shattered.

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Ektachrome by Jacques-Yves Cousteau

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Color Flashes in a Cave Left in Darkness Since the Sea Was Formed

Captain Cousteau held the camera for this photograph of a Mediterranean grotto 45 feet below Sanary. Groping forward, Jacques Ertaud detonated the flash bulb, then swam back muttering, "I think it was red." Aqualung divers several hundred yards apart communicate by hooting into their mouthpieces. Close up, they convey simple phrases by careful enunciation and tones produced deep in their throats. These rocks are daubed with more delicate shades than an artist's palette. They are coated largely with algae and flat sponges.

A Nazi Torpedo Sank This Greek Vessel

Struck off the Mediterranean island of Porquerolles in 1944, the S. S. *Donator* lies in 150 feet of calm, dim water.

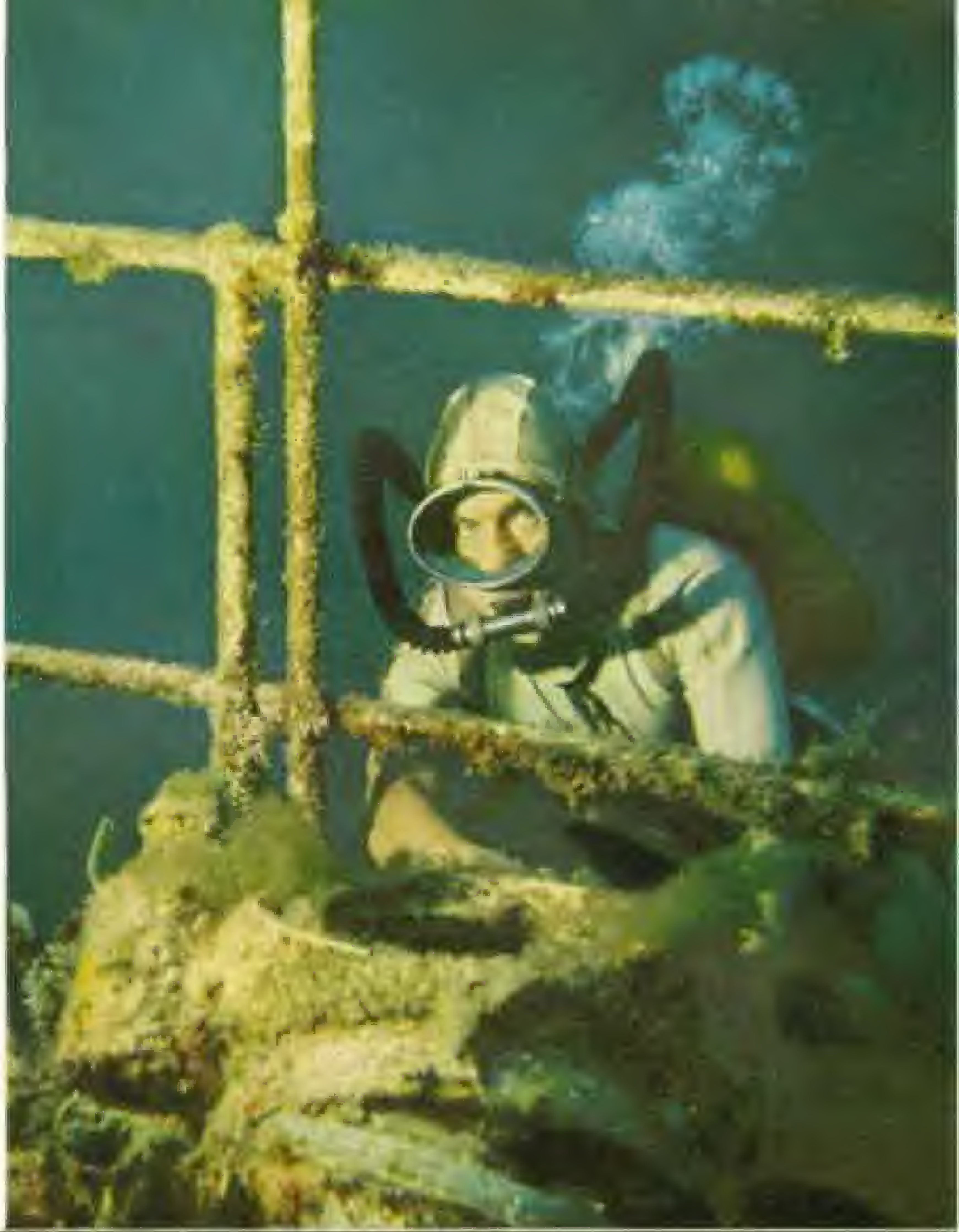
The French Navy's Undersea Research Group located the wreck by echo sounding, then sent four Aqualung divers below. They found deck and holds loaded with empty barrels; the crew had vanished without trace.

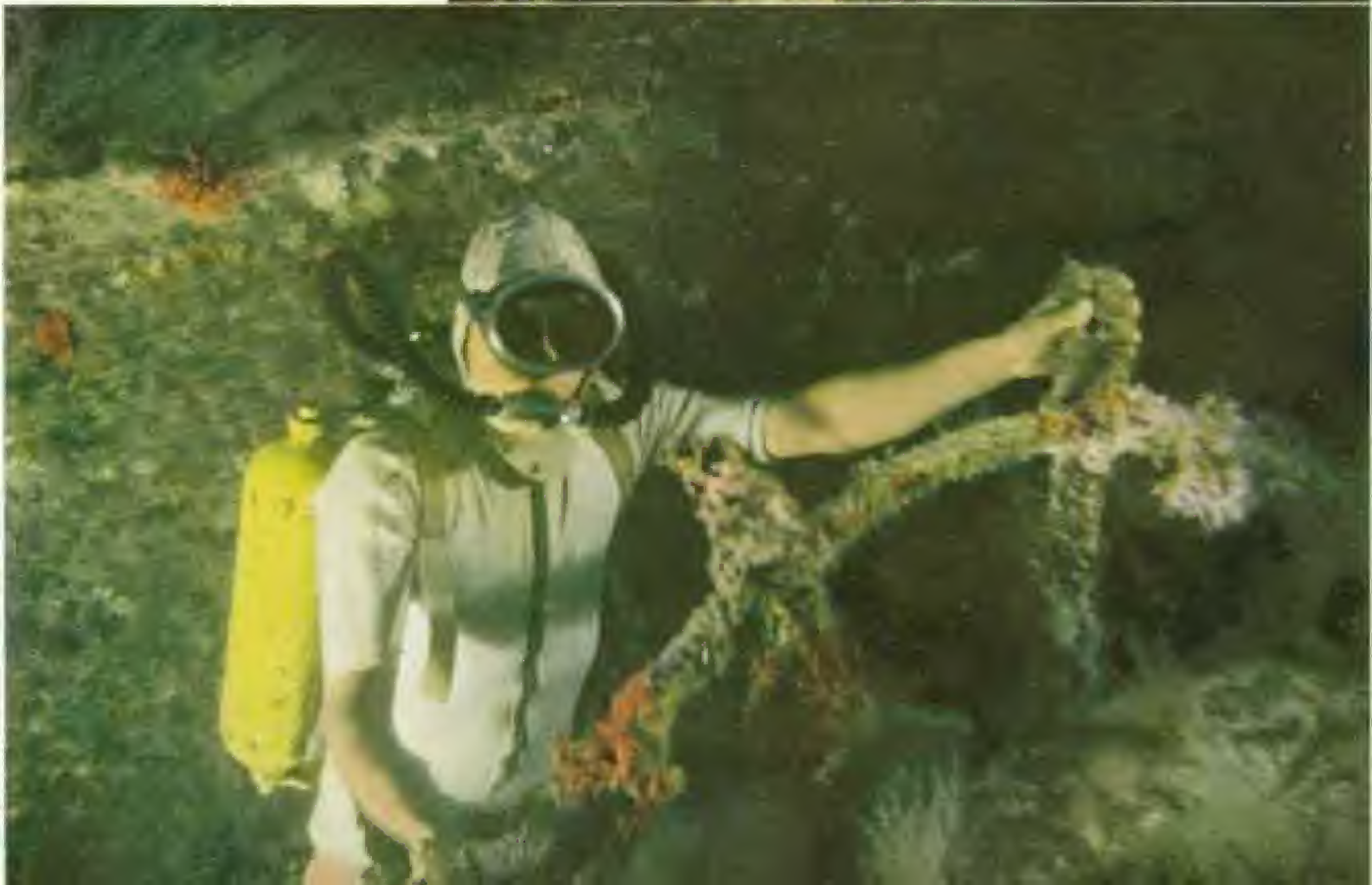
Diver Piovano found the compass (right) still working, but the ship's wheel stuck fast. He wears the Aqualunger's "midseason" tunic of ¼-inch foam rubber, designed by Frédéric Dumas.

"Piovano's eyes," says Captain Cousteau, "have the intense, popeyed stare I have noticed in all divers at depths below 150 feet."

Known date of the *Donator's* plunge gave Cousteau a valuable check on the growth rate of bryozoans, the marine animals encrusting rails, wheel, and compass.

Ektachromes by Jacques-Yves Cousteau





A Flippered Visitor in Spider Crab's Cave

Dumas found many intricate galleries leading back into the sea wall from this 100-foot-deep cavern. Vaults of the grotto trap his exhaled air bubbles. Yellow sponges hang from the rocks.

Such grottoes usually house big sea bass or groupers. Dumas's Maja crab (below) probably paused here on his yearly spring trek from the depths up to the Mediterranean's shallow spawning grounds.

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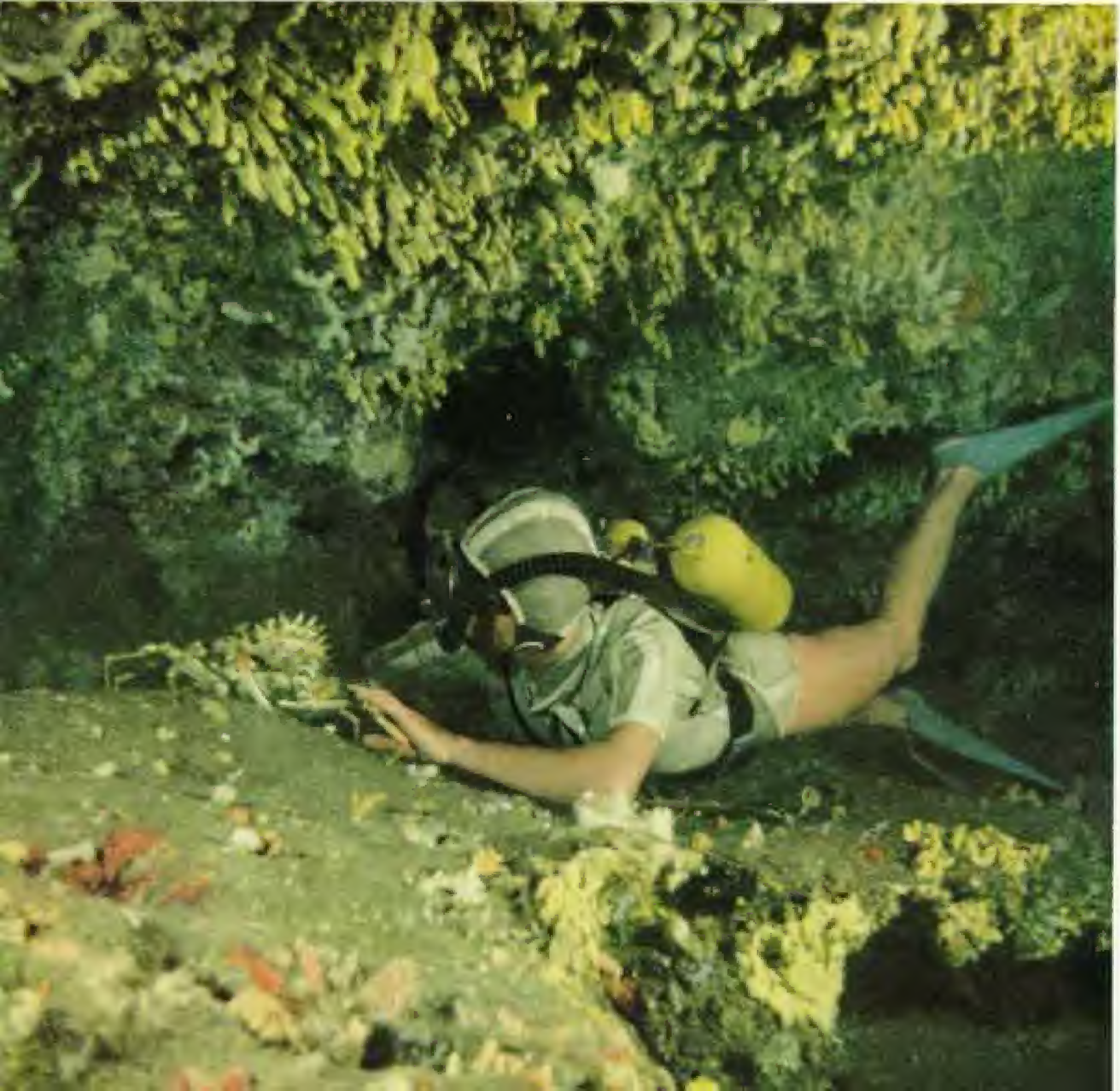
Ektachromes by Jacques-Yves Cousteau



the curious spoor of the countless ships cruising beyond our horizon: burnt-out electric-light bulbs. By the dozens, they shone on the sand and danced on the breakers. Out of all the myriad objects thrown overboard every day by sailors of all nations from Perim to Suez, only these fragile globes of glass seemed to have survived, floated over the jagged coral, and established their scintillating beachhead.

Faintly at first and then more definitely, a long dark silhouette defined itself on the starboard bow—the island of Abu Latt, objective of our voyage (pages 457, 460). An old, uplifted reef, Abu Latt is made entirely of fossil coral; even the sand on the beaches is a mixture of shells and pulverized coral. It boasts not a rock or a stone, but only an immense field of jagged coral in stem form, as pleasant to walk on as an overturned harrow. Around the island, a barrier of water-line reefs creates a kind of shallow lagoon. Beyond them stretches the saltiest "open" sea in the world—and the hottest after the Persian Gulf.

On this island, eight members of our expedition were to live and work for the next 38 days. Along a small bay on the eastern coast, easily accessible to the *Calypso's* small boats, they pitched their tents. The radio operator put up his aerial. Under Dupas's debonair direction, ten tons of food, equipment, and other supplies were ferried ashore in our shallow-draft aluminum barge and stacked. Gradually a small orange-and-gray village took shape. Its population: Drach, Cherbonnier, Mercier, Callame, Zang, Tazieff, Nesteroff, and myself.

Diving Begins Without Aqualungs

Once established, we set about our submarine exploration. As a preface, Prof. Pierre Drach gathered the divers around him and delivered a lecture on practical underwater work, stressing the differences between the principal species of madrepores, alcyonarians, ascidians, and calcareous algae.

Drach himself, a burglar's jimmy in hand, was to tackle the fixed fauna below. Dupas and Nesteroff were to contribute their skill as hunters, stalking and harpooning the bigger fish. Dumas was to conduct his own unconventional harvests by detonating TNT cartridges and then diving to scoop up everything that failed to float to the surface.

For the first two weeks we were forced to dive without Aqualungs; our brand-new air compressors resisted every effort to make them function. But the waters proved so rich in specimens that the dinghy, the raft, and the barge were soon brimful of samples destined for the large sorting table on the beach.

There Mercier and Cherbonnier selected, classified, and preserved everything of interest (page 461). Callame and chemist Jacqueline Zang, meanwhile, painstakingly collected samples of water from different depths and quadrants and noted their temperature, acidity, and proportion of oxygen, nitrate, and phosphate.

At long last, Montupet discovered what had gone wrong with the compressors: the diameter of the exhaust pipes was too small. To allow them more scope, he and his men promptly hacked a hole through the deck, and on January 3 the first 50-horsepower Junkers cut loose with a roar. Slightly deafened, but elated, we celebrated with champagne our imminent return to deep diving.

Rapture and Sudden Death

With our Aqualungs we were now able to descend to 200 or 300 feet. Actually, experience showed that our best operating level lay no lower than 210. To go farther exposes a diver, not merely to increased pressure (with its subsequent problems of decompression on the way up), but to a phenomenon known as "the rapture of the depths."

The chief symptom of this phenomenon is, to put it bluntly, the sensation of becoming as drunk as a hoot owl. With some divers this intoxication begins to occur as early as 120 feet down; with others, not until 180 or 200. Mild elation grows into ecstasy; danger reactions tend to fade. Below 330 feet the Aqualunger may pass out, lose his mouthpiece, and drown.

Just such a fate overtook our diving companion, Maurice Fargues, during one of the experimental deep dives made by members of the Undersea Research Group. In 1947, Dumas, on a routine dive to discover what had fouled the drag cable of a French mine sweeper, had set the record at 306.9 feet. A few weeks later Fargues plunged down beside a rope hung with slates, wrote his name on one 397 feet down, tried to go farther, lost consciousness, and drowned. He had swum, free of any connection with the surface, deeper than any man before or since, had undeniably attested his claim, but, tragically, had not lived to wear his laurels.

Physiologists believe that this narcosis resembles in many respects a gradual anesthesia. As the diver descends, his tanks feed air into his lungs and blood stream at greater and greater pressures. The blackout which sometimes follows is believed by some to be caused by increased absorption of nitrogen—four-fifths of all air—into body tissues under pressure. The process was thus originally named "nitrogen narcosis."

More recent study by our group, however, has convinced us that the "rapture" is due also, at least partly, to excess carbon dioxide.

This gas, normally exhaled with every breath, is not properly discharged from the lungs under high pressure.

By constant diving under careful supervision our Undersea Research Group had built up since 1945 a considerable backlog of experience with the dangers of penetrating the "zone of rapture." Each of us knew what to expect, what impulses must be fought, what emergency procedures should be followed through sternly ingrained habit. Yet Fargues's fatal error kept us aware of the limitations of even the best training.

Narcosis was not our only danger. If we should dive deeply, stay too long, and ascend too rapidly, we would invite an attack of the bends, or caisson disease, which can be not only painful but even crippling or fatal.

Brooklyn Sand Hogs Named the Bends

It's an odd ailment with an odd history. Sand hogs building the great piers of the Brooklyn Bridge worked in underwater caissons subject to considerable pressure. Ignorant of the physiological strain they were imposing on their bodies, they would emerge from the caissons at the end of the work shift and double up with terrible pains in their joints. Fashionable women in that period affected a drooping posture known as the "Grecian bend." With a wry, self-deprecating humor, the sand hogs began to refer to themselves as suffering from the "bends."

Their trouble was roughly identical with that of any diver using compressed air. Their blood stream had absorbed a large volume of nitrogen under pressure. As they left one pressure zone for a much lighter one, the nitrogen left solution and coursed through the body's circulatory system in a froth of bubbles, like an opened champagne bottle, exerting an excruciating pressure against the nerves. This pressure hurt worst at the joints, because there, in the high fat content of the marrow tissues, it had been most easily absorbed and most intensely concentrated.

It used to be thought that, if a diver came up from a given depth at a uniform rate, he would escape the bends. Now we know that he can swim upward at any speed so long as he halts at certain levels for a certain number of minutes, depending on how long he has been below and how often. This is called "stage decompression."

Tables that tell how long a diver must halt at each stage have been exhaustively worked out by the British Admiralty, and more recently by the United States Navy, for any single dive. A major contribution of our Undersea Research Group, the personal work of Lt. Jean Alinat, was the construction of graphs, based on incessant experiments, which make those calculations for repeated dives by the same person within a limited period of time. It's a different, more complex problem, since the body's nitrogen tolerance varies intricately with the duration and intensity of its exposure to pressure.

We found, for example, that on the day's first dive to 100 feet, an Aqualunger remaining there for 35 minutes should halt on the way up at 10 feet for four minutes. On a second dive to this depth, however, made after an hour's rest, he should pause for 16 minutes at 20 feet and 16 minutes at 10.

Such figures presuppose the use of the three-cylinder model of Aqualung and its pressurization to 3,000 pounds, a level considered safe abroad. Federal regulations in the United States forbid the raising of air-cylinder pressures to more than 2,000 pounds; so the American manufacturer of Aqualungs has compensated by increasing the tanks' volume.

Whether tanks inflated to American or to European limits are used, one truth is abundantly evident: the Aqualung provides no absolute guarantee of immunity below. Properly and discreetly used by well-trained and well-supervised personnel, however, the Aqualung can make diving into the "middle depths" a rewarding experience.

We had all these facts well in mind when we made ready for our first dives by Aqualung down to the Red Sea's coral kingdoms. But one other menace remained to give us food for thought: sharks.

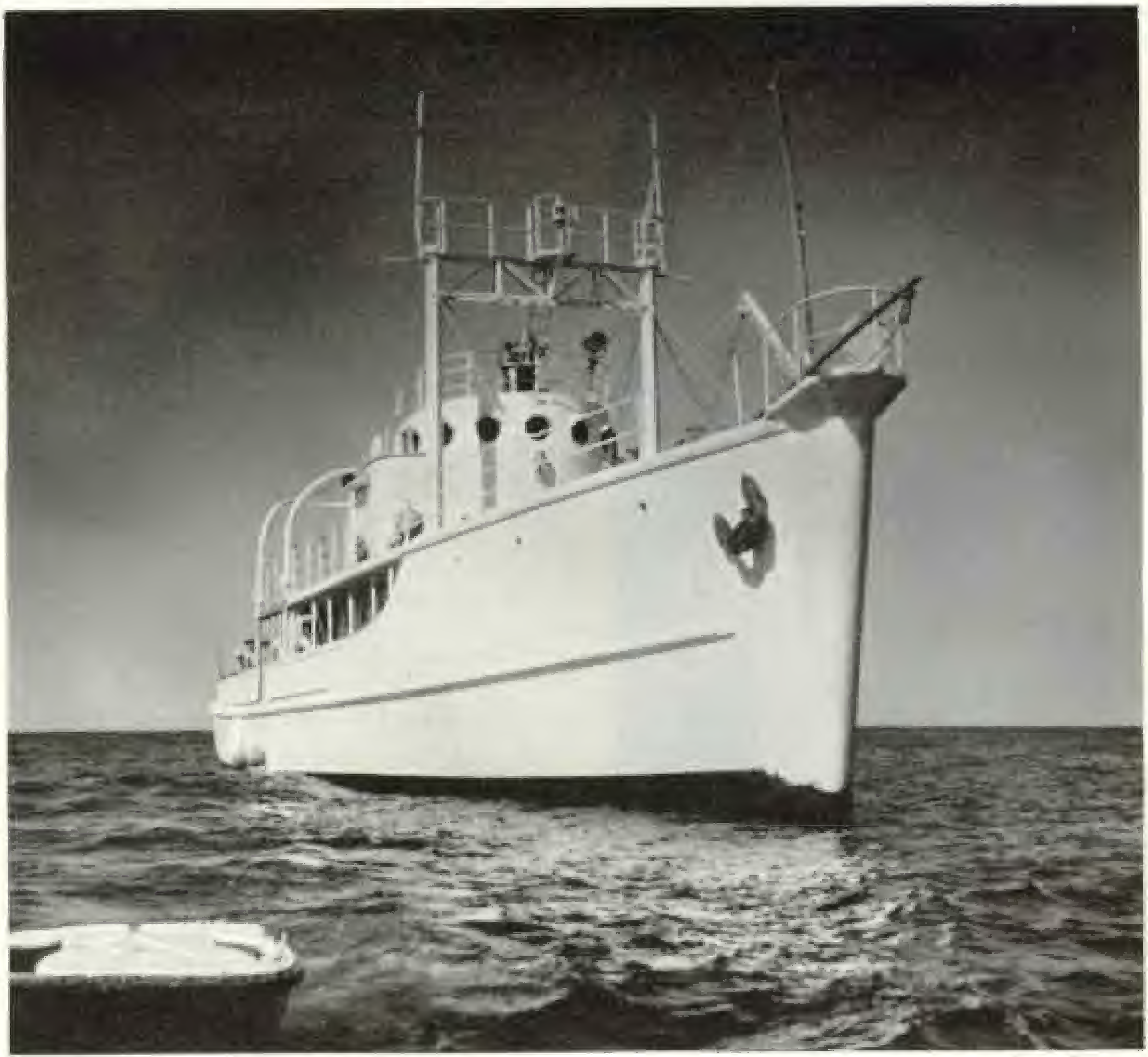
A fortnight before, while our compressors were still out of action, Nesteroff, the doctor, Drach, and I had dived from our barge, clad only in goggles, trunks, and flippers. Suddenly a 5-foot shark caught sight of us from about 30 yards. After a second's hesitation he rushed toward me at terrific speed.

Why me? I was sincerely convinced that I offered the least appetizing target among the four of us. But I could not pause to debate the question. I was absolutely defenseless, and, even if I had had a weapon, the suddenness of the attack would not have given me time to use it.

What the Shark Taught Me

Fortunately, when he was only three feet away, the shark slued around at 20 to 30 knots and shot off into the distance. I did not wait for him to make a second pass. I retreated to the barge.

There I pondered the way in which he had upset, not only our peace of mind, but some of our preconceptions about sharks. First, this fish had seen us from as far away as we had seen him. His eyesight, or some other sense, must have been very keen to permit him to find my position instantly. Second,



Jacques Ertaud

Calypso in War Swept the Seas for Mines; in Peace She Explores the Depths for Science

To provide a floating laboratory, workshop, and diving platform for the expedition's geologists, biologists, physicists, and photographers, Captain Cousteau remodeled this American war-surplus vessel. Sonar equipment, an interior diving well, and an aluminum bridge made *Calypso* an odd but utilitarian vessel. A tubular section attached to the bow contains a ladder leading to a bulging underwater chamber with five observation portholes (page 431). There an observer can stretch out and scan the nether sea; and, synchronized with a stroboscopic light reflector, an automatic camera can record at 30-second intervals a history of the day's run.

he had attacked deliberately, at great speed, though we had expected sharks, in these coastal waters, to be very cautious. Third, he had veered away sharply and rapidly at a moment when I was making a frantic and probably futile effort to get out of his line of attack. In brief, he could hardly be said to have maneuvered poorly, as we had often been told.

This little incident, abortive though it was, made a strong impression on all of us. Nor did the sharks allow the impression to fade. In the ensuing two weeks, still bereft of our Aqualungs and confined to fairly shallow water, we encountered them constantly. Some ran away; some passed by, unconcerned; others prowled around us, nosed at us, grew most insistent.

These we simply couldn't get rid of. Sudden gestures would drive them away for a moment, but they came back almost at once. If we turned our backs to them, they would swoop at our legs. If we faced them and swam in their direction, an approved technique, they would go away for a moment, only to return. We decided that the important thing was to gain time and at the first opportunity to get out of the water.

J.-Y. Cousteau

A Reflector Goes Down to Light Deep Water's Dusky Studio

Knob at casing's center permits the photographer to set controls for the firing of a single flash bulb or a multiple detonation.

In short, when at last we had regained our Aqualungs and were prepared to christen them in the deep waters off Abu Latt, we had become saddled with something of an inferiority complex.

Dumas, Ertaud, and I were the first to go. Skimming through the shallows, we approached the reef wall and its "balcony" overhanging the blue abyss. Dead ahead we saw several sharks, one of them 10 feet long.

Cautiously we descended, keeping our backs to the cliff and holding in front of us our camera and special reflectors (pages 435, 465, and 472). Deeper and deeper we went, and yet more awesome became the sharks' merry-go-round as they approached, fixed us with their stern eyes, went away, returned.

Are Sharks Cowards?

From 160 feet down we looked up and saw their long, dark profiles silhouetted against the shining surface. Below us we could see other sharks wandering over a shoal of sand. Seeing my companions swimming among these wild beasts, naked, and far from the safety of the upper world, I could only conclude that we were mad.

Yet already we were getting used to their whirling attendance. Dumas, in fact, soon lost himself in inspection of the sea wall while a big shark, 13 feet long, swam slowly toward his legs.

I could not restrain myself; the sight of that man calmly examining a small opening in the cliff, while an enormous *Carcharinus* sniffed at his ankles, unnerved me. I hooted through my mouthpiece as loudly as I could. Dumas gave no sign of hearing. Finally the great shark, majestic as an ocean liner, turned and slid away.

It occurred to me then, and our later experience seemed to confirm it, that we were actually safer at this great depth than nearer the surface. The shark which had made a pass at me the first day, I decided, had probably assumed I was just some helpless animal which could be eaten without a fight. Down here at this level, however, we probably looked like strange bubble-blowing fish with two tails, worth investigating but not quite safe to charge.

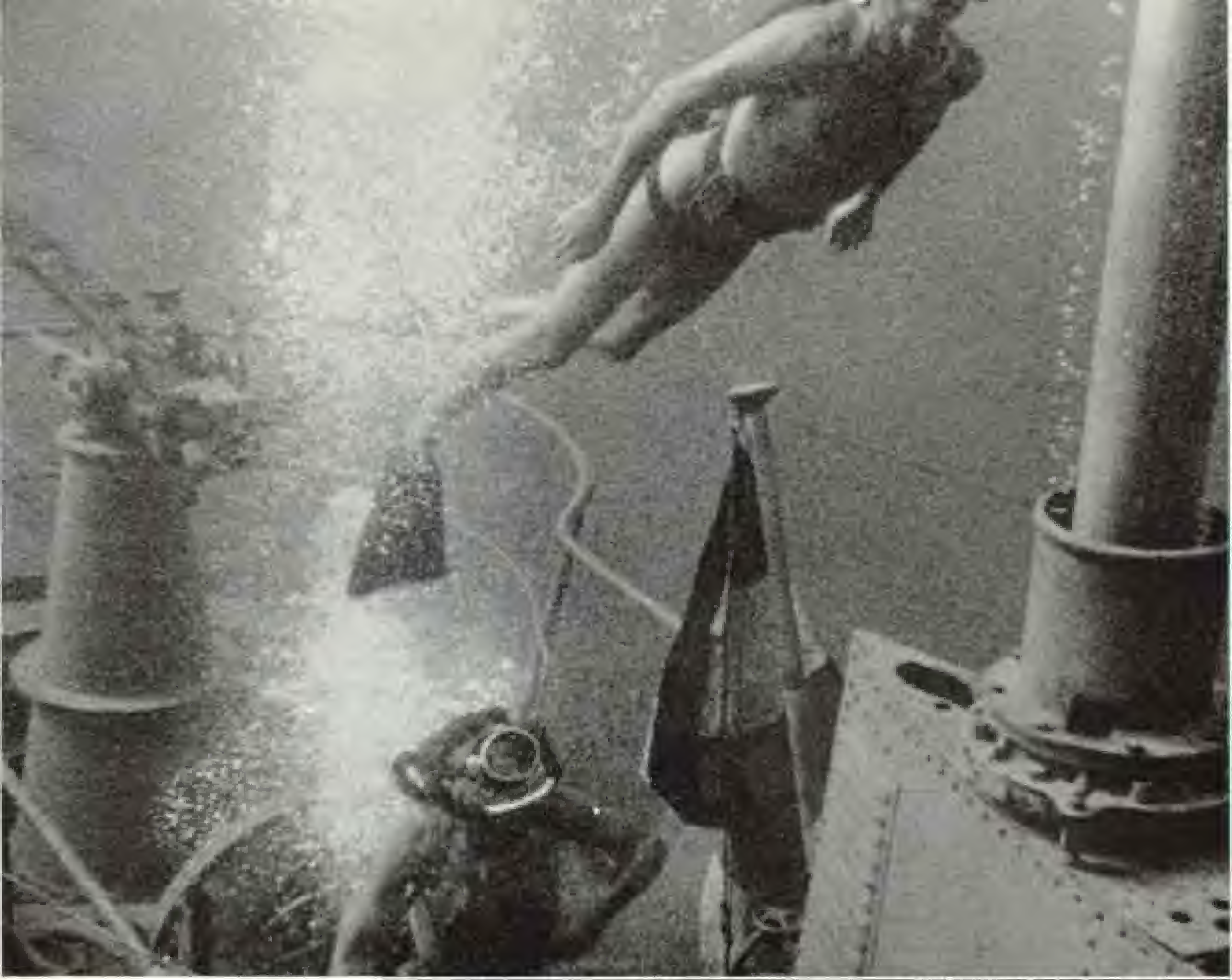
Cowed by a Triggerfish

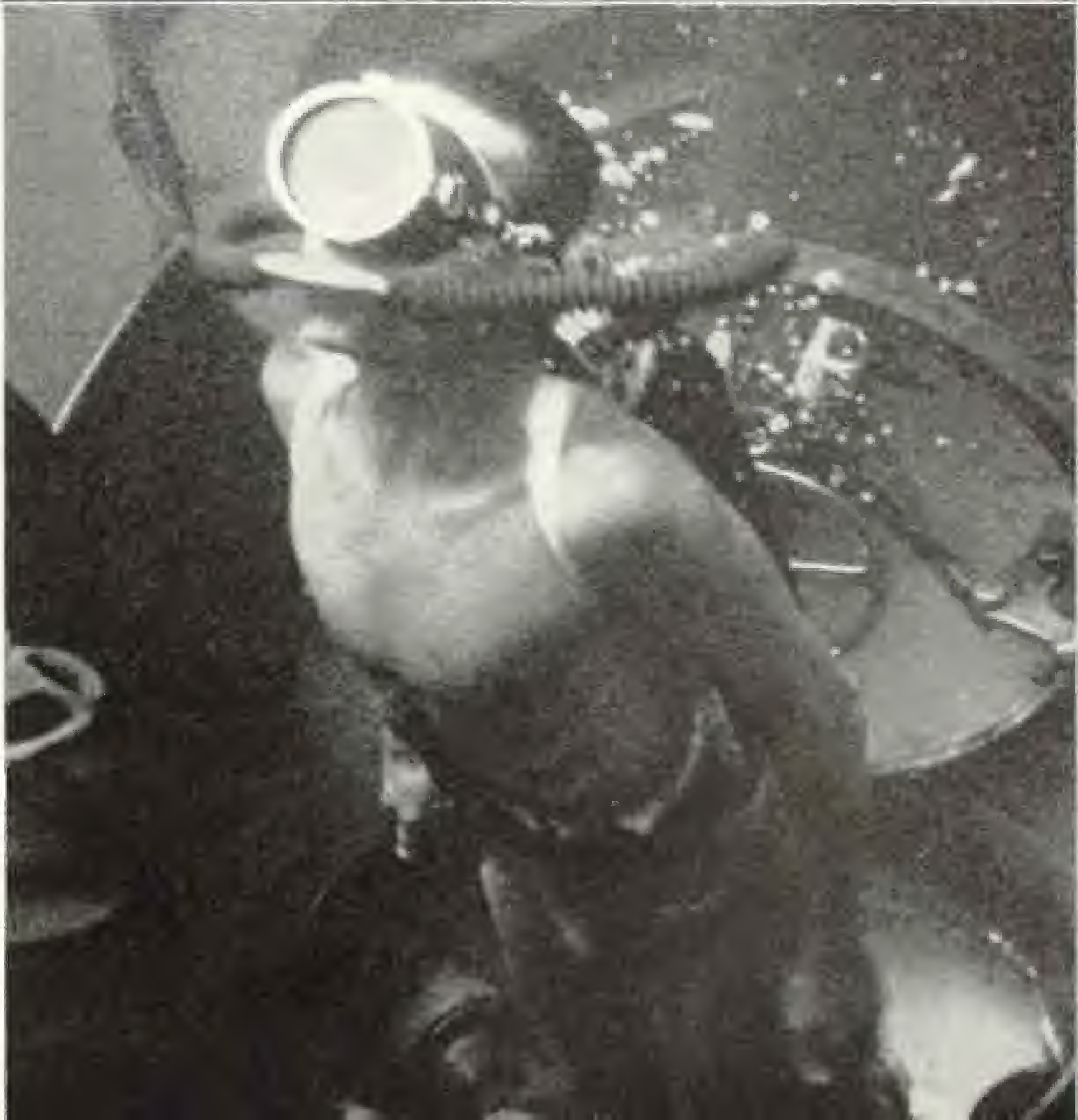
One other thing made me think I was right. We had found that, when we exploded a cartridge under water, we had to corral our dead specimens at once or the sharks would arrive and eat them under our eyes. Yet, alive, those same fishes would swim without fear among sharks. One day, in fact, Beltran and Dumas had seen a triggerfish, an inoffensive little four-pounder, amuse himself by rushing at a shark and chasing him away.

It is one thing, of course, to become intellectually persuaded that a 10-foot shark means no harm, and another to convince one's nerves. Yet familiarity did begin to breed in us a certain healthy contempt for these thugs of the deep, and we turned our attention to other things.

There was much to see and much to be seen by. Giant hump-headed parrotfish, powerful jacks, shoals of blue bonitos and silver sardines, all flocked to have a look at us, lingered for a moment, then with a shrug of their fins flitted away. Great jellyfish floated by, not always fast enough. One of them was attacked and eaten right in front of us by a group of large brown-velvet fishes.

Some of the coral blocks we skimmed past looked like the skulls of dwarfs; others, of giants. Ocher and magenta tufts alternated with clumps of coral that resembled mauve petrified heather. Red organ-pipe coral (*Tubipora*) clung to the sea wall like beehives. Graceful parasols of *Acropora* coral spread their filigrees as if to shelter their tenants, big red-and-gold and spotted-brown fishes.



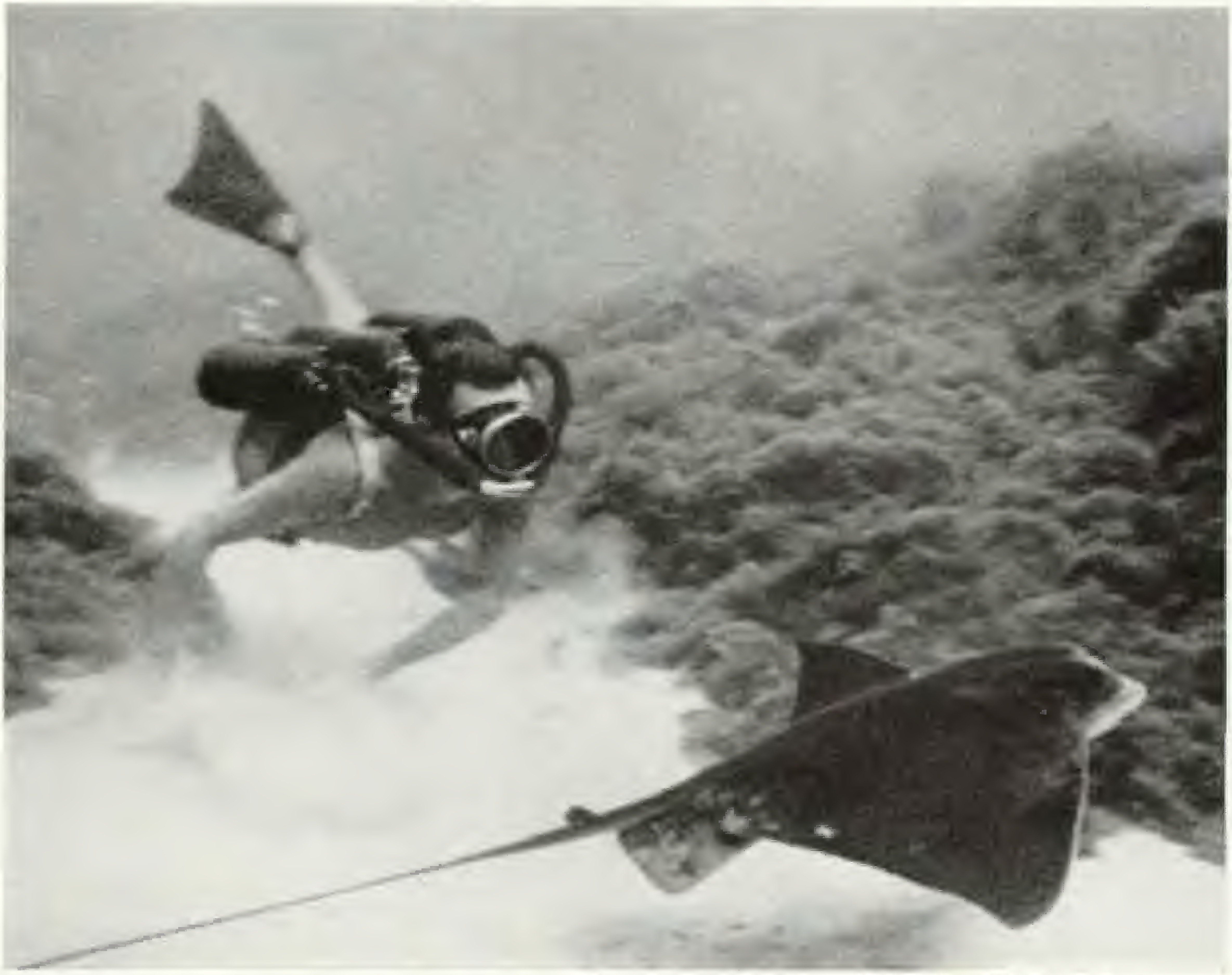


Divers Pop Like Corks from a Sub's Hatch 120 Feet Deep

To test the Aqualung's advantages, Frédéric Dumas and a companion ran trials from the French submarine *Rubis*. Clad in lungs and flippers, they squeezed into the sub's tiny air lock and waited until the inner hatch was clamped shut. Sea water flooded their coffinlike compartment, creeping up with icy fingers until it filled the air lock. Now they breathed air compressed to the pressure of almost five atmospheres. When the outside hatch opened, the two divers shot up in a cloud of bubbles. Their escape was the first made from a submarine by Aqualung.

Later Captain Cousteau, taking a position under the *Rubis*, her hull silhouetted against the sky, made motion pictures of torpedoes issuing from her tubes amid clouds of bubbles.

J.-Y. Cousteau,
P. Tailliez, F. Dumas



J.-Y. Cousteau, P. Tailliez, F. Dumas

"Don't Tread on Me." Sting Ray Says It with Barbed, Whiplike Tail

Diver Dumas handled dozens of rays, but they could never sting him so long as he held the harmless end of the long tail. Here, 140 feet down in the Mediterranean, Dumas moves to grasp the ray's venomous, flailing weapon. If he fails to hold fast, the saw-tooth projection near base of the tail can give him a nasty cut.

On the bottom crawled big sea snails. Giant clams, jammed into crevices in the rock, held their shells half open and spread their gaily colored mantles. Around each coral head drifted a cloud of little gray, purple, and black coral fishes; as we approached, they would vanish, swallowed up by the coral's many openings. So confident were they of their hide-outs that they would remain in the coral even after we had broken off chunks of it and taken it topside for inspection.

Ballet in the Grottoes

Along the reef's sheer wall grew screens of coral. Here and there, still at shallow depths, we discovered narrow passages by which we could slip through and join the multitudes of fish which fluttered there like ballet girls in the wings of a theater awaiting their cue. Everywhere we saw frightened little snouts and supple bodies clinging to the wall.

These grottoes of dead coral were covered with a great variety of marine flora and fauna—ascidians, sponges, hydrozoans, calcareous algae—innumerable daubs of color like the random pattern of an artist's palette. In and out swam schools of yellow-spotted groupers; butterflyfishes, with their gold and blue stripes; fish as flat as saucers, carrying long antennae like those of an auto radio; triggerfishes, electric blue or green and yellow; unicornfish, greenish gray, with a horn in the middle of their foreheads.

All in their Sunday best, these gay citizens milled about the reef's cornices like a crowd at the opening of a surrealist exhibition. Lurking on the fringes, moray eels tucked their snakelike bodies into crannies along the cliff and gawked with open mouths at the motley throng.

From time to time an especially strange object attracted our attention. Floating motionless near the bottom, it looked like a ball of tousled feathers or a headless and tailless milliner's bird. On closer inspection we recognized it as a lion or tigerfish, whose body seems to disappear in the middle of innumerable fins. Every one of the dorsal fins is slightly venomous, a fact which may explain why it didn't become frightened when we poked it a little.

The abundance of marine life and its variety of form and color reached a maximum between 10 and 30 feet. Here, in addition to the flashing shoals of fish, we could discern innumerable worms, small, hairy crabs, and colored slugs—a whole crowd of vermin-on-holiday looking as if they had "dressed ship" for the occasion. Celery-shaped alcyonarians grew in profusion; each deck of coral flaunted a parasol; cylindrical sponges protruded like sections of sugar cane; gorgonian colonies developed to the size of trees; and whiplike horny coral trailed in the water like abandoned lamp cords (page 469).

At 130 feet, where light and color diminish, Dumas and I found the scenery familiar. We had glimpsed cliffs like these below Cassis and Ile de Riou, off the southern coast of France. Here were the same loggias cut into the dead wall, the same tapestries of ascidians and calcareous algae. The only things we missed were the lobsters, which, in the Mediterranean, lounge on balconies like these.

Jacques Ertaud

Scientists Check Sediment Dredged from the Red Sea

At 200 feet the cliff came to a halt, and a ramp of sand and mud sloped away at 45° to 50°. We thought we detected at 260 feet another abrupt drop, but we decided not to flirt any further with narcosis.

I found it difficult to imagine how these reefs had been built, except in terms of the Darwinian theory. Starting from a preexisting rock base, close to the surface, the corals must have begun to form toward the light. Their growth rate doubtless corresponded with a very slow sinking of the sea bottom. As the coral gradually thickened, its base must finally have dropped to a depth where the microorganisms building it tended to die and all construction ceased.

Certain parts of the reef seemed particularly rich in fish. Sometimes we passed through schools so thick that we could not even see through them, much less avoid them, and against our skin we felt the tap-tap of thousands of little snouts.

TNT Brings a Rain of Fish

Into one such shoal Dumas dropped a 100-gram cartridge of TNT. Result: a rainfall of tiny fish, colorless and clear as glass, for 100 feet around. Another experiment brought up 200 pounds of coral fishes. Caught and spilled on the *Calypso's* deck, they formed a vibrant rainbow, with colors so bright and shapes so strange as to wring a gasp of admiration from everyone aboard.

After death, the colors faded and the bodies tarnished. But by color photographs, taken immediately, we were able to retain at least on film their pristine beauty (pages 466, 467). Our marine biologists, Cherbonnier and Mercier, lost little time, however, in post-mortem eulogies; they filled up their jars.

"I love animals," said Cherbonnier, dropping one in a jar of formaldehyde. "What an irony that I must kill them to study them!"

It took us some days to catch on, but soon we became aware that mealtime, off our Red Sea island, was strictly kept. Twice a day, morning and evening, as if regulated by the sound of a gong, the sea began to bubble, and the dorsal fins of bonitos and jacks cut the surface like scythes. By the thousands their victims, small, silvery fish, leaped in panic from the water, and the pursuers, in the excitement of hunger, often flopped from the surf to the beach, helpless until a kindly wave swept in to carry them back to sea.

Pelicans Join the Feast

Over this battleground the boobies swooped and dived, plummeting with folded wings beneath the surface and swimming under water toward their prey with outstretched necks. As for the pelicans, they paddled about in the middle of this massacre, long beaks plunging deeply into the water and rarely missing their target. For half an hour the slaughter would continue. Then, when appetite had been sated, an uneasy truce would prevail once more beneath the sea.

One fish which seemed to enjoy making fun of us was the hump-headed parrotfish. On our first dive at Shab Jenab we had spotted a dozen of them. Weighing about 65 pounds each, greenish blue and orange in color, they had swum in our direction, circled us, then turned majestically away.

We looked at each other in wonder. They were big fishes, more than a yard long, stockily built, with powerful fins, a heavy mouth, and something like a parrot's beak instead of teeth. On their foreheads they displayed a sort of whitish protuberance as disproportionate as the nose of Cyrano de Bergerac.

After that first meeting we tried to get better acquainted, but they remained standoffish. We would see their fins or tails breaking the surface of the water every day, often in lagoons so shallow they could hardly swim, and one day from the top of the north islet we watched a school of some 200 pasturing along the coast.

Sometimes, too, we would spot them when diving. Always, however, they would dash away, and neither Dumas with his explosive, Dupas with his gun, nor Nesteroff with his cartridge-propelled harpoon could capture a single specimen. The best we could do was to catch them on Jean de Wouters's stereo color film.

But on January 22, while diving for the last time at Shab Suleim, De Wouters, Beltran, and I stumbled at last upon a striking pair of hump-headed parrotfish. We had been cruising along the reef wall when Beltran, signaling with his arm, suddenly pointed in the direction of the lagoon. There, in scarcely three feet of water, swam our quarry.

Slowly we turned toward them, trying by the most unobtrusive motions not to alarm them. Our caution paid off. For once the big fish did not flee; they adopted us. Side by side we floated through the shallows, an eerie but exhilarating experience.

Then we noticed a curious thing. From time to time these fish would charge against the coral. Their beaks would close with a crunch, and a white scar would appear on the reef. Unhurried, they would repeat this operation again and again—sea cows, browsing on stone pastures.

Between bites, they ruminated with closed mouths, crushing the coral with their pharyngeal grinding mill. To obtain a tiny amount of assimilable living matter, we decided, they must have had to swallow an enormous quantity of coral; at the rate at which they were eating when we watched them, we estimated they could consume about 10 tons of coral apiece every year.

Every now and again they would eject behind them a big cloud that muddied the water for a cubic yard. I swam near one of these clouds as it fell slowly to the bottom in small white grains. It was sand, the same kind as that covering the lagoon. Clearly, we had found one of Nature's reef-building machines at work.

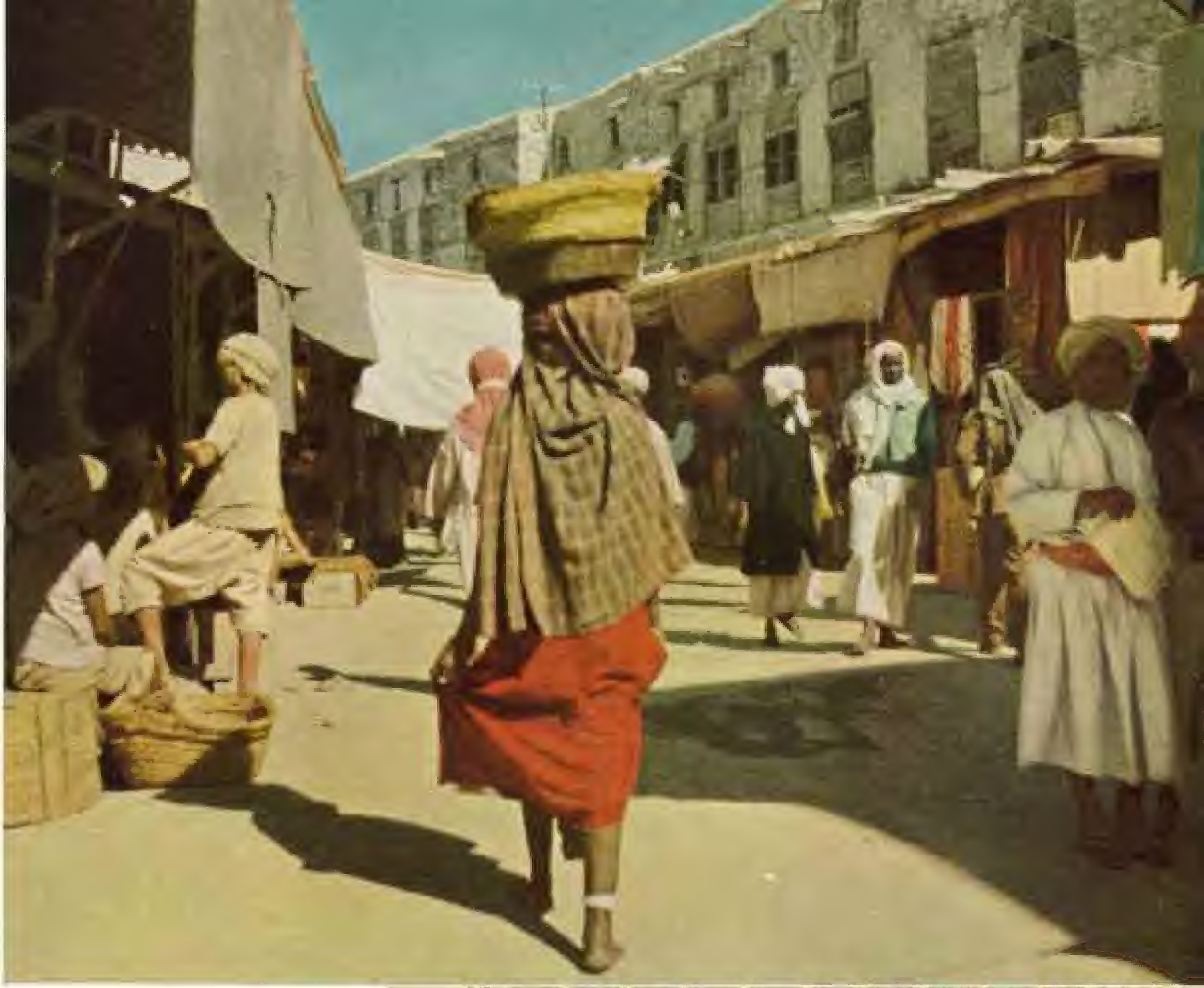
This parrotfish and others, we felt sure, must be by far the biggest coral crushers on the job. It would be in large measure their product, along with that of other reef-building plants and animals, which the sea currents and the wind would use to build the kind of small, low sand islet which is found all along the Farasan Bank.

Octopus Gentle as a Kitten

Another creature of the deep which interested us greatly was the octopus. Well-meaning friends brought up on the literature of Jules Verne and Victor Hugo had soberly warned us of the dangers of being caught and devoured by these nightmarish devilfish.

The octopuses we met in the Mediterranean (we found none in the Red Sea, although other expeditions have done so), seemed far more frightened of us than we of them. Shyly clinging to the reef and resorting to camouflage, they proved to be the most bashful of wallflowers. It was only after nearly an hour of determined play with one that Dumas persuaded it to accompany him in an odd little dance before our camera (page 437).

Jet propulsion, we found, was an old story to the octopus. We watched them propel



Jidda's Sun Shines on Free and Unfree

Saudi Arabia's Jidda, the port by which most pilgrims reach Mecca, served as the expedition's main base of operations in the Red Sea. Supplies were flown up from Asmara for off-loading to *Calypso*.

Cousteau and his men found Jidda a bewildering combination of old ways and new. Oil-rich Arabs owned big American cars, but forbade their wives to appear in public. They kept to the burnoose, but tore down the city's beautiful old fortifications. They installed telephones, but could not always make them work.

Most passers-by proved happy to be photographed.

These children, seemingly as melancholy as prisoners, stare out of the barred window of their school.

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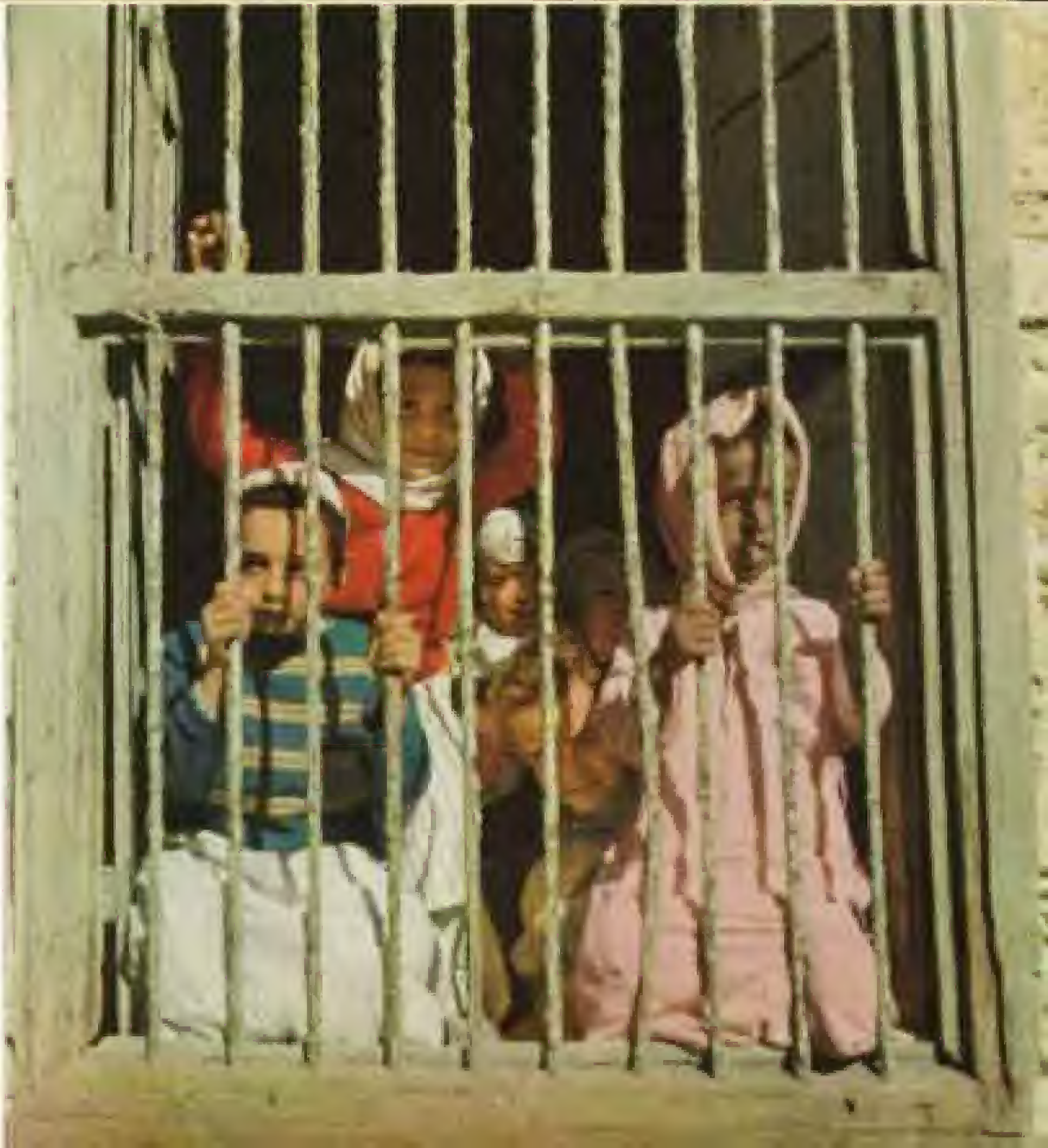
Ektachromes by Jacques Ertaud



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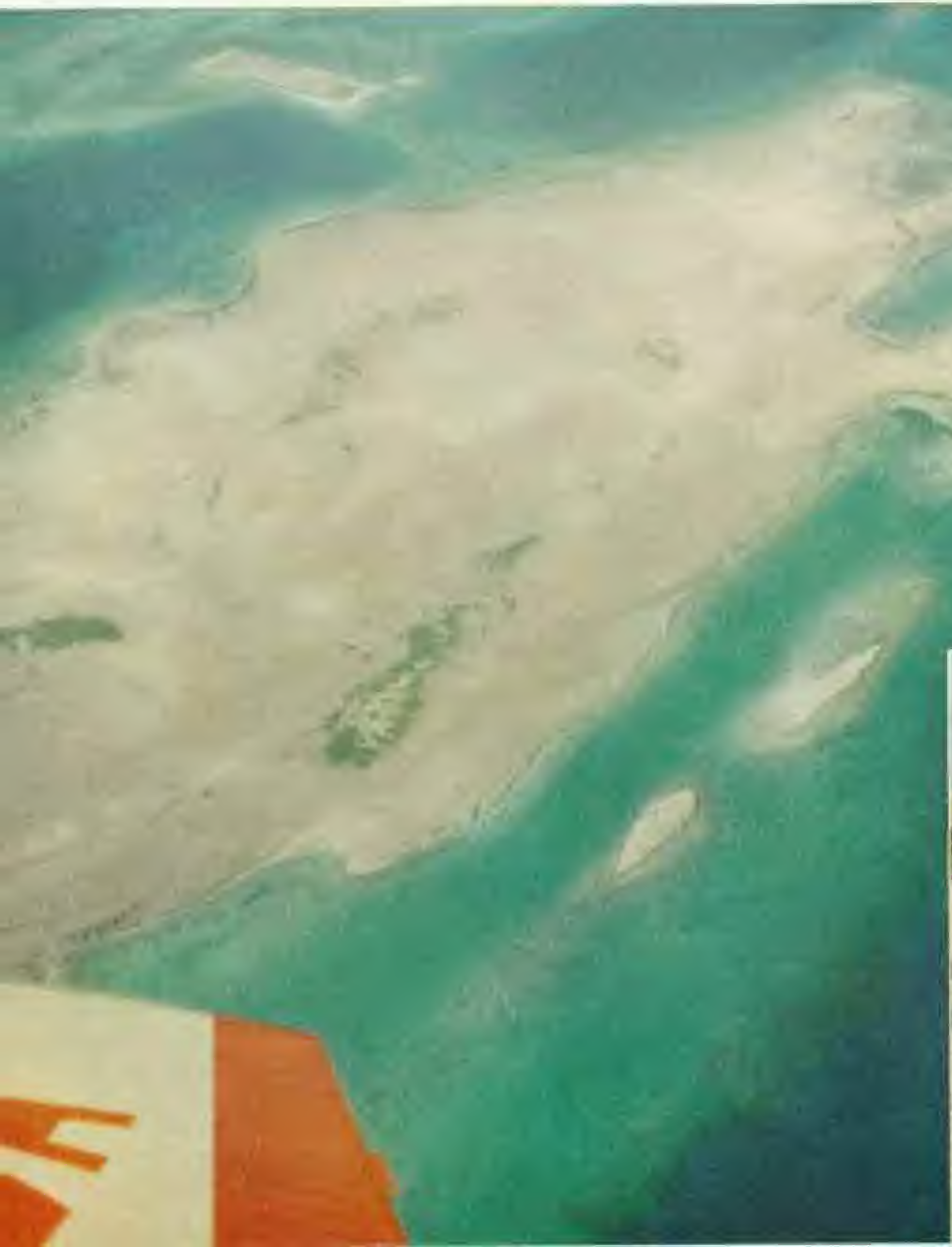
Arabians Prepare to Board *Calypso*

Flying Saudi Arabia's flag as a courtesy, Captain Cousteau (with binoculars) and First Officer François Saout stand on *Calypso's* bridge and watch officials of Lith, an Arabian port, approach in the aluminum-alloy tender. Burnoosed figure in bow is Lt. Jean Dupas, a French paratrooper assigned to the expedition. He is trained in the Arab dialects (page 463).



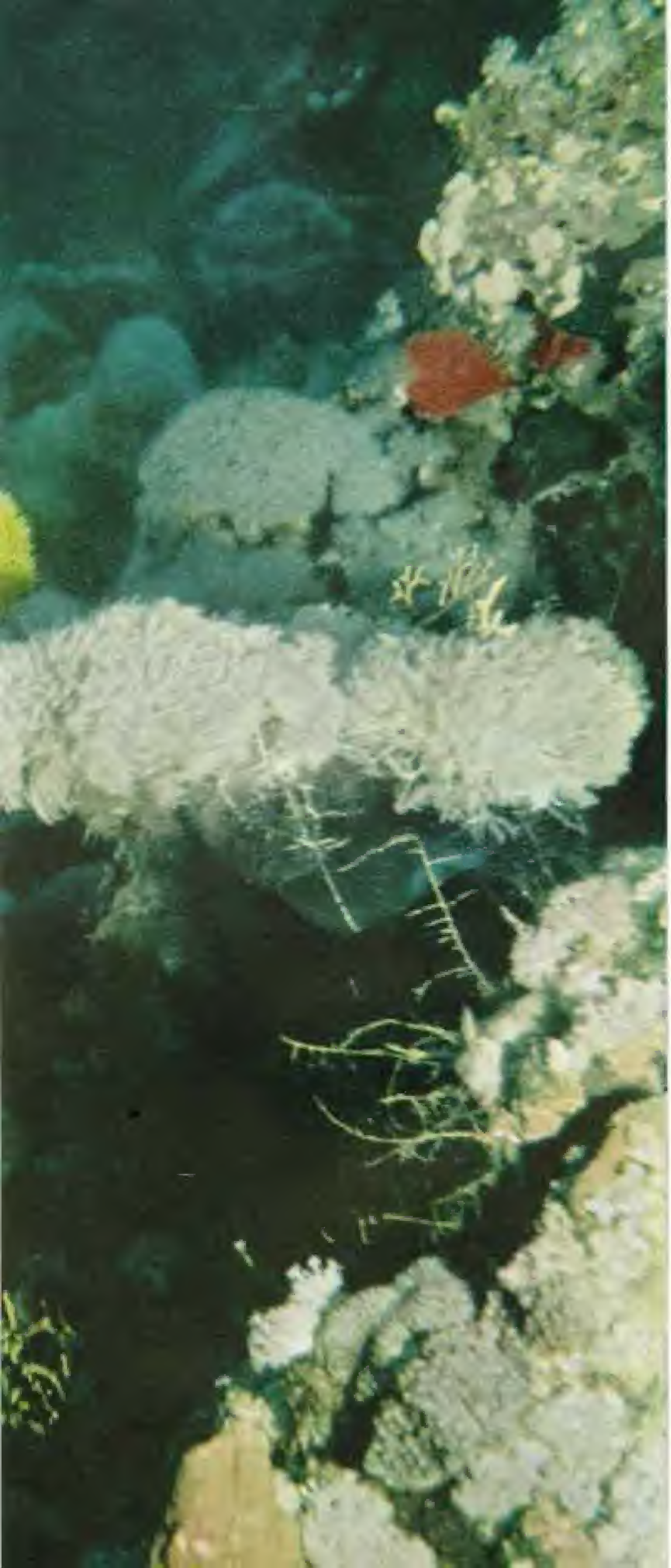
Abu Latt, Red Sea's Coral Flattop, Offered a Strange World to Explore

This barren island, nearly 4 miles long and 1 mile wide, provided an ideal outdoor laboratory for *Calypso's* oceanographers. In the lagoons and along the coral barriers, marine life teemed in such variety and abundance that the expedition's scientists found their 38-day sojourn all too short (page 460).

Feeding time off Abu Latt, they discovered, came twice a day. In the morning and again at evening, the sea bubbled as big fish drove smaller fish before them in frantic hordes. Some flopped in panic or frenzied hunger on the beach; others fell prey to diving gannets and pelicans. Half an hour later an uneasy truce set in; all was calm.

Seen from the air, the shallows stand out green; the depths, blue. Inset: Expedition members lunch in the welcome shadow of a plane.

Ektachromes by Jacques Ertaud



Man-fish Threads His Way Gingerly Through an Eerie Poison Garden

Branchy *Millepora* coral at left suggests a candelabrum for Neptune's banquet table. One touch of its spikes leaves an allergic rash worse than poison ivy's. The diver proceeds with all the caution of a barefoot boy.

Diver Frédéric Dumas's tanks will last about an hour, depending on his operating depth. The farther down he goes, the more compressed air he must draw upon to offset the sea's absolute pressure.

Above the water, Dumas's Aqualung weighs more than 30 pounds. Down below, with its three cylinders full of air compressed to 200 atmospheres, it weighs three pounds. As tanks empty, the Aqualung becomes even lighter.

The diver himself usually wears leaden weights of two to seven pounds, according to his personal gravity. With this ballast to offset his buoyancy, he moves in perfect balance, able to float, turn over, or glide ahead with the languid ease of a fish.

Flippers on his feet propel him at a top speed of two knots. Hands serve as rudders.

Four men were required to make the picture: the model, the cameraman, and two assistants holding flashlights. All wore Aqualungs.

Biologists on the Red Sea trip eagerly embraced the opportunity which Aqualunging offered to observe marine flora and fauna in their true environment. Dredges and nets provided a wealth of samples for laboratory analysis. But for accurate study of "the economy of the reef," there was no substitute for on-the-spot investigation.

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Ektachrome by Jacques-Yves Cousteau

Scientists Pitch Camp on Abu Latt Island and Sort Their Haul

This Red Sea reef possesses no trees, almost no vegetation—hardly a rock. Its interior comprises an immense field of stem-shaped coral, as pleasant to walk on as harrow spikes. Shells and pulverized coral make up its beaches.

Yet the island, so inhospitable to man, supports many forms of life. Long-legged crabs scuttle into the water and hoist periscope eyes. Rats, snakes, scorpions, and insects abound. Gannets, pelicans, spoonbills, and herons make Abu Latt their home, and lobsters convene in shallow pools at the reef's northern end.

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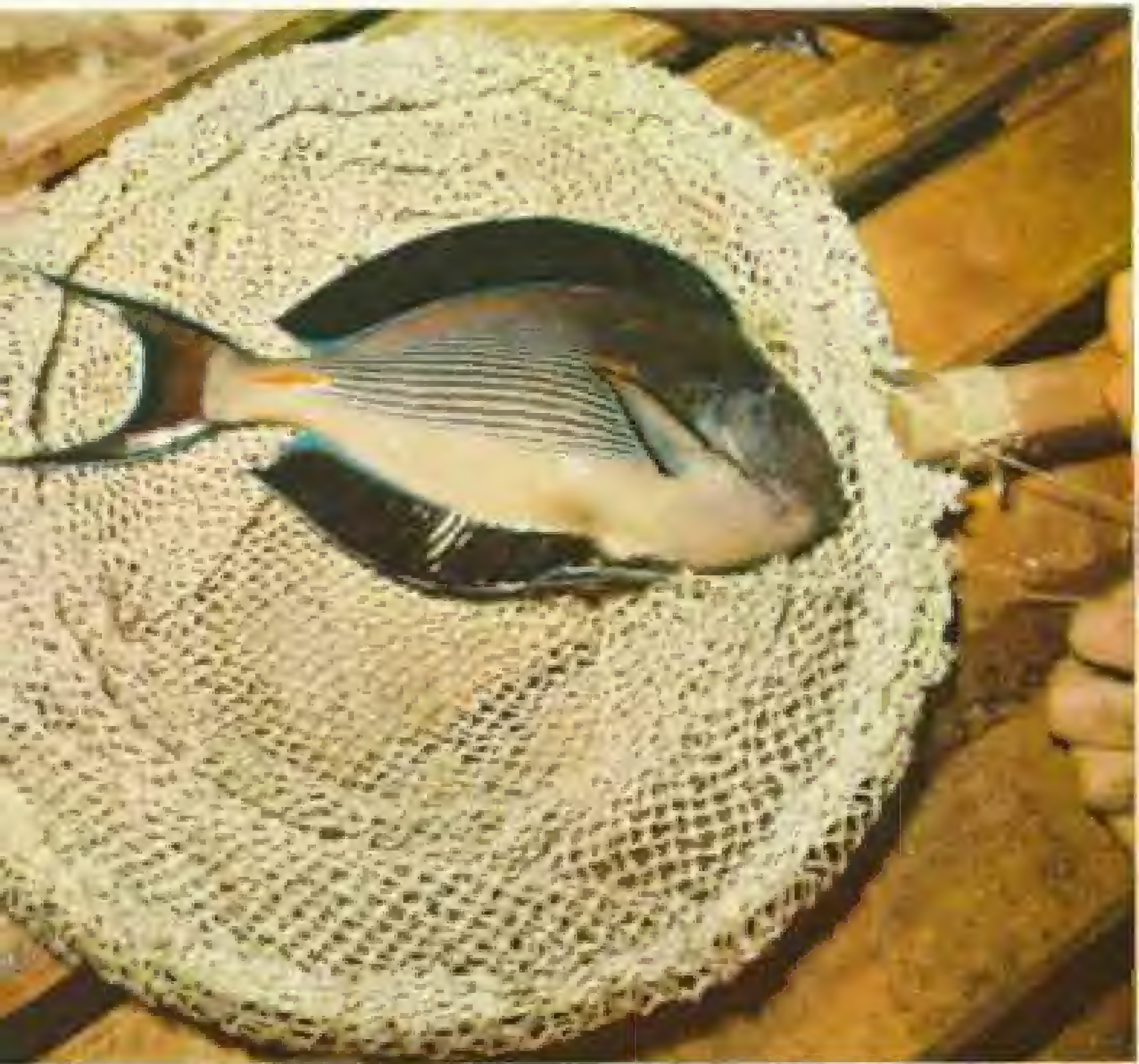
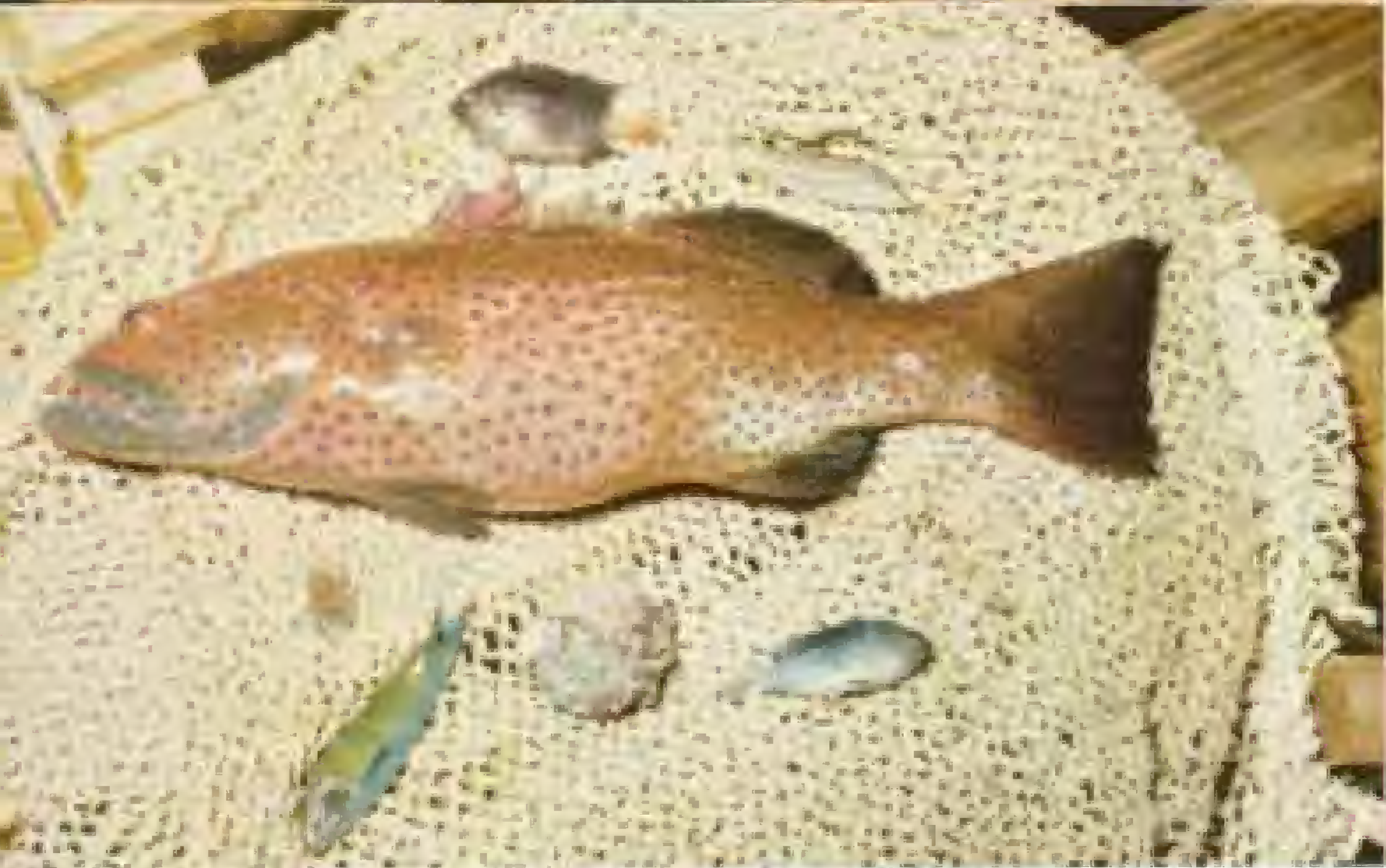




The Red Sea Yields Samples of Its Infinite Variety

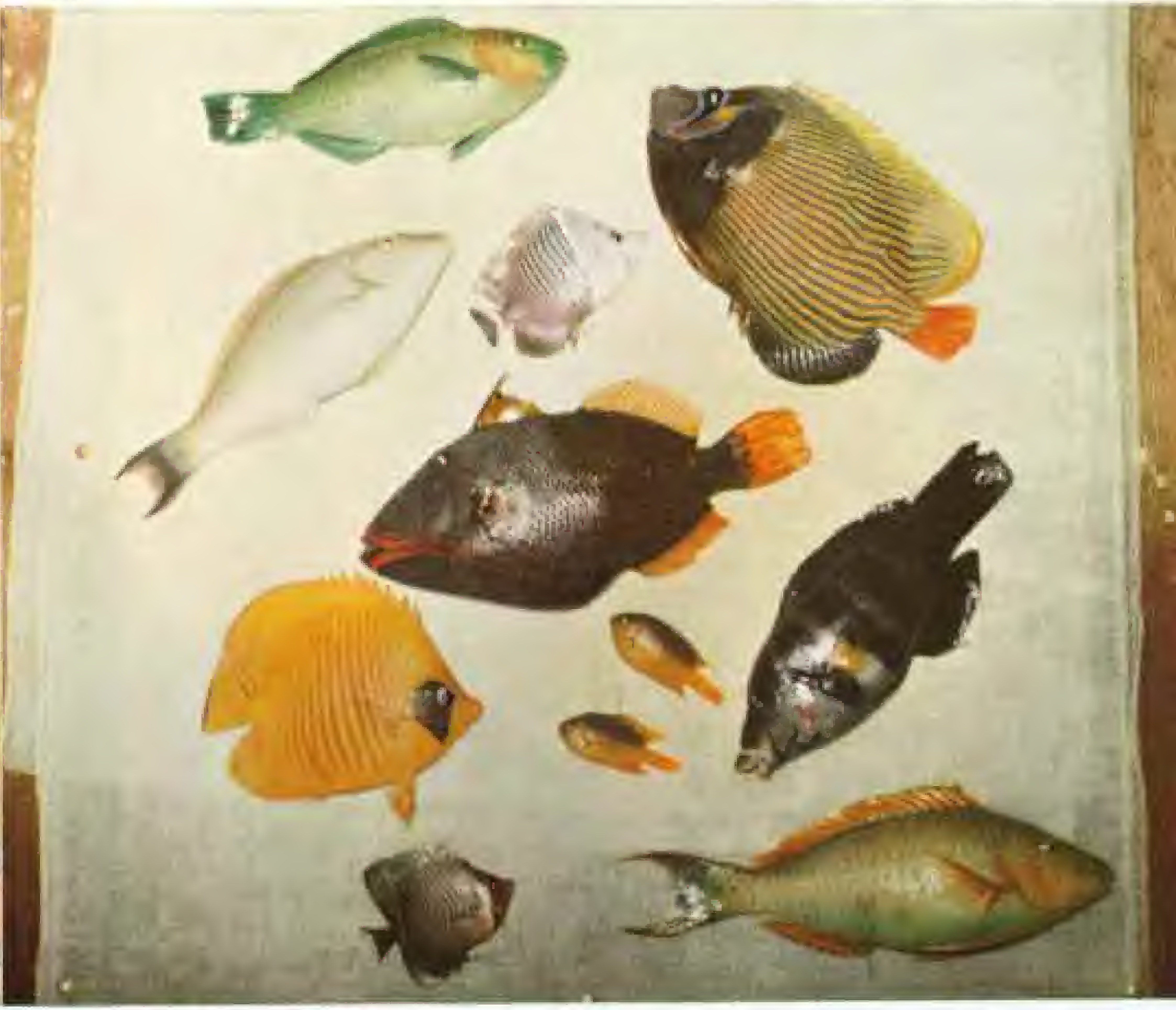
Aqualung divers off Abu Latt Island kept the expedition's biologists well supplied with fish specimens caught by harpoon, hook, and explosives. Said Dr. Gustave Cherbonnier in his laboratory aboard ship: "I love animals. What an irony that I must kill them to study them!"

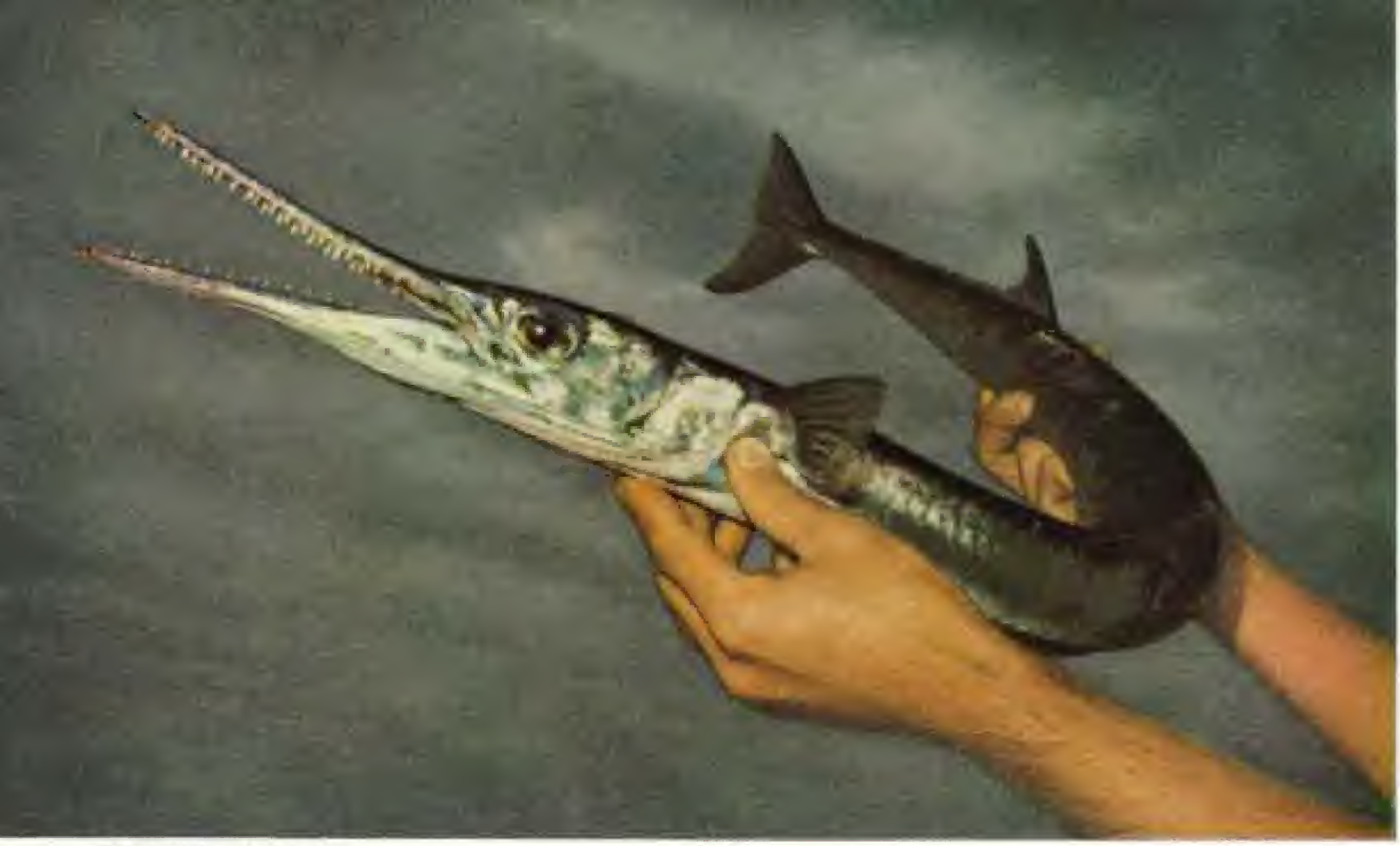
← Orange patch near tail of surgeonfish houses its razor-sharp lancet. The surgeon uses this weapon to "operate" on any fish bold enough to attack it.

Edible polka-dotted sea bass (shown with coral fishes) was plentiful around Abu Latt.

↓ This gaudy collection includes butterflyfish, with eye patch; triggerfish (center); spiny butterflyfish (top right); and parrotfish (bottom right). Thick-lipped fish is a wrasse.

Ektachromes by Jacques Ertaud





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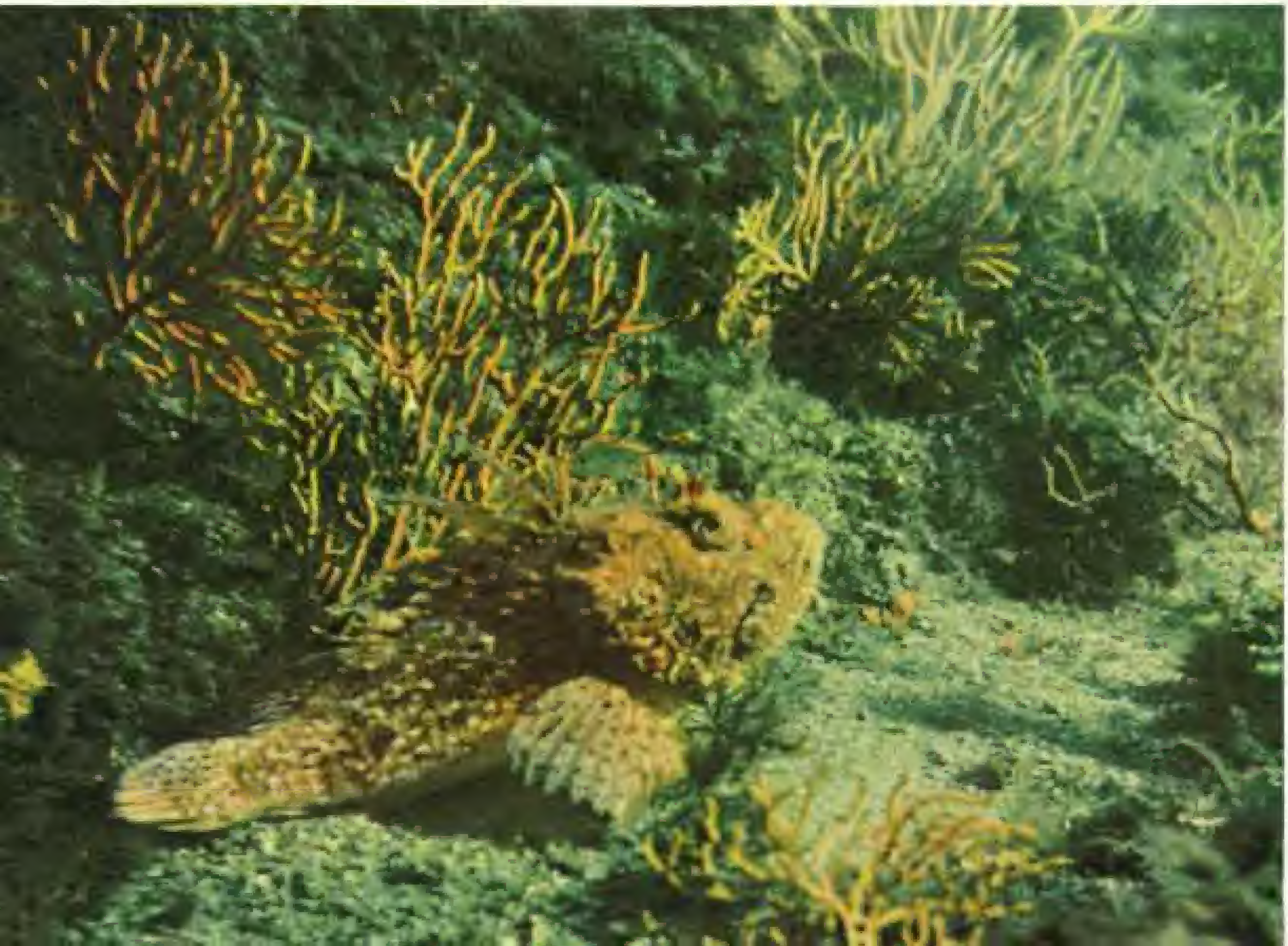
Needlefish May Be More Graceful, but Lowly Scorpionfish Tastes Better

Like a stone skimmed by a boy, a needlefish ricochets across the water in 30-foot hops. Needlefish apparently leap sometimes to elude pursuers, sometimes just for fun.

Spines bristling, the scorpionfish (below) looks too ugly to be edible, but he forms the main ingredient of the celebrated French chowder, bouillabaisse. This artful deceiver camouflages himself against sand and gorgonians. Two minutes earlier he blushed a deep red to blend with a different background.



Ektachromes by Jacques Ertaud

Arab and Frenchman Have Much to Talk About. Dachshund and Shark Do Not

In turban and loincloth, Lieutenant Dupas can pass among Red Sea fishermen as one of their own.

An army officer attached for years to a Moroccan unit, Dupas learned to live, talk, and think like an Arab. A more recent assignment: to teach French paratroopers how to jump into the sea and swim by Aqualung to underwater objectives.

↓ Ship's dog yapped at first shark hauled aboard, but soon grew bored at the sight.

Over the Stern Go Aqualung Divers and Cameras

→ Captain Cousteau in white shirt watches as Dumas, at ladder's lower rungs, dons his goggles. Waiting above him is Wladimir Nesteroff of the Sorbonne, his geologist's hammer and specimen bag hung at his belt. Third to go will be Dr. Haroun Tazieff, expert on volcanoes from the University of Brussels.

↓ Disguised by mask and breathing tubes, Cousteau receives his still camera. It will weigh nothing in the water, thanks to its built-in air ballast. An attached Aqualung will keep its internal pressure constantly adjusted. Cable trailing from camera leads to water-tight flash-bulb reflector (opposite), which Cousteau will use to bring out color of the depths.

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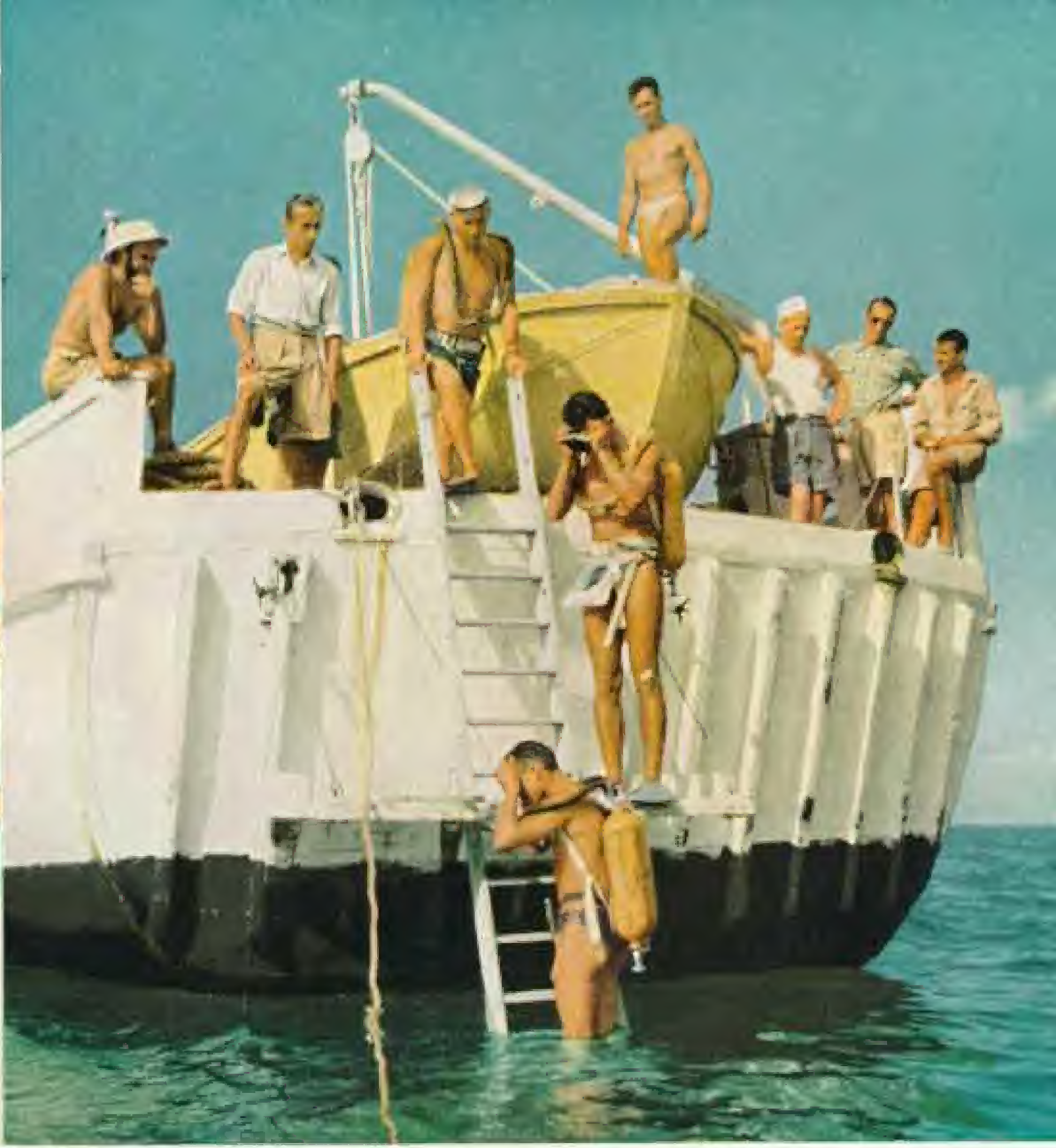
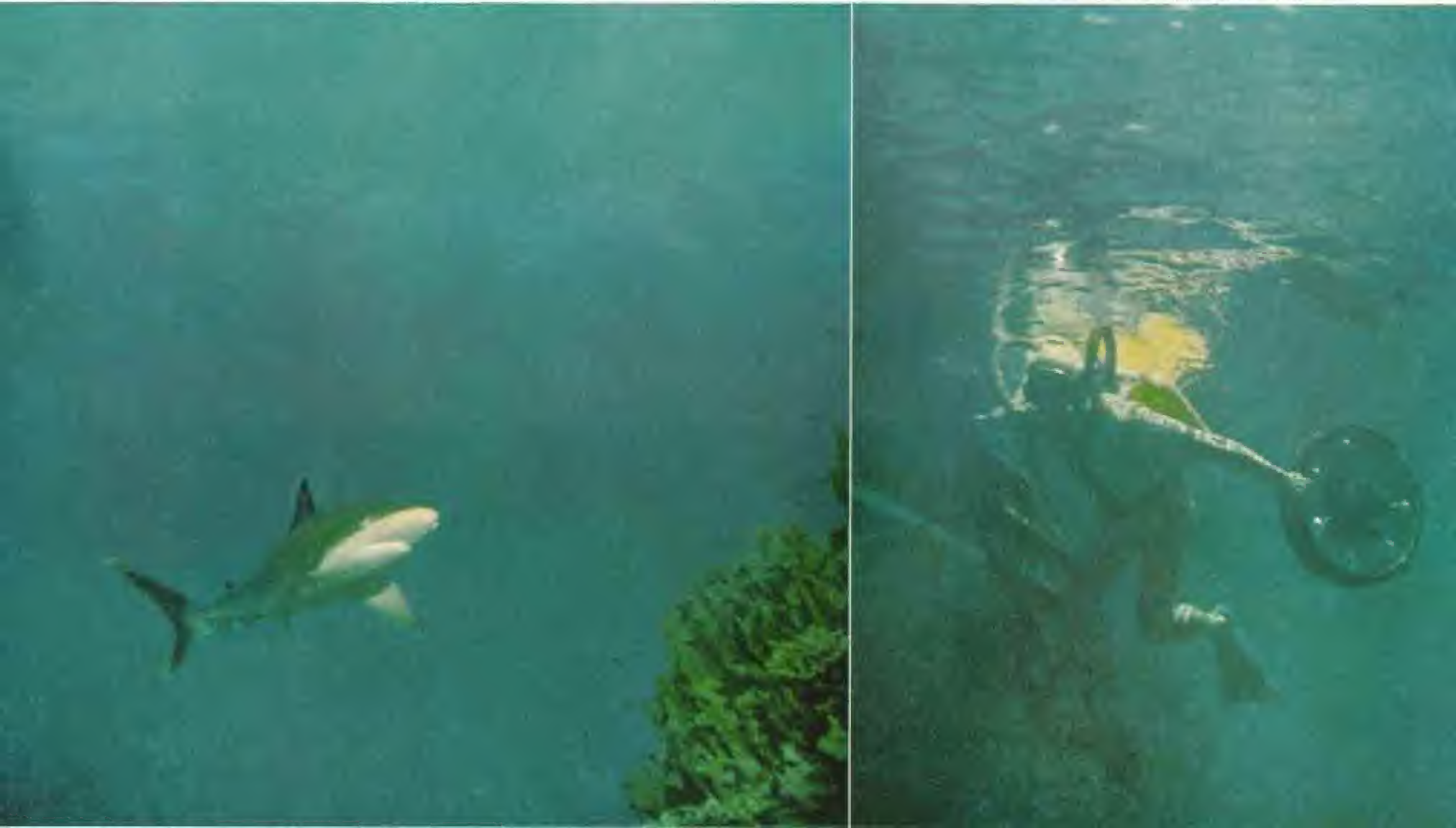
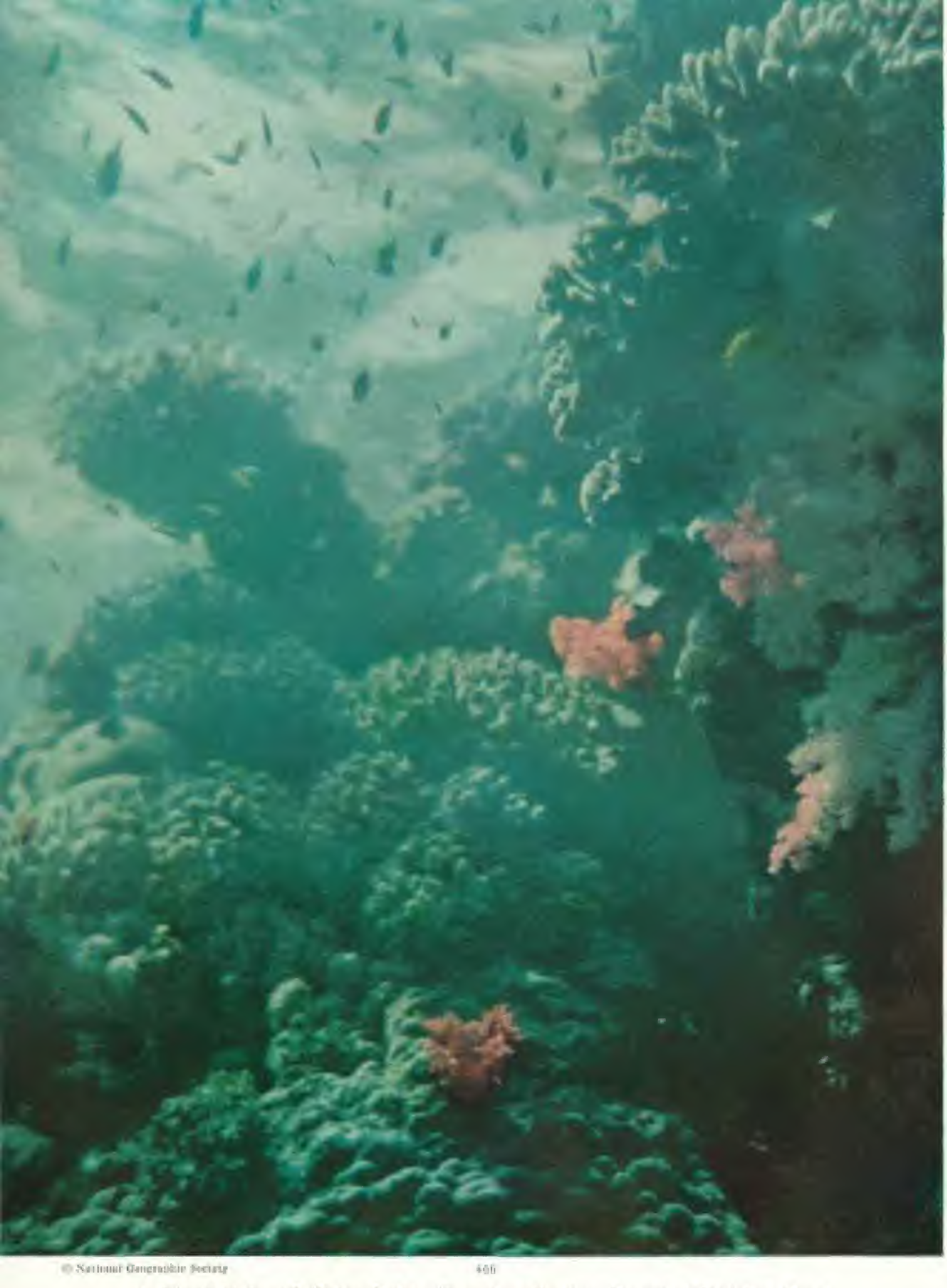




Sharks Prowled Around the Divers, but Gave Them Guarded Acceptance as Strange Bubble-blowing, Two-tailed Fish

Swimmers near the surface, like the Aqualunger here descending ladder with his reflector, risked sudden attacks by sharks. These fish apparently assumed any bodies floating in upper waters were fair game. Farther down, however, they became cautious to the point of cowardice. Divers saw a 4-pound triggerfish chase one big shark.

Ektachromes by Jacques Ertaud and Jacques-Yves Cousteau



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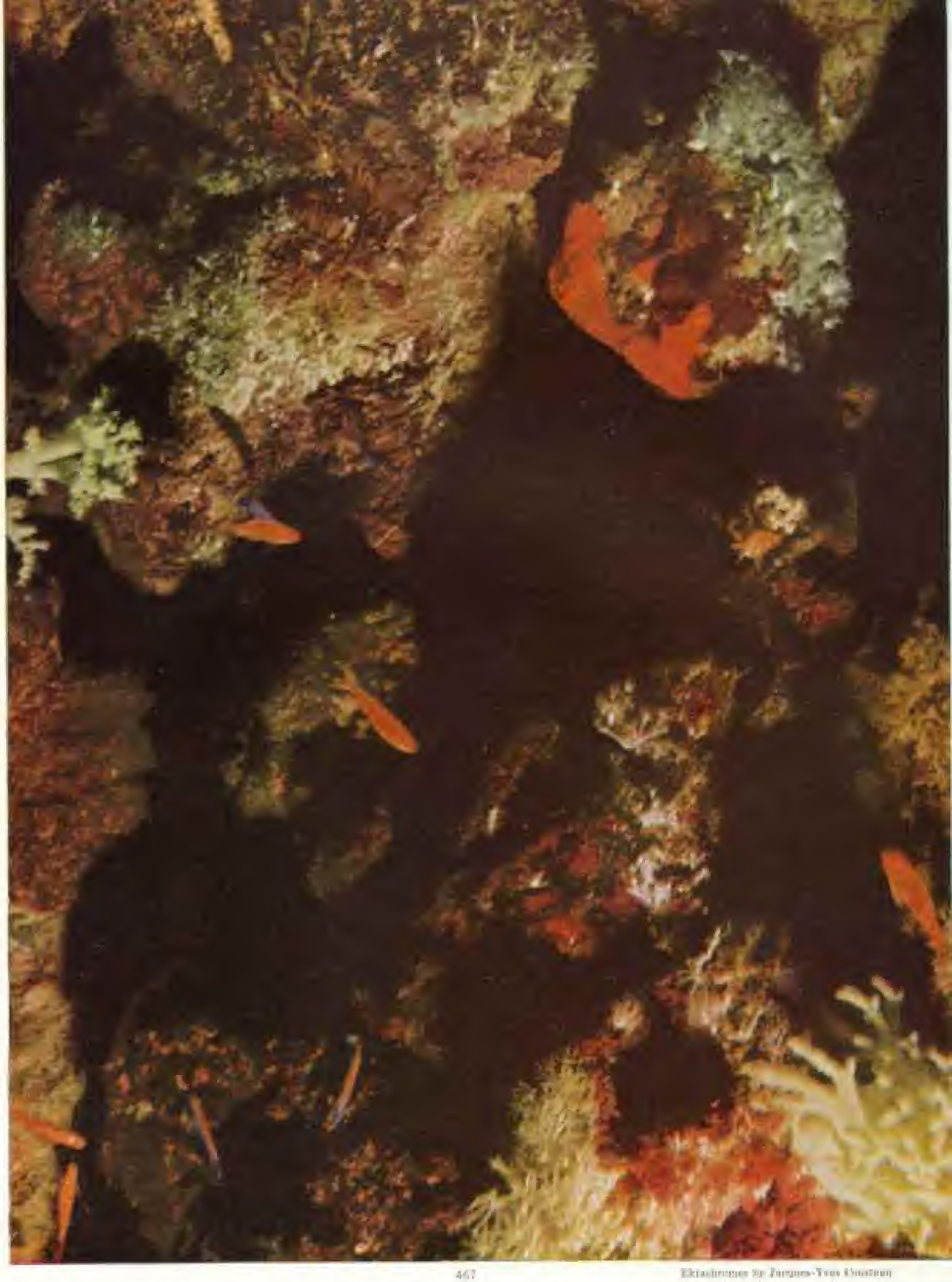
A Cloud of Pastel Fishes Drifts Through a Shallow Forest of Red Sea Coral

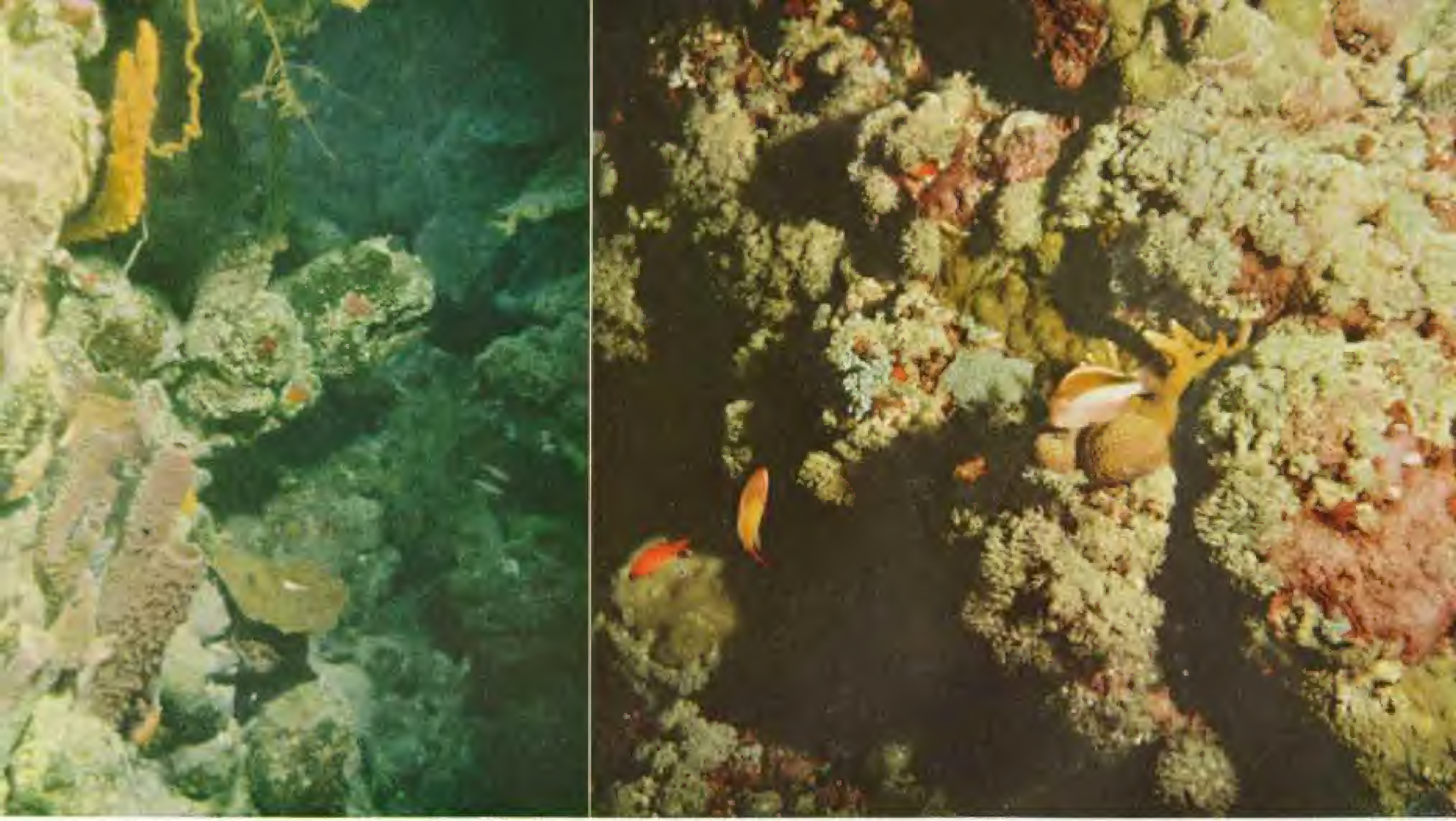
Chief zoological explorer with the expedition was Prof. Pierre Drach of the Sorbonne. His customary equipment for work below included a housewife's string shopping bag, a depth meter, a compass, a watertight watch, a white board and indelible pencil, and a burglar's jimmy. On this reef, only 25 feet down, natural and artificial light combine to bring out the delicate shades of coral clusters and their inhabitants.



Ektachrome by Jacques-Yves Cousteau

Same Reef, 110 Feet Deeper, Reveals Hues Which Only a Powerful Flash Can Illuminate

For marine biologists, one advantage of diving in the Red Sea was that water below 20 feet was virtually immobile, with no perceptible motion from surface waves. Aqualungers at this level detected wave action only by an increase in pressure as surface water rose and fell. Until photoflash went off in front of this sea wall, divers could dimly glimpse only dark blues and greens. Reds and russets were completely absorbed.



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Red Sea's Twilight Zone: A Battery of Sponges Stands at Attention, and a Freckle-faced Fish Guards His Coral Hide-out

Crannied sea wall, 120 feet down, contains countless tunnels and escape routes for its gaily colored population. Divers found that the tiny beige and brown hawkfish believed he was invisible. Freezing beside his poisonous *Millepora* coral branch, he refused to move until touched. Then he whirled round in a clownish dance, only to settle beside another coral twig, stiff as a china fish in a child's aquarium.

A Second Later Alarmed Fish Vanished Like Flies in Rock Crannies

Dumas, studying this reef's outgrowth of supple gorgonians, lolls without effort 100 feet down. Regarded by the rest of the expedition as half-fish, Dumas has made more than 3,000 dives.

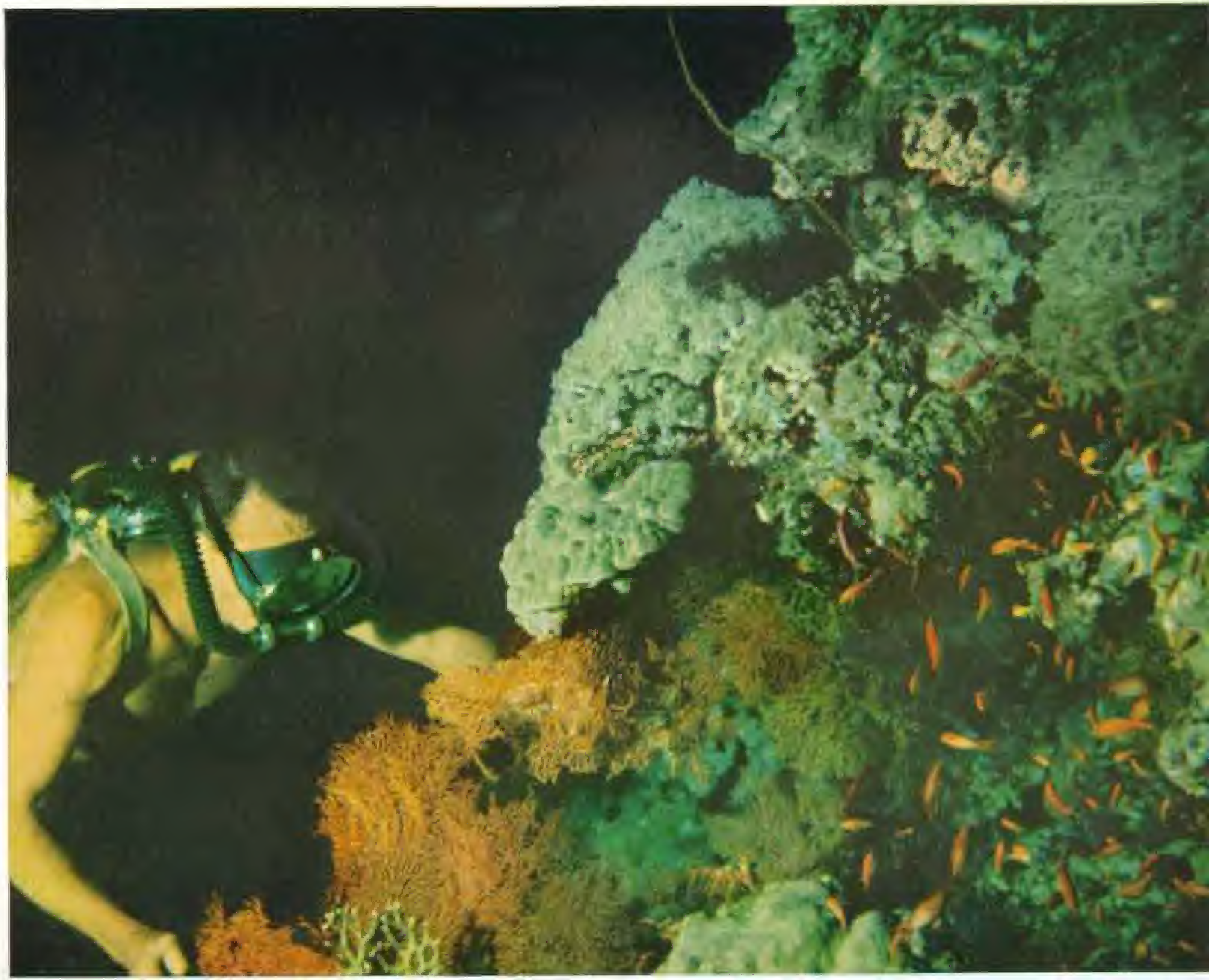
Scraggly "wire" at right was mistaken at first for an electric cord jettisoned by a ship. Closer inspection showed it to be a whiplike horny coral.

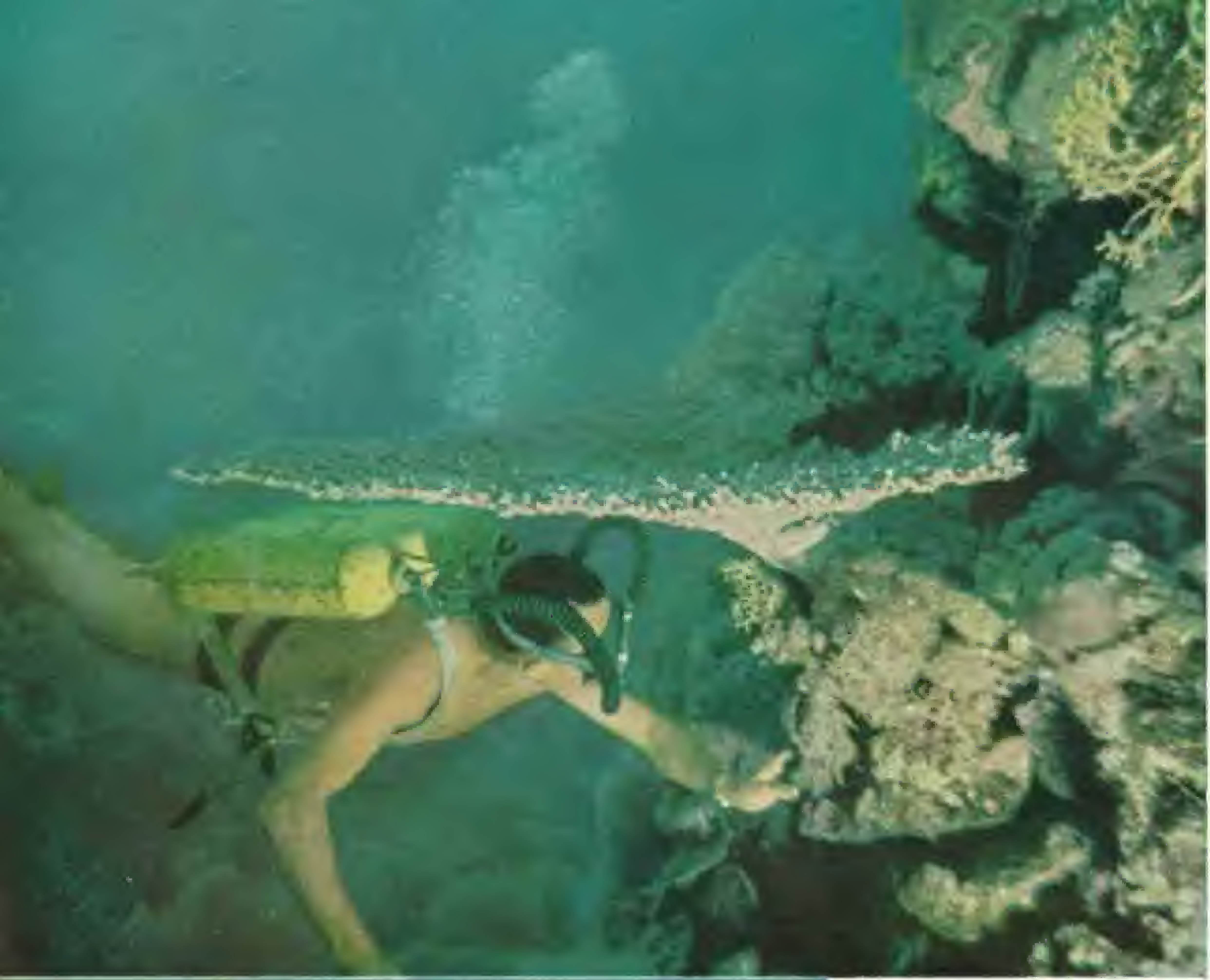
One aspect of Aqualunging which both fascinates and frightens divers is the experience known as "the rapture of the depths." When a diver ventures below some 150 feet, he feels increasingly intoxicated. Life appears wonderful; danger reactions fade. If he continues down to 300 or 400 feet, he may pass out, lose his mouthpiece, and drown.

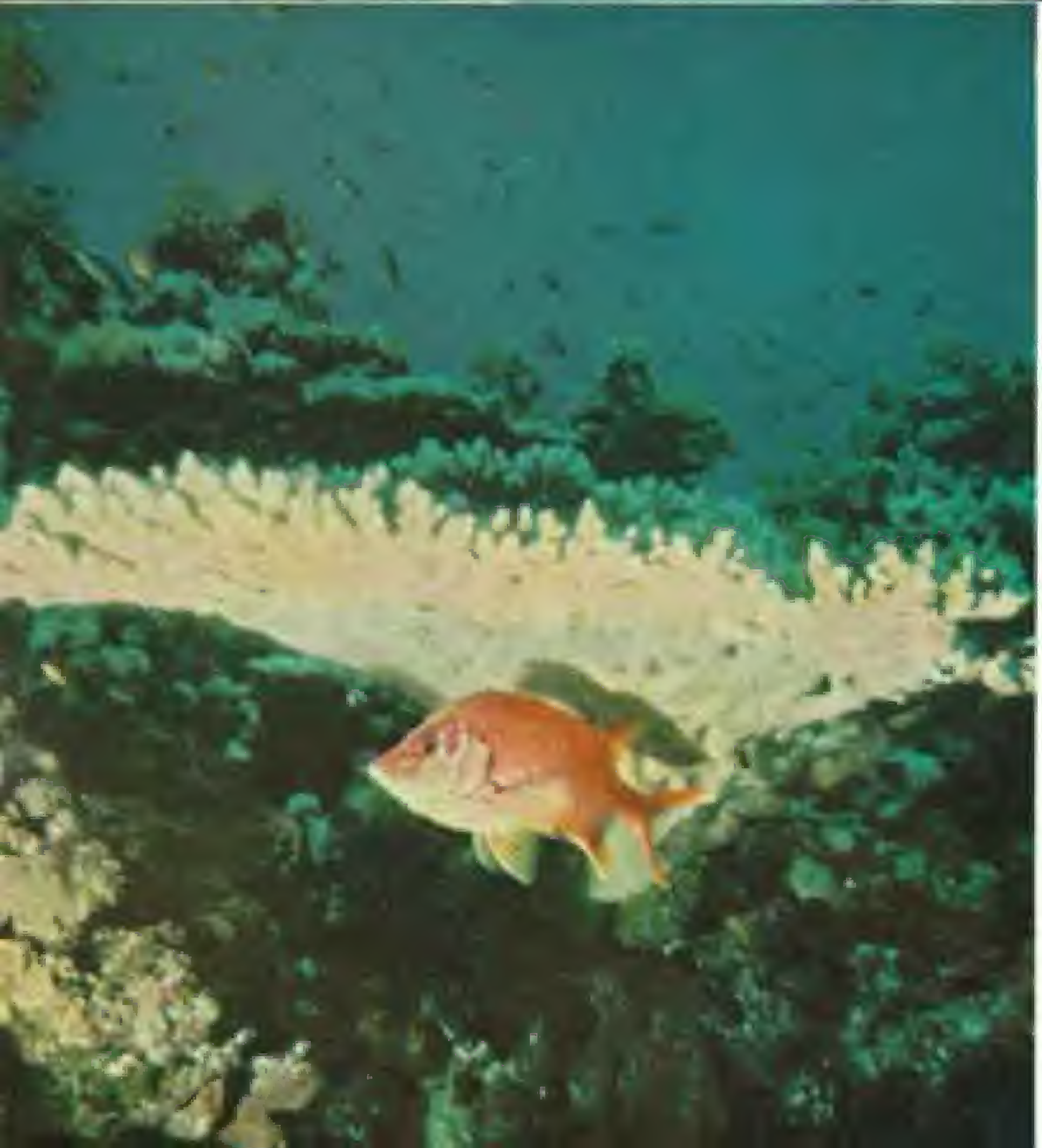
But if he confines himself to a moderate depth and then returns to the surface, the exhilaration departs—and with no avenging hangover.

Physiologists describe this process as narcosis and liken it to a gradual anesthesia.

Ektachrome by Jacques-Yves Cousteau







Same Parasol Shelters Dumas and Squirrelfish

Only the bubbles floating up from his exhaust valve betray the diver's dependence on the upper world. Otherwise his Aqualung confers upon him the freedom of the depths. Warmed by the tropical Red Sea, he wears only bathing trunks.

"When you swim, you're an angel," said one of the French divers, "and when you float, you're at rest on the world's largest feather bed."

Shy little reef dweller huddling under the coral shelf bears two popular names: squirrelfish, for its large, brown, apprehensive eyes, and soldierfish, for the chain-mail look of its scaly armor.

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Ektachrome by Jacques-Yves Cousteau

themselves by sucking in water and expelling it behind them, and on occasion we saw them release their notorious "ink." This murky cloud is neither camouflage nor a venomous screen, though other recent investigators say the "ink" is slightly caustic and therefore distasteful to fish. However, too small actually to hide the octopus, the cloud may well be meant to represent a false octopus, a vague sort of decoy designed to fool weak-eyed pursuers.

A diver can easily outswim an octopus, which usually flutters quickly to the bottom, spreads out, and pretends it isn't there. Prodded, the octopus will make one despairing leap and then become as docile as a tabby cat.

We saw all this in the twilight zone of the sea, where the spectrum's red waves were filtered out, where red coral appeared dark blue, carmine gorgonians seemed violet, and blood flowed emerald green. We knew it would take many months before the biological specimens collected in this stratum would undergo final analysis and before scientists could or would launch their first tentative generalizations on the life we had explored.

But one thing we had for sure: photographs. Men have looked into the sea before and taken pictures through windowed boxes, through the portholes of bathyspheres,* and, clad in cumbrous helmets, through the tropic shallows. No one to our knowledge, however, had ever swum down to great depths and with artificial light of great intensity caught on film the actual colors of the fish's kingdom.

Treasure from a Roman Argosy

My own experiments had begun four years before. Like most scientists and divers, I had assumed that pigmentation 50 or 100 feet below the surface was pallid and uninteresting. Then, in the summer of 1948, Tailliez, Dumas, and I had dived by Aqualung down to the wreck of a Roman vessel sunk in 130 feet of water off Tunisia. It had been built by Sulla to transport loot from the sacking of Athens. From its deck I brought up three marble columns and two Ionic capitals, part of a Greek temple which apparently had struck the fancy of the emperor.

Though daylight had appeared to illuminate these fragments well enough on the sea bottom, where they seemed a dull gray and brown, I was astounded to find at the surface that their encrustations of algae actually glowed with violent reds and oranges.

Determined to defeat this capacity of deep water to screen out the more brilliant colors, I started at once to improvise means of bringing adequate artificial light below. Attaching a powerful lamp to a surface connection, I took it down to the twilight zone, 150 feet below the surface, and there, on 35-mm. Agfa color Cine film, took the first pictures of the depths in their true colors.

Since we wished to check the behavior of color emulsions and flash-bulb lights under the sea, we were forced to try many combinations of both daylight and interior flash film as well as blue and natural bulbs. We diversified these permutations even more by dipping the bulbs in tinted varnishes of several colors.

The cameras we used were not unusual in themselves, but their housing was. We built into them enough air ballast to give them a positive buoyancy of one pound, which both assured their easy handling below and their ability to float if we had to drop them.

Even the Cameras Wore Aqualungs

We did more. We permitted our cameras, like ourselves, to "breathe" at any depth. To each was attached a miniature Aqualung which fed it compressed air in proportion to the increase in pressure of the sea around it (page 440). The diver simply opens a valve on the camera at the surface, allowing air to enter the regulator. Thereafter, as he swims downward with the camera, its regulator automatically adjusts the intake of compressed air to compensate for each additional foot of depth.

A further refinement we devised was to mount our Rolleiflex on a shaft with two pistol grips. The diver trains his camera on the subject like a charging submachine gunner. By revolving one grip, he can change the focus; the other alters the aperture.

Our principal problem, of course, was always one of light. The most powerful flash bulbs we could obtain gave an illumination of some 5,000,000 lumens—about 400,000 candlepower. On land, such a bulb exploded at night will make possible a color shot 50 feet away in $\frac{1}{25}$ of a second. In the twilight sea, dense with its quintillions of microscopic organisms and suspended minerals, a similar flash will light up only a 5-foot radius. And to set off eight bulbs of this power at once will illuminate, for color purposes, only an additional seven feet.

When we took our underwater photographs on the *Calypso* expedition, we usually employed four Aqualung divers—one to man the camera, two to carry the lights, and one to act as subject.

It was an eerie studio in which we operated. Down from the brilliant surface we would glide, past the cliff dwellings of a thousand fish, into the dusk of 150 or 175 feet below,

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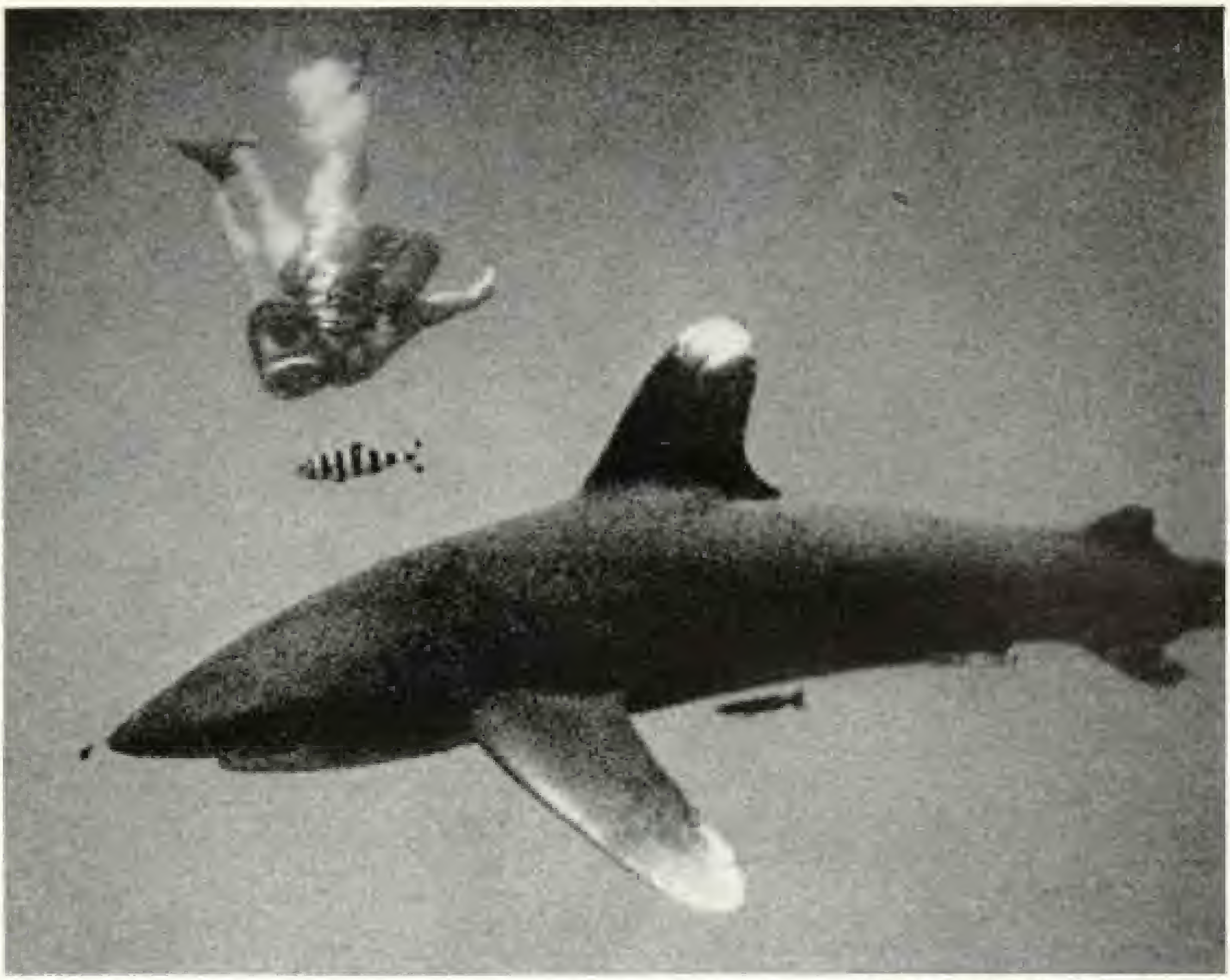
* See, by William Beebe, in the NATIONAL GEOGRAPHIC MAGAZINE: "Half Mile Down," December, 1934; "Wonderer Under Sea," December, 1932; "Depths of the Sea," January, 1932; and "Round Trip to Davy Jones's Locker," June, 1931.



J.-Y. Cousteau, P. Tailliez, F. Dumas

This Diver Overtook an 8-foot Shark, Then Boldly Tweaked Its Tail

Fifty feet deep off the Cape Verde Islands, diver Dumas met the creature and its attendant pilotfishes. All went happily until two blue sharks broke into the party. Captain Cousteau banged one intruder with his camera, and the divers swam head on at the sharks, bluffing them for 10 minutes until rescuers approached. Striped *Naucrates*, one of the pilotfishes, swims above, and a remora, or shark sucker, beneath this monster. A baby pilotfish, scarcely more than a mouthful, leads the way, seemingly pushed ahead by a cushion of water.

Grottoes opened out from the sea wall, dim and inviting. The utter silence of the depths lay upon us like a benediction.

While Dumas would reconnoiter for a passageway, I would attempt to position the divers holding their great reflectors—one near the subject, one farther away and overhead. Only the backdrop of the grotto itself would be stable: I and my camera floated; the reflector men floated; Dumas, easing through his coral corridors, floated.

All would be ready. Pressing the flash buttons, I would explode our "slow peak" bulbs and trip the camera. The darkness would flower for a long instant into blinding light, a light that had never dwelt on this particular cross section of marine life since the seas were formed; then all would be gray and shadowy once more. We would blink our eyes, mutter "I think the color was there, all right," and return to our world above.

Not until the film was developed would we feel certain that the miracle was indeed fact: that at depths where neither fish nor man could detect them, colors existed as brilliant and as beautiful as any at the surface. We do not know why they exist, or what purpose, if any, they serve. But they are there.

All travelers returning from strange realms attempt to buttress the credibility of their tales with pictures of the marvels they have seen. We, I think, are in a different position. For here the photographs themselves are the real marvels.

We offer these pictures to you now with pride and pleasure—pride in the work of the many men who made them possible, and pleasure in the thought that by Aqualung, photoflash, and hand-held camera we have been able to pull aside more fully the dense sea curtain which, since the dawn of time, has shrouded from man's eyes a world of vibrant color—the world of the twilight depths.*

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* *The Silent World*, by Captain Cousteau, with Frédéric Dumas, is planned for February, 1953, publication by Harper & Brothers, New York.

Pack Trip Through the Smokies

You Can Ride Part Way into the Great Smoky Mountains National Park, But in "the Wilderness" You Must Leave Your Horse and Go on Foot

By Val Hart

With Illustrations by National Geographic Photographer Robert F. Sisson

"ABOUT that groundhog you saw yesterday," Sam said, "did you know they make mighty fine eating? I'll tell you how we cook them. First you got to get yourself a nice fat young groundhog, dress it, and boil it."

Sam paused to throw a log on the fire, then continued. "Now, if you're out in the woods, you get sassafras or spicewood for season; then you take the meat out of the water and bake it." He smacked his lips.

"Has a wonderful flavor," he said. "Couldn't tell the difference if it was coon or bear."

This introduction to mountain cooking made my kitchen in Washington, D. C., seem far away. We were on a pack trip through the Great Smoky Mountains National Park, and by now our horses had taken us deep into the mountains (map, pages 476-477).

Escape from "Modern Living"

My late-September vacation was an escape from television, banging screen doors, and the gray routine of housekeeping. No change could have been more complete, for I had never camped before nor ridden a horse very far. I glanced at the friendly and now familiar faces lit by the fire and thought how odd it was that only a few days before we had been strangers.

We had met at Tom Alexander's Cataloochee Ranch near Waynesville, North Carolina. Tom, rancher and forester, was our outfitter and guide. For years he has taken pack trips into the Smokies, and he knows every trail, ridge, and stream. In his very quietness at that moment he seemed a part of the mood of the hills. So did Glenn Messer, Tom's helper, and Sam Woody, our camp cook.

The rest of us Tom called his "trail riders": Ruby Bere, a bacteriologist from Madison, Wisconsin; Genevieve Bass, a housewife from Lakeland, Florida; Elizabeth Yates, a writer from Peterboro, New Hampshire; Bob Sisson, a staff photographer for the NATIONAL GEOGRAPHIC MAGAZINE, and I.

We were up early for the first day's ride. Tom gave us last-minute instructions: Don't tie a horse close to another until you learn their preferences—some horses hate each other; keep a distance on the trail; watch out for yellow jackets; and hitch up with the halter rope, never the reins.

"Come on, you cowpunchers, let's get going!" Tom yelled, and led the way from the ranch stables toward Hemphill Bald, first steep climb from the ranch house. Ruby and I glanced at each other. Both inexperienced riders, we were pleased that our horses took their place in line and moved at all (page 479).

We entered the park and headed northeast along the crest of Cataloochee Divide. From this height of 5,100 feet we watched clouds in the long distance drifting low, merging with deep haze and veiling the tops of the Plott Balsams, Mount Pisgah and Pisgah Ridge, and Mount Sterling.

This blue haze, which looks like smoke rising to the sky, gives the mountains their name. Except for treeless balds on isolated peaks, the dense vegetation of the valleys extends to the top of the highest spruce- and fir-covered mountains.

This section of the Appalachian Mountains astride the border of North Carolina and Tennessee, the highest mass in eastern United States, is too far south to have a true timber line.* Many of them tower a mile high; 16 peaks are more than 6,000 feet above sea level. Timber line in this area would not begin at less than 10,000 feet.

The trail narrowed suddenly, and we passed through a jungle of rhododendron, the first of hundreds we would see. Masses of dog hobble (*Leucothoe*), dense and intertwined with the trunks and branches of rhododendron, covered the forest floor. So thick was the growth that only occasional patches of sunshine lit bright-red partridgeberries growing along the trail.

Mountain Berries Ripen Late

The Smoky Mountains, we soon discovered, conceal surprises for those who venture off the park highways. From the quiet darkness of the jungle mass we emerged into the full sunlight of a meadow of goldenrod, sunflowers, purple and white asters, and vagrant butterflies. Ripe blackberries and blueberries dotted our trail; at lower levels the fruit had ripened several weeks earlier.

Leaving the crest of Cataloochee Divide, we turned northwest into McGee Branch Trail

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* See "Rambling Around the Roof of Eastern America," by Leonard C. Roy, NATIONAL GEOGRAPHIC MAGAZINE, August, 1936.

Blue Haze as from Fire Gives These Mountains a Name: the Great Smokies

Clingmans Dome, second highest mountain in eastern United States, is seen from Myrtle Point, top of Mount Le Conte (page 487). Unbroken forest stretches to the horizon; trees in this national park are never cut. Here the Government preserves frontier conditions of a century ago.

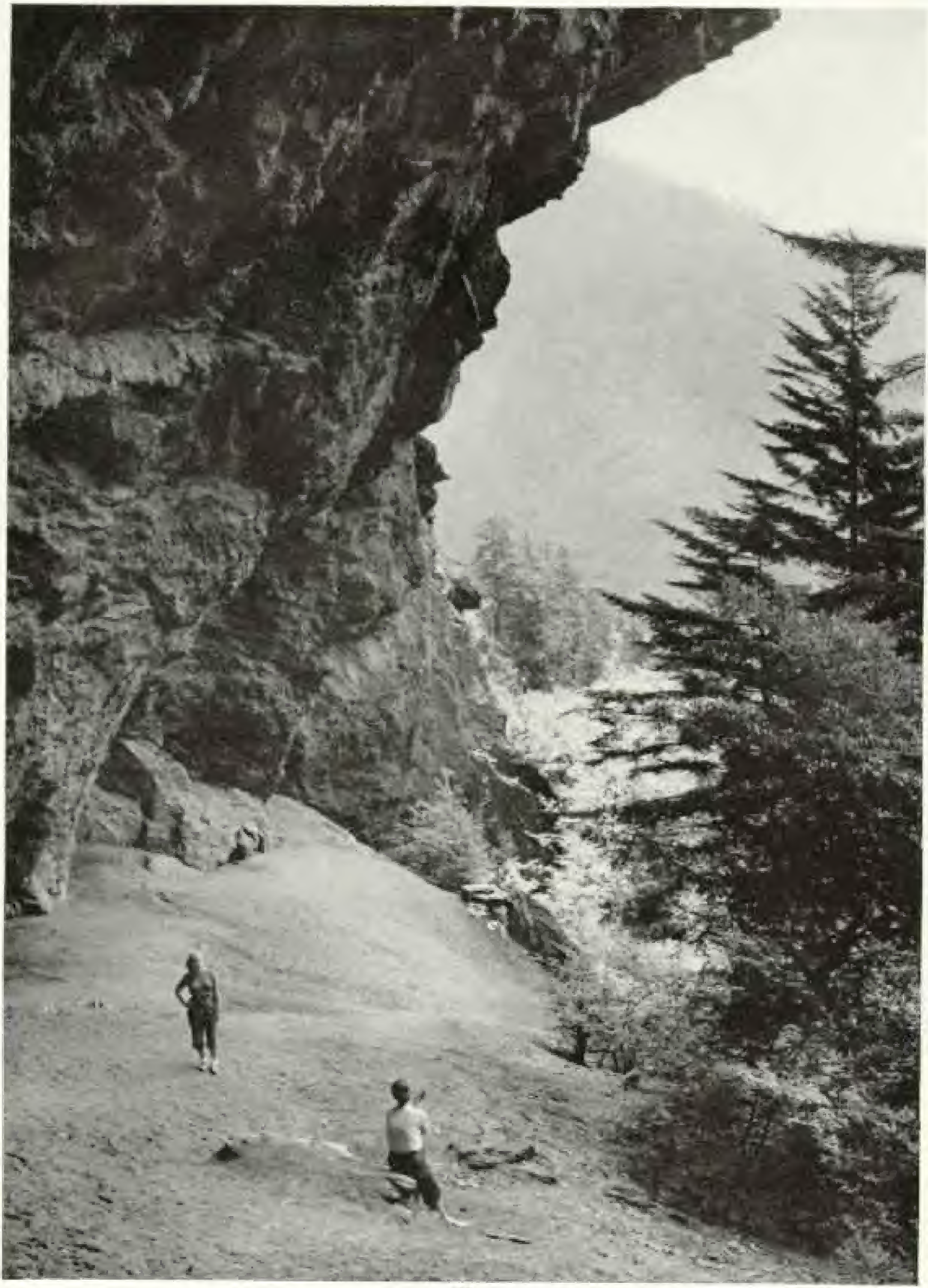
for the sharpest descent of our entire trip—2,000 feet in one hour. On the way down the lead horses seemed terrifyingly far below, and the tops of those tall trees still lower. I wondered if Ruby, like myself, was hanging on grimly to the saddle and praying that her horse wouldn't go over the side. Liz, who could ride a horse before she could write her name, seemed completely at ease, as did Genevieve just ahead.

In the quiet valley of Caldwell Fork we passed several abandoned cabins and houses. Mountain people had lived here years before the Government acquired the land for a park; but now the only signs of life were the clawed-off bark of apple trees whose ripe fruit had tempted bears. From off somewhere a ruffed grouse drummed in the loneliness.

Our first night's encampment was on Rough Fork of Cataloochee Creek, at the clearing of Old Woody Homestead, one of these empty houses. We tied up our horses, watched Sam start his fire, saw the gray smoke rise, and caught the tempting odors that rose with it. In no time at all Sam produced broiled lamb chops, mashed potatoes, peas, and buttered hot biscuits. Food never tasted better.

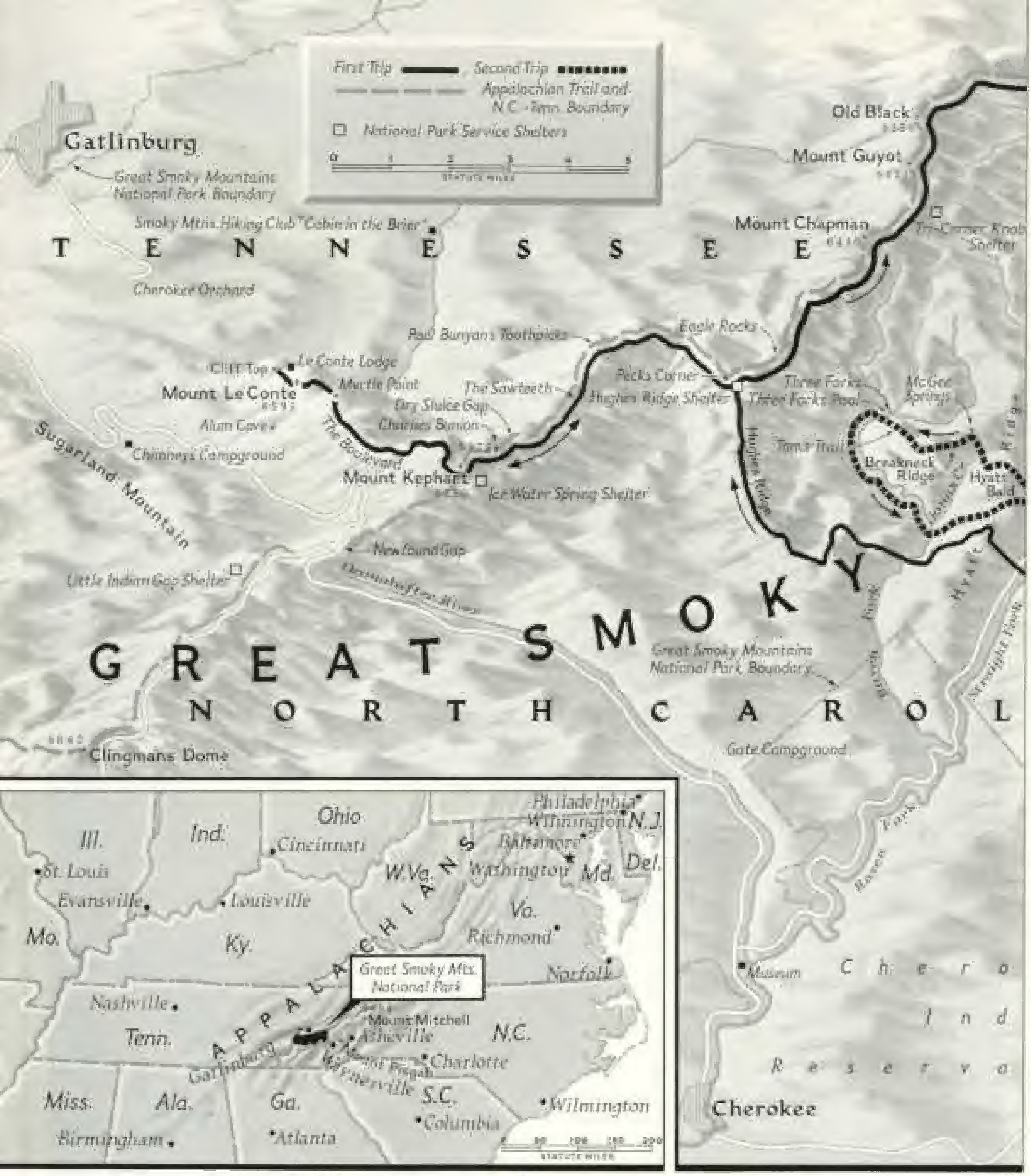
Sound Advice Blithely Ignored

Bob Sisson, an experienced camper, gave us good tips: Put on top of your duffel bag the things you will need in the morning; use your jacket for a pillow; above all, pick a good place for your sleeping bag; clear the ground of rocks and twigs, and get your air mattresses blown up before dark.



Hikers Rest at Alum Cave Bluffs, Halfway Point to the Top of Mount Le Conte

Many a lunch has been spread beneath this overhang, a popular picnic and observation spot. A white deposit coating sections of rock has the bitter taste of alum.


First Trip
Second Trip
Appalachian Trail and N.C.-Tenn. Boundary
National Park Service Shelters
0 1 2 3 4 5
STATUTE MILES
Gatlinburg
Great Smoky Mountains National Park Boundary
Smoky Mtns. Hiking Club "Cabin in the Brier"
TENNESSEE
Cherokee Orchard
Old Black
Mount Guyot
Mount Chapman
Tri-Corner Knob Shelter
Paul Bunyans Toothpicks
Eagle Rocks
Cliff Top
Le Conte Lodge
Mount Le Conte
6593
Myrtle Point
The Sawteeth
Pecks Corner
Hughes Ridge Shelter
Three Forks
Three Forks Pool
McGee Springs
Dry Sluice Gap
Charlies Bunion
Alum Cave
The Boulevard
Chimneys Campground
Sugarland Mountain
Mount Kephart
Ice Water Spring Shelter
Tom's Trail
Breakneck Ridge
Hyatt Bald
Hughes Ridge
Newfound Gap
Oconaluftee River
Little Indian Gap Shelter
GREAT SMOKY
Great Smoky Mountains National Park Boundary
NORTH CAROL
6642
Clingmans Dome
Gate Campground
Raven Fork
Straight Fork
Museum
Cherokee Indian Reservation
Cherokee
Ill.
Ind.
Ohio
St. Louis
Cincinnati
Philadelphia
Wilmington
N.J.
Baltimore
Del.
W.Va.
Washington
Md.
Evansville
Louisville
Va.
Mo.
Ky.
Richmond
APPALACHIANS
Great Smoky Mts. National Park
Norfolk
Nashville
Mount Mitchell
Tenn.
Asheville
N.C.
Gatlinburg
Mount Pisgah
Charlotte
Waynesville
S.C.
Miss.
Ala.
Ga.
Wilmington
Columbia
Birmingham
Atlanta
0 50 100 150 200
STATUTE MILES

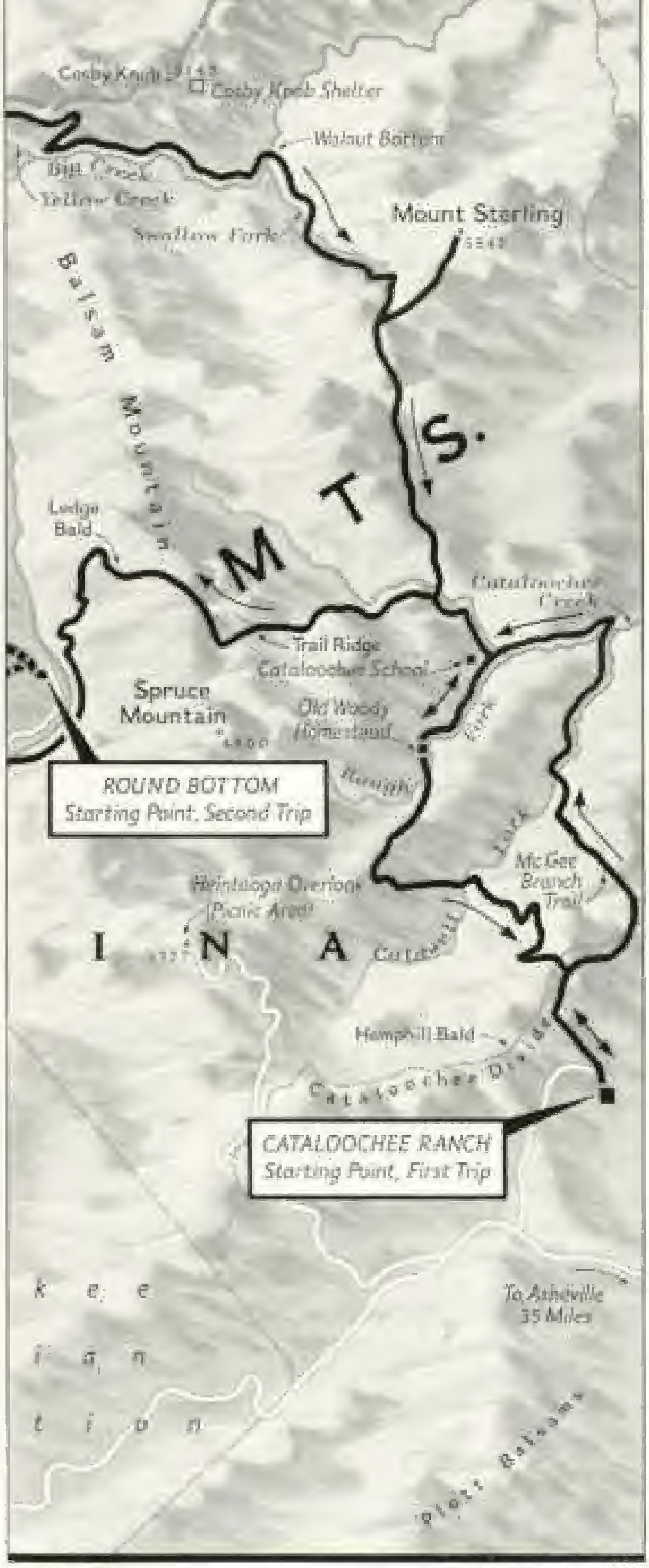
Great Smoky Mountains National Park Straddles the Crest of the Appalachians

Congress authorized the park in 1926; Tennessee and North Carolina deeded lands, and John D. Rockefeller, Jr., matched State funds. Now the park contains 508,446 acres, of which two-fifths remains virgin forest. This playground lies within easy reach of eastern city dwellers. Sixteen peaks rise above 6,000 feet.

This sound advice we all ignored. Liz and Ruby, bird and flower books in hand, disappeared around the bend of an inviting path, while the rest of us sat lazily around, listening to a near-by tumbling stream. After dinner we kept warm by a roaring fire, singing ballads and telling stories.

Then, by flashlight, Gen and I struggled to blow up our air mattresses, find our sleeping bags, and rummage through duffel bags for soap and toothbrushes. Gen couldn't find her blanket. "Here is one Florida cracker who'll sleep cold tonight," she said. We pulled our bedding close to the fire and tried to sleep.

But sleep outdoors does not come easily to one used to four walls and a ceiling. Now our walls were moonlit sycamores, tulip trees, and maples; our ceiling the stars.


Cosby Knob
Cosby Knob Shelter
Walnut Bottom
Big Creek
Yellow Creek
Swallow Fork
Mount Sterling
Balsam Mountain
MTS.
Ledge Bald
Cataloochee Creek
Trail Ridge
Cataloochee School
Spruce Mountain
Old Woody Homestead
Rough Fork
ROUND BOTTOM
Starting Point, Second Trip
McGee Branch Trail
Heintooga Overlook Picnic Area
I N A
Caldwell Fork
Hemphill Bald
Cataloochee Divide
CATALOOCHEE RANCH
Starting Point, First Trip
To Asheville 35 Miles
k e e
i a n
t i o n
Plott Balsams

A National Geographic Map

We watched a gypsying mist envelop a narrow trail near by and listened to unfamiliar night sounds—the splash of a stream over rocks, whinnying of our horses, and unexpected crackles of the dying campfire.

"About bears," Gen whispered. No one had mentioned bears. "I was in a camp one time, and we always kept tin plates by our sides to bang together. Scares them off and wakes up everybody to help."

Fine idea, we agreed; so we tiptoed among the sleepers to the "kitchen." With tin plates by our sides, we finally went to sleep.

The next morning, not far from camp, we came upon a one-story wooden building. Tom said, "That's Cataloochee School, the only active school in the park." We stopped for a visit (page 500).

Mildred Deal, who teaches first, second, fourth, and fifth grades in one room, invited us in. The children, seven healthy, happy youngsters, were shy, but pleased at this invasion of their schoolyard.

We admired their old-fashioned double desks and their crayon drawings above the blackboard. A potbellied stove in a corner provided heat. A second room in the back, with no panes in the windows, served as a recreation room on unpleasant days.

Black Bears by Hundreds

On the trail again, Tom pointed out bear markings—their droppings, logs clawed for grubs, and big tracks in the soft ground. Hundreds of black bears, protected in the park from hunters, range over the Smokies. Critical months for these animals are just before they hibernate, about Christmas. Then they must put on fat to last through the winter.

Many animals and birds, among them deer and wild turkey, have become scarce in the Smokies since the chestnut blight deprived them of a chief source of food.

From Trail Ridge, a climb of 1,500 feet in four miles, we could look across to Spruce Mountain. The patches of color on the mountainside, Tom told us, were laurel thickets. These almost impassable jungles, where bears like to live, are known to the mountain people as "woolly heads," "yellow patches," or "slicks."

The vastness was overwhelming. The Great Smoky Mountains National Park embraces 508,446 acres of forests, with 200,000 acres of virgin timber. In a few hours' climb horses carry their riders through sweet gums, umbrella magnolias, and shortleaf pines, common in our southern coastal States; then upward under maples, oaks, and hemlocks familiar in more northerly States, and finally into the stands of red spruce, fir, and mountain ash atop the highest peaks.

Temperature, sunlight, and shade often changed suddenly. Riding along the crest of Balsam Mountain, in the shadow of magnificent oaks, beech, and basswood, we kept on our jackets. But we hurriedly removed them when we emerged into the hot sunlight of Ledge Bald.

After lunch on a trail by a mountain stream we found a carved board which proclaimed "Round Bottom 2½ Mi."

"The lyingest sign in the mountains," Tom said. "It's a good four miles to camp." The sign was one of the more legible, however, for all over the park trail markers have been chewed and clawed by bears.

Round Bottom, former camp site of the Civilian Conservation Corps, lies on Straight Fork. Of the 653 miles of trails in the park, 90 percent were made between 1933 and 1942 by several hundred CCC boys. Some of these trails are four feet wide; others are merely suggestions that someone has passed through the forests. The Appalachian Trail crosses the park, following many of the highest ridges for 70 miles.*

It was raining when we halted, and Sam began cooking supper under an old shed; but Liz predicted the rain would stop—the jay she had heard meant clearing weather. The jay was right. The moon came out, and we went to sleep early, scorning the shed, home of numerous mouselike shrews.

Actually, one ran across my face during the night, and I never knew whether it got into my sleeping bag, because right then I established some kind of Smoky Mountain record for both sound and alacrity in emerging from that tightly zipped pouch.

When morning came, Ruby washed some clothes in the stream, hung them to dry, and struck out for a hike, for here we were to stop for another night. She took her nature walks at every opportunity, and they earned her the nickname "traipsin' woman."

A swim in the icy-cold water, followed by a walk, gave us a fine appetite for supper—fried chicken, rice, gravy, string beans, and hot corn bread.

The next morning we were awakened by Sam, who was removing the now dry underclothes Ruby had draped around yesterday's fire. "Ain't never seen nothin' like this in these woods," he said to no one in particular. "Now, was they *boomers* I'd know what to do with them."

Boomers Go Faster than Lightning!

"What's boomers?" we asked, and Glenn answered for him. "A boomer is the fastest little varmint in the mountains, kind of a red squirrel. Hit goes so fast that if lightnin' strikes the top of a tree whar a boomer is, the boomer can beat it down to the ground, look back up, and say 'Hit's split!' "

He was right about their speed. Boomers were all over the mountains, and Tom, Glenn, and Sam saw them frequently, but I saw only where they had been.

I did see red crossbills, though. A flock of them flew in to take possession of our camp at Round Bottom before the pack horses were loaded. Sam told us that, because they used to swarm around and feed on salt licks provided for cattle, the mountain people call them "salt birds."

Our next overnight stop was to be at Pecks Corner. "If you forgot anything, you can probably get it there tonight," Tom reassured us. "Nice little country store."

During the morning's ride we passed through a low gap to Raven Fork of the Oconaluftee.

A Taste of the Wilderness

"Over to your right," Tom said, as we forded Raven Fork stream, "is the most beautiful part of the Smokies. It's the real wilderness area of the park. Trails that used to lead in there have been closed off for 15 or 20 years and no horses are allowed. People can go in, of course, if they can get in" (page 489).

The hardwood trees of Hughes Ridge gave way suddenly, about a mile from the camp site at Hughes Ridge Shelter, near Pecks Corner, to dense spruce and balsam, with a forest carpeting of moss, fern, and thick oxalis, or sheep sorrel. At a higher elevation hobblebush grew under the spruce and pine.

Pecks Corner, 5,700 feet high on the Appalachian Trail, proved to be miles from any roads or country stores. The joke was on us women, because we had cleaned up especially for a momentary brush with civilization.

The water at Pecks Corner contains sap from balsams and is sometimes harmful to horses; but it is fine for bears, I was told. One came to our camp that night—a friendly black cub, begging for food (page 483).

Later our flashlights picked up the dark outline of two grown bears making their way up a path from the spring. That night we were careful to have tin pans within easy reaching distance.

Mount Le Conte, with its promise of spectacular views of sunset and sunrise, was our next destination. Since we would stay that night at Le Conte Lodge, Sam and Glenn remained at Pecks Corner to "take care of the bears and pack horses."

From Pecks Corner our trail led once more into a spruce and balsam forest called Paul Bunyan's Toothpicks. For me these quiet, high, dark forests with their soft, mossy, uncluttered floors are the most beautiful in the Smokies. Under the spell of their shadows the ancient Cherokee belief in "Little People," their *Yunwi Tsunsdi*, seems credible.

These kindly, pretty, child-sized people, with hair falling below their knees, lived near the tops of the highest mountains, the Cherokees thought. They passed most of their time dancing and beating tiny drums. Sometimes they worked at night for good

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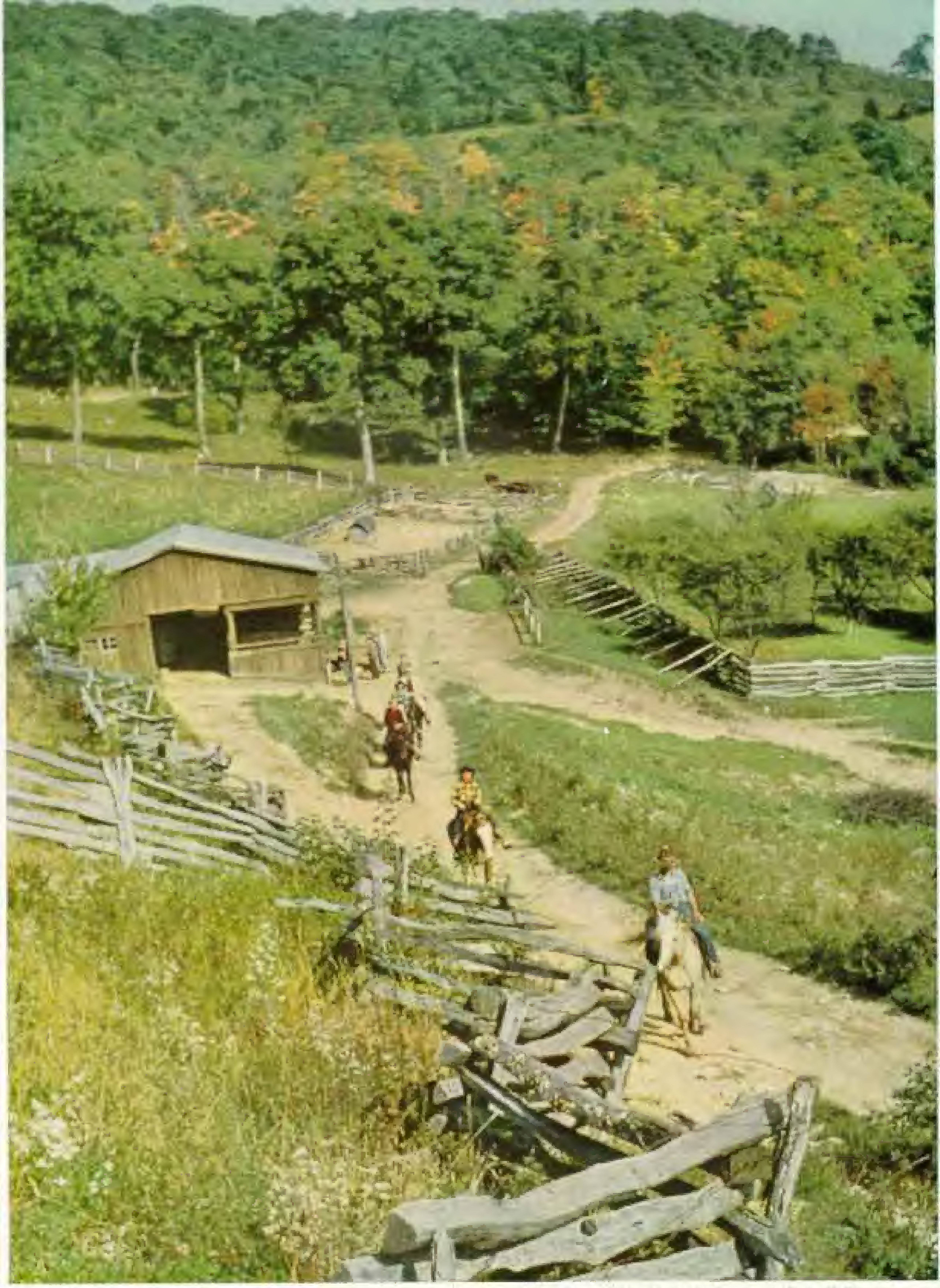
* See "Skyline Trail from Maine to Georgia," by Andrew H. Brown, NATIONAL GEOGRAPHIC MAGAZINE, August, 1949.



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Kodachrome by National Geographic Photographer Robert F. Sisson

Trail Riders Start a 10-day Adventure in Great Smoky Mountains National Park

Campers leaving mile-high Cataloochee Ranch, near Waynesville, North Carolina, include some city people astride horses the first time. Their guide (foreground) knows every path in the Smokies. Pack horses have gone ahead.

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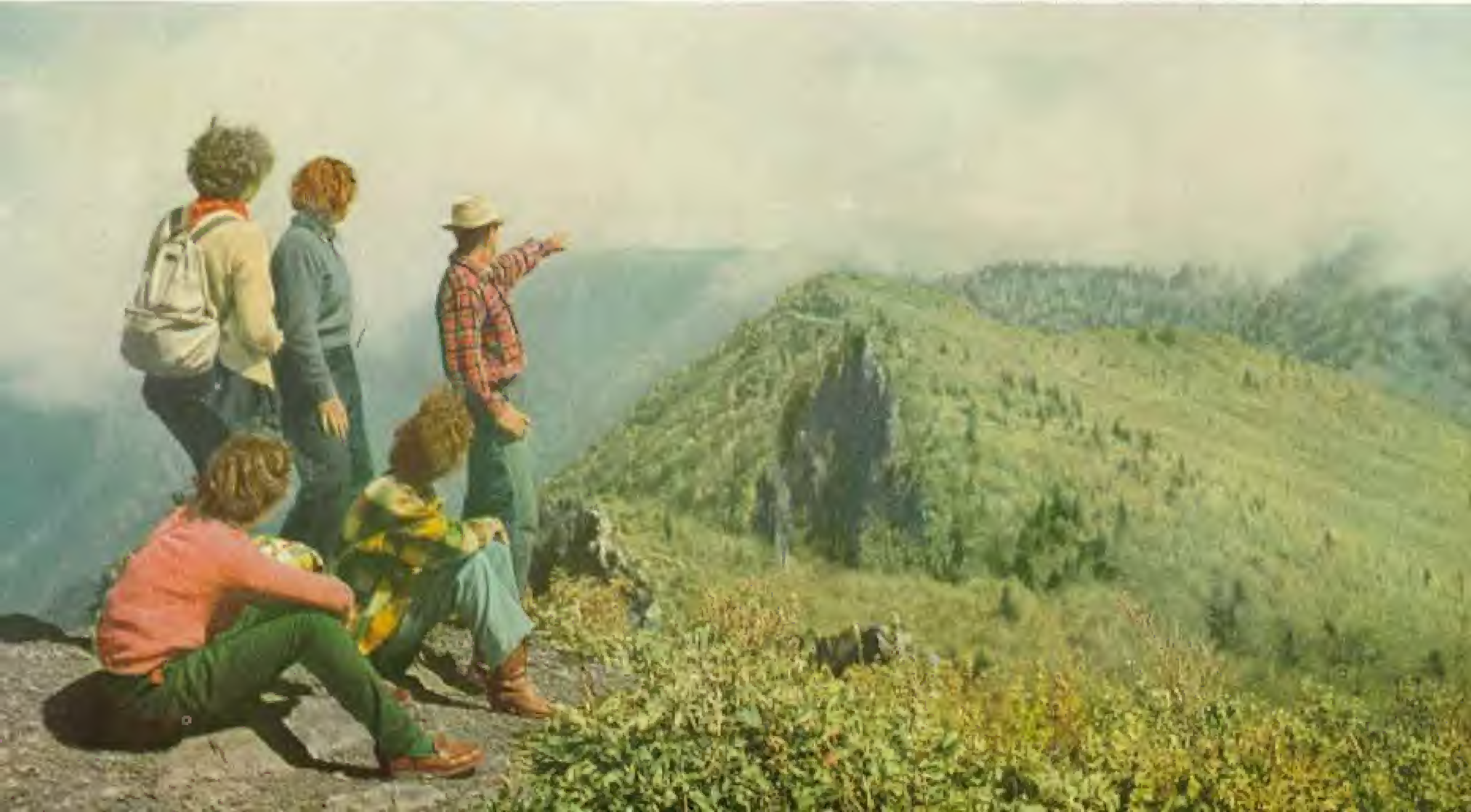
▲ Bare Summits of the Smokies Are Called Balds. Stands of Virgin Timber Give Way to Grassy Glades

Indian axmen, cattlemen, or winds? Who or what caused those mountaintop clearings in which riders suddenly break into sunlight? No one has explained the mystery to everyone's satisfaction. Hemphill Bald is not a typical one, as its top was cleared for pasture in comparatively recent times.

▼ Thomas W. Alexander, leader of the pack trip, points out the afternoon's route through the haze that named the Smokies. He stands on Charlies Bunion, a peak named for a fabulous, footsore guide. Fire has left the summit bare.

Kodachromes by National Geographic Photographer Robert F. Sisson



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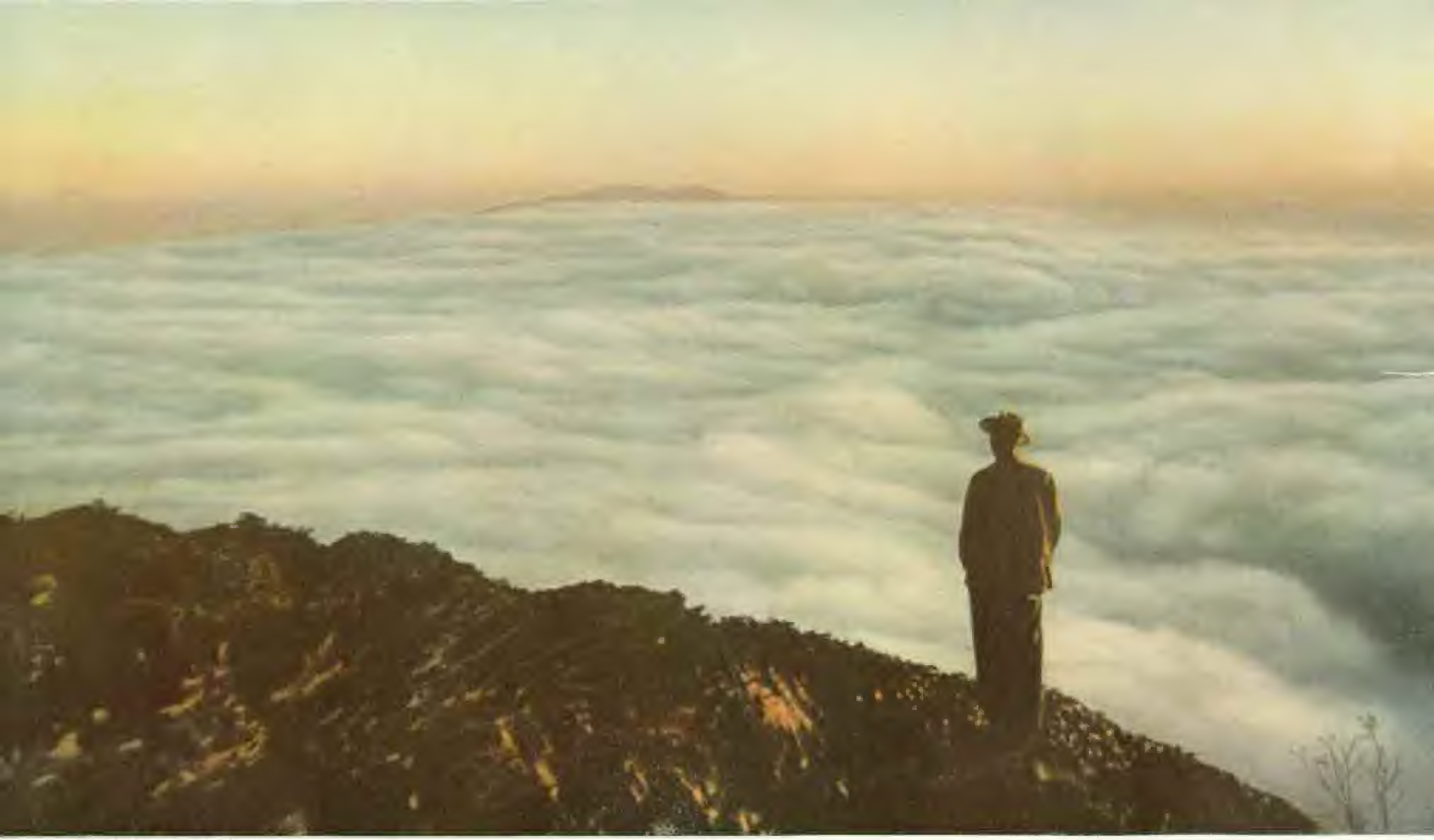
↑ Lungs Expand, Spirits Soar on Top of the World

Knowing where breathtaking views may be found beside tree-tangled trails, Mr. Alexander plans rest periods to take advantage of such vistas. These girls survey a misty valley a few feet off Eagle Rocks on the Appalachian Trail.

→ Glenn Messer's lunch-packing horse brings up the rear of the caravan.

↓ This fearless cub visited camp one night, begged scraps of bacon, and had his picture taken. Blinded by the photographer's flash, he bounded off into the night. The campers following, were startled when flashlights silhouetted two grown bears.

Kodachromes by National Geographic Photographer Robert F. Sisson



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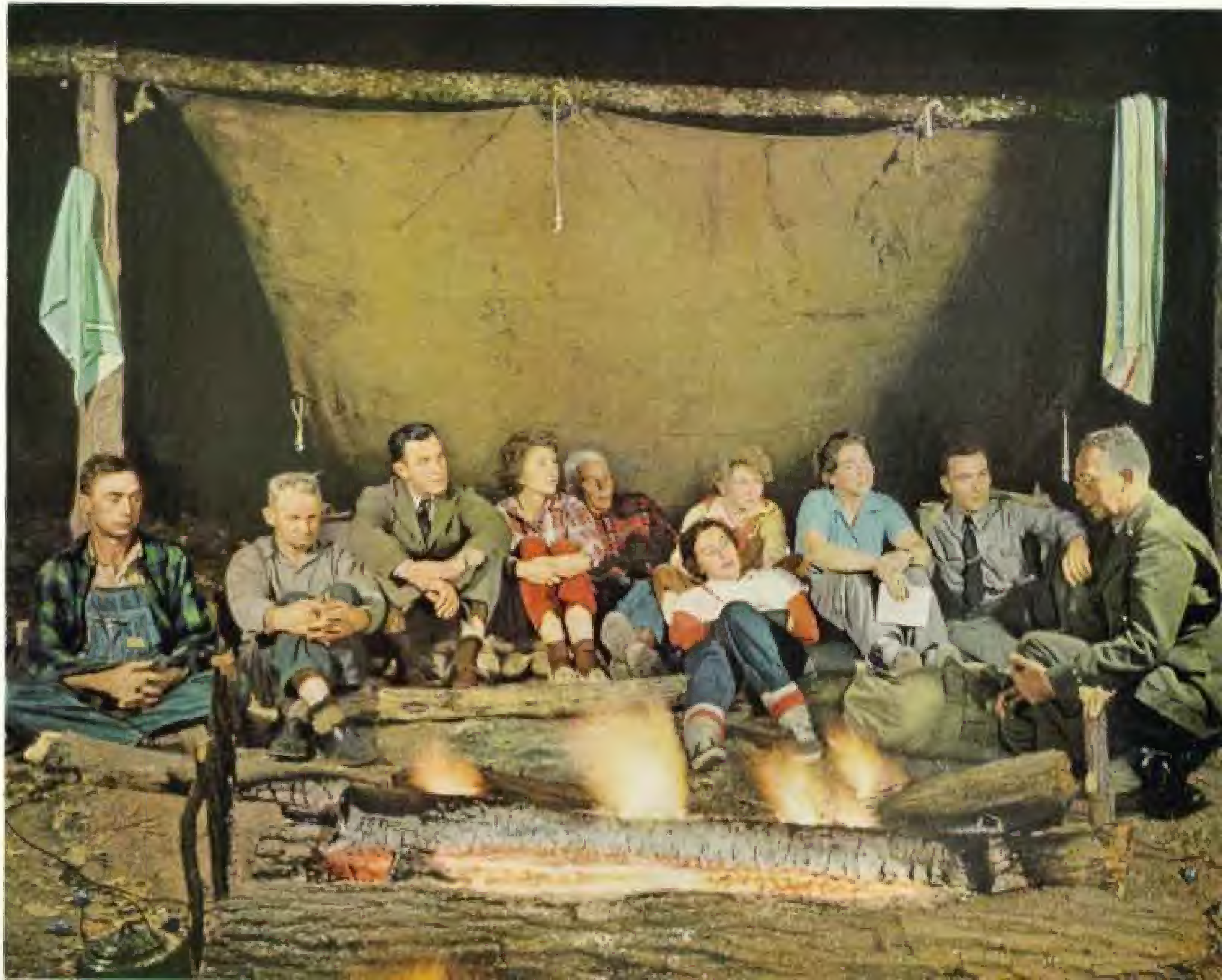
Clouds Banked Like Snow Seem to Offer a Cushiony Bridge from Mount Le Conte to Clingmans Dome

No road leads anywhere near Cliff Top, Le Conte's grandstand view into space. Those who would see a sunset like this must climb by foot or horse. At this instant night had fallen in Gatlinburg, Tennessee, more than 5,000 feet below. Now and then a hole in the cotton showed town lights blinking.



A Naturalist Recites the Park's Wonders by Campfire's Light

It was a dark and threatening night in Walnut Bottom, and the riders stretched a tarpaulin as shelter. Arthur Stupka (right), naturalist of the 508,446-acre Great Smoky Mountains National Park, began his talk to visitors eager to understand what they had seen.

"The Smokies," he said, "represent the greatest mountain mass east of the Rockies. They get more rain than almost any section east of the Pacific Northwest; some spots may catch 100 inches. Here survives the main remnant of a magnificent hardwood forest. Certain forest trees in the Smokies attain a size not reached by the same species anywhere else in America.

"The park has three life zones. By climbing a vertical 5,000 feet, you can observe life changes existing across 1,200 miles of latitude—from Georgia to southeastern Canada."

Kodachrome by National Geographic Photographer Robert F. Sisson

© National Geographic Society

Kodachromes by National Geographic Photographer Robert F. Sisson

↑ **Fording Raven Fork, Everyone Soon Got Soaked to the Knees**

Here thousands of acres are set aside as eternal wilderness. Streams are clear and cold, but none is lovelier or harder to follow than Raven Fork. When the hikers did not jump from rock to rock, they crawled through rhododendron jungles along the banks.

↓ **Lazy Hikers Hate to Leave Three Forks Pool's Campfire**

Breaking camp takes little time once breakfast is over. As wilderness hikers have to carry their gear, they hold everything to a minimum. Sleeping bag, soap, toothbrush, handkerchief, jackknife, flashlight, and a change of socks are all a girl needs.

people; and always they led lost Indian children home.

We had been warned about the Sawteeth, but the admonition was unnecessary. Tom had already pointed out that the Appalachian Trail traverses the sharp mountain crests, whose drop off on both sides is thousands of feet.

No one talked much on this ride; we were busy holding reins and watching our horses' footing. Sometimes the way led up almost perpendicular sides; sometimes it wound among the rocky teeth. This part of the trail weaves between two States and sometimes marks the dividing line between Tennessee and North Carolina.

Still on the Appalachian Trail, we passed Dry Sluice Gap and tied up our horses for a climb to Charlies Bunion. This peak, a mass of solid rock, is startling in contrast with the heavy forests and dense growth all around it. Many years ago a fire stripped it of vegetation, and the soil washed away (page 481).

The trail from Charlies Bunion is deceptive. In places it is a high ledge where trees and underbrush hide steep drops of 1,500 feet from unobservant riders or hikers. At one such point Gen's pack dropped from her saddle. She dismounted, as any of us would have done, to pick it up. One look at Tom's intense face alerted us to the danger. But her horse stood quietly, she remounted safely, and our string passed the ledge. "I just didn't want to have to go back and have Tom think I'm a sissy," Gen said later.

The Boulevard: Watch for Traffic

A little later Tom told us we were approaching the Boulevard. He advised us to stay well off the roadside because the horses, unused to fast-moving motor traffic, might become frightened. Pecks Corner should have prepared us, for the Boulevard sign, where we left the Appalachian Trail at Mount Kephart, turned out to be only another bear-clawed marker pointing a narrow trail to Mount Le Conte nearly five miles away.

Heavy fog closed in on the Boulevard. We rode along in silence through dense clouds, scarcely able to see the switching tail of the horse ahead or the face of the rider just behind us. The steep, winding trail became a narrow rocky ledge, shot from the side of Myrtle Point, Le Conte's eastern overlook.

With the exciting feeling of being momentarily suspended in space, I called back jokingly to Liz, "What does the Sawteeth have that this hasn't?" Liz, holding tightly to the reins, tense, alert, leaning slightly toward the wall and ready to jump, was in full control of her horse. Only a foolish beginner would have turned to look back on that ledge, I quickly realized.

"Camp" for the night was Jack Huff's lodge near the top of Le Conte, its cabins inviting with comfortable beds and roaring fires, its manicured lawn warm in unexpected sunshine. With sudden enthusiasm to watch the sunset, we climbed to Cliff Top, 6,593 feet above sea level, Le Conte's other vantage point. To our left a white churning sea of wind-charged clouds hid the valley; the bright red of the sunset flamed on the clouds over Clingmans Dome, purple in the distance, and threw a delicate glow to the dark green of Sugarland Mountain (page 484).

A Hurricane Leaves Its Mark

After a good night's sleep and a breakfast that would have done credit to Little Black Sambo, we said good-bye to our pleasant hosts at Le Conte and started down the Boulevard in bright morning sunshine. Sam and Glenn welcomed us back to Pecks Corner and told us that a trail crew had been by, clearing away damage caused by a hurricane several weeks before.

The next morning, riding over the crest of the Smokies on the Appalachian Trail, we passed the worst of the hurricane damage at Mount Chapman and between Mount Guyot and Old Black. The hurricane, rare in the Smokies, had ripped through Florida, followed the State line between Alabama and Georgia, then reversed itself, so that the tag end had hit the Smokies from western slopes.

Where it had struck, destruction was complete. Huge trees, stripped of bark, were strewn about the mountainsides. Other trees, without room to fall, leaned against each other. Forest undergrowth, accustomed to shadow, was startlingly exposed in the bright, open sunlight.

Nature, having shown her ruthlessness, demonstrated her prodigality in the high balsam forests of Mount Guyot. Growing among fern and moss were hundreds of young balsams, fighting for sunlight and survival. Frequently birch and spruce with an affinity for each other grew together, their branches forming twisted patterns across the trail.

We stopped for lunch along the "old burns" (fire-scorched land) of the Big Creek watershed where red fire cherries, rose-purple huckleberry bushes, and yellow birch trees flashed their fall colors. Just before Cosby Knob the pack train pulled ahead of us, and there we left the Appalachian Trail and turned toward Yellow Creek and a two-nights' camp at Walnut Bottom.

Purple ironweed, foamflower, lady's-tresses, and blue lobelia grew around this pleasant camp, as well as the more familiar goldenrod

Mountain Orchestra Warms Up for a Square Dance at Cataloochee Ranch

Fiddler Cal Messer (center), who loves old-time ballads, sometimes walks five days a week just to play and sing at parties. He is the composer of "Whoa, Ebenezer, Whoa" and "I Got One Old Hat" (page 489).

and asters. But flowers which had bloomed earlier and were now in the "fruit" or berry stage were my favorites.

Barred Owl Joins Campfire Chatter

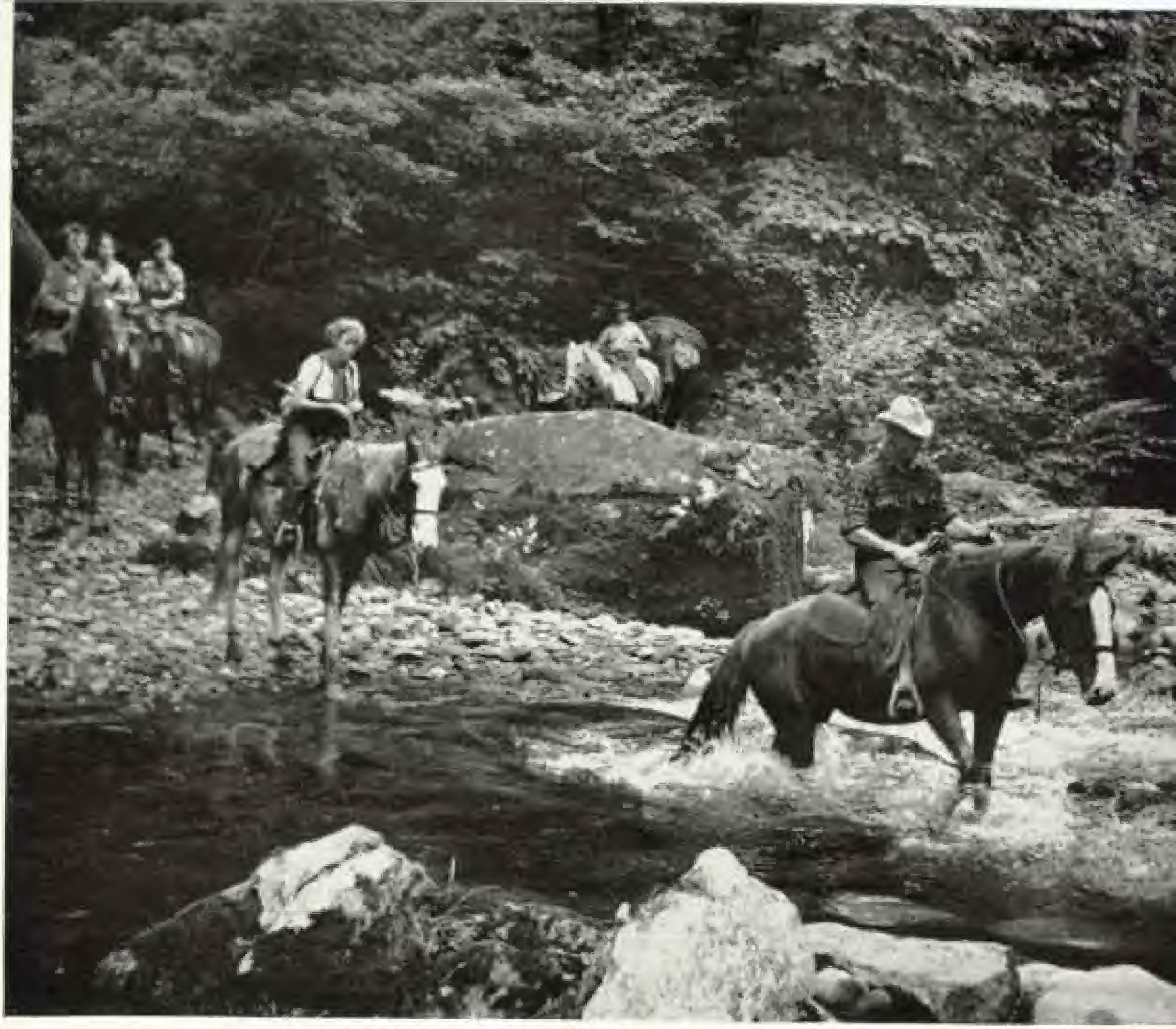
Arthur Stupka, the park naturalist, Ralph K. Shaver, ranger, and Donald Pfitzer, ranger-naturalist, joined us for supper on our last night at Walnut Bottom (page 485). Into our campfire conversation broke the mournful hooting of an owl. Mr. Stupka identified the bird as a barred owl. The horned owl usually is found only at lower altitudes.

In the valleys and at lower elevations live wood thrushes, Carolina wrens, and robins; among the hardwoods of the middle levels, ruffed grouse, hawks, and owls; and at the top, among the spruce, mountain ash, and yellow birch, are northern ravens, veeries, and juncos.

Every year during Christmas week the park makes a census of winter birds. On a one-day count, 56 kinds were identified. More than 200 species of birds live in the immensities of the Great Smokies.

In the morning we rode through ascending mists along Swallow Fork and in the early afternoon reached our last camping ground on the top of Mount Sterling. Heavy fog obscured an exceptional view from the fire tower, but only Sisson minded. We threw our sleeping bags on soft spongy moss, and wandered through the "smoke," picking blueberries and blackberries for supper.

On our last day's ride we stopped for lunch at Rough Fork of the Cataloochee, site of our first night's camping ground. Our route home on the trail which had been so hidden in mist now lay open and appealing in the sunlight and warmth of goldenrod and asters. We entered a wild virgin forest and rode in the shadows of giant silver bells, tulip poplars, white oaks, hemlocks, buckeyes, sugar and red maples. Bear markings were everywhere; hundreds roam that one wild forest. Glenn claimed he could smell them.



Tom Alexander Plunges into Raven Fork; Ruby Bere Follows Gingerly

Close to these riders lies an extensive wilderness area whose tangled trails have virtually closed it to mounted parties for the last two decades.

"Mountain boys leave here," Tom said, "and go to work in factories in Baltimore, Philadelphia, and Wilmington, or on ranches out West. But almost always they come back home, saying they couldn't drink the water." We could understand how anyone who had grown up in these mountains would find it difficult sinking roots in other ground.

Few Park Visitors Forsake Highways

Last year 1,945,100 people visited the park. Of these only a few thousand left the paved roads to go into the woods. These mostly were on conducted hikes of short duration. "About 99 percent of the people who come here see only 5 percent of the park," Tom estimated.

We were welcomed back to the ranch with an old-fashioned Smoky Mountain square dance. Friends of the Alexanders, town people from Waynesville and mountain people from the hills, had come from miles around. Between vigorous sets, Cal Messer, mountain fiddler, sang for us his own charming "song ballads." The "hoot-e-nanny gathering" provided a fine farewell for Ruby, Gen, and Liz, who were leaving early in the morning (page 497).

My curiosity about the closed wilderness area and desire to see it for myself held me at Cataloochee Ranch. Bob, too, stayed over, for Tom had promised that within three days he would take us in. By that time, weather reports indicated, a threatened storm would have cleared away. Meanwhile, there was Cataloochee Ranch to enjoy—and the Cherokee Indian Fair.

The fair, with its midway, exhibits of farm animals, home sewing, canning, and farm produce, was like a country fair elsewhere in the United States, but with an Indian accent. It is held annually on the grounds of the Cherokee Indian Reservation, at the southeastern edge of the national park.

Today only 3,000 Indians who form the Eastern Band of the Cherokee Nation remain to preserve as a distinct national unit their once powerful race. They are the descendants of those Cherokees who in 1838-39 fled deep into the Smoky Mountains to escape the forced westward removal known now as the Trail of Tears.*

Red Indian potatoes, strawberry popcorn, and native flour corn, bright beans for bread, and the largest pumpkins and snap beans I have ever seen vied for attention among the agricultural exhibits. Some of the beans were dried and strung together in the old mountain custom to make "leather britches" (page 495).

Hand-carved wooden figures of farm and wild animals, and baskets woven of white-oak splints and honeysuckle dominated the arts and crafts displays. Some Indian women showed how these baskets are made; others worked at their looms and spinning wheels, or fashioned bright beaded bracelets.

At the singing contests I was intrigued by alternately loud and soft chanting in the ancient Cherokee tongue and by unexpected minor notes. Faces and lips of the singers were strangely motionless, for in singing as in speaking Cherokee, the lips never close.

We watched young Indian boys perform their Eagle Dance (page 495), and brightly dressed elderly men and women chant and dance their ancient Quail Dance. Then, in startling contrast, we saw a violent game of Indian ball.

Hard-boiled Arrowheads!

Ameneta Sequoyah, who finished second in the archery contest, let us examine his bow and arrow. When the wooden arrow point has been boiled a half hour, he explained, it becomes hard enough for hunting. His bow and arrow still bring down quail.

Seventy-year-old Jim Catolster, who hunted with a blowgun as a boy, demonstrated that he has not forgotten this ancient art. Antedating the bow and arrow, the blowgun is made of a stalk of river cane, the joints smoothed and hollowed. The locust-wood dart, forcefully blown through the gun, is feathered with thistledown (page 494).

Vegetables and fruits are major crops of the modern Cherokee, and since World War II tobacco also has been a cash crop. But Joe Jennings, reservation superintendent for seven years, told us of another source of income, called "chiefing." Indians who "chief" stand in front of the numerous handicraft and souvenir shops by the roadside and provide local color for tourists.

"We lost one of our best Sunday School superintendents all last summer because he started 'chiefing,'" Mrs. Jennings remarked. "Sunday is one of our best tourist days."

Back at the ranch we planned our trip into the wilderness area. Tom, Glenn, Bob Sisson, John Bradley, a forester from Birmingham, Alabama, and I would go by car to Round Bottom. Pack horses, brought by truck to that point, would carry our food and equipment up the mountain toward Breakneck Ridge, our jumping-off place.

"The Forest Primeval"—25,000 Acres

At Walnut Bottom Mr. Stupka had told us something of the wilderness. In the national park there are 22 major watersheds, equally divided between Tennessee and North Carolina. One of the more inaccessible watersheds is the Raven Fork area. Some 25,000 acres here were selected to remain forever free of any development. About 15 years ago the trails were allowed to grow over and even horses were barred.

"It is not a closed area," Mr. Stupka had said. "But because of its isolation and the fact that no roads come close to it, the impact of numbers of people will be eliminated.

"In the years to come, American people, particularly scientists, will have the experience of seeing original wilderness conditions. We hope people can say five hundred or a thousand years from now, 'There have been changes, but not here.'"

Extra shoes, jeans, and shirts, carried in duffel bags on the pack trip, were left behind for our walking expedition into the wilderness area of the Smokies. We took with us only essential personal items—a sleeping bag, minus air mattress, and a small back pack with comb, toothbrush, handkerchief, jackknife, flashlight, and a change of socks. To the amusement of my companions, I also found room for a lipstick and a compact.

From Round Bottom up the slope of Hyatt Ridge and nearly to the top, a climb of about 2,000 feet, one of the pack horses carried all our food and packs, and the other carried me. Tom insisted on this, and while I felt rather overly protected, since everyone else was walking, I appreciated his decision later.

As we climbed, we passed through groves of beeches and up into the northern hardwood belt. The song of a pine warbler heard

* See "Indians of the Southeastern United States," by Matthew W. Stirling, NATIONAL GEOGRAPHIC MAGAZINE, January, 1946.

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Kodachrome by National Geographic Photographer Robert F. Sisson

Spring's Rhododendron Blossoms Overhang Mountain Trails >

A 15-foot-high arbor shelters these girls on Alum Cave Trail, their route to the summit of Mount Le Conte.

↑ Rain-soaked Hikers Dry Out in a Bower of Mountain Laurel

Photographer Sisson, having pictured the Smokies' autumn foliage, returned the next June to capture the spring show. Accompanied by four Gatlinburg residents, he set out for Thunderhead Mountain. There one of the girls, sitting above a rock crevice, discovered a rattler inches below her. A cudgel flattened the snake.

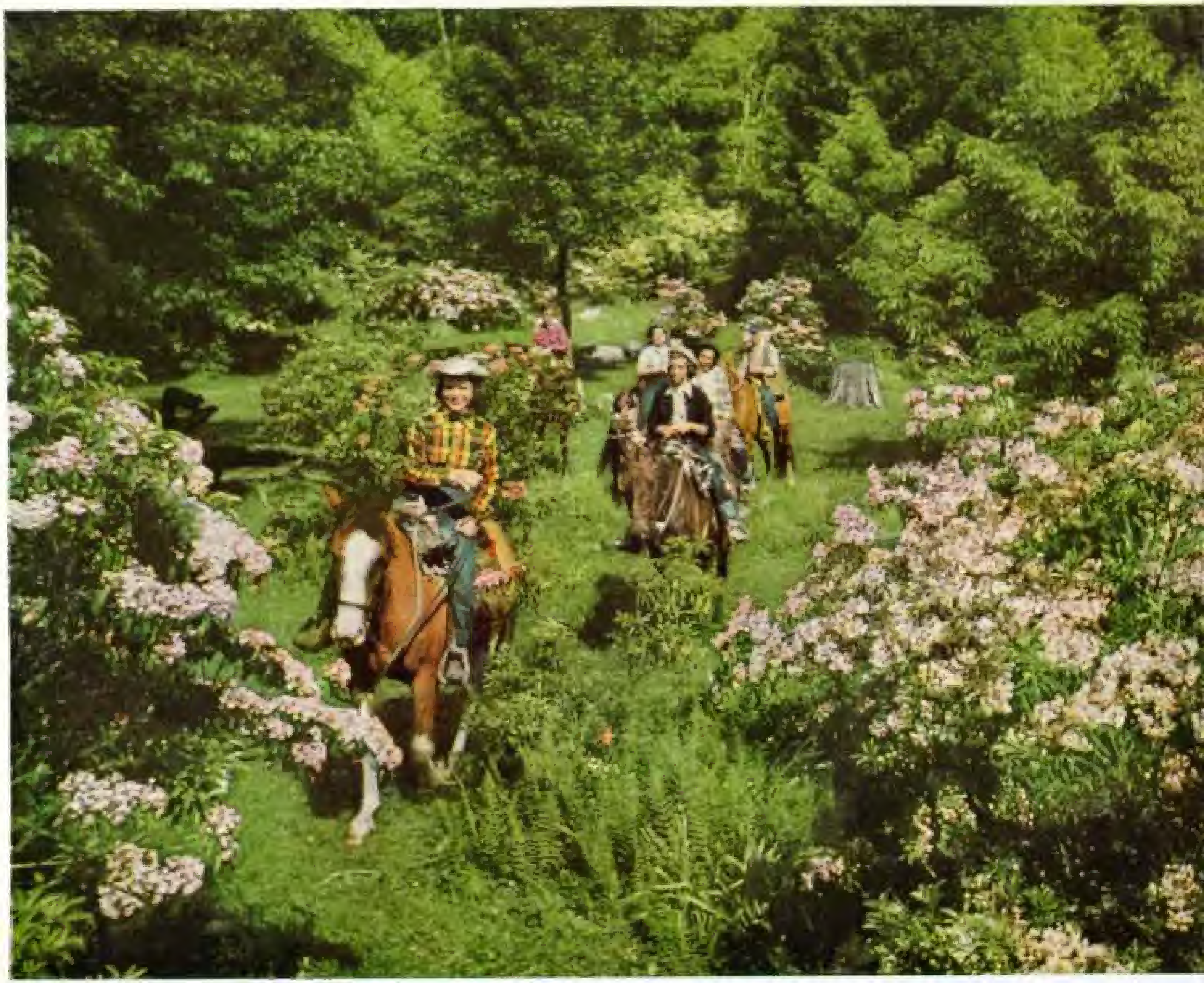
Retreating, the hikers met a bear. It charged the camera but harmed no one.

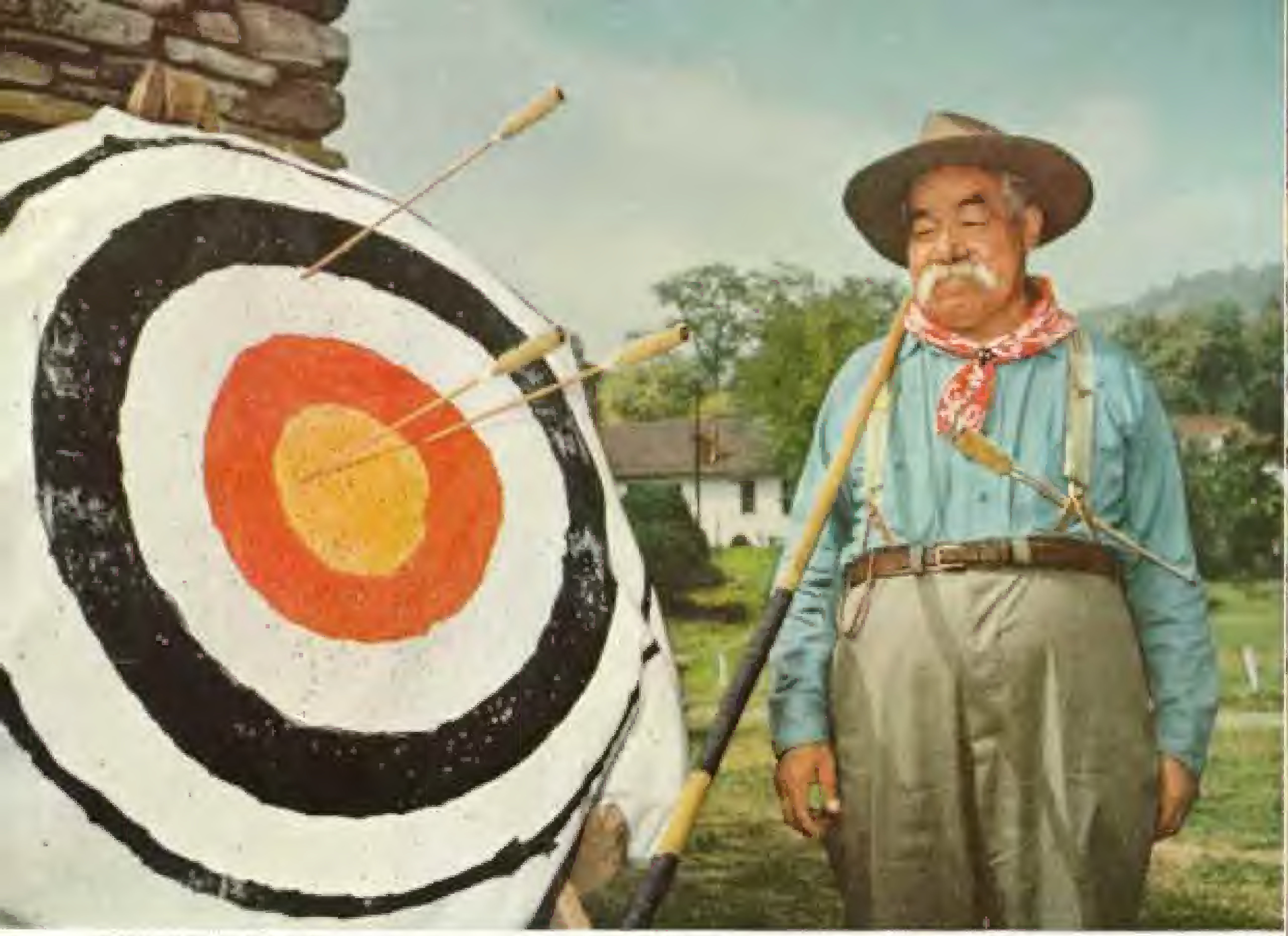
Nothing, however, could save the hikers from drenching when rain came pouring down. A half hour's run brought them to this shelter. They were drying socks when the sun broke through.

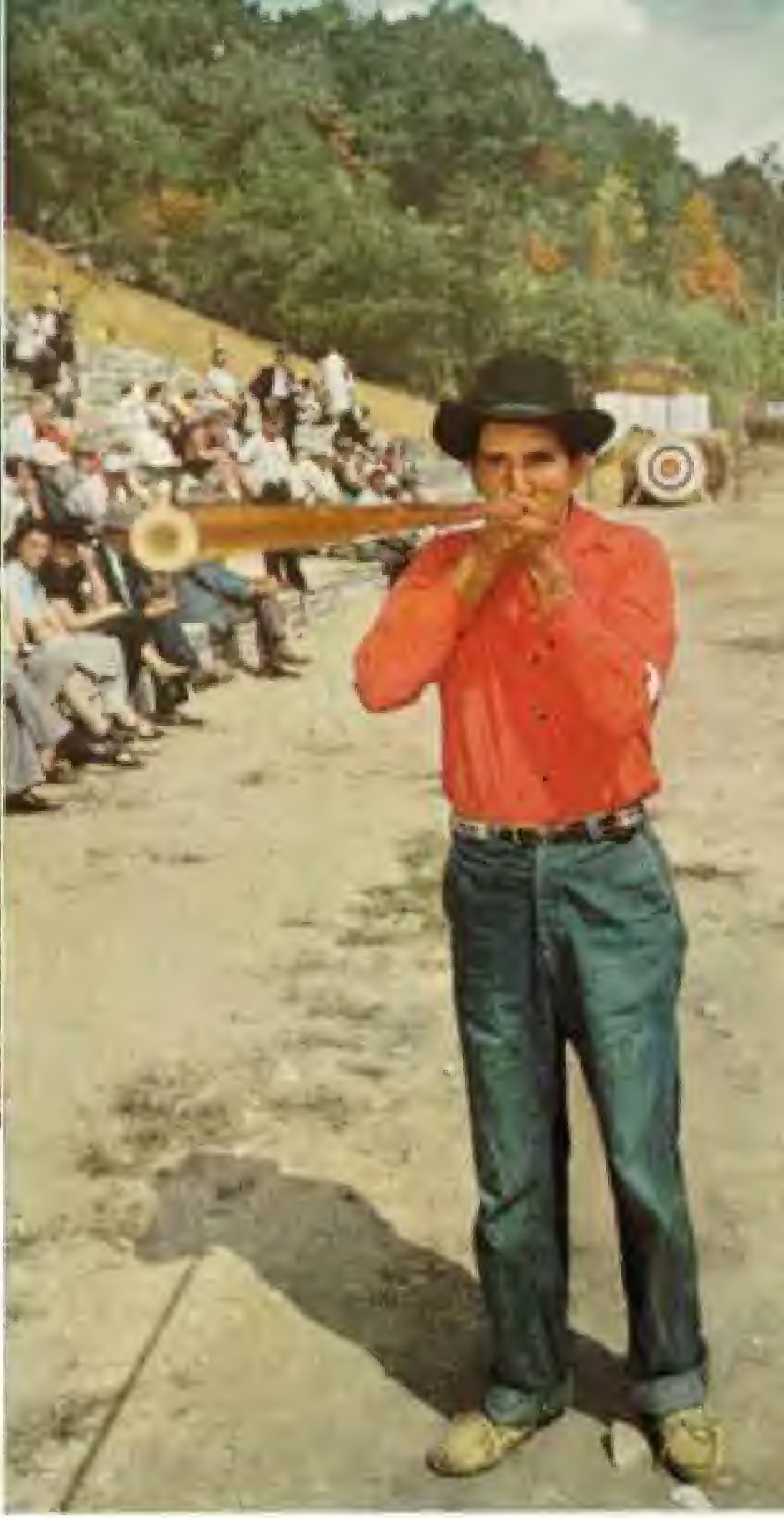
→ Laurel Brightens the Trail Home

Judy Alexander leads the caravan back to Cataloochee Ranch through a section which her parents call "the wildflower garden." Born in the Smokies, she knows the woods almost as well as her father, Tom Alexander, and when he's away she organizes and leads expeditions. Judy became a licensed guide when she was 13 years old.

Kodachromes by National Geographic Photographer Robert F. Sisson







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Indians Demonstrate Skill with Blowguns at Cherokee Reservation's Fair

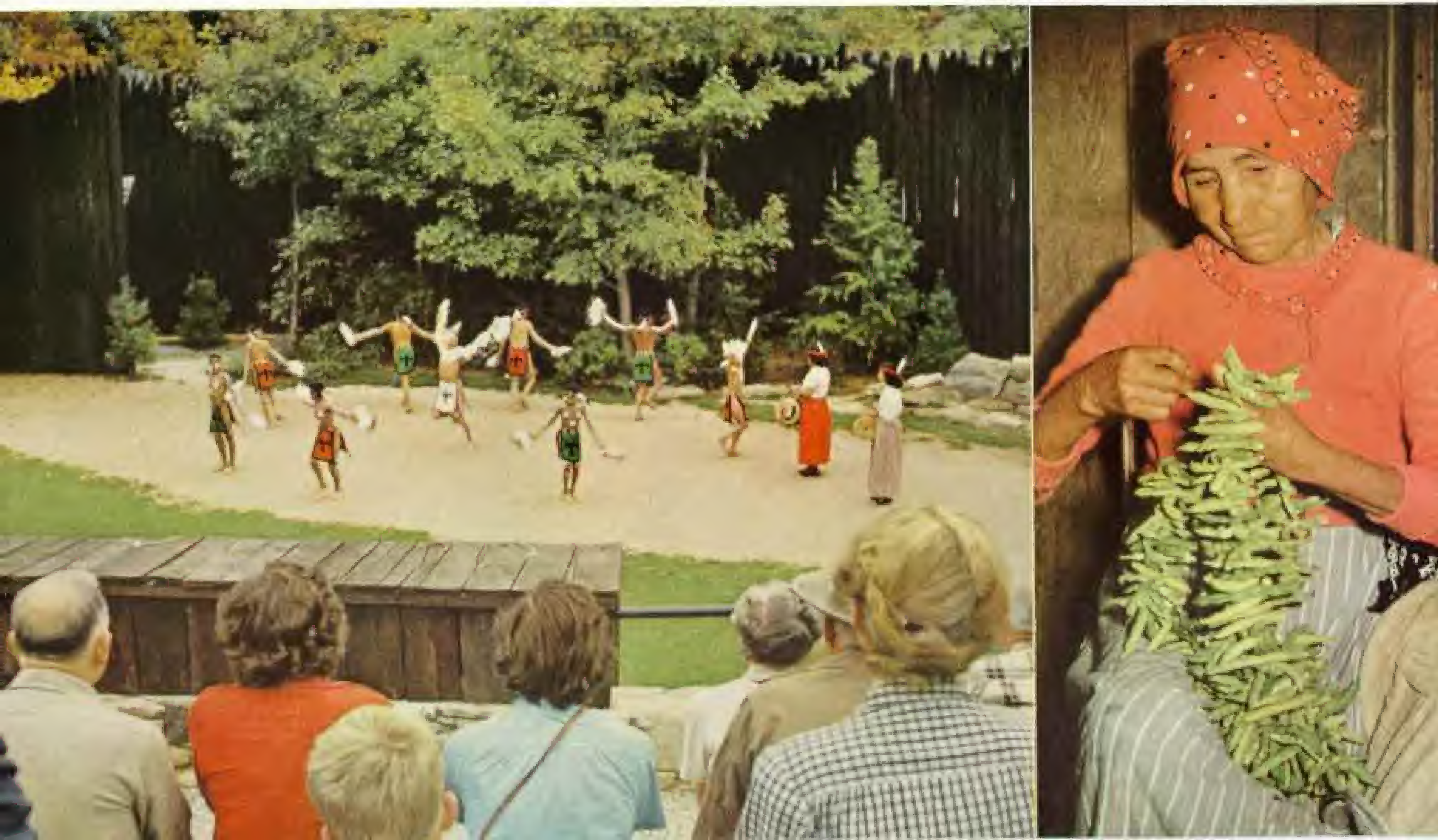
Three thousand Eastern Cherokees trace descent to the thousand or more who fled into the Smokies rather than suffer removal to the West in 1838-39. Four thousand of nearly 17,000 died as a result of the trek known as the Trail of Tears. Most of those left behind endured a century of hardships. A road cut through Cherokee Indian Reservation in the 1930's brought prosperity. With visiting motorists came a new vocation called "chiefing." Now roadside "chiefs" dress up in feathers and war paint and, for a price, pose for photographs.

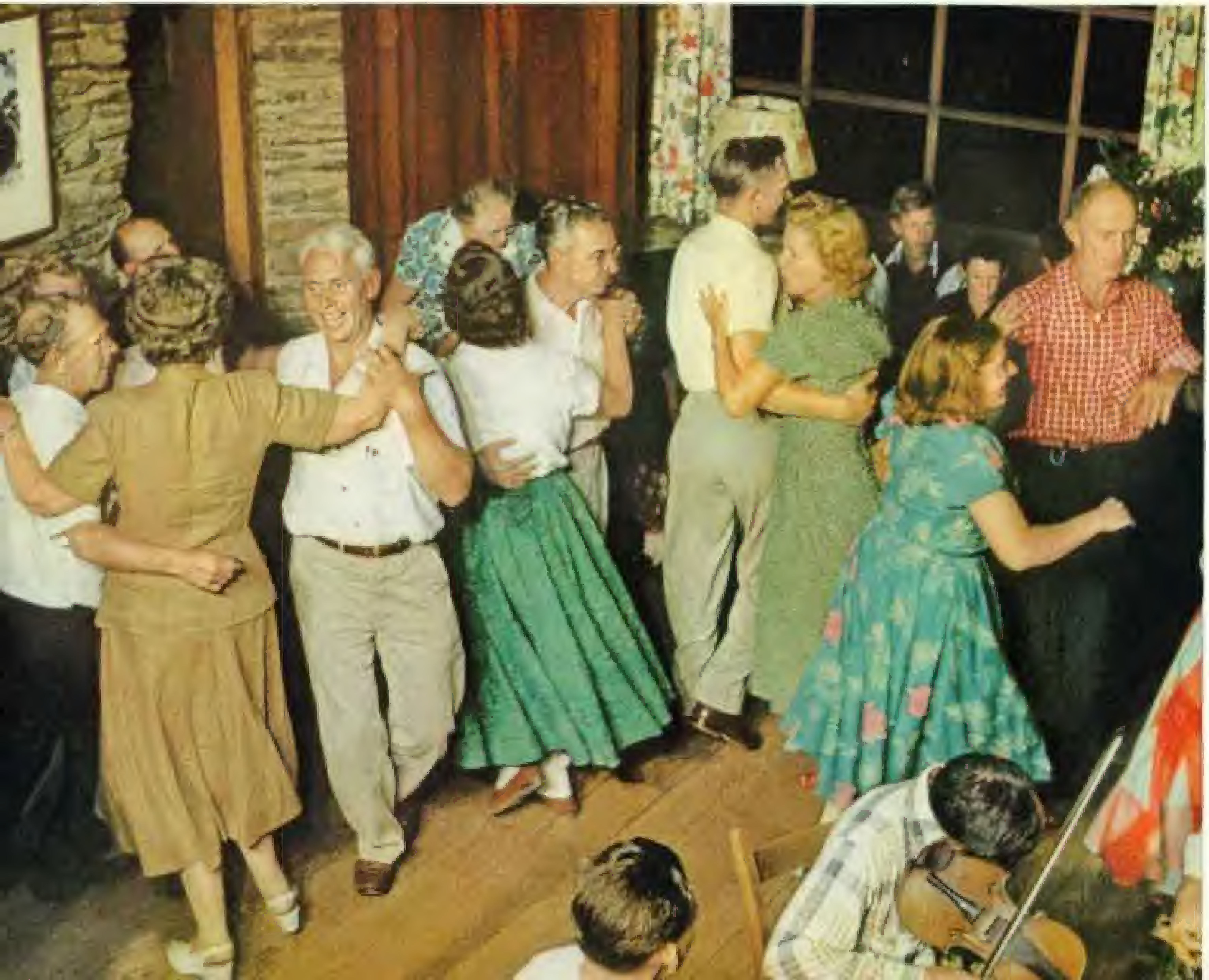
Left: Jim Catolster, who used to hunt with a blowgun as a boy, shows off his locust-wood darts feathered with thistledown. Amenata Sequoyah (right) points the business end of a gun made of a cane stalk.

As Girls Beat Drums, Schoolboys Perform the Eagle Dance in the Mountainside Theater at Cherokee

Last year 152,000 persons paid admission to see "Unto These Hills," a drama annually held in this amphitheater, partly for the Indians' benefit. The play employs 158 Cherokees, 48 in the cast itself. Right: Nessih Watty, a Cherokee, strings green beans for winter fare. Dried, they are known as "leather britches."

Kodachromes by National Geographic Photographer Robert F. Sisson





↑ Wilderness Hikers Test the Temperature of Three Forks Pool

This area, heart of the wilderness, has been inaccessible to horseback parties for almost 20 years. These hikers found old trails so overgrown they had to fight their way through. Here and there the ground had been torn up by fighting bears. At Three Forks, where fish are undisturbed, 10-inch trout rose for bread crumbs.

← Riders Return to a Square Dance

Cataloochee Ranch welcomes back every trail party with an old-time dance, a real "hoot-e-nanny gathering." City dudes swing with blue-jeaned mountain folk.

A Cherokee wandered into this party, watched awhile, and departed without saying a word. "Wallflowers" included several mothers holding sleepy babies or minding shiny-eyed children who tugged at their skirts and pleaded, "Don't go home yet, Ma."

Fiddlers here work in the midst of a swirling circle. Rankin Ferguson, the caller (extreme right), dances as he chants. Mr. Alexander, the host, mingles with his guests in the left center.

Kodachrome by National Geographic Photographer Robert F. Sisson

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Kodachromes by National Geographic Photographer Robert F. Sisson

Laurel (Top) and Rhododendron Bloom in Prodigal Profusion. Nature Is Their Gardener

Nurtured by deep humus and high humidity, both plants attain astounding size in the park. Rhododendron trees shoot up to 40 feet; trunks of the mountain laurel sometimes reach an extraordinary circumference.

Brilliant pinks begin to tint the foothills in March. As spring progresses, flowers march up the slopes until in summer the heights blaze rose-pink (page 491).

North Carolina's Wayah Bald and Tennessee's Mount Le Conte offered these sights late in June.

through the trees blended harmoniously with the clump-clump of horses' hoofs.

A steep climb through spruce and birch took us to Hyatt Bald, now overgrown with young oak, birch, maple, and briers. No one has ever been able to explain to the satisfaction of everyone the origin of the balds in the Great Smoky Mountains. With spruce and hardwood all around, these balds, bare of trees and covered with a heathlike growth, dominate from 4,000 feet or higher the tops of numerous peaks (page 480).

Why Are So Many Smokies Bald?

Some scientists say that excessive evaporation, caused by winds and altitude, killed the trees on the balds. Others maintain that Indians cleared the mountaintops so well for lookouts and camp sites that tree seedlings have not yet regained a hold.

The Cherokees themselves believed that their ancestors cleared the tops as lookouts for a monster which was carrying away their children. According to legend, the Great Spirit sent thunder and lightning against the marauder, and afterward the mountaintops remained forever bald.

Tom is convinced, and most mountain men agree with him, that the balds were caused by man—perhaps cleared by white men or Indians as a grazing ground for cattle. He also thinks the balds will grow back into forests as man-made uses of them disappear. Hyatt Bald, once a treeless heath but now surrendering to wilderness growth, strongly supports his argument, as do Ledge Bald and Mount Sterling.

Where the maintained trail ended on Hyatt Ridge we said good-bye to the horses and to Glenn's nephew, who had come along to take them back to the ranch. After lunch at McGee Springs we loaded our equipment on our backs and struck off on foot. Again I was given preferential treatment, since I packed only my own equipment.

Breakneck Ridge is aptly named. I had hiked many miles, but always in flat coastal country; climbing is quite a different matter. The trail, overgrown, but fairly well defined, led through a forest of spruce and birch, but not once on that struggle to the top did I think about its beauty.

My knees ached, and my breath came short. Still Tom, just ahead of me, kept on going. Because the wilderness trip was strenuous, he had been somewhat reluctant to take me along. Now, I thought, perhaps I had been foolhardy to attempt it. But as the only woman in the little group, I was determined not to be the first to cry "uncle!" Then finally someone farther back suggested a rest stop. I sank down happily on the nearest log.

"What you need, Val, is a ramp," Tom said, dropping his pack to the ground.

"Ramp? What I need is a tunnel through this mountain," I replied, trying to catch my breath.

But Tom pulled up a white root and passed it around—the ramp he had referred to. "Stronger than garlic. Taste it," he urged. Only Bob had the courage to bite into that strong root; the rest of us scorned it in favor of chocolate bars.

Refreshed, we started again. We clambered over logs, pushed away briers, and edged around giant spruce trees. I learned to dig my toes deep into the ground when a strong foothold was necessary.

"Anybody want to stop and puff a while?" Tom called back as we reached the top. Everybody did. We dropped our sleeping bags and packs on the ground and used them as back rests.

Glenn seemed scarcely out of breath, but he, too, was glad to halt. I tried to lift his pack, but could hardly get it off the ground.

"First time I ever made a pack horse out of myself," he said, eying that bulging canvas bag. "Next time I load up them horses I'll know how they feel. 'Stead of cussing them out for not standing still, I'll feed them apples."

The descent of Breakneck Ridge, although hazardous, was easier for me than the short climb. We climbed over huge logs, or crawled under them when they were propped against the mountainside, and held tightly to trees to keep from slipping.

Traps among the Rocks

Tom warned us to stay clear of overgrown places on our right, where the mountain dropped sharply down.

"Years of growth are down there," he said. "You could fall in over your head in no time."

The growth was deceptive, for it looked fairly solid from above. "Underneath the duff," Tom went on, "are rock boulders with big holes in between. Filling the holes are more spruce duff, and branches, trunks, and roots of dead trees. It would be easy to break a leg."

Further out on the ridge we turned to the right. "What is the name of this trail?" someone asked. "Doesn't have a name," Tom replied. "Years ago I cut this through myself when we had a camp at Three Forks."

Immediately we named it "Tom's Trail." It, too, was merely a suggestion of the way down. Rhododendron jungles had engulfed it in places, and through these we crawled and climbed. Growth was so thick that our packs would have been scraped away had they not been securely strapped on.

An Unexpected Recess Delights Children of the Cataloochee School

This frame structure remains the area's only working schoolhouse because most families moved out to make way for the park. It has old-fashioned connecting desks and potbellied stove. Class let out when the campers rode up. Teacher Mildred Deal calls off her pupils' names; the author jots them down (page 477).

We came suddenly into a small clearing in the narrow path. "A couple of b'ars met here and didn't have enough sense to pass," Glenn said. Freshly torn up ground showed they had been fighting while we sat quietly lunching near the top of the mountain.

At the end of Tom's Trail was Raven Fork. We stepped from rock to rock to cross it and came to our camping ground.

This was the most beautiful place in the park, Tom had told us, and we agreed. Here the cold water of three rushing streams comes together to form quiet Three Forks Pool, covering a fifth of an acre. Spruce trees, huge hemlocks, bright-red maples, and yellow birch trees stood guard along the edges, and dark rhododendron leaves reached in to touch the clear water (page 496).

We jumped from rock to rock as far as we could get toward the center. A kingfisher, startled by this invasion of his wilderness home, squawked from a birch tree opposite us, then flew away into the forest. A boomer also chattered his complaint and took off into the woods too fast for me to see his red coat.

Some six hundred miles of rocky streams splash through the Smokies. We had seen many of them, but none more lovely than rushing Raven Fork, running so quietly into this clear, serene pool.

Glenn built a campfire by the water, and over it Tom cooked steaks and boiled rice. After such a strenuous, exciting day, none of us lacked appetite. My sleeping bag I pulled near the fire, for the woods were close around us and filled with night sounds of animals. Bob saw the gleam of two small

Bedtime under Tarpaulins: Riders Wind Watches, Inflate Mattresses, Unpack Bags

On the first night out, ears magnified birds into bears, but here after a week in the wilds the riders ignored wilderness sounds. Elizabeth Yates (left) is the author of *Brave Interval*, a novel based on her Smokies trip. Val Hart publishes two weekly papers. Genevieve Bass (in western boots) is a Florida housewife.

eyes through the dark—an inquisitive mink or fox.

Breaking up camp next morning was a simple matter for five people with few belongings. We packed away the food and cooking utensils, rolled up our sleeping bags, and were ready to go. Then we sat around the fire talking for an hour, enjoying the quietness all around us (page 486).

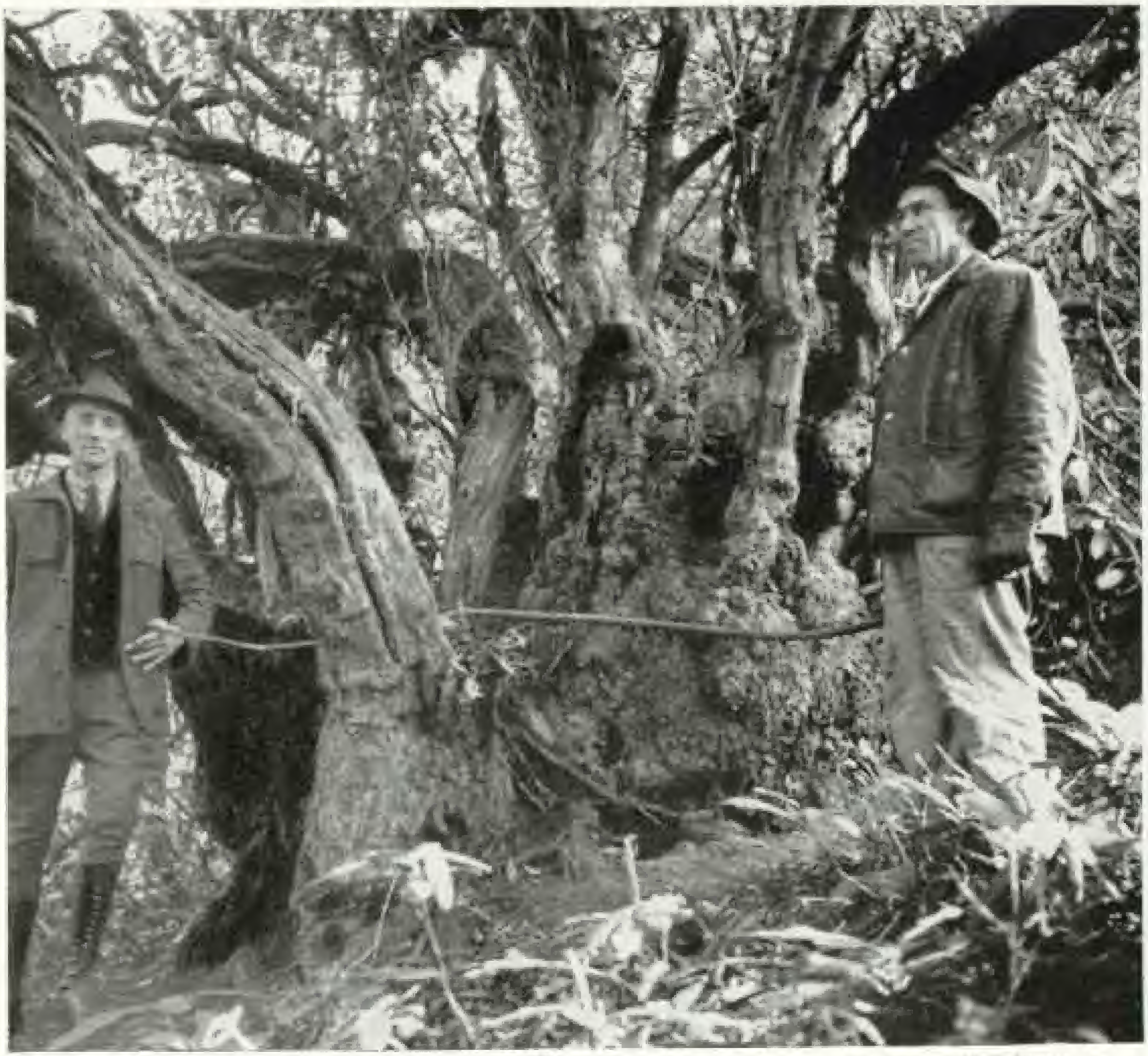
We were reluctant to leave Three Forks, but a long day's hike, this time downstream, faced us. We started at the confluence of Raven Fork, stepping or jumping from rock to rock. Glenn, John, and I played a game to see whose shoes would stay dry the longest. Bob, making pictures, strode through the water to wherever the light was best. Tom, knowing we would all be wet before long, waded right in.

Strangely enough, our feet were not cold, even in that icy water. Occasionally, where the stream was too deep to wade, we crawled through rhododendron jungles on the side.

In the late afternoon we started looking for a good camping ground. But the tangled forest growth pressed in closely against the stream. Finally at Jonas Creek we climbed a small hill, pushed through dog hobble and rhododendron, and made our camp under towering hemlocks.

We changed to dry socks and hung our wet ones on branches bending over the fire. This night, if any animals came to visit our small camp, none of us heard them. We were "healthy tired" and slept soundly.

Early in the morning we started off again, continuing downstream. With full confidence in the cleats fastened to my shoe soles, I had



B. M. Johnson

Hundreds of Years Old, This Mountain Laurel Measures 82 Inches in Diameter

Favorable weather and soil produce luxuriant growths in the Smokies. Some wild cherry trees attain four feet in diameter and grapevine stems a circumference of five feet. *Kalmia latifolia*, the mountain laurel, is a shrub, not a tree, but this world's-record specimen, the fusion of several plants, has limbs as large as small trees. Its foliage is poisonous if eaten. The discoverer, Jim Shelton, stands on the right.

begun to enjoy climbing along rock ledges, wading in the river, and jumping from rock to rock. But we still had a stiff mountain climb ahead of us, and that I dreaded.

No Place for Slickers?

At one point we followed Glenn and Tom through a rhododendron thicket toward a "trail," a detour necessary to avoid a deep gorge in the stream.

Numerous dead trees, their trunks and branches thickly intertwined, were piled together and covered in places with duff. Into this confusion rhododendron bushes were jungled. We had to laugh out loud, it seemed to be such a deliberate obstacle course. But we covered it fairly easily, climbing first up, then down, then up again.

When we stopped to rest by the stream, Glenn was sharpening his jackknife. He looked at me and shook his head.

"Nobody asked my opinion," he said, "but was somebody to ask me, I'd say this is no fit place for a woman. Hit's a place for roughnecks, and not city slickers. Especially women city slickers."

I disagreed. To see a part of the American wilderness was a memorable experience for this city slicker. On that last day's hike I watched the stream spill over the rocks, and thought that I would probably never again be in this wild, forbidding region.

But most of the Great Smoky Mountains are more accessible; and as Tom said, there is something about the water that brings you back.

Pennsylvania Dutch Folk Festival

Visitors by Thousands Flock to Kutztown, Pennsylvania, Each Year for a Sample of "Dutch" Culture—and a Taste of Shoo-fly Pie

By Maynard Owen Williams

With Illustrations from Photographs by the Author

IN southeastern Pennsylvania some of our Nation's fairest land rolls along from fruitful valley to pleasant hill. Here, generations ago, refugees from poverty and oppression in the Rhineland and Switzerland found a peaceful haven in a superlatively fine farming section.*

The Pennsylvania "Dutch" were honest, industrious, intelligent, and neat, and so they have remained. Loyal Americans, in love with our land and institutions, they say they were the first to call George Washington the "Father of His Country." Their familiar name, "Dutch," implies no connection with the Netherlands, but is a corruption of the German word *Deutsch*, meaning German.

On a sunny Fourth of July I was driving through the Dutch country. From Reading I turned northeastward along U. S. Route 222 toward my destination, Kutztown.

Close-set shocks of golden grain were drying in the sun, while green expanses of waving corn rested the eye. Set in fat valleys, neat homes and bulky red barns suggested patient toil, prosperity, and idyllic peace. Lying in the shade, mild-eyed cattle chewed their cuds. Lustrous-backed chickens crowded the feeding boxes or lifted their heads as they drank.

Dutch Partial to Red

Bright-red tractors stood under long forebays decorated with geometric designs or simulated arches indicated by semicircles of white paint on the red walls. These "Dutch" descendants of German and Swiss ancestry like any color so long as it is red!

I could forgive the few signboards, since they pointed the way to good food, a Pennsylvania Dutch distinction. Here and there, as I passed through a village, a sharp-angled church, painted deep red over the duller bricks, lifted a narrow spire toward heaven.

About halfway between Allentown and Reading, Kutztown shoestrings its stores and restaurants along Route 222 (map, page 506). On each side neat homes set in velvet lawns soon give way to growing crops. On College Hill, at the west end of town, rise the ivy-draped buildings of Kutztown State Teachers College.

Hundreds of cars were going my way. At the town's principal intersection many of us turned to our left and after a few blocks drove into the grounds of the Kutztown Fair Association, already thronged with visitors. For this was our objective—the annual Pennsylvania Dutch Folk Festival.

More than 50,000 persons from 36 States came to see this four-day revival of "Dutch" culture, folklore, and tradition, and to partake of genuine Pennsylvania Dutch cooking. Busloads came daily from New York City. Some visitors came from the Canal Zone, Cuba, Hawaii, Switzerland, and England.

Dress Identifies "Plain People"

But no one enjoyed the festival more than the fun-loving Pennsylvania Dutch themselves. They came principally from the counties of Berks, Lebanon, Lancaster, York, Adams, and Dauphin.

To the eye, the vast majority of this well-fed, well-dressed throng was no whit different from any other American gathering. The preponderance of Pennsylvania Dutch are loosely grouped as "Church People"—Lutheran, Reformed, United Brethren, Evangelical, and the Moravians. Their daily customs and habits are those of their fellow countrymen anywhere in this broad Nation.

In the throng, however, was a sprinkling of those picturesque Pennsylvania Dutch known generally as the "Plain People"—Mennonites, Amish, Dunkards, or Brethren, and River Brethren—distinguishable by their dress. These thrifty, mostly agricultural folk have clung to their old religious beliefs and precepts through the years.

Mennonite men wear low, broad-brimmed hats and coats with stand-up collars and no lapels. The women don small, neat black bonnets, with prayer caps of fine white linen beneath, and dresses with tight bodices, long, tight sleeves, and high necks.

Unlike the Mennonites, the Amish wear brilliant colors—bright violet, rich wine-red, or vivid green. The men's shirts nearly always are of one of these bright hues, but their suits are black, without lapels or outside pockets. Their black hats have broad brims and low crowns. Hooks and eyes, and even

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* See "In the Pennsylvania Dutch Country," by Elmer C. Stauffer, National Geographic Magazine, July, 1941.

Clifford B. Yeich

Pennsylvania Dutch Neighbors Play Spin-the-plate in a Barn near Allentown

With their Folk Festival, held at Kutztown, the Pennsylvania Dutch keep alive a culture inherited from pioneer forebears. Here Dr. Harry Hess Reichard tries to seize the plate before it stops spinning, so that he may claim a kiss from Mrs. Paul R. Wieand (right). Her husband (front, center) conducts the festival's games.

zippers, take the place of forbidden buttons. Amish women tie black aprons over their bright dresses and wear black bonnets and black shawls. Children's clothes are copies of those worn by grownups.

Mennonite men usually are clean-shaven, but not so the Amishman. He wears a full beard and long hair. He always shaves his upper lip, however, since two centuries ago the mustache was the mark of a soldier. Another distinguishing feature of the Amishman is his high four-wheeled buggy, for most branches of the church forbid automobiles.

But the austere Mennonite, the devout Dunkard, and the bearded Amishman were few at Kutztown. To see them in numbers it is necessary to move southwest into Lancaster and York Counties. The Plain People make up only about one-tenth of the Keystone State's "Dutch."

Many visitors found their chief attraction in the side shows. Children rode live ponies or the prancing steeds of the merry-go-round (page 508). Thirsty folk swigged birch beer and orange juice. Grandmothers passed out dripping waffle sandwiches.

Everyone sampled the cooking (page 511). The women from numerous churches and the Kutztown Grange served family-style dinners, each wide tent specializing in "Dutch" dishes, such as *schnitz un knepp* (dried apples and dumplings), *hinkle bott boi* (chicken potpie), or more Anglicized dishes like roast beef.

Schnitz un Knepp Is Hearty Fare

Schnitz un knepp is a sturdy dish for sturdy folk. The broth in which the apples are cooked and into which the dumplings later are dropped is from bacon or ham. Shoo-fly pie, a widely known favorite, is a delicious concoction of crumbs and molasses.

While the women in their tented kitchens prepared food, each guest was presented with a red-and-white menu, with two pages of folk beliefs and proverbs, as preliminary food for thought.

"When eating anything for the first time in a season, make a wish and the wish will come true," I read. I wished I knew the taste of blue-balsam tea, and a cup appeared at once.

In front of me stood a gaily colored motto card of undoubted truth: "Man and wife are one. But each has a stomach."

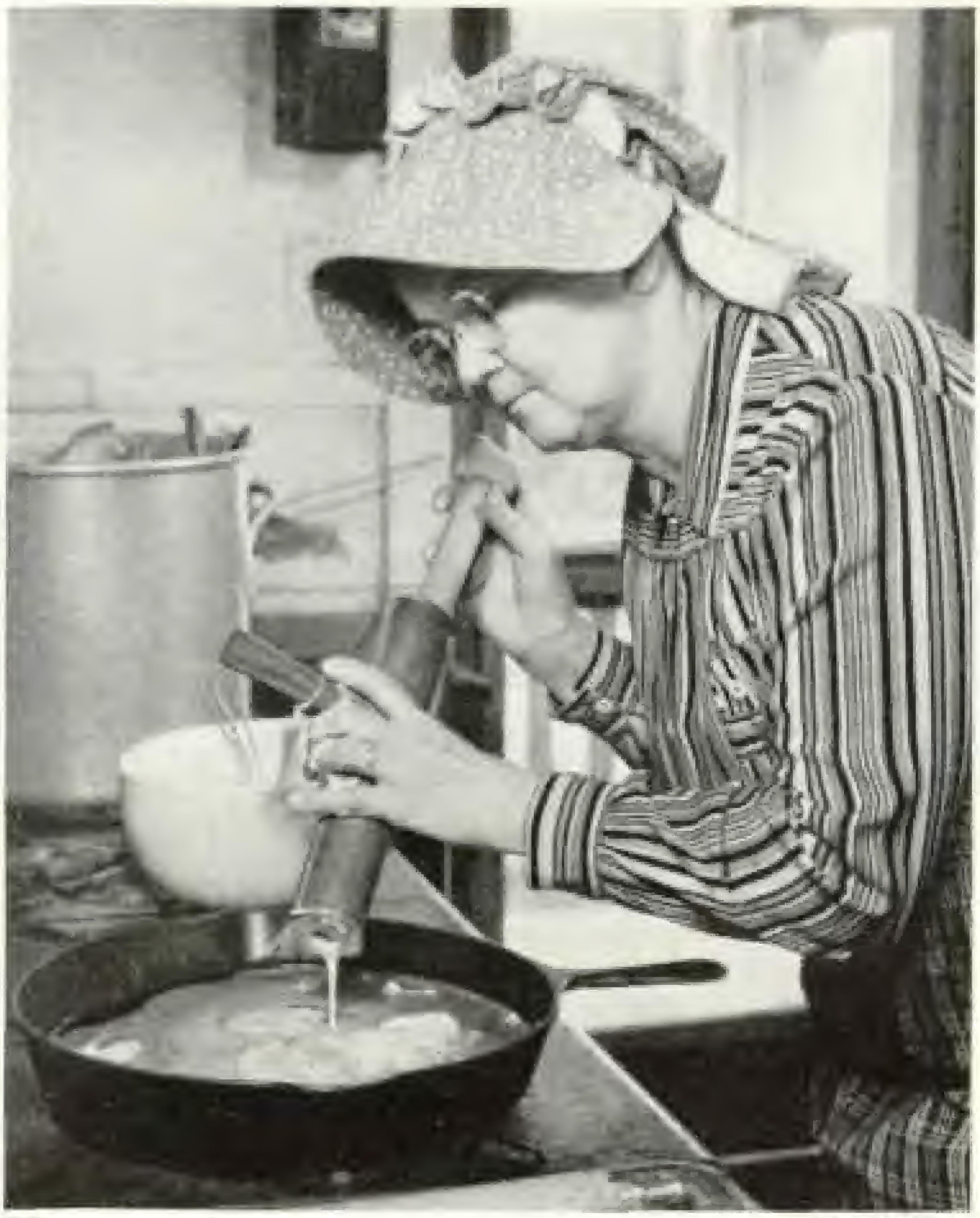
Nor did the next motto restrain the wife's love of good food: "A fat wife and a full barn never did any man harm."

A third motto warned against carelessness, even in so carefree a business as family dinner: "If you lay a loaf of bread upside down on the table, the angels in heaven will weep."

Before the festival was over, I had been fed by women of many faiths and culinary skills. But in choosing the sunbonneted cooks of the Women's Guild of Zion Evangelical and Reformed Congregation of Windsor Castle, Pennsylvania, as my first hostesses, I followed the example of an expert.

He was the Dutch dialect entertainer, G. Gilbert Snyder, known as "Die Wunnernaus" (the wonder nose), who covers his shock of gray hair with a wide-brimmed black Amish hat (page 510).

While I was taking his picture at table, it occurred to me that such a man knows his way around. A half chicken breast, lying on a bed of steamy dumplings, gave visual support for this judgment.



105 Clifford R. Yates

A Kutztown Housewife Fries Funnel Cakes

Cooking is a high art in the Pennsylvania Dutch country (pages 510 and 511). Here Mrs. Carrie Lambert pours batter through an antique utensil called a flint. A funnel serves the same purpose; hence the name funnel cakes. Fried in fat, the cakes are eaten with jelly or powdered sugar.

"Hex Signs" Debunked

Heart of the festival was the series of programs in the main tent. These were concerned with the preservation of Pennsylvania Dutch culture, tradition, and speech.

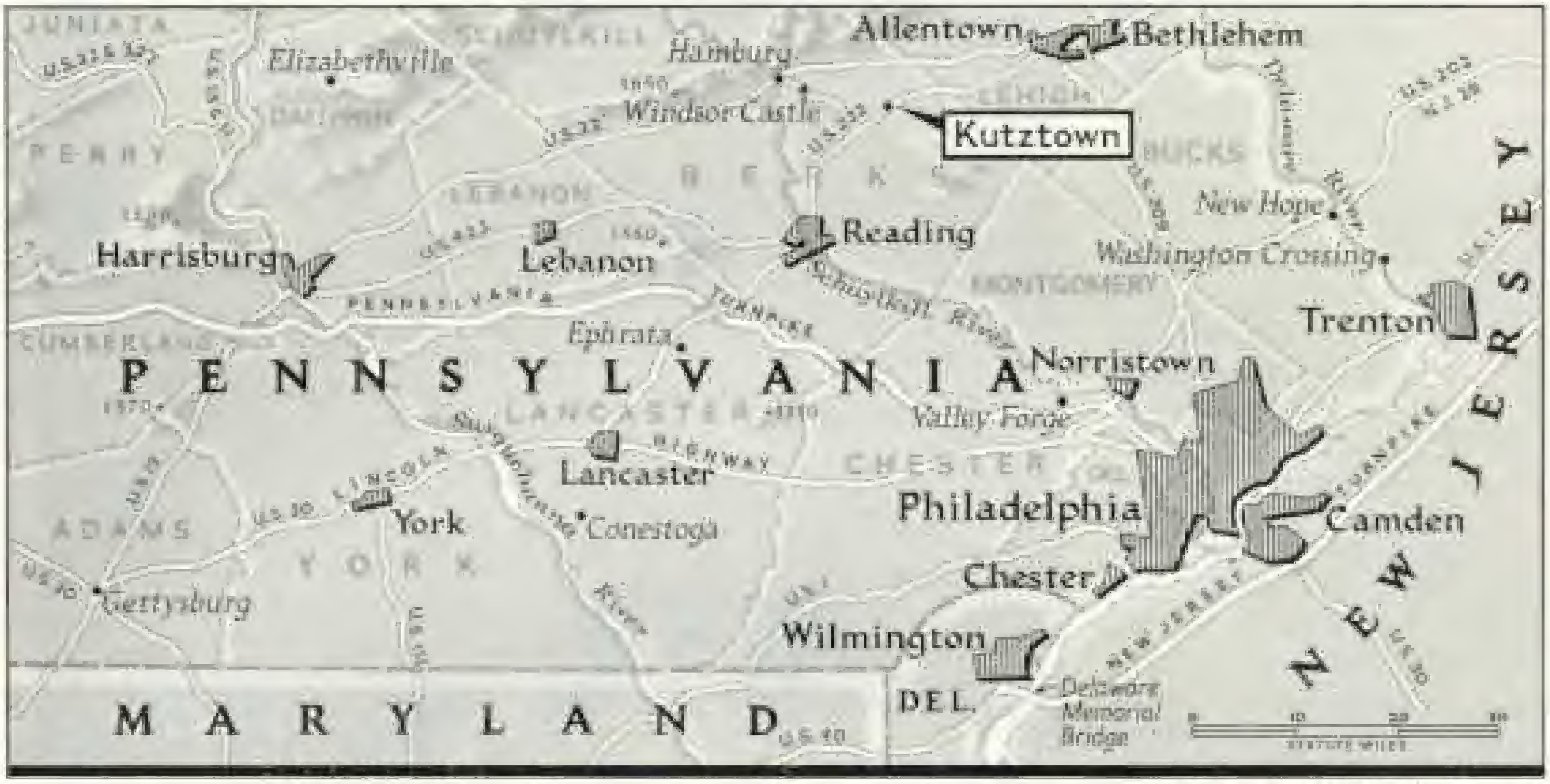
Here I heard Dr. Alfred L. Shoemaker, director of the Pennsylvania Dutch Folklore Center, and one of the leading spirits of the festival, debunk three widely accepted "Dutch" myths.

"Hex signs" on barns, he pointed out, are not hex signs at all; a Pennsylvania Dutch housewife does not feel obligated to place "seven sweets and seven sours"—relishes—on her dinner table; and an Amishman does not paint his gate blue to signify he has a marriageable daughter!

Dr. Shoemaker has found identical barn decorations in German, Swiss, and Alsatian folk art, but believes them to be decorative motifs, nothing more. Many writers have nonetheless repeated the idea that the designs, sometimes called hexafoos, are used as a kind of "spiritual lightning rod" to ward off evil.

But the same patterns had decorated hope chests, birth certificates, house blessings (page 516), and red-brown sgraffito plates, on whose lighter overlay the pattern had been so scratched as to become permanent when fired.

The small area in which the decorated barn causes passing motorists to squeak their tires and stop for a look is centered in Kutztown and does not extend far in any direction.


JUNIATA
PERRY
CUMBERLAND
ADAMS
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LANCASTER
LEBANON
DAUPHIN
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BUCKS
MONTGOMERY
CHESTER
Elizabethville
Hamburg
Windsor Castle
Allentown
Bethlehem
Kutztown
Harrisburg
Lebanon
Reading
New Hope
Washington Crossing
Trenton
Ephrata
PENNSYLVANIA
Norristown
Valley Forge
Lancaster
York
Conestoga
Philadelphia
Camden
Chester
Gettysburg
Wilmington
Delaware Memorial Bridge
DEL.
MARYLAND
NEW JERSEY
Schuylkill River
Susquehanna River
Delaware River
Pennsylvania Turnpike
Lincoln Highway
U.S. 22
U.S. 30
U.S. 40
U.S. 1
STATUTE MILES

Drawn by Robert W. Northrop

Here the Pennsylvania Dutch Have Lived and Prospered Since Colonial Times

German and Swiss immigrants settled the area. Today it contains some of the Nation's finest farms. No specific boundaries, but traditions, cookery, and sometimes speech habits set the region apart.

Why didn't the hex sign migrate westward with the Conestoga wagon? Dr. Shoemaker had an answer for that one. Because the Plain People—Amish, Mennonites, and Dunkards—imposed a barrier of nonuse.

But Dr. Shoemaker, scholarly in his search for truth, is tolerant of fable. Says he:

"No matter how well we may try to educate, people I am afraid will still go on saying 'hex signs' are symbols put up to ward off evil spirits . . . the myth is interesting, fascinating, and is exactly what the tourist wants to hear!"

Dr. Shoemaker turned to the story of the seven sweets and seven sours. Pure alliteration, he said. Long ago a prize was offered for their names, but it goes begging.

As for the blue gate: "There simply aren't that many gates," he said.

In Lancaster there is a lively sale of booklets on bundling, or courting in bed, in both the Old and New Worlds. A speaker questioned its prevalence among the Dutch.

Dr. Shoemaker asked one of his students the purpose of the wide plank which separated a couple as they snuggled under blankets, fully clothed, in a cold house.

"To keep everything above board," the student gleefully replied.

Associated with Dr. Shoemaker in furthering the annual festival are Dr. Don Yoder and Dr. J. William Frey. All are members of the faculty of Franklin and Marshall College at Lancaster.

Dr. Frey is the troubadour of the movement. Wearing a hand-braided, weather-stained old hat, he sang folk songs to delight his listeners. The church groups also sang. For more than an hour I listened to and joined in the singing of Dunkard hymns and Amish slow tunes.

Leader "Deacons" the Hymns

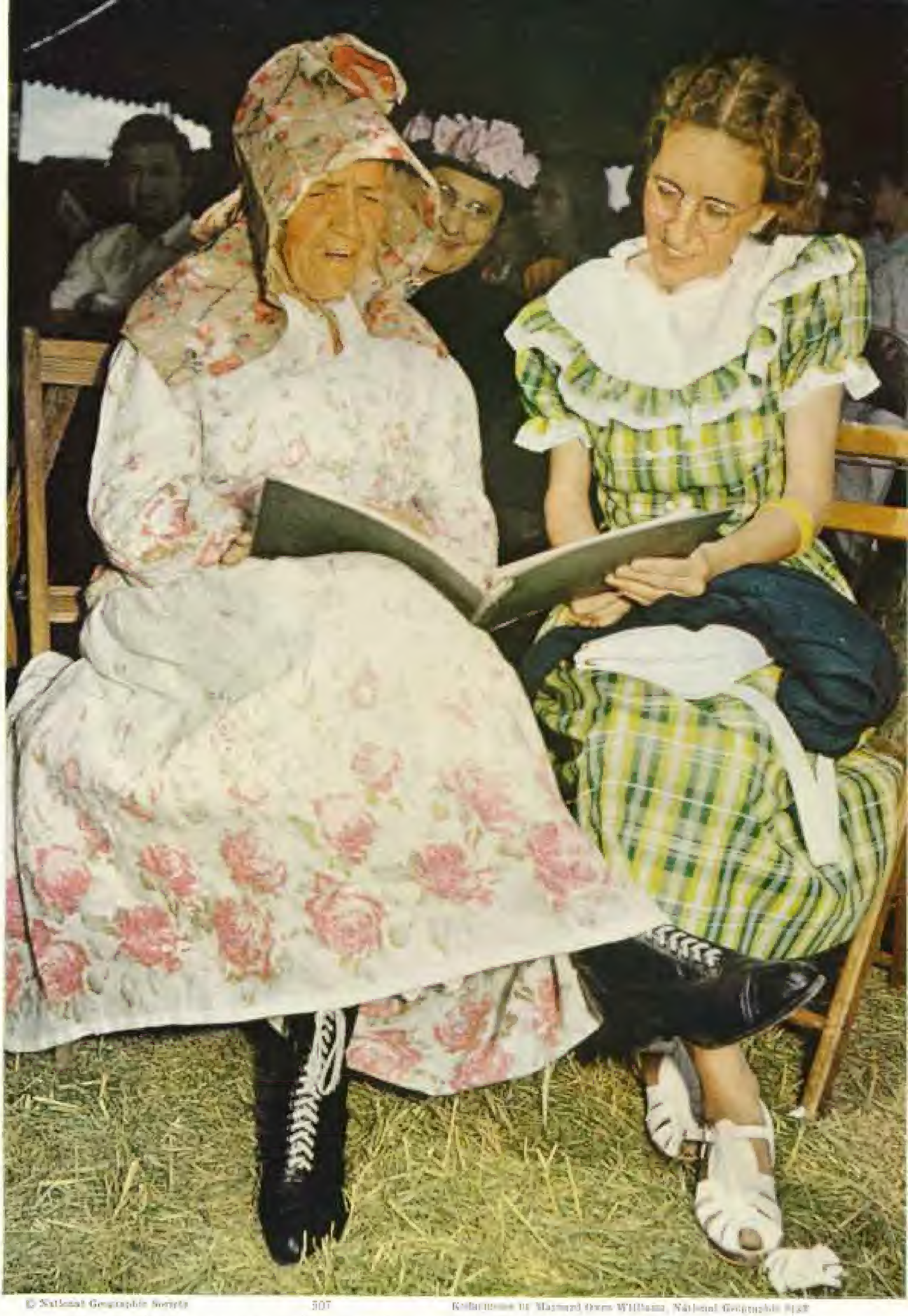
About a score of Dunkards occupied the platform while we sang "Dutch" words to old, familiar music. Many Dunkard congregations lacked hymnbooks, so the leader lined out the words. Since this task often fell to a deacon, the phrase "to deacon" the words came into use.

The Amish slow tunes were sung by Joseph W. Yoder, who has published several of them. The Amish bar musical instruments, but they produce the effect of a pipe organ with human voices. They also refuse to permit their hymns to be sung on the radio.

Mr. Yoder asserts that the Amish slow tunes represent the earliest form of Christian singing and are related to the old Gregorian chants. Sometimes there are eight or ten notes for a single syllable, and to carry these from memory requires constant practice. Mr. Yoder fears that, if they are not soon set down, they may be lost forever.

Preservation of the Pennsylvania Dutch dialect is one of the preoccupations of the festival, and much of the attention to it takes the form of humor. Die Wunnernaus is only one of a group of dialect entertainers.

Another, Paul Wieand, is best known under the name of "Sabina," for which rollicking character he uses a falsetto voice. With his



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Kodachrome by Maynard Owen Williams, National Geographic Staff

Bonneted Aunt Sophia Bailer Reads Her Remedies for Warts and Other Ills

Aunt Sophia, 85 and spry as a sparrow, adds color and folklore to the Pennsylvania Dutch Folk Festival.

"Gotta Dime? Let's Ride the Ferris Wheel!"

Generations ago Swiss and German refugees found a haven of peace and plenty in southeastern Pennsylvania. Through the years their descendants became known as the Pennsylvania Dutch.

Today these American families revive old customs and traditions at the annual Dutch folk festival. Held at Kutztown, the four-day meeting attracts thousands of visitors from many parts of the Nation.

Singing, exhibits, contests, and folklore discussions feature the program. "Dutch" dialect entertainers spin tall tales. Boy meets girl in kissing games (pages 512 and 514). Booths purvey the region's food specialties (pages 510 and 511).

This midway calls to mind the old-time country carnival. Youngsters await their turn on the Ferris wheel. Customers crowd a merry-go-round.

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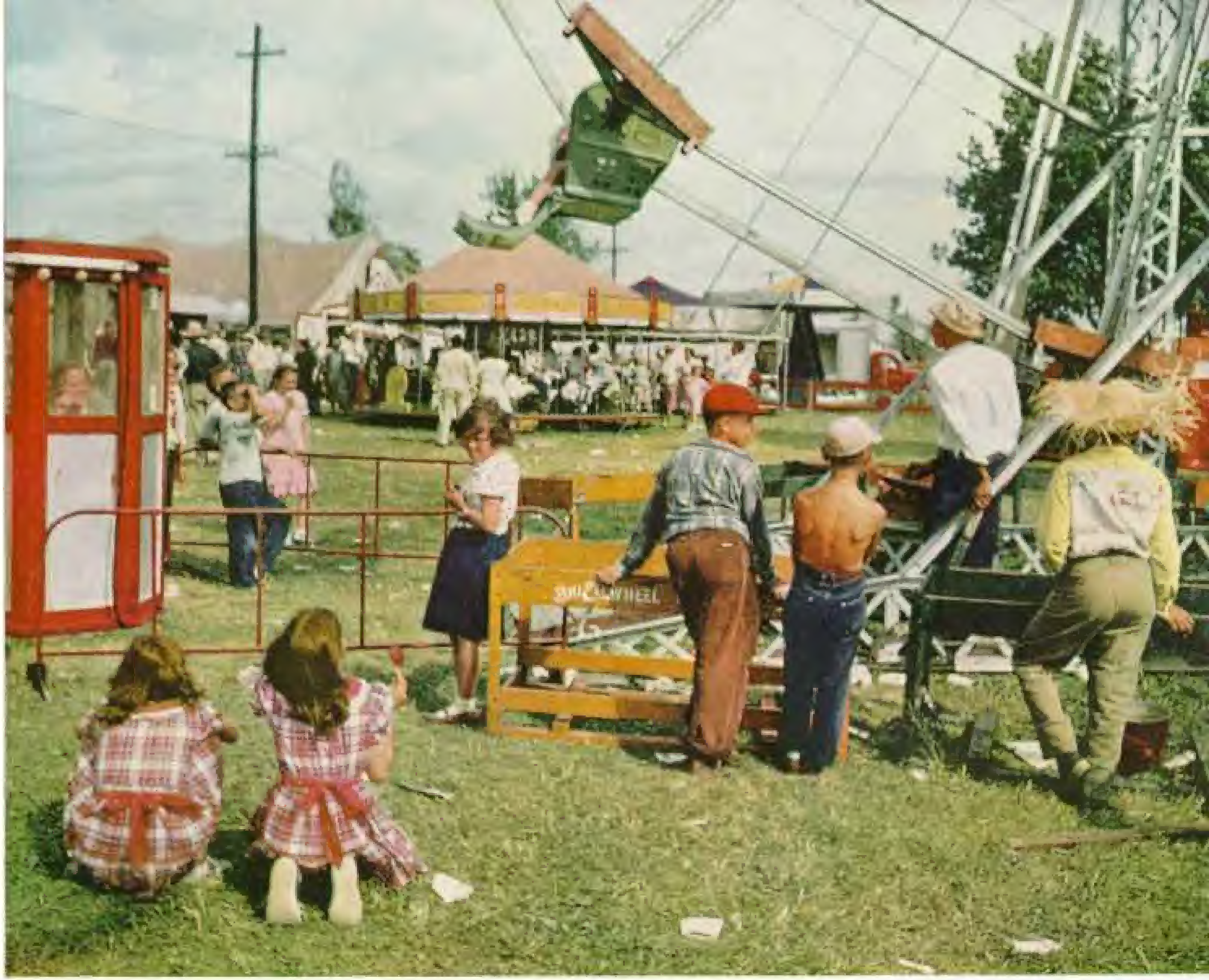
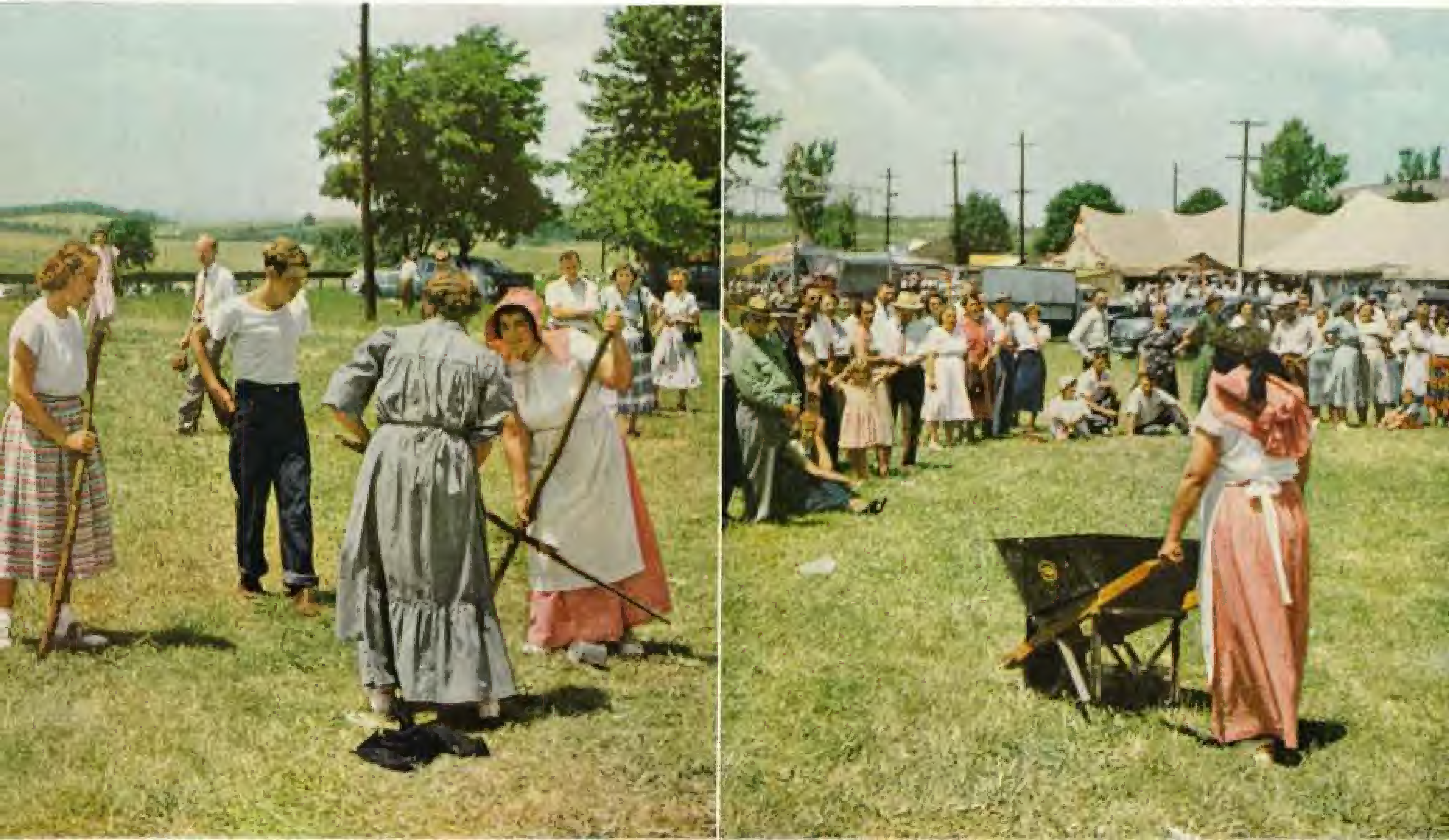


Young Women Play a Game with Sticks and Tin Can . . . A Blindfolded Driver Veers Off Course in the Wheelbarrow Contest

Fun-loving Pennsylvania Dutch ladies put on old-fashioned sunbonnets and long dresses to compete in the folk games. Left: A player swings her pole at the tin can, attempting to knock it into a hole (hidden by contestants). Her opponent guards the goal, as in hockey. Beware of barked shins in this game! Right: Contestants aimed their wheelbarrows at a distant peg (not shown). Then, blindfolded, they attempted to reach it. This unwieldy barrow charges the sidelines.

Kodachromes by Maynard Owen Williams, National Geographic Staff



← Adult and 4-year-old Converse in "Dutch"

Preservation of the Pennsylvania Dutch speech, a dialect based upon German forms, is one of the festival's main purposes. Today this folk language is passing into disuse, though an estimated half-million people still understand it.

G. Gilbert Snyder, radio commentator and dialect entertainer, found that this lad not only understood his tongue twisters but could reply in kind. Mr. Snyder, from Reading, is widely known in the Dutch country as "the Inquiring Man with the Wondering Nose," from his stage name, *Die Wunnernaas*.

Decorative Menus → List a Taste Treat

Pennsylvania Dutch women are renowned for their culinary prowess. During the festival church auxiliaries vie in preparing delicious meals and snacks. Fragrant odors, wafted from cooking tents, stop many a passer-by.

These menus are bilingual. An artist has painted the placards with traditional motifs featuring an allegorical bird, the *distelfink*. Shoo-fly pie, mentioned in this menu, is made of crumbs and molasses.

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← Bakers Roll and Cut Tasty *Fawsnachts*

Visitors to the cooking tents found food for thought in prominently displayed proverbs.

"A fat wife and a full barn never did any man harm," said one. Another read: "Man and wife are one. But each has a stomach."

Fawsnachts are cousins of the doughnut. They may be cut in various shapes—usually square or rectangular—but they *never, never* have round holes; a mere slit suffices. Some households make them but once a year—on Fawsnacht Day (Shrove Tuesday). Gourmets dunk the fried dough in blue-balsam tea, molasses, or powdered sugar.

To meet demand, these women adopt an assembly-line technique. Mixers prepare the dough in large bowls, then pass it down the table for rolling and cutting.

"Get 'Em While They're Hot!" →

Fawsnachts fry in deep fat. The cook will sell them for 75 cents a dozen, 10 cents apiece. A customer waits with dollar bills in hand.

Kodachromes by Maynard Owen Williams,
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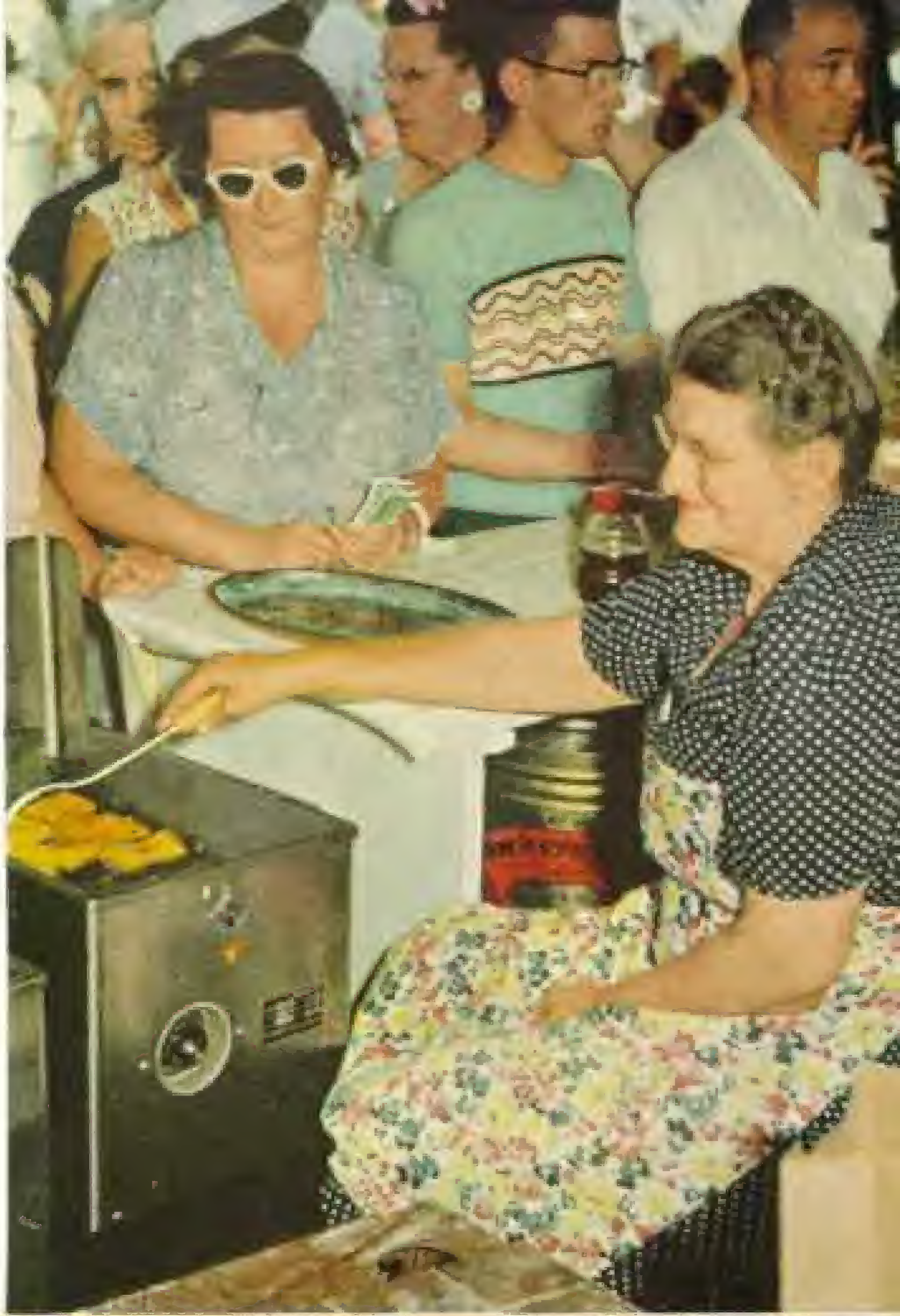

WOMEN'S GUILD ZIONS CHURCH
CHEESE CUSTARD
COFFEE
CHICKEN POT PIE

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↑ Churchwomen Show the Younger Generation How to Make a Patchwork Quilt

Quilting, like other folk handicrafts, is a fading art, even in Pennsylvania Dutch country. Many young people saw the process for the first time at this festival exhibit.

The author heard one of these workers admonish a companion: "Don't sew so fast. We'll run out of work!" "If I do," replied her friend, "it will be the first time in 74 years."

← With hearty smacks, boys and girls play "Picking Cherries." One couple stands on chairs, another below. The miss in the "tree" passes a red-lipped cherry, or kiss; the boy transfers it with gusto to his partner.

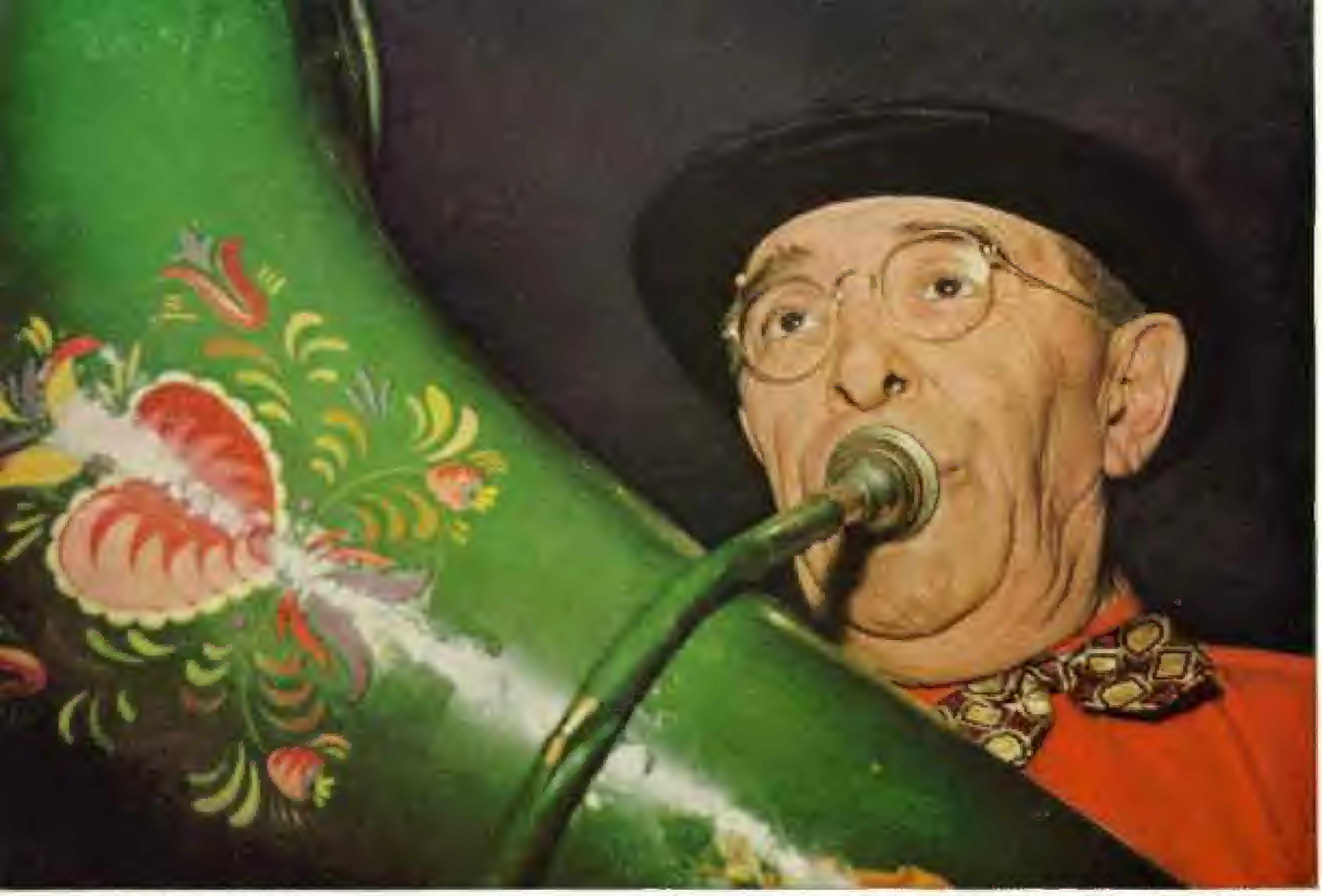
→ **Pungent Vapor Drifts from a Kettle of Boiling Apple Butter**

To make old-style apple butter, drop pared apple bits in a kettle of cider bubbling over an outdoor fire. Boil slowly and long; stir constantly.

These women demonstrate the technique. The 10-foot handle turns a wooden paddle which keeps the thickening butter from sticking to the kettle.

↓ Oswell J. Seip (seated), mathematics teacher at Allentown High School, makes violins, violas, and cellos from wood cut in the Pocono Mountains. Here Mr. Seip exhibits his handiwork.

Kodachromes by Maynard Owen Williams, National Geographic Staff



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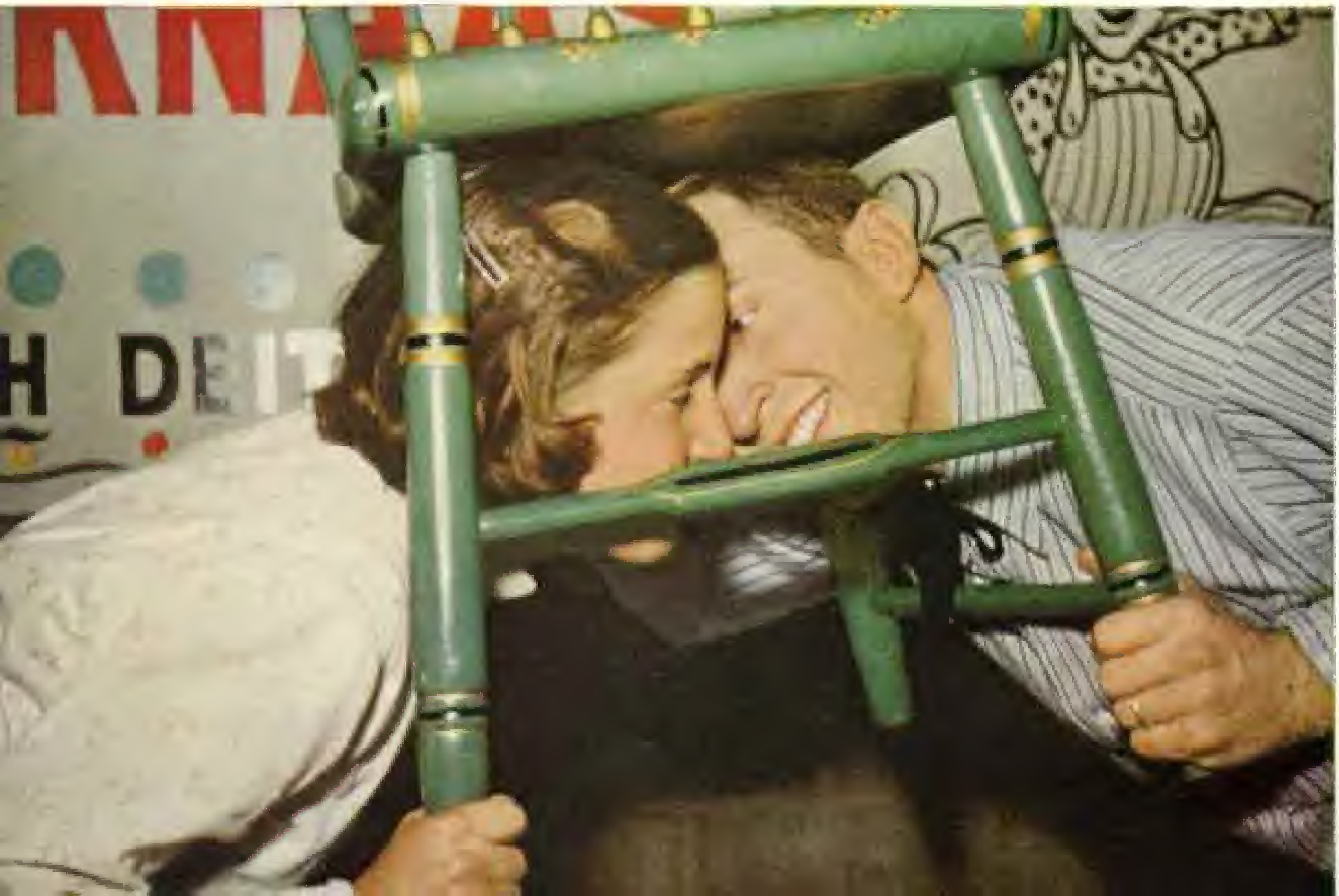
↑ *Oompah! Oompah!* Charles Link Hits Bass Notes on the Tuba

Schwab's Dutch Band, of Elizabethville, Pennsylvania, plays for family reunions and *fersammlings*, or get-togethers, throughout the "potpie belt." Hearts and flowers, a frequent theme in Dutch folk art, decorate Mr. Link's cherished green horn.

↓ Call It What You Will, but It Looks Suspiciously Like Kissing!

With a chair as the "roost," a young couple plays "Cleaning the Hen House," an old Dutch parlor game. First they meet above the roost, then on the roost (through the chair), and under. At each stage the girl, you may be sure, gets soundly kissed!



teammate "Der Assebee," in real life Dr. Harry Hess Reichard, a retired professor of German, he presented sidesplitting skits in shrill dialect. The pair also entertain in Pennsylvania Dutch on the radio, Dr. Reichard, as "Assebee Mumbauer of Owl Valley," providing a droll philosophy (page 504).

Samuel Wissler, of Ephrata, a community which is an old stronghold of "Dutch" culture, presented a humorous skit in dialect, highlight of which was a description of the discovery of America by Columbus.

When Mr. Wissler donned his false whiskers, his low black hat, and tight-fitting suit, the willing audience was ready to laugh before he had uttered a word. But the comical aspects of his recital were balanced by the fact that he was keeping alive a dialect which is passing into disuse. Dr. Shoemaker estimates that about half a million people understand Pennsylvania Dutch today.

Incidentally, the dignified Dr. Shoemaker is known to his fellow "Dutchmen" as "Goat Beard."

The Allentown newspapers carry columns in Pennsylvania Dutch. One of the best known of these is by William S. Troxell, "Pumpernickle Bill" (as he spells it).

The crowds also enjoyed hearing the efforts of Pennsylvania Dutchmen to master the English language.

Old chestnuts such as "Did you bell? Sure I belled, but it didn't make," and "Bell don't button. Bump," bobbed up. They are not difficult to understand. The first simply means, "Did you push the bell? Sure, but it didn't ring." The other: "Bell doesn't ring. Knock."

A trifle more difficult was the statement attributed to a little boy who was watching a train roll by. As it passed, he turned to his mother and said, "Ain't, Mom, when the little red house makes by, the train is all?" He meant: "Isn't it true, Mom, when the caboose goes by, then that's the end of the train?"

How to Call a Hog—or a Husband

Delightful was the cow-hog-chicken-cat-and-husband-calling contest.

"Wootsie, wootsie, wootsie," is the accepted form for hog calling, for example. But when the women participants were asked to call their husbands, there was a slight pause. Then one woman asked, "Do you mean when I'm mad at him, or just for so?"

Old games claimed a share of attention (pages 504, 512, and 514). Boys and girls played "Picking Cherries." One couple stood on chairs and another below. Each cherry, in the form of a kiss, was passed down from the girl in the tree to the boy below and from the boy in the tree to the girl below.

One tent sheltered a quilting party (page 512). Not many years ago nearly every churchwomen's guild in the Dutch country made patchwork quilts, but today the art of quilting is losing ground rapidly.

In another tent apple butter was being boiled in traditional style. Apple butter parties still are popular in a few localities and are all-day affairs.

After the apples are gathered, some are pressed into cider. The rest are pared and cut into small pieces, then put into the cider, which is boiling in a huge copper kettle over an outdoor fire.

To be good, apple butter must be boiled slowly and long, but constant stirring is required to keep it from sticking to the bottom of the kettle. Stirrers used large wooden paddles with long handles (page 513).

Favorite "Dutch" Bird, the Distelfink

Hand-painted bells, flatiron stands, handmade soap and candles, and hand-blocked stationery were on display, as well as needlework with Pennsylvania Dutch decorative motifs—the heart, the tulip, and that allegorical "Dutch" bird, the *distelfink* (page 511).

In one tent was one of the thousands of Conestoga wagons that once rolled over the first macadamized highway in the United States, from Philadelphia to Lancaster, then the State's largest inland town, and later hauled the possessions of the pioneers all the way to the Pacific coast. With slight modifications it became the prairie schooner.

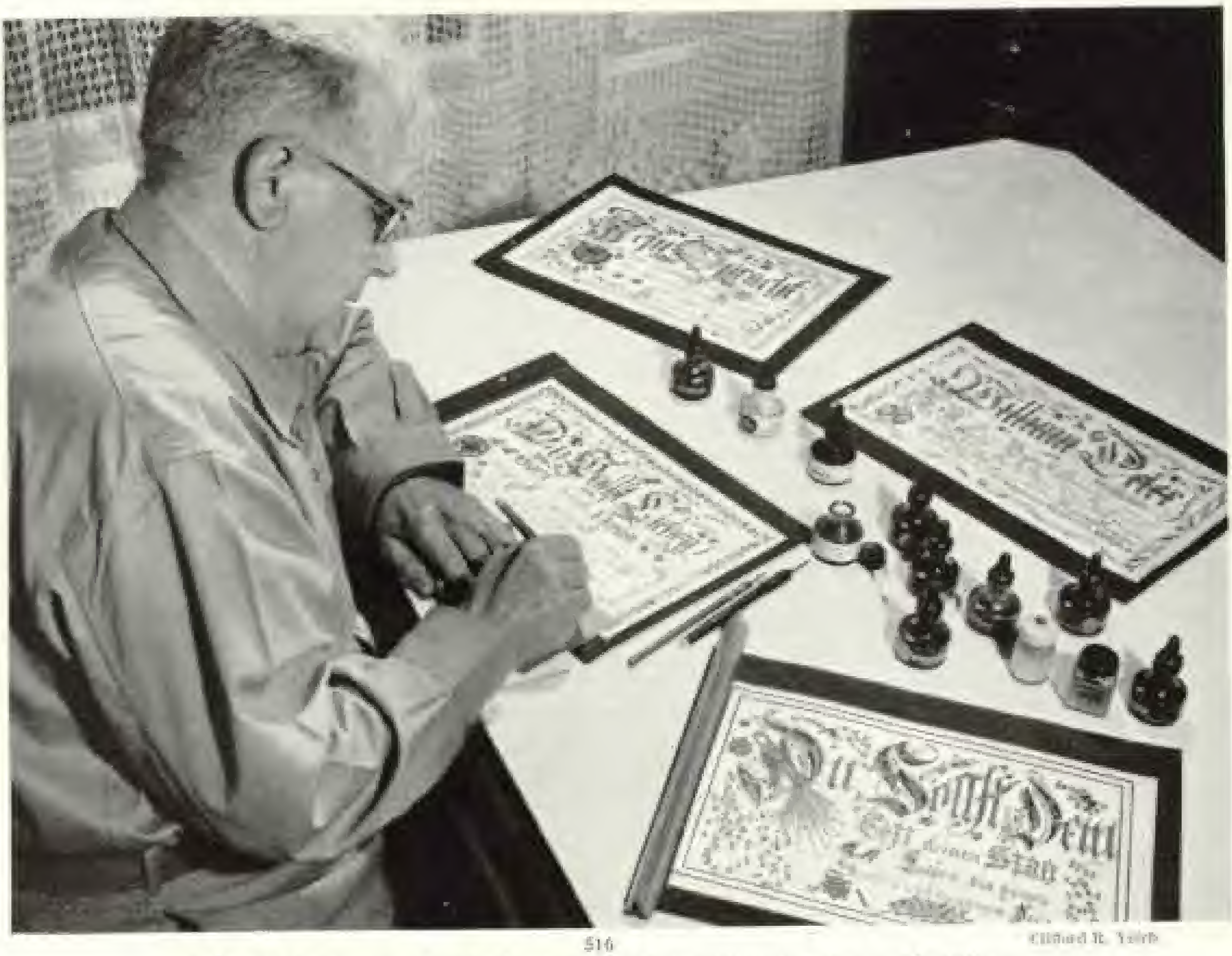
Its body was built sway-backed so that, on hills, the loads would not slip out at the ends. Weighing as much as a modern automobile, the wagon was hauled by six Conestoga horses, one of which the driver rode, and took from three to four days for the 62-mile trip. The wagon was first built in the Conestoga Valley, in Lancaster County.

This wagon, according to legend, is the reason why American motorists drive to the right and why the steering wheel, which replaces the Conestoga driver, is on the left.

No real horseman would try to mount a trained horse from the right, and the best spot from which to guide a wagon when passing is on the near side. To mount the off horse from the left, a driver would have to walk the wagon tongue; so the nigh, or near, horse was ridden. Had the wagons passed on the left, a sextet of horses would have obscured the view.

Hence the wagoner mounted as a huntsman would. He guided his horses to the right of any wagon he met. Today, motorists on the Lincoln Highway follow the habits, as well as part of the route, of America's first paved highway.

Many bits of our common speech date from



Clifford R. Yorb

A Lehigh County Artist Letters a House Blessing for a Neighbor

Decorative certificates, as well as house blessings, are displayed in many Pennsylvania homes. William P. Shoemaker is a specialist in this form of art. Here he writes, "Thou Shalt Love God, Thy Master."

the days of the rough-and-tumble Conestoga wagoners. When they met on a narrow road, the language was censorable, but even time hasn't taken away the flavor of such phrases as "I'll be there with bells on."

I had thought the reference was to such bells as those of a court jester. But in the Dutch country they insist that it refers to the bells which decorated the wagon harness and made music on the long, tough road.

If a wagoner got stuck and had to accept a pull out of the mud, according to custom he had to forfeit his bells to the rescuer. Arriving with bells intact meant that there had been no trouble on the trip.

How "Stogies" Got Their Name

Even the long thin cigars known as "stogies" got their name because the Conestoga drivers smoked them.

With the Pennsylvania Turnpike reaching out at both ends and streams of cars following one another at a legal rate of 70 miles an hour, the elapsed time in travel from Philadelphia to Pittsburgh has been cut from 20 days to half a day!

In 1794 the Lancaster-Philadelphia road, built without labor-saving machinery, cost $7,500 a mile. On the modern turnpike, $7,500 worth of highway wouldn't give a 70-mile-an-hour motorist room to stop.

Specimens of the finest of colonial weapons, the Lancaster rifle, were on display. Later this firearm became famous as the "Kentucky" rifle, but it was first made in Lancaster County.

Earlier rifles took too long to load, but in the Lancaster the bullet was wrapped in a patch of cloth or leather which filled the barrel more closely with less friction and enabled the gunner to push the ball home with a light wand instead of ramming it tight. The patch box in the time-polished stock was a work of art as well as utility.

The Conestoga wagon and the Lancaster rifle were centers of interest throughout the festival.

After four days, during which the normal population of Kutztown was increased twenty times, the last to leave bumped across a hard-packed waste, close-petaled with flattened paper cups and bright-red menu cards. Even Pennsylvania Dutch neatness could not withstand a folk festival in full cry.

Lost Kingdom in Indian Mexico

In the Ruins of Their Ancient Civilization the Tarascan Indians Hunt with Spears, Strum Guitars—and Capture Brides

By Justin Locke

With Illustrations from Photographs by the Author

FOR the heroes of science fiction, the customary vehicle for a trip into the past is a time machine. For me it was an ancient, asthmatic bus throbbing in the market square of Pátzcuaro, Mexico. If it held together long enough, it would, I hoped, take me into the land of the Tarascan Indians, whose golden empire and strange pagan gods ruled supreme here before the coming of the white man.

The journey, I quickly discovered, would not be a lonely one. From my perch on a gasoline can by the driver's seat I watched Tarascans clamber aboard to fill each seat and the aisle, too. Women in bright blouses clutched live chickens and bags bulging with everything from pottery and beans to bananas and carved spoons. The men carried big sacks of corn, which they slung along the floor and used as cushions.

Chocolate Cements a Friendship

One 4-year-old girl, finding no other unoccupied spot, solemnly ensconced herself on my lap.

The 10-mile ride to Erongarícuaro took an hour and a half. As we jounced along I proffered my small companion a piece of chocolate and made what I thought were interesting observations on the world around us. She ignored my commentary, but with a grateful smile spread the chocolate liberally about her face and blouse.

Eventually, the bus drew to a trembling halt on the shores of Lake (Lago de) Pátzcuaro, and we disembarked (map, page 519).

Across the water stretched the islands of Janitzio, Yunuén, Tecuena, and Jarácuaro. To my right and left cultivated fields led down to the shore line (page 536). Behind me wooded foothills marked the beginning of the western Sierra, home of Paricutín.[*]

In 1943 this volcano rose like an evil genie from a peaceful cornfield. It has since entered a period of quiescence, but during my visit it was erupting noisily and earning the title some Mexicans have given it, "the Angry God of the Sierra." I meant to see it at close range, if I could. But I was in no haste; Tarascan Mexico lay all around me, and that was objective enough for the present.

I rose at dawn the next day to visit Janitzio by dugout canoe with "Tata" (father) Pedro, a hardy 85-year-old fisherman. Our primitive, shallow-draft boat cut narrow channels through the thick aquatic grass. Haze veiled the shore line and its background of volcanic shapes. Neither Tata Pedro nor I uttered a sound. Only the beat of his round-bladed paddle broke the silence.

Suddenly Tata said: "Have you heard the story that the Americanos are draining the waters of the lake so as to reach the golden pillars that uphold Janitzio?"

Before I could answer, he laughed.

"To tell the truth, Señor, I cannot believe such things, but such is the story among many of the island people."

Tarascan Indians, I knew, are great believers of legendary tales passed on by older members of their communities. I had heard of the golden cow of Cerro el Ziraté; of the dreaded *miringua*, malevolent spirit of the Sierra; and of buried treasure by the ton.

Tata Pedro pointed with his paddle. To the right a lonely boatman was hunting coots and ducks from his canoe. With scarcely a ripple, his boat slid toward a thousand tiny dots.

Slowly the boatman rose and threw his long spear, or *fisga*, in a high arc. With a flashing of wings the birds whirred into the air. But the hunter had made his kill.

To launch his fisga, he had used a spear thrower, or *atlatl*, which provides a catapultic action. Tata Pedro assured me that this weapon, an earlier development than the bow, is effective up to 150 feet.

1,000 Boats Mass for Hunt

Almost every week during the migration season, he said, large hunts are organized by the lake fishermen. A mass of boats forms a large semicircle around the ducks. Then the boats close in to shore. Outside the ring many canoes poise in strategic locations.

Suddenly, with much screaming and splashing of water to scare and confuse the ducks, the hunters of the first line lift hundreds of spears. The kill is under way. Birds that escape the onslaught of the inner group come

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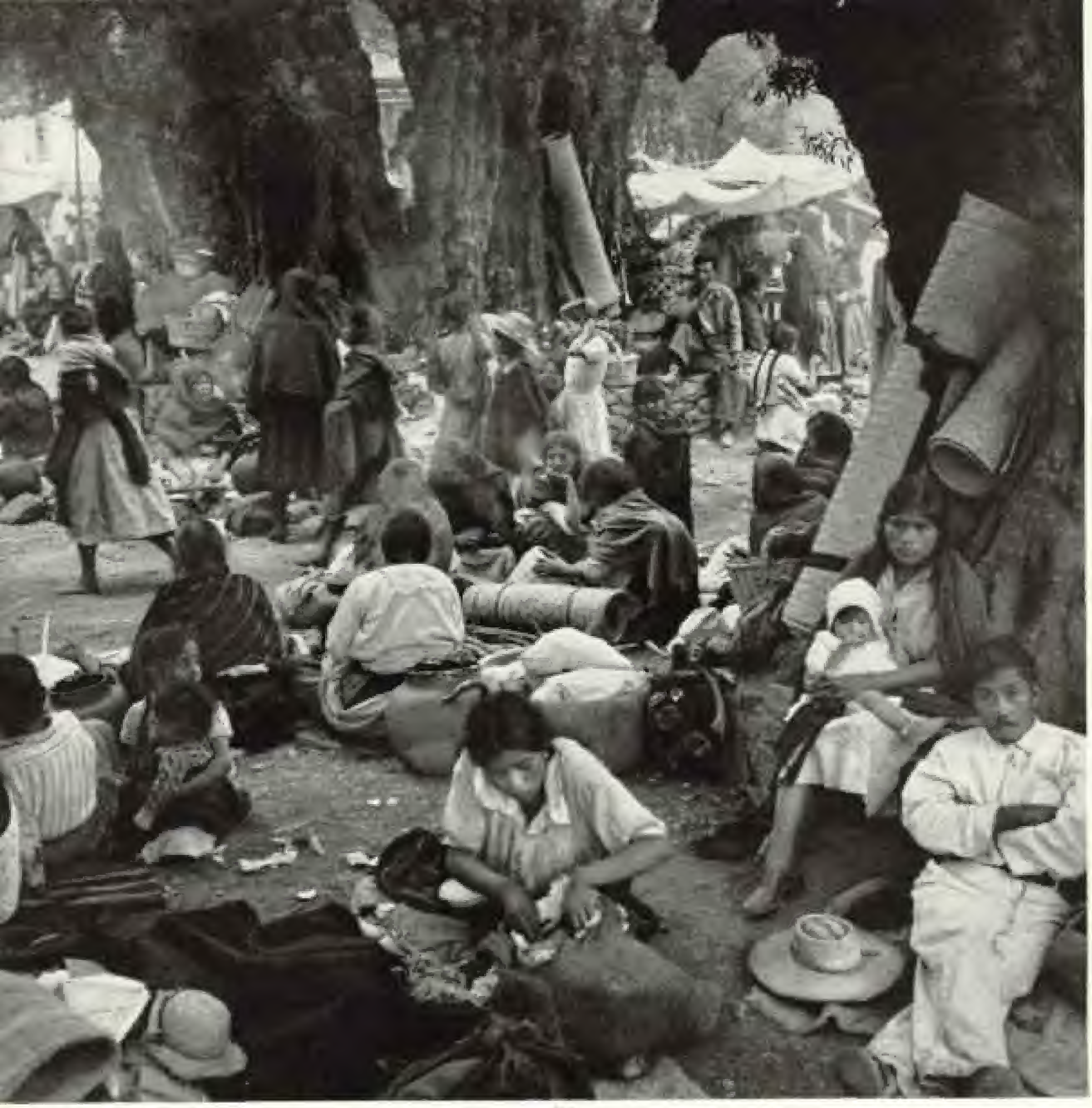
[*] For other recent articles on Mexico and Paricutín in the National Geographic Magazine, see "Mexico's Booming Capital," by Mason Sutherland, December, 1951; "Down Mexico's Río Balsas," by John W. Webber, August, 1946; and "Paricutín, the Cornfield That Grew a Volcano," by James A. Green, February, 1944.



Gnarled and Ancient Olive Trees Shade Tarascans Visiting Tzintzuntzan

These Mexicans trace descent from an Indian tribe that fought off Aztec conquest, and this quiet town, once a fair-sized city, was the capital of their vanished empire. During a three-day pre-Lenten fiesta the Indians sleep here on straw mats. The olives, a few of them 10 feet thick, were planted some four centuries ago, in the time of Bishop Vasco de Quiroga (page 539), but are no longer cultivated.

to rest beyond the first line—only to find a second ring of marksmen awaiting them.

Biggest hunt of the year, when a thousand canoes may participate, occurs on October 31, when the season begins. This hunt precedes the *Dia de Todos Santos*, All Saints' Day.*

After midnight the women and young girls of the island leave for Janitzio's cemetery. They bear baskets of marigolds, lighted candles, and elaborately prepared dishes of fruit, bread, boiled duck, and other delicacies, which they place on the graves in impressive array.

After covering the immediate area with flower petals, they keep vigil by candlelight throughout the night. Kneeling, they chant and whisper prayers, while the chapel bell tolls above the flicker of a thousand tiny lights.

On more ordinary days, I found, Janitzio's busiest hours come in the early morning and evening, when the fishing fleet arrives and departs.

Fishing Boats Carved from Single Log

Between times, young boys and girls wind thread for the nets and string it out in great lengths to dry along the streets. Old men

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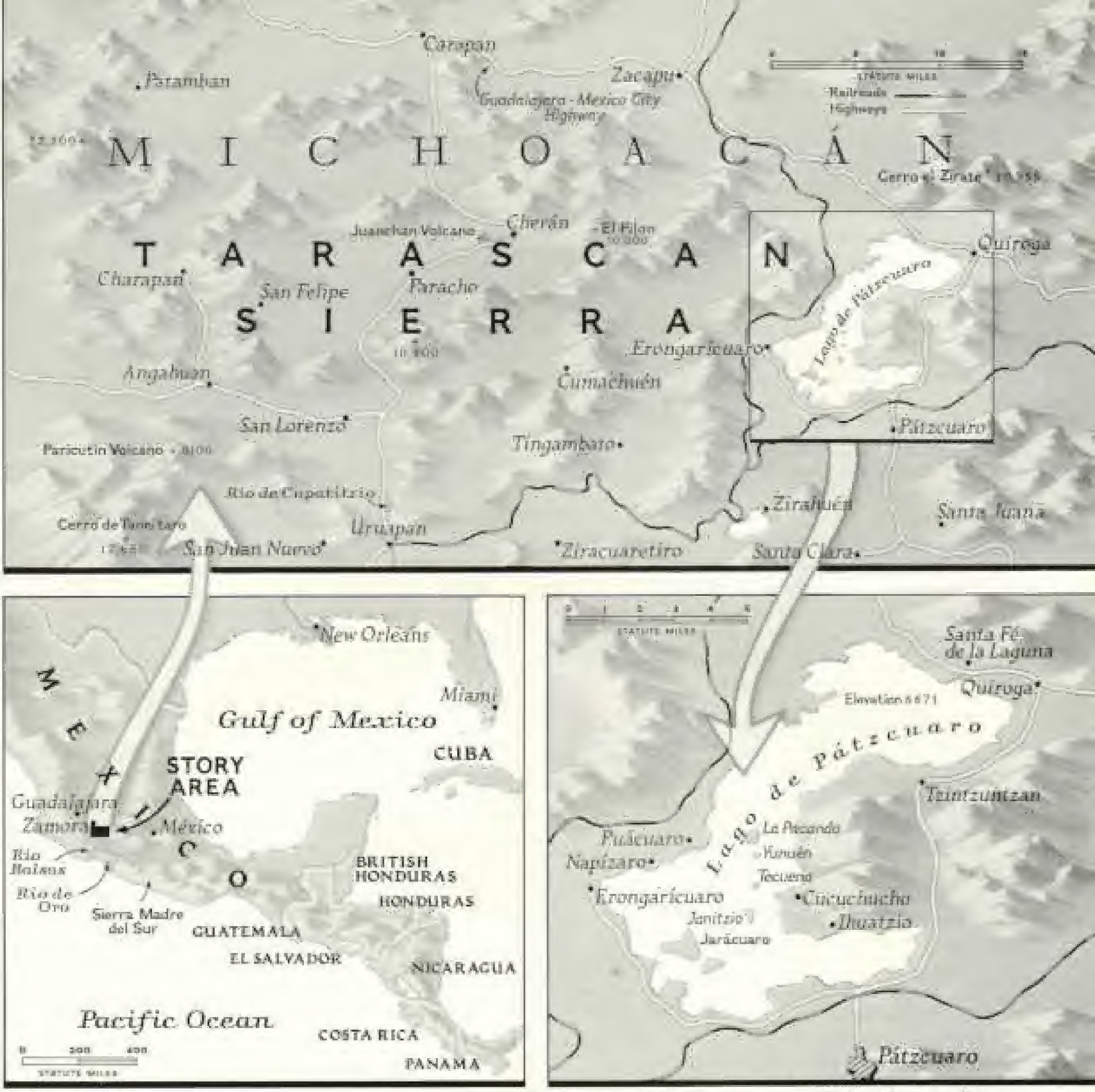
* See "Mexican Land of Lakes and Lacquers," 22 illustrations from photographs by Helene Fischer and Luis Marquez, NATIONAL GEOGRAPHIC MAGAZINE, May, 1937.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San Felipe
Paracho
S I E R R A
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10,800
Erongarícuaro
Angahuan
Cumachuén
San Lorenzo
Pátzcuaro
Paricutin Volcano 9100
Tingambato
Río de Cupatitzio
Zirahuén
Santa Juana
Cerro de Tancítaro
Uruapan
San Juan Nuevo
Ziracuaretiro
Santa Clara
New Orleans
Miami
M E X I C O
Gulf of Mexico
CUBA
STORY AREA
Guadalajara
Zamora
México
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Río de Oro
Sierra Madre del Sur
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Puácuaro
La Pacanda
Napízaro
Yunuén
Tecuena
Erongarícuaro
Cucuchucho
Janitzio
Ihuatzio
Jarácuaro
Pátzcuaro

A National Geographic Map

Volcanoes and Lakes Shape the Lives of Mexico's Tarascan Indians

Paricutín (top, left), spouting millions of tons of lava and ash, has built a cone 1,500 feet above the original ground level. Born in 1943, it suddenly became quiet early in 1952, and neighbors wondered whether its fiery nocturnal displays had ended. Many Tarascans live around Lake Pátzcuaro, seat of their pre-conquest empire; others dwell in the highlands.

and women mend the nets (page 525). As for the tired fishermen, they try to catch up on their sleep. Late afternoon calls them back to the lake in their large dugout canoes.

Cut from single pine logs, these craft are custom-made in the Sierra and brought to the lake by oxcart. In Cumachuén and Santa Juana their manufacture is a centuries-old craft. Manned from the prow by three oarsmen, the canoe is steered by a paddler at the stern, while other crewmen arrange nets.

On the day on which Tata Pedro and I approached the volcanic mound of Janitzio, most of the long boats had returned from making the early-morning catch. Already big seine nets were being hung for the day along the streets to dry (page 530).

Leaving Tata Pedro huddled over a cup of hot coffee, I started climbing the narrow streets of the village. Its tan adobe dwellings, pitched roofs of tile, and ample balconies were now caught by the sun's first light. At the island's wholesale store, Janitzenas waited their turn to sell their trays of fish.

I walked down a cobbled path under overhanging nets to the home of a fisherman, Salvador Fermín, whom I had met on a previous visit (page 523). Stopping before the open doorway, I called within.

In the dark recesses of a terra-cotta kitchen, pottery hung symmetrically against a wall of red earth. A young girl flipped tortillas above an open fire. The glare brightened her dark eyes, flashed on her silver earrings, and tinted her sparkling yellow blouse. She wore a necklace of coral from the distant sea and a heavy wool skirt that extended to her bare feet.

"My father is hanging his nets with his crew, but my mother will soon be back from the store," she said shyly.

I sat by the door to wait. The room, I saw, contained a few *petates*, or sleeping mats, several nets, two water jugs, a chest of wood. In a far, dark corner stood the characteristic Tarascan home altar decorated with an array of religious figurines and pictures of saints.

Beside a vase containing faded paper flowers on the altar table stood two receptacles for copal incense. These, I knew, would be lit each day at sundown. It was a simple ritual, reminiscent of rites practiced in the days of the Tarascan Empire, when smoke from sacred bonfires was believed to provide direct contact with the gods.

Tarascan Warriors Fought the Aztecs

The Tarascans, I was well aware, had not always lived as humbly and obscurely as the Indians I was now visiting. The civilization they had founded along the shores of Lake Pátzcuaro in the 14th century had, in fact, rivaled that of the Aztecs. Displacing or assimilating earlier nomadic and farming tribes, they had built an empire whose might was felt throughout west-central Mexico.

Tarascan craftsmen turned out copper tools that were widely sought, mosaics of multicolored feathers, brilliant lacquer work, idols carved from stone or molded of *pasta de maíz*—the ground pith of cornstalks.

In the arts of war, too, the Tarascans could hold their own with any of their neighbors, the Aztecs included. When trouble threatened, high priests in richly feathered capes would call the young men of the empire to arms. And the warriors themselves, their naked bodies tattooed and painted red and black, would sally forth behind their feathered banners, led by officers in jeweled vestments.

Strong and effective they were—until the day Hernando Cortéz set foot on Mexican soil. Then their chief, Zuangua, made his fateful blunder. Montezuma pleaded for a common front against the enemy. Fearful of Aztec trickery, Zuangua refused.

Cortéz, seizing the chance to "divide and conquer," left the Tarascans for later and fell upon the Aztecs. When they had been destroyed, he sent Cristóbal de Olid to take care of the Tarascans. In a matter of weeks the Tarascan Empire had passed under the Spanish crown.

Worse was to follow. The notorious Nuño de Guzmán, avid for gold, took over the conquered territory and proceeded to starve, torture, and enslave the Tarascans. Plagued by disease and driven by fear, the natives fled to the Sierra.

Yet the tragedy was to have a hero as well as a villain. Don Vasco de Quiroga, an eminent lawyer from Spain, was dispatched to right the Indians' wrongs. Promptly he laid out new towns, brought hope to the oppressed, and revived the Tarascans' ancient crafts. In 1538 he became Bishop of Michoacán (page 539).

He did not, of course, resurrect the empire itself, nor wholly restore its culture. Tarascan country now extends a scant 40 to 60 miles between Lake Pátzcuaro and the Sierra (map, page 519).

What the Tarascans have lost in power, however, they seem to have gained in hospitality. As I daydreamed by the door of my friend's cottage, his wife came up the street, bearing an earthen jug. Plunging her hand within it, she drew forth a glistening fish fully a foot long: the *pescado blanco* (white fish), prized throughout Mexico. Her husband had caught it that day, she said—and presented me with five others like it, wrapped in clean, wet grass.

I walked back to my lodgings, carrying the fish. In the Tarascan waters from which they came, I had been told, live curious species of primitive aquatic life. For Lake Pátzcuaro lies in a basin without an outlet. One odd inhabitant is a salamander, the *axolotl*.

Important commercially is the small minnowlike *tirú*. Tarascans catch them with their graceful *mariposa* nets, huge webbed "butterflies" which they use with skillful teamwork (opposite page).

Island of Hatters

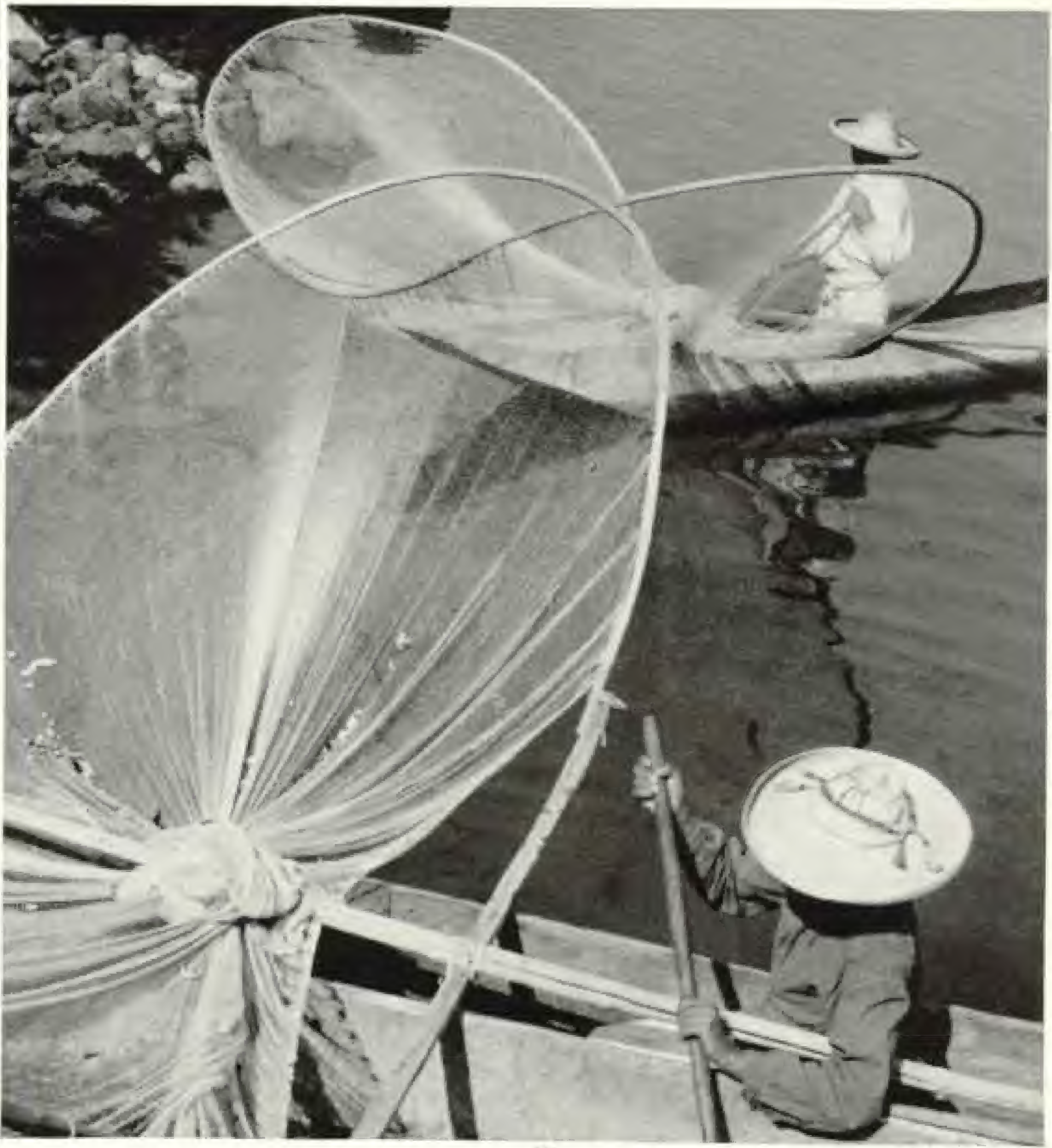
Janitzio, the island I had approached first with Tata Pedro, is the most important of the group. But the others are inhabited, too, and interesting in their own right.

In Jarácuaro at least one member of every family makes hats of palm strands. As these take shape, the hum of Singer sewing machines is heard throughout the town. Later the hats are blocked by steam and trimmed with colored bands.

On Friday the islanders stack their products, one upon the other, atop their heads and leave for the market of Pátzcuaro.

Even Jarácuaro's music teacher, Maestro Nicholás Juárez, is a hatter.

One fiesta morning I set out by canoe to visit the maestro. Following the sound of music, I arrived at last at Emigdio Pantaleon's house and stepped into a crowded courtyard.



Herzo, Black Star

***Mariposa*, the Spanish Word for Butterfly, Named Pátzcuaro's Graceful Winglike Nets**

Fishermen, operating with balletlike precision, stir water with paddles to set fish in motion, then dip their nets.

Beneath a large guava tree, the 12 men of the town's wind-instrument band were leafing through the score of the next number.

Soon all were ready but the French horn player, who was being reluctantly shaken from a deep slumber. Slowly the band started a march. At the close of the number I caught the maestro's eye. Clarinet in hand, he took my arm, and we walked to his house.

Soft Music and Cooling Jicamas

Sitting with me in the shade of his enclosed patio, the maestro took up a violin and began to play delicate Tarascan tunes from an earlier day. His graceful young daughter brought freshly cut oranges and cooling jicamas, and, from the sunny courtyard, the scent of mimosa drifted toward us.

It was pleasant, but finally I took my leave and returned across the lake to Erongarícuaro. I wanted to be there for Sunday, which is market day and a magnet for Tarascans everywhere.

On Saturday evening burro trains from distant mountain villages start their journey through pine forests from the heights of the Sierra to the shores of Pátzcuaro. Unloading their cargo of firewood and tying up their burros, the Indians bed down by their stacks of wood to await the morning's trade.

From my lookout by the lake at sunrise, the large fishing canoes leaving Janitzio seemed mere dots on the horizon. Little by little, however, they took clearer form, and soon a hundred boats were heading in for the landing. Carrying paddles and baskets of fish, the islanders scrambled ashore.

In the square I saw bananas and sugar cane from Ziracuaretiro, onions from Puácuaro, beans from near-by villages, and corn from Sierra towns. A Tarascan from Tingambato parted banana leaves in a wooden crate to expose large chirimoyas, a fruit delicacy from his town. A merchant from Guadalajara tempted passing natives with bits of jewelry, ribbons, and painted toys.*

By noon trading had passed its peak. Large stacks of wood had changed hands for fish, and lake dwellers commenced their loaded trek to the shore. Boats were filled to the gunwales. One by one, the heavy-laden boats shoved off to avoid the strong winds of late afternoon (pages 524 and 525).

Sierra Tarascans, adjusting their colorful serapes and upturned hats, headed their donkeys up the trail, leaving nothing but splinters behind.

Ruins Recall Tarascan Empire

For the Tarascans, the past is never far away. To the north, in Santa Fé de la Laguna, Bishop Quiroga's easy chair is enshrined. Here, too, is the site of the first of his Michoacán *hospitales*, centers of teaching as well as healing.

On the eastern shore of the lake lies Tzintzuntzan, "Place of the Hummingbirds," once the political capital of the Tarascan Empire. During certain fiestas, multitudes of overalled Spanish-Indian mestizos and satin-clad Tarascans in holiday mood scramble to the tops of old Tarascan ruins to enjoy the view of village and lake.

On such days a large market is held in the historic church courtyard beneath the shade of 400-year-old olive trees. Some of the squat, grotesque trunks are 10 feet in diameter (page 518).

South of town a mound of adobe mud and rock is all that is left of Michoacán's first church, constructed by Father Martín in 1526.

Near Ihuatzio, "Place of the Coyote," five mounds of Tarascan ruins stand atop an ancient lava flow. Even in the present village, the old symbols of fertility have been carved in rock on the church façade, while high above, on a ledge of the steeple, crouches a large lava-rock coyote. On the belfry are carved symbols of "Our Father the Sun and our Mother the Moon."

Everywhere I heard tales of unexplored ruins in remote and wooded sections of the land, and often, in the hands of the mestizos and Tarascans alike, I saw stone idols, copper bells, clay pipes, obsidian knives, and large, elaborately carved shells.

One day I revisited the colonial city of Pátzcuaro. Its cobbled streets, flanked with the overhanging roofs of many 17th- and 18th-century buildings, possess a strongly Old World flavor, bequeathed it by early Spanish settlers (pages 537 and 543).

Pátzcuaro, however, has its eyes on the future as well as the past. Here has begun a tremendous social experiment designed to reduce poverty and illiteracy. Twenty Tarascan villages, by-passed by most of man's technological improvements, have become a United Nations laboratory for teachers dedicated to stamping out misery in depressed rural areas all over Latin America.

Unesco, the UN's Educational, Scientific, and Cultural Organization, maintains its Pátzcuaro headquarters in the one-time home of former President Lázaro Cárdenas. Its training center is called CREFAL, *Centro Regional de Educación Fundamental para la América Latina*. Five schools like it are planned in other parts of the world.

Student specialists, learning their job while teaching Tarascans how to better their lives, demonstrate such sciences as home economics, health, rural economy, and social education. Mexico, Bolivia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Haiti, and Peru send trainees. After two years the graduates go home to teach others.

Into "Mouth of the Hot Land"

Ten miles from Santa Clara, the bus I rode plunged down a steep escarpment into the *boca de tierra caliente*, or "mouth of the hot land," the southernmost point of the present Tarascan area.

Here, below the high volcanic plateau, I entered a region where large springs and gushing underground rivers have created dense jungle growths.

In semitropical Uruapan I found the center of the Mexican lacquer industry and the shop of Leopoldo Elvira. As I entered his establishment, my ears were met by the strains of Beethoven's Fifth Symphony.

Young workers around a large center table were cutting intricate designs in partly lacquered trays. In a corner of the room Leopoldo was thumbing through an album of Brahms records.

"My men are craftsmen," he explained. "On exacting and delicate work like this, they

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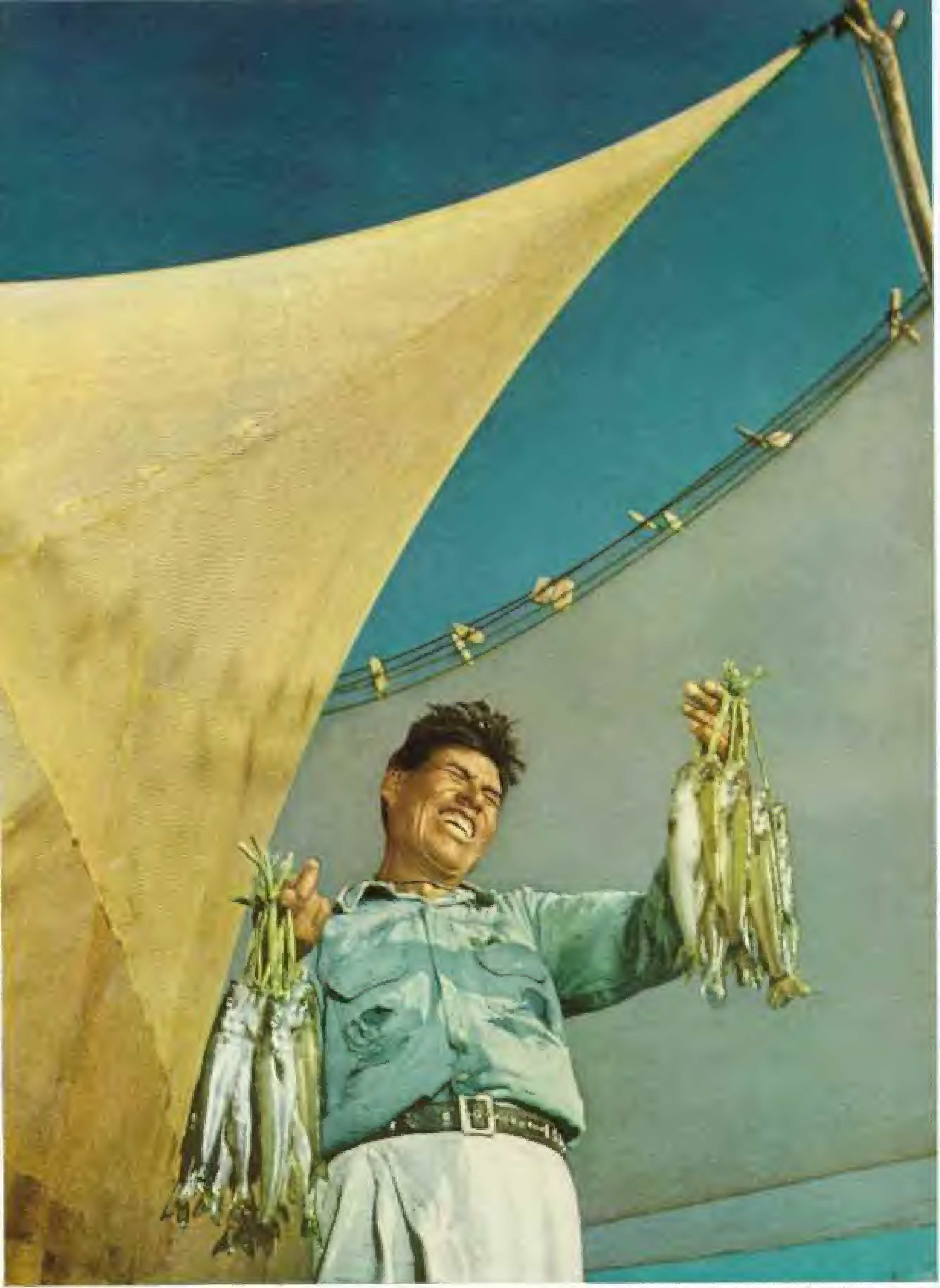
* See "Vignettes of Guadalajara," by Frederick Simpich, NATIONAL GEOGRAPHIC MAGAZINE, March, 1934.



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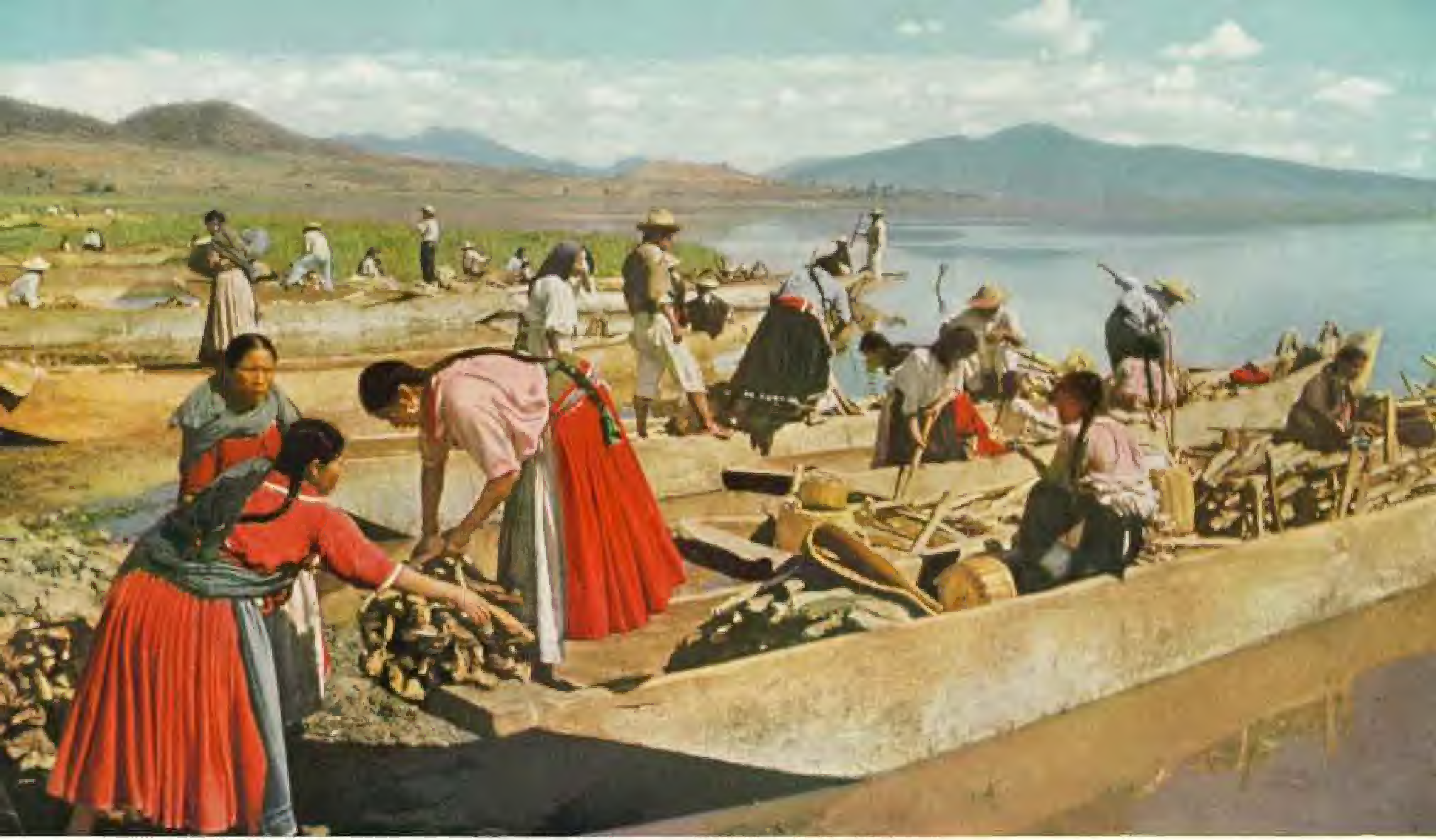
Kodachrome by National Geographic Photographer Justin Locke

A Tarascan Fisherman amid Drying Nets Bursts into Smiles and Shows Off His Catch

Salvador Fermín takes delicate white fish from Mexico's Lake Pátzcuaro, where his Indian ancestors fished centuries ago. His people's antique duck spears, dugout canoes, and butterfly fishing nets attract visitors by the thousands.



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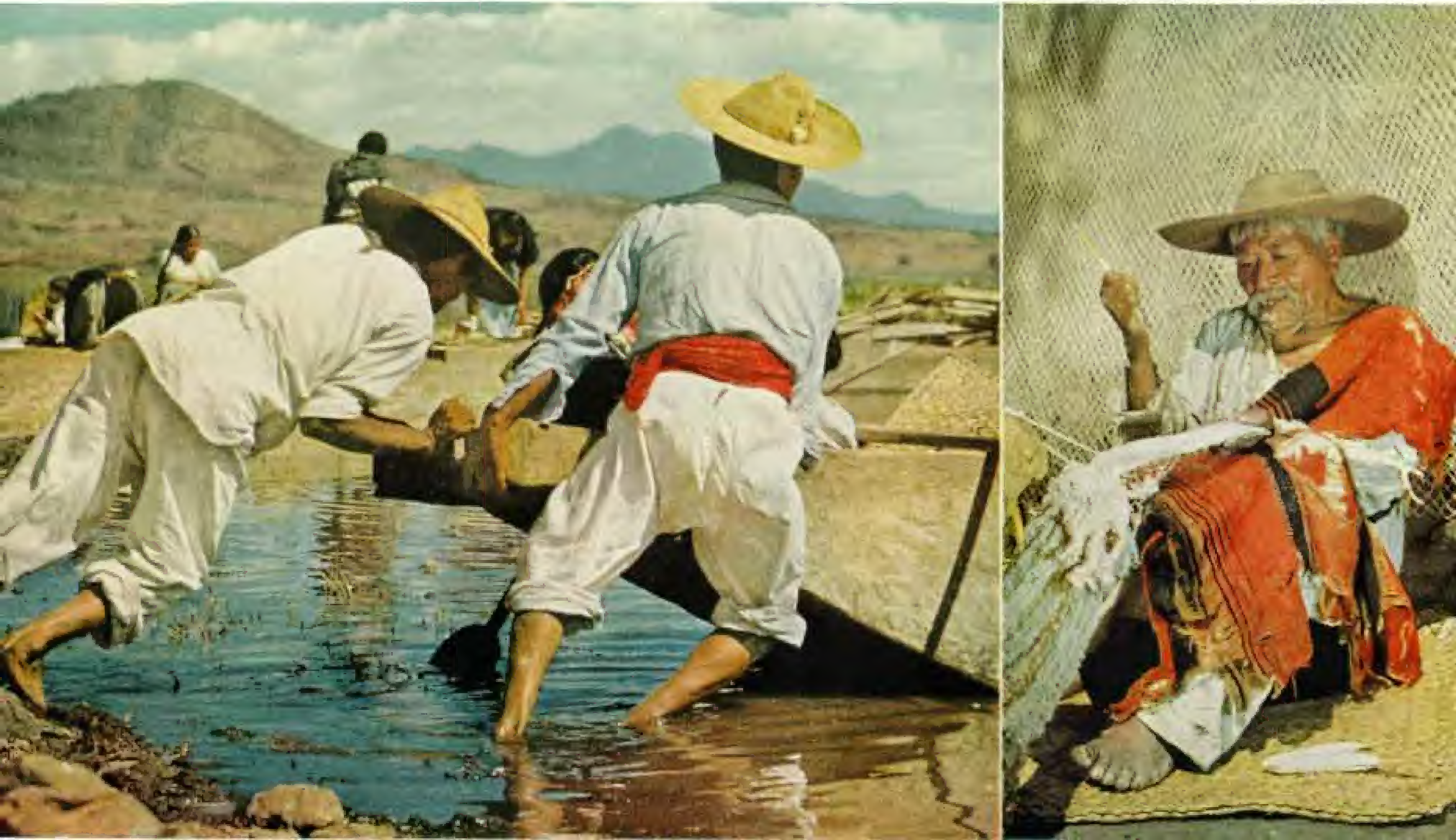
Janitzio Island Indians, Having Bartered Their Fish, Load Dugouts with a Week's Supply of Firewood

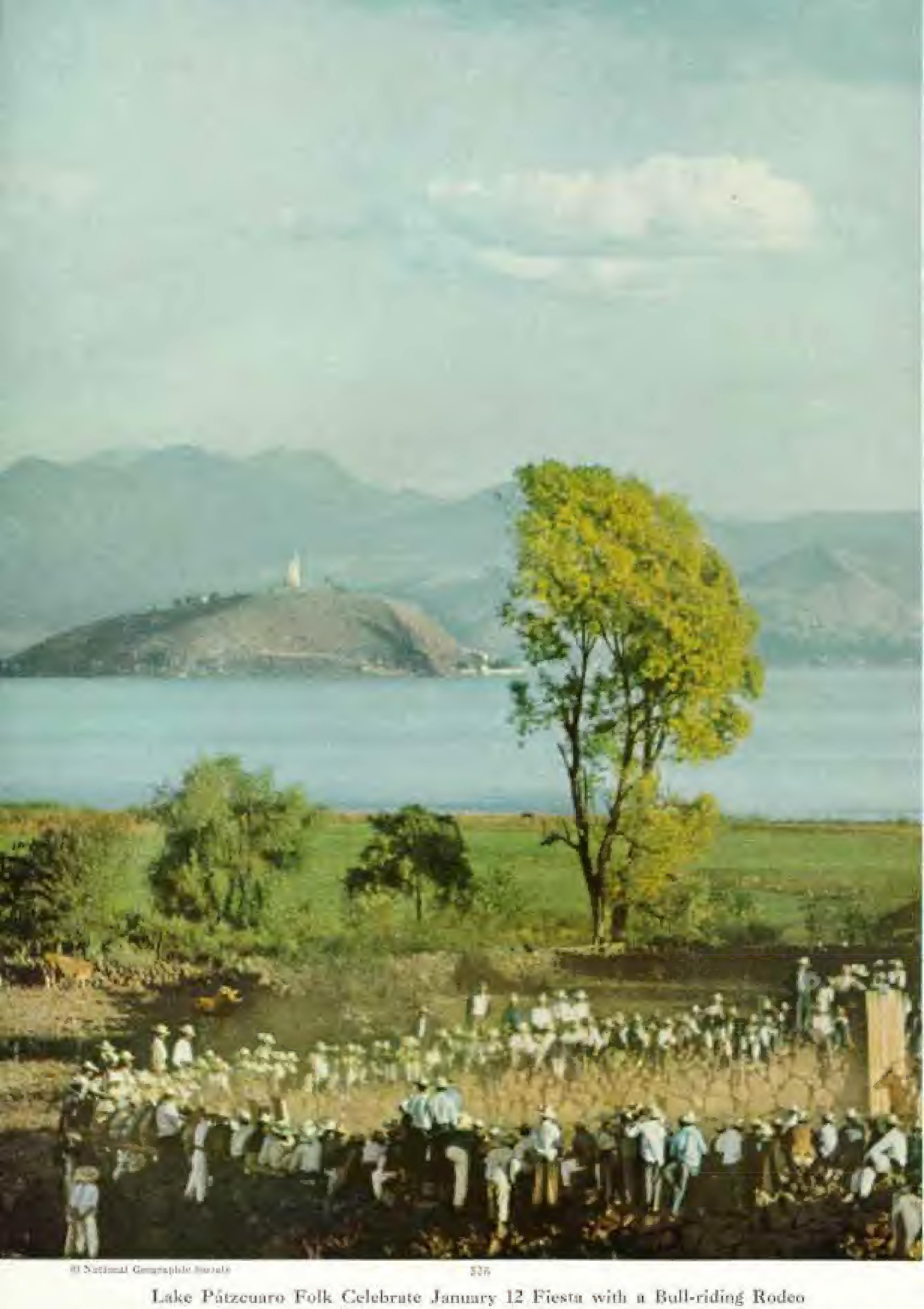
These Tarascans live on an island denuded of wood. Their highland cousins, rich in forest products, catch no fish. Each Sunday forest and lake people meet in Erongaricuaro and exchange wares (page 541). Donkeys plod back to the Sierra with fish; canoes return across Lake Pátzcuaro with fuel and humanity.

Men Heave Against Shore, Women Strain Against Paddles to Launch a Hundred Canoes . . . An Oldster Sews His Nets

Fearful of Lake Pátzcuaro's afternoon squalls, fishermen stop trading in Erongarícuaro at midday. Then they carry firewood to dugouts, leaving toddlers to guard stacks not yet moved, and hasten home. Right: Tata (father) Domingo, who is in his early eighties, is too old to fish but young enough to make nets. Janitzio Island, his home, has another octogenarian who still fishes; sometimes he paddles his canoe through driving rains.

Kodachromes by National Geographic Photographer Justin Locke





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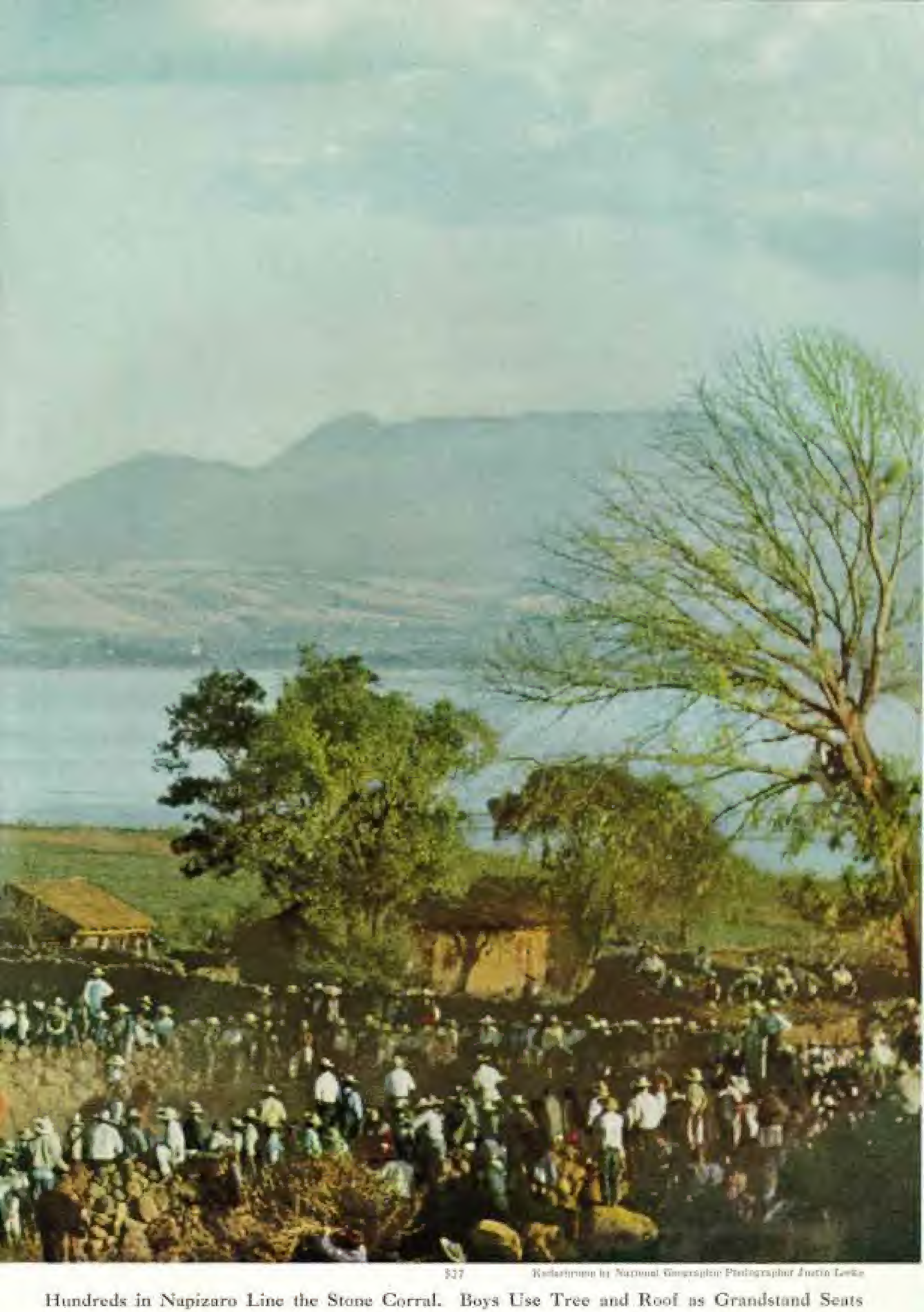
Lake Pátzcuaro Folk Celebrate January 12 Fiesta with a Bull-riding Rodeo

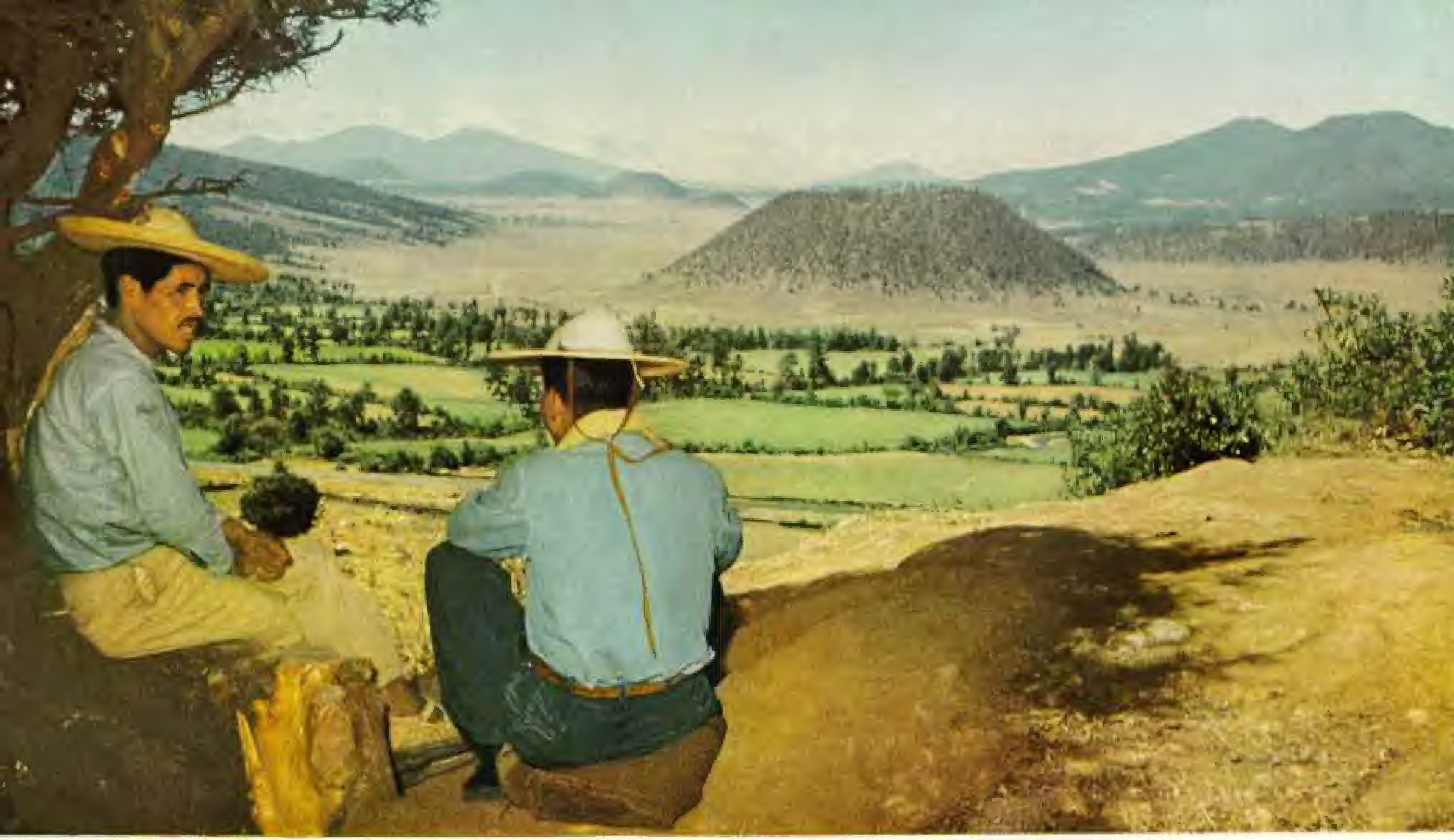
Amateur riders volunteer to master a bull or cow, but some lose their nerve at the last minute. A gigantic statue to José Morelos, a hero of Mexico's War for Independence, surmounts distant Janitzio Island.



Kodachrome by National Geographic Photographer Justin Locke

Hundreds in Napizaro Line the Stone Corral. Boys Use Tree and Roof as Grandstand Seats

Here bulls are not killed but ridden bareback. Roped and thrown, they are saddled only with a strap for clinging hands. Mounted while on the ground, they rise and buck, trying to shake off and gore tormentors.



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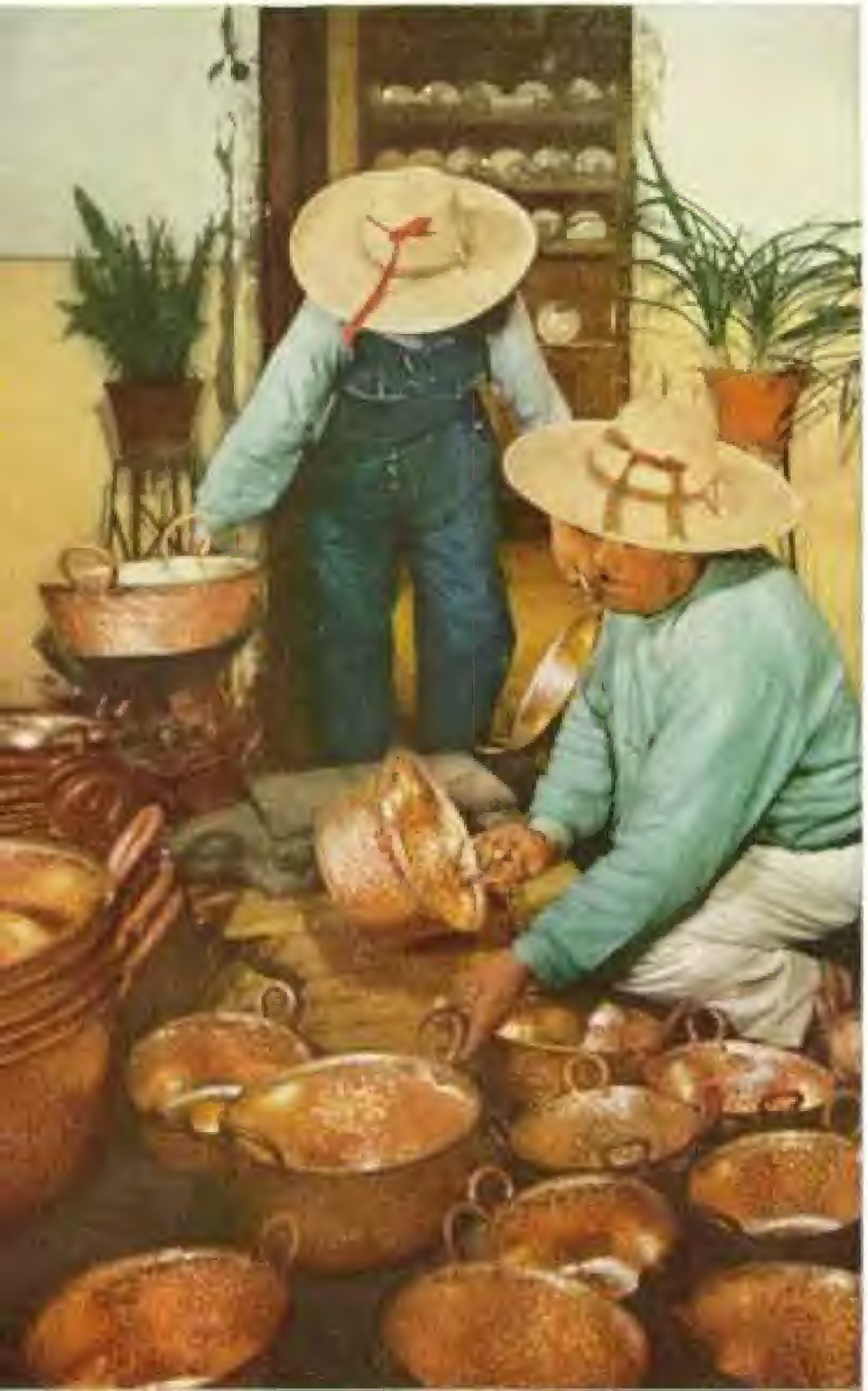
Forest-clad Ghosts of Dead Volcanoes Dot the Valley of Cherán, Not Far from Paricutin

Mexico's belt of fire, overlying a reservoir of molten rock, has erected hundreds of cinder cones on the Tarascan Sierra. Here any man who plows for corn may reap a live volcano, such as Paricutin, born in 1943. Farmers like these two climb Juanchan (center) and till the crater bed.



Carved Door, Copper Kettles Illustrate Old Indian Arts

◄ Tarascan smiths gained fame in pre-Cortesian times for their fine copper axes, hoes, pincers, awls, and ornaments. Legend says they knew the art of tempering the metal; but, if they did, the secret perished with them. Four centuries ago Spaniards conquered Michoacán and, needing brass for their cannon, levied a tribute in copper against Tarascans. Adventurers seized the mines and impressed native workers.

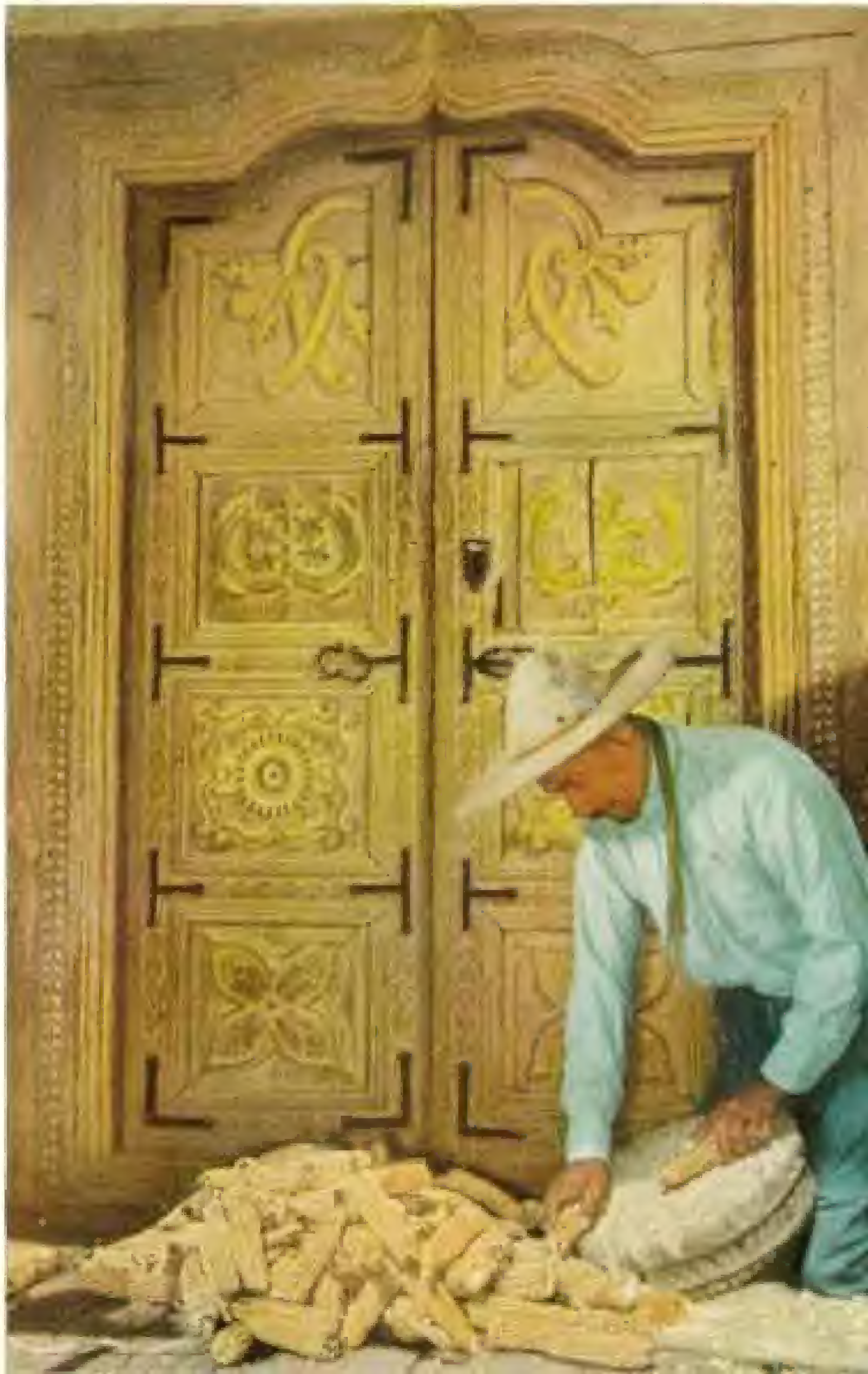
Today mines and smelters are shut; scrap is used in place of ore. Michoacán's great copper industry survives only in Santa Clara (left). There some 50 coppersmiths fashion the popular *cazo* (kettles), which find a sale all over the Republic. Working with charcoal and antique hand bellows, they shape their wares from flat sheets.

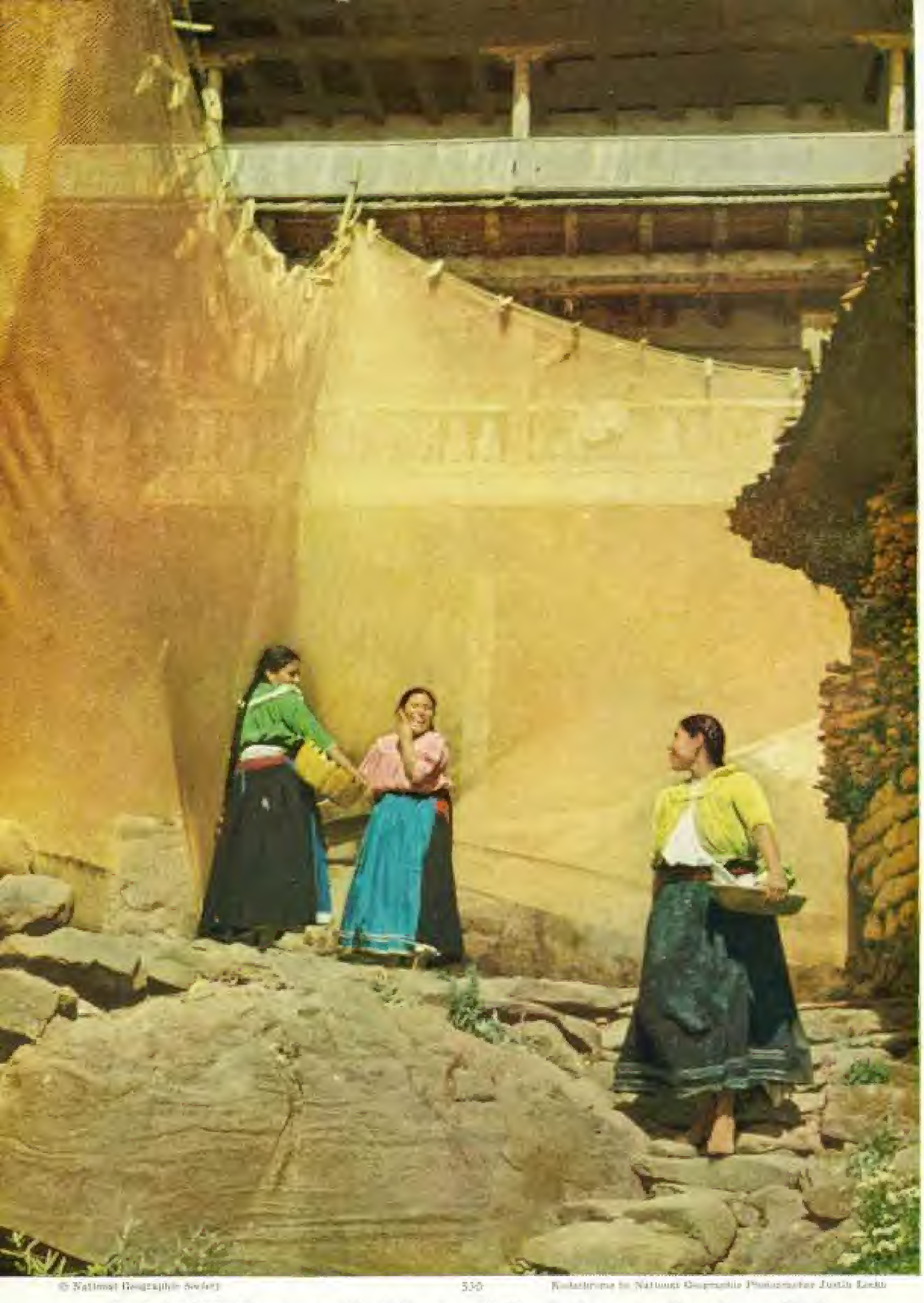
These pots sell by weight. The merchant measures them on his scale.

► This elaborate door stands in Charapan, a Sierra town, where patio walls hide it from public gaze. Michoacán wood carvers created it a century or so ago; theirs is a vanishing art.

Using a corncob scraper, the tenant shells corn for his tamales, tortillas, and *atole*.

Kodachromes by National Geographic
Photographer Justin Locke





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Janitzio Girls React to a Bit of Gossip with Shy Smiles and a Tumultuous Giggle

Tarascan women, celebrated for their long dark hair, let braids hang to knees. One of these islanders steps down to Pátzcuaro Lake front to wash dishes; her friends go to market. Fish nets dry in the sun.

need a relaxed atmosphere, something that will relieve tension and fatigue. This music seems to do the trick."

He picked up a tray, examined it, and put it down. "And that's not the only measure I take," he added. "Every day at 1, the boys and I head for my ranch and spend the early afternoon swimming in the Río de Cupatitzio. Limbers up the muscles, you know."

Leopoldo's workroom was a riot of color, so elaborate was his display of finished trays. I could understand now how this lacquer craft had brought fame to the area in both preconquest and modern times.

In pre-Cortesian days Tarascan rule extended south to the Sierra Madre del Sur. Coyuca de Catalán, on the Balsas, was the center of the southern empire, known widely for its gold work. Today goldsmiths still ply their craft in half a dozen villages, including Los Placeres, appropriately located on the River of Gold (Río de Oro).

One cloudy and dismal December morning I left with a guide for the Tarascan Sierra. Traveling west by horse from Erongarícuaro for six hours, I climbed upward through the foothills to where the little wooden villages hug volcanic slopes.

Until recent years Cherán was one of the region's typically isolated settlements. Today it is split by a modern asphalt road which starts at Carapan, on the Mexico City-Guadalajara highway, and runs southward to Uruapan. A town of approximately 3,400, Cherán is still 87 percent Tarascan, and its Indian customs have changed little.

The streets were deserted and cold, for I arrived during one of the winter rains. Clouds scudded swiftly down from the north and swept across the town toward the valley below, where cinder cones rose 800 feet above the cultivated floor (page 528).

Wooden Houses Have Oriental Look

To the east bare-limbed willow trees framed a small group of wooden *trojes*, log houses with an Oriental look to them (page 533). Beyond, El Pilon, a 10,000-foot volcanic peak, rose from its clouded base into a darkened sky.

Taking refuge under the plaza portals, I relieved the chill by drinking a cup of steaming orange-leaf tea. Across the street, beneath overhanging roofs, a group of young boys crowded close together. Their bright serapes provided the only spark of color in an otherwise dreary setting.

Here in the Sierra live 60 percent of the Tarascans. To these hills the lake Tarascans and subject tribes fled during the Spanish conquest, returning by necessity to the nomadic life of their earliest ancestors. Though Quiroga and Father Juan de San Miguel later brought new courage to the exiles and started the resettlement of the Sierra valleys, many Tarascans remained.

Living in Cherán today, I found an American couple, Mr. and Mrs. Maxwell D. Lathrop, and their children. Linguists, the Lathrops are translating the New Testament into Tarascan, publishing a newspaper in that language, and teaching the people to read.

President Cárdenas Hailed from Tarascan Country

"Tarascan has no known kinship with any other Indian tongue," Mrs. Lathrop told me. "Twenty-five years ago children were punished for speaking Tarascan in school, but all that has been changed now, thanks to President Cárdenas, who came from this Tarascan country himself.

"Written Spanish baffles Tarascan children, though their IQ is high. Learning to read their own language, they assimilate in six months what it takes three years to learn in Spanish.

"Tarascans are quick in repartee; they are full of puns. We felt we had arrived when we made our first play on Tarascan words, and it still thrills us to find the right Tarascan phrase to express a baffling idea."

The Lathrop children grew up speaking Tarascan. When someone at the dinner table uses English, they shout, "Gringo!"—an odd word coming from children of an American family.

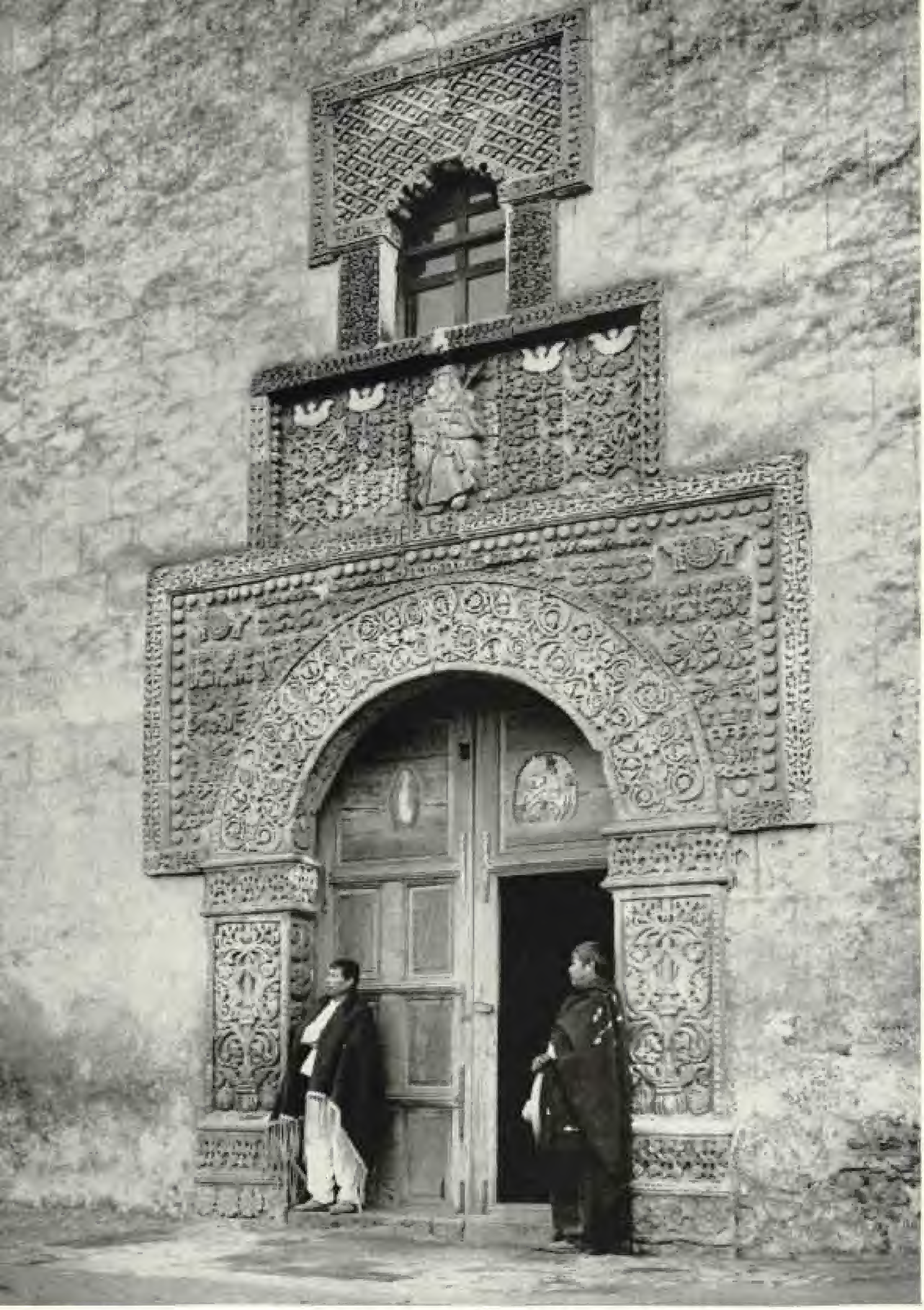
Since birth the four children have been taught not to drink unboiled water or eat unwashed fruit, both dangerous practices in rural Mexico. When Alice was 3 years old, she was asked to name man's first fault. "Adam's sin," she answered, "was to eat fruit before it was washed."

The next day I left for Paracho, widely known in Mexico for its guitar industry. There I called on Camilo Nava, a young Tarascan schoolteacher who had agreed to accompany me through parts of the Sierra.

We started our trip on December 20. Bouncing along at first in a taxi, we ended up riding horseback through the mountain wilderness and spending cold nights in old trojes under the shelter of a few serapes spread on the floor.

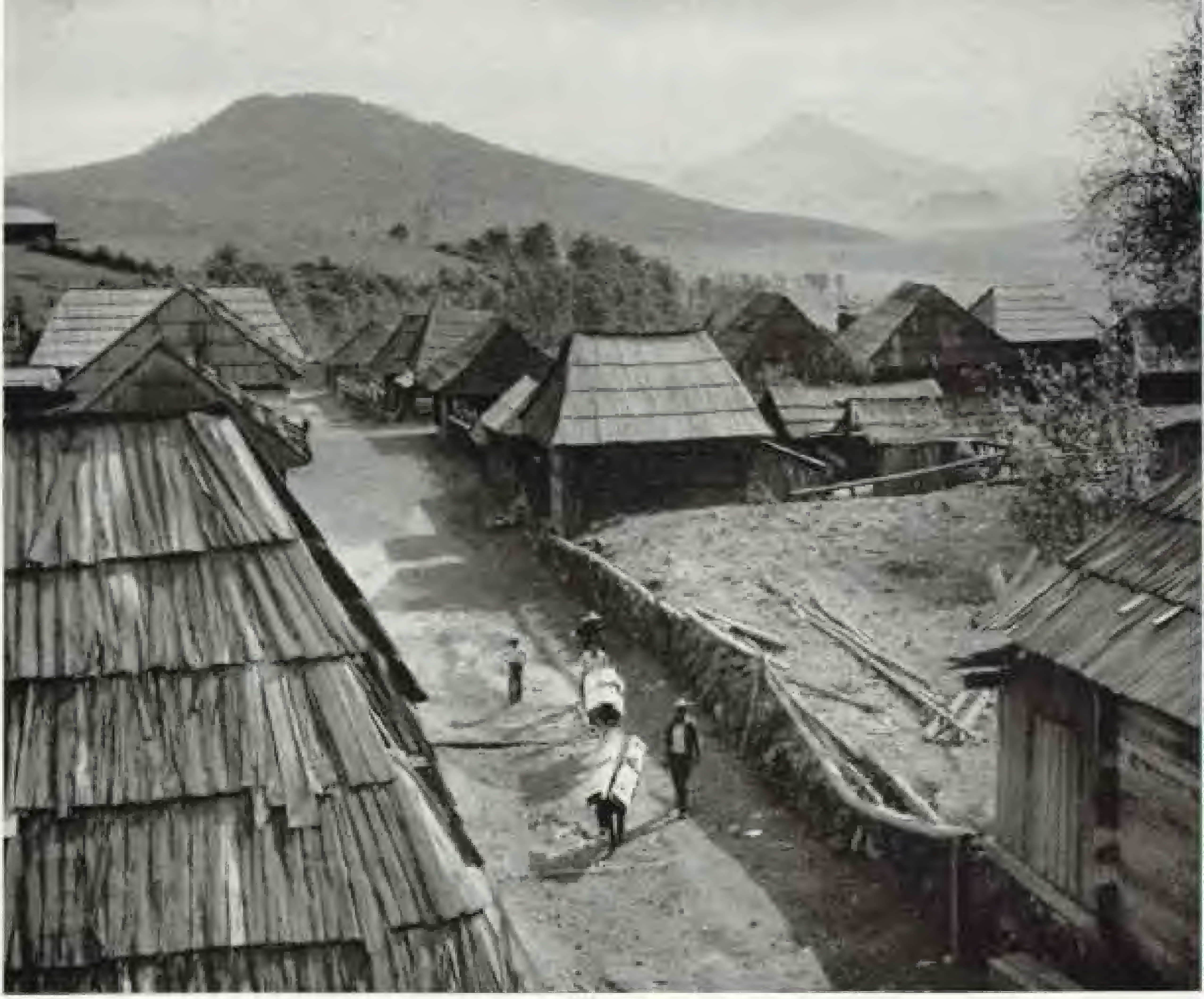
In San Felipe we saw curious wrought-iron work on the church door and on the doorknobs of the village dwellings—figures of birds, dogs, soldiers. These adornments are remnants of a once-thriving industry. Today it survives only in a few blacksmith shops, where I saw ax heads and plows being hammered to sharp blue points.

On horseback we continued our journey through thickly wooded pine areas to Patam-



A Gem of 16th-century Art Is the Carved Stone Façade of Angahuan's Church

Travelers seldom gazed upon this treasure until 1943, when multitudes began pouring through isolated Angahuan to see Paricutin Volcano. Tarascan artists did the carving.



Charapan Builds with Wood, a Rarity in Adobe Mexico

Tarascans' frame structures, called *trojes*, are known to have existed since the last quarter of the 18th century, but their origin is uncertain. Spain, which introduced so many styles into colonial Mexico, seems to have had nothing like them. Charapan's roofs bear heavy shakes instead of shingles. Doors generally face the rear court, leaving the street side bare. Donkeys here carry planks cut from the slopes of an extinct volcano.

ban, where green pottery is made. Covered with a copper glaze, this pottery is celebrated throughout Mexico.

On the fourth day we arrived at San Lorenzo, a village of about 600. Now we were within earshot of Paricutin's explosions.

In one of the many gardens a young Tarascan sat strumming his guitar. Long black hair hung over his eyes. His hat was perched high at an angle on his head. About his neck he wore a brilliant green kerchief in sharp contrast to a sparkling pink-satin blouse. On his knee a glaring red serape was gracefully draped. Suddenly his dark, round face grimaced, and he burst into song.

Strategy of Stealing a Bride

By the village fountain we found maidens washing cooked corn in preparation for festive dishes, for it was Christmas Eve (page 546). Disconcerted by our inspection, the girls giggled and hid their faces. I was inclined to linger, but Camilo urged me to leave.

"Be careful, Justino," he said jokingly. "Wells and public fountains, you know, are the scene of many courtships. Unless you plan to steal a girl to be your bride, let us be on our way."

He had a point. As in the days of the conquest, Tarascan youths frequently steal their brides—with the full cooperation of the bride-to-be, of course.

The strategy is planned in covert meetings at the wells and public fountains of the villages, where the girls come to fill their water jars. The abduction is usually staged in the evening, when darkness facilitates flight.

The girl may be captured voluntarily or by pretended force as she leaves church or strolls with her girl friends around the plaza. The lover then runs with her, or carries her off, to a relative's home or previously selected refuge. Friends ward off pursuers. Later the groom's family soothes the bride's parents. The marriage is formalized by civil authorities and followed by elaborate ceremonies.

In Angry Mood, Paricutín Bombards the Tarascan Sierra (Taken on Infrared Film)

Planter and Son Survey Mountain-girt Pátzcuaro, Mexico's 6,671-foot-high Lake

The water level is dropping. Landing piers and excursion boats stand marooned, and channels grow so shallow that motorboats can scarcely push through the water weeds. Some residents blame the charcoal burners busily stripping trees off the enclosing hills. Whenever the lake's flavorsome white fish are running, there is money to put beans and tortillas on fishermen's tables.

Occasionally the girl is the aggressor. A young friend of mine married simply because his sweetheart had scornfully observed, "You're not man enough to steal me!"

After wandering along paths thick with Parícutin's dust, we arrived at the home of Pedro Alejo. First welcoming his friend Camilo, Pedro offered us shelter for the night.

Early in the evening we sat on tiny chairs in the smoke-filled kitchen lighted by burning pine. A dish of beans, tortillas, a cigarette, and light chatter carried us into the night to the hour of the festivities. About 10 o'clock Camilo and I, wrapped in our blankets, started down the pathway to the chapel.

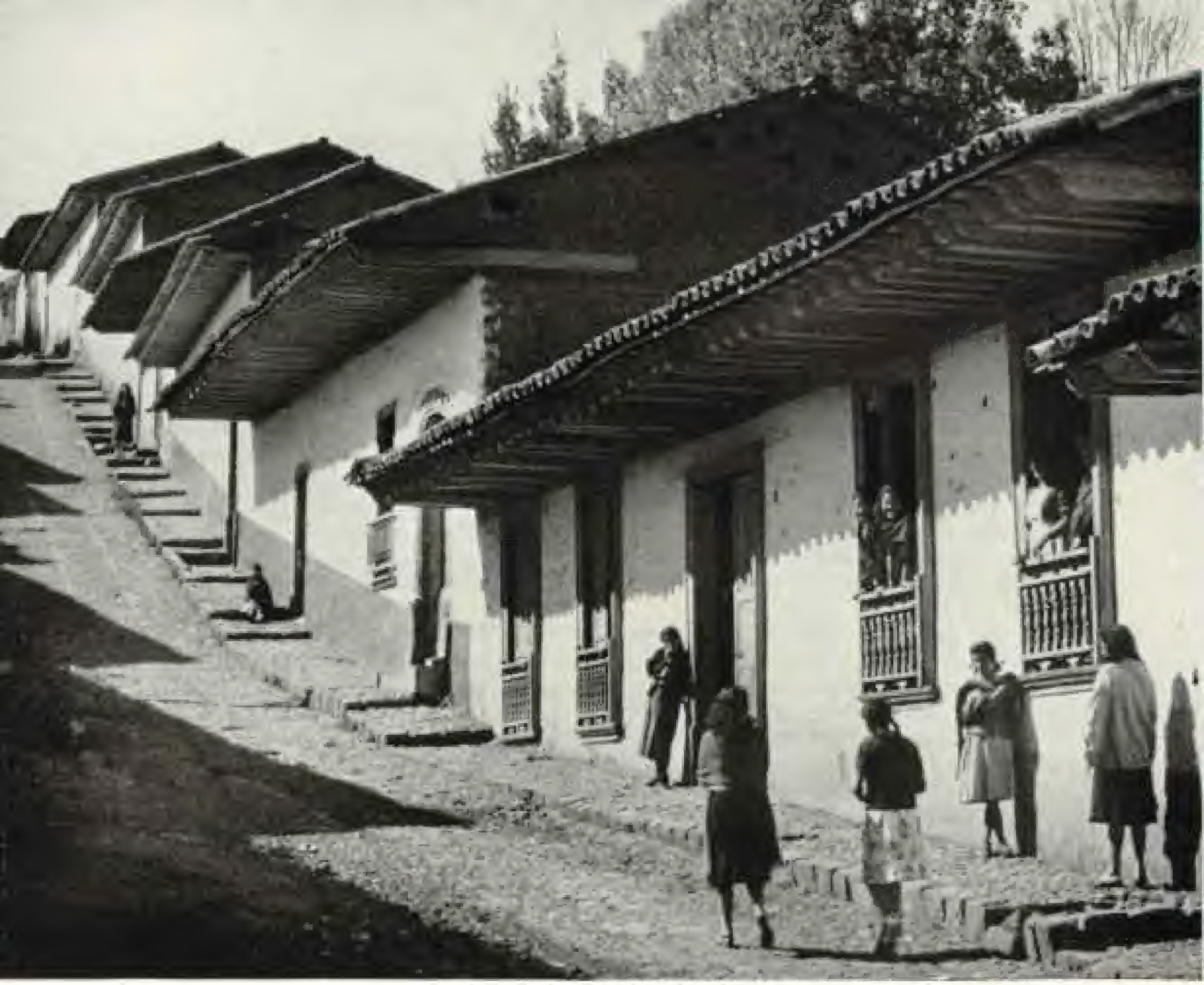
As we entered the chapel courtyard, I saw the musicians gathered around a small fire. Flickering flashes gave life to their still forms. Tarascan women, faces covered by dark-blue shawls, entered the chapel and knelt in prayer before the Virgin Mary. Her portable niche was embellished with flowers, strips of colored paper, tortillas, ears of corn, and fruit.

Soon the musicians hitched their serapes across their shoulders and started to tune their instruments. The resulting confusion of sounds awakened the night. Young girls representing shepherdesses, dressed in blue and white and wearing flowered straw hats, strode into the chapel, shouldered the shrine, and started a procession toward the home of one of the townsmen in charge of festivities.

Christmas Play: Angel Chases Demons

Dutifully the musicians fell in behind the shrine and struck up an air vaguely classical. Villagers followed in silent procession. Suddenly, flaming torches of resinous pine dissipated the darkness and revealed brilliantly dressed dancers in the lead.

When the parade had reached its destination, the Virgin was deposited in a temporary shrine next to an image of the Christ Child. Tarascans then crowded into every available space in the courtyard. Boys, beaming from perilous positions atop wooden fences and



Pátzcuaro Girls Enjoy the Winter Sun in the Cobbled and Eave-hung Calle de San Miguel

Every Friday this city witnesses a stirring sight as Tarascans paddle across the lake bringing chickens and fish to market (pages 524 and 525). Vendors from mainland towns arrive with clay pots, palm-leaf raincoats, wooden spoons, twig brooms, and coconut-husk saddle blankets. Boys sell garlic buds plucked from vegetable necklaces; hatters wear their merchandise stacked in tiers on heads, and pack burros trail barbered tails.

branches of near-by trees, waited impatiently for the dances to begin.

Dancing before the Christ Child, the shepherdesses sang softly. Abruptly, devils in sparkling black-and-red costumes rushed in.

"I guard the Holy Child," shrieked a tiny girl dressed in white. A winged angel, she bravely stood her ground. At this the demons accepted defeat, though defiantly claiming their power over man. As the demons retreated, masked hermits in conical hats and gray robes jumped upon them and struck them with whips of twine, to the great delight of the audience.

The fiesta was far from being ended, but, hearing bells ringing, we hurriedly left for the church. Piercing its interior with our flashlight, we found the floor covered with sleeping women who had entered to seek refuge from the cold and await the ceremony. Now they began to stir, and one or two homemade candles were lighted.

As the sacristan appeared, the shoulder-borne Christ Child and Virgin were brought through the main doorway and deposited on the altar. As if by signal, a murmur of prayers ran through the church, and hundreds of candles seemed to glow at once. In the soft light, the strum of guitars was heard.

Dance Is Reminiscent of Africa

Looking back, I saw eight black-masked "negrito" dancers enter and approach the center of the nave, where they clapped hands and danced to a monotonous guitar accompaniment. With their richly embroidered costumes decorated with dangling bells, mirrors, and shiny metal beads, the performers might well have been dancing somewhere on the African Continent.

As the service neared its end, a group of women sang softly, while children blew whistles to imitate the song of birds. Here and there a dog curled up at the feet of its owner.

Camilo and I walked quietly to the back. In the doorway, with the darkness of the night behind them, stood the three devils in their flashing costumes and glittering crowns. Wrapping our blankets tightly about us, we gave the demons a wide berth and walked out into the night.

Tarascan dances, performed in nearly all villages during main fiestas, vary with each locale. For one of the most popular, the masked *Viejitos* (Little Old Men), the dancers of Cucuchucho don wrinkled pink masks of clay, wigs of white horsehair, flat straw hats, serapes, and pants embroidered at the cuffs. In mimicry of old men, they lean heavily on wooden canes. Their steps, intricate and lively, are accompanied by guitars.

In the Sierra region, however, viejito dancers wear light-colored wooden masks to simulate the features of the Spanish conquerors of long ago (page 545).

In the graceful dance of the *Canacuas* (Crowns), which I saw in Tingambato, Indian girls in native costumes made offerings of fruit, pastry, and flowers to the visiting Bishop of Zamora—a modern counterpart of an ancient ritual which honored Xaratanga, one of the old Tarascan goddesses (page 544).

From San Lorenzo, Camilo and I at last launched our long-anticipated trip to Paricutin. Catching a bus on the dirt road that skirts the volcano, we rode eight miles to the village of Angahuan (page 532).

Along the way we were able to catch short glimpses of the "Angry God of the Sierra," and the rising column of smoke from its crater was continually in view. As we neared the village, the greenish countryside turned pale. Soon the bus was gliding smoothly over long stretches of cinder and ash.

Forests Killed by "Angry God"

We got off the bus in the midst of a desert waste that was once a fertile cornfield. Walking with difficulty across its porous surface toward the village, we fought a strong south wind which raised a whirlpool of cinder dust high into the sky.

Down the desolate lava-dust streets of Angahuan we walked until we came to the churchyard. There we rested by a tall stone cross. Tarascans, harassed by the wind, scurried past us, crossed the yard, and entered the shelter of the church.

Southward, clouds of dust seemed to flatten the landscape. Above and beyond them Paricutin's eruptions diluted the blue sky into colorless gray. Although it was five miles away, the volcano brooded menacingly over our little village.

Eager, nonetheless, to see the angry god at closer range, we left by horse for the cone itself with Jesús Saldaña, a young Tarascan guide. Skirting a solid 20-foot wall of lava, we rode to a point west of Paricutin and from there traveled by foot. We crossed wide gullies and started climbing through a ghostly forest of whitened upright trunks of trees whose bark and leaves had long since been killed by showers of volcanic dust. To the south, low hills showed deeply eroded crevices and spiny surfaces. Their woods, once lushly green, now resembled bristles on the backs of dormant gray monsters.

As we climbed, we passed over thick deposits of ash and cinder, their smooth surfaces broken by innumerable crannies and pockmarks where pieces of rock blasted into the air had buried themselves out of sight. Across this strange wilderness, as desolate as the face of the moon, an aimless yellow butterfly fluttered as if lost.

Eruption Drives Climbers Back

In the background rumbled the volcano's dirge, half heard, half felt; the only other sound was the constant ticking of falling particles of lava dust on our hats.

At last we arrived at the foot of the cone, whose sides rose almost a thousand feet above the surrounding lava field. Deceptively symmetrical and smooth from a distance, these slopes proved actually to be littered with jagged lava deposits.

Though the crater was spouting lightly, we ventured a try and defiantly climbed to within 300 feet of its crest. There a sudden quaking beneath our feet stopped us short.

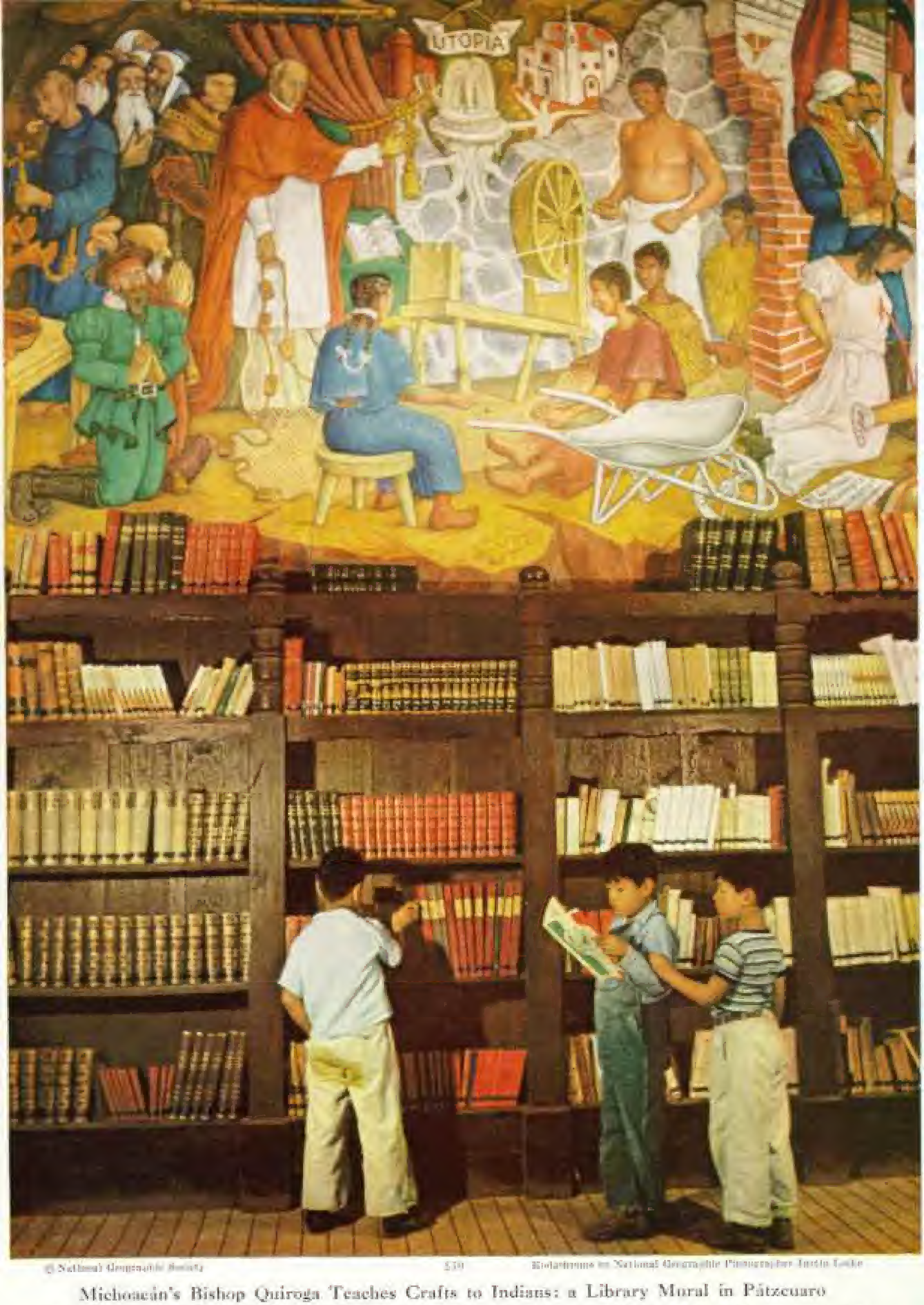
A moment later, hot lava flew high into the air above us and fell back down the inner sides of the crater and the outer sides of the cone. Smoking red particles tumbled around us.

We required no further warnings; we beat a hasty retreat. Clearly, we had encroached upon sacred ground and had incurred the wrath of the angry god.

That moonlit evening we watched Paricutin's further eruptions from a more comfortable spot, a geological station several miles away (pages 534-5).

Since it burst from the earth, Paricutin has buried Tarascan villages and covered fields of corn with cinder and ash over an area of at least 60 square miles. Rising 1,500 feet above the original plains, it has vomited lava over a radius of some two and a half miles on the north side of the cone.

I thought, gazing at the volcano's gaudy pyrotechnics: surely the Tarascans have suffered enough. Surely their once-great domain has been sufficiently constricted without the subtraction of still other acres. But the angry god only muttered the more, and the soft ash fell unceasingly upon the remnants of an empire and a civilization.



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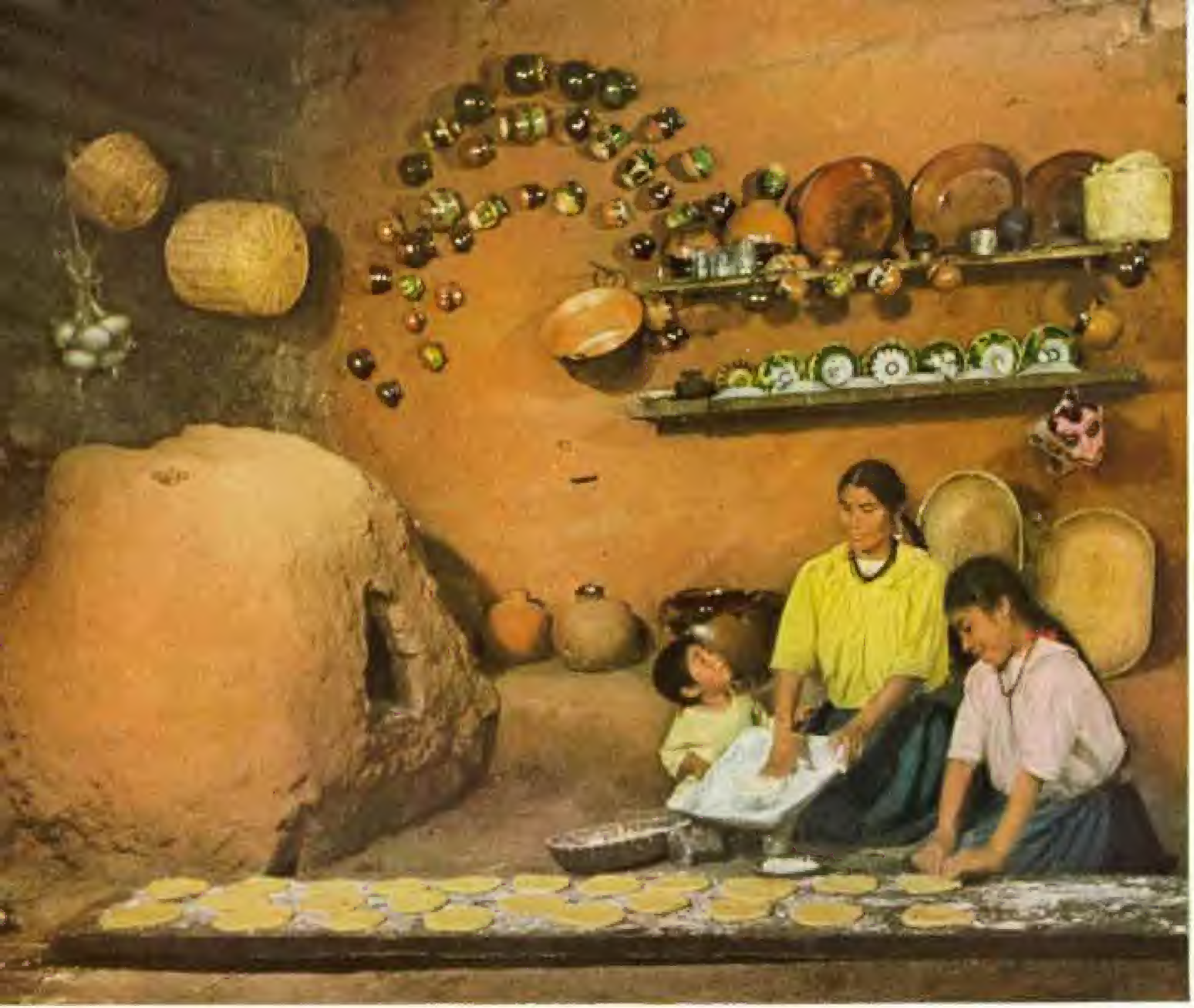
Michoacán's Bishop Quiroga Teaches Crafts to Indians: a Library Mural in Pátzcuaro

Conquistadors kneel; boys wear palm-leaf rain capes. The curlicue from a friar's mouth (left) represents the Tarascan tongue. Blood gushes from a patriot (right). "Utopia" stands for the society Quiroga hoped to found.



Mamma and Her Helpers Pat Fiesta Cakes in a Tarascan Kitchen

Seldom during daylight hours does the soft pat-pat-pat of tortilla-making go unheard in this Janitzio Island home; but, as a feast day approaches, mother prepares sweetened wheat cakes as a welcome change. She will bake them in the beehive-shaped adobe oven.

Brother, who helpfully gets his hands messed up with dough, is destined to be a fisherman, like his father and grandfathers. Sister is the girl of page 544 (center) who sells toy butterfly nets made by her grandfather.

The housewife has no refrigerator, vacuum cleaner, or electric washer, but appears content without them. She loves to ornament walls with her pottery. Her pots, copper kettles, wicker baskets, and wooden trays come from Tarascan towns specializing in those wares.

Bedroom, parlor, shrine, and kitchen all share space in the one big chimneyless room. The dining corner, plastered with red earth, has no table, but it is swept so thoroughly that meals are served on the floor.

Fish and tortillas make up the usual repast. Atole, a thin corn gruel, provides drink.

One corner (not shown) is given to the shrine, where the family's paper saints preside. On special occasions they are reverenced with the smoke of copal, the resinous incense which Tarascans burned to the pagan gods.

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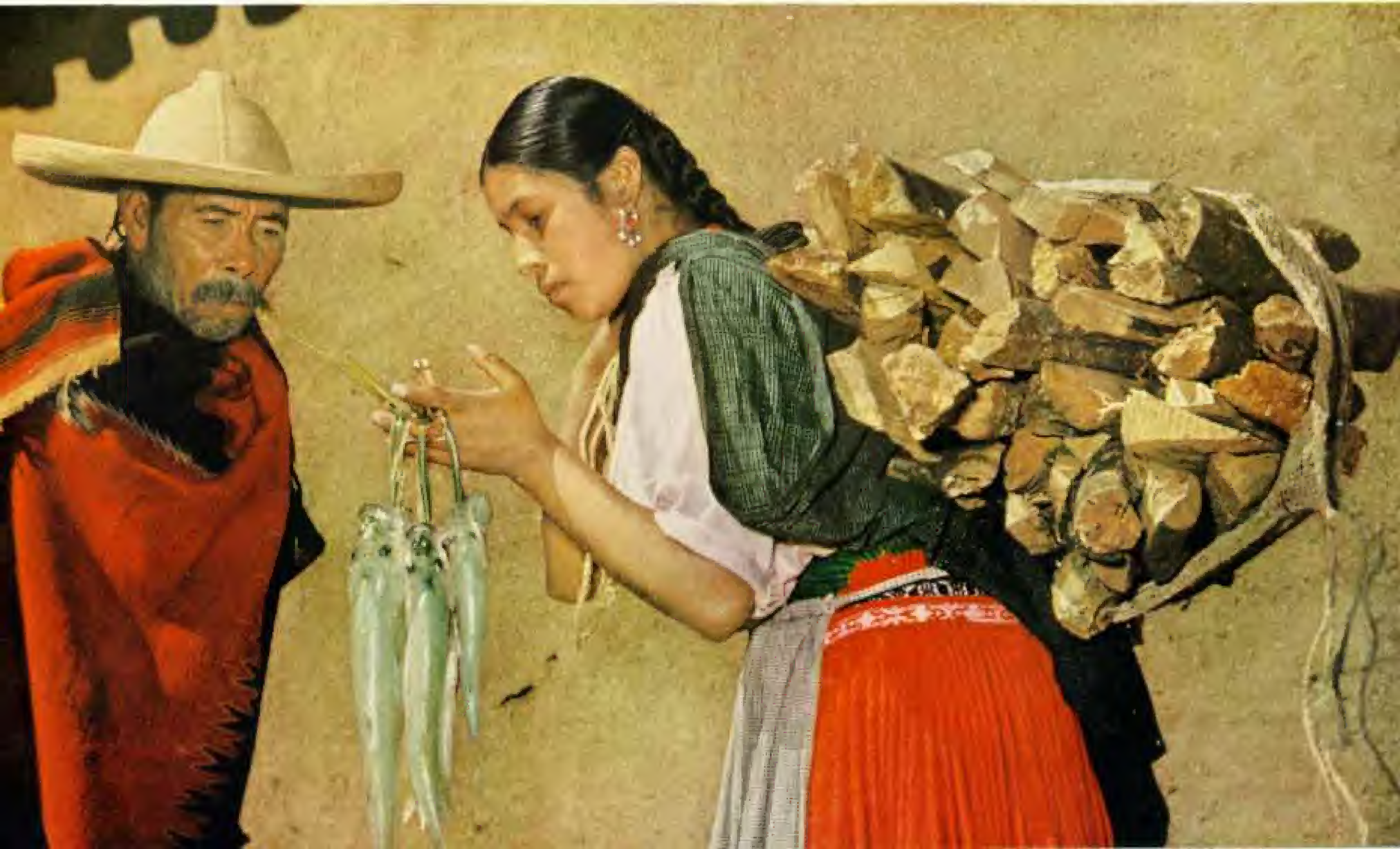
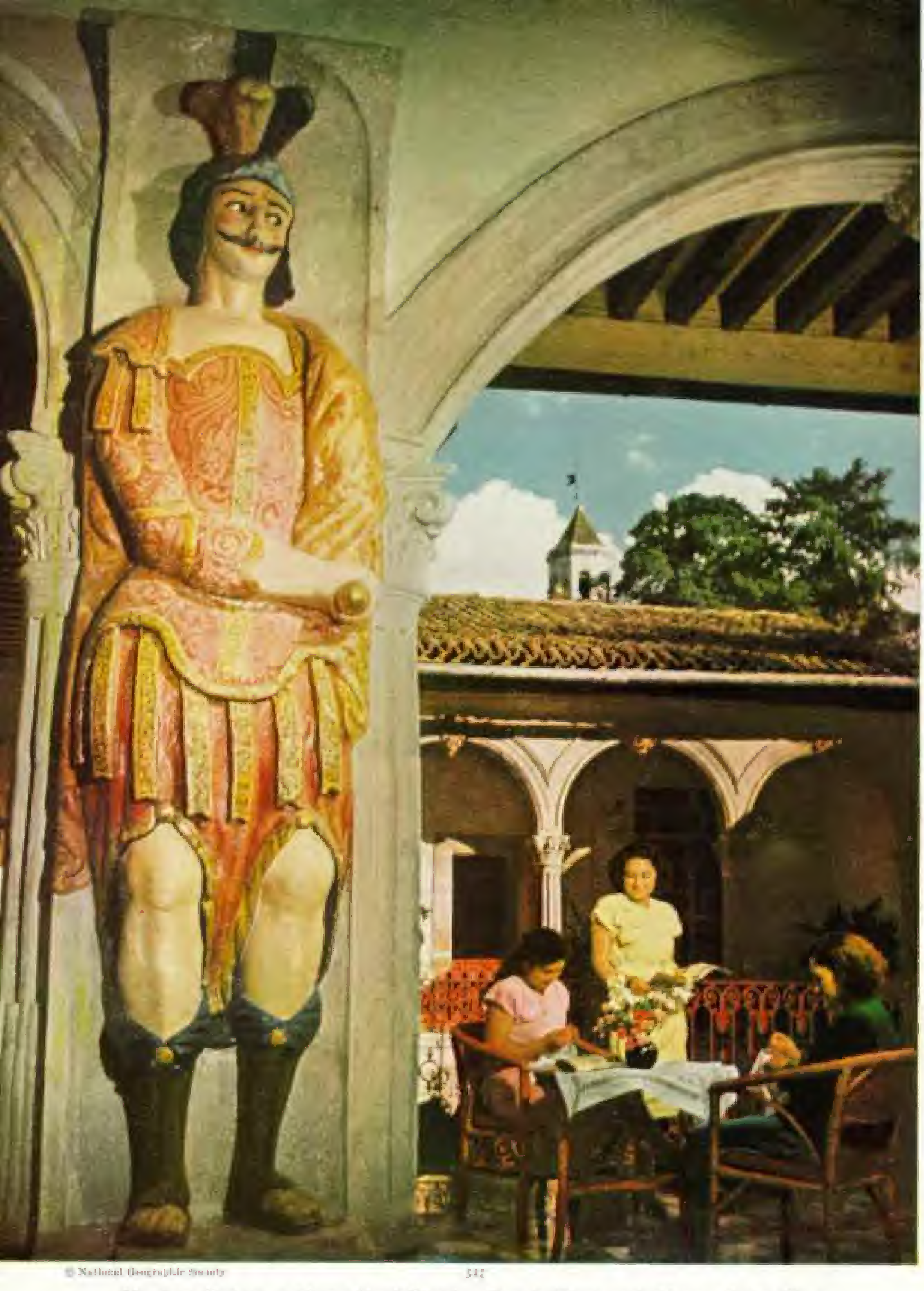
"I Offer My Last Six Fish," Elodia Campos Tells the Forester, "for Another Load of Your Firewood": Erongaricuaro

Kodachrome by National Geographic Photographer Justin Locke





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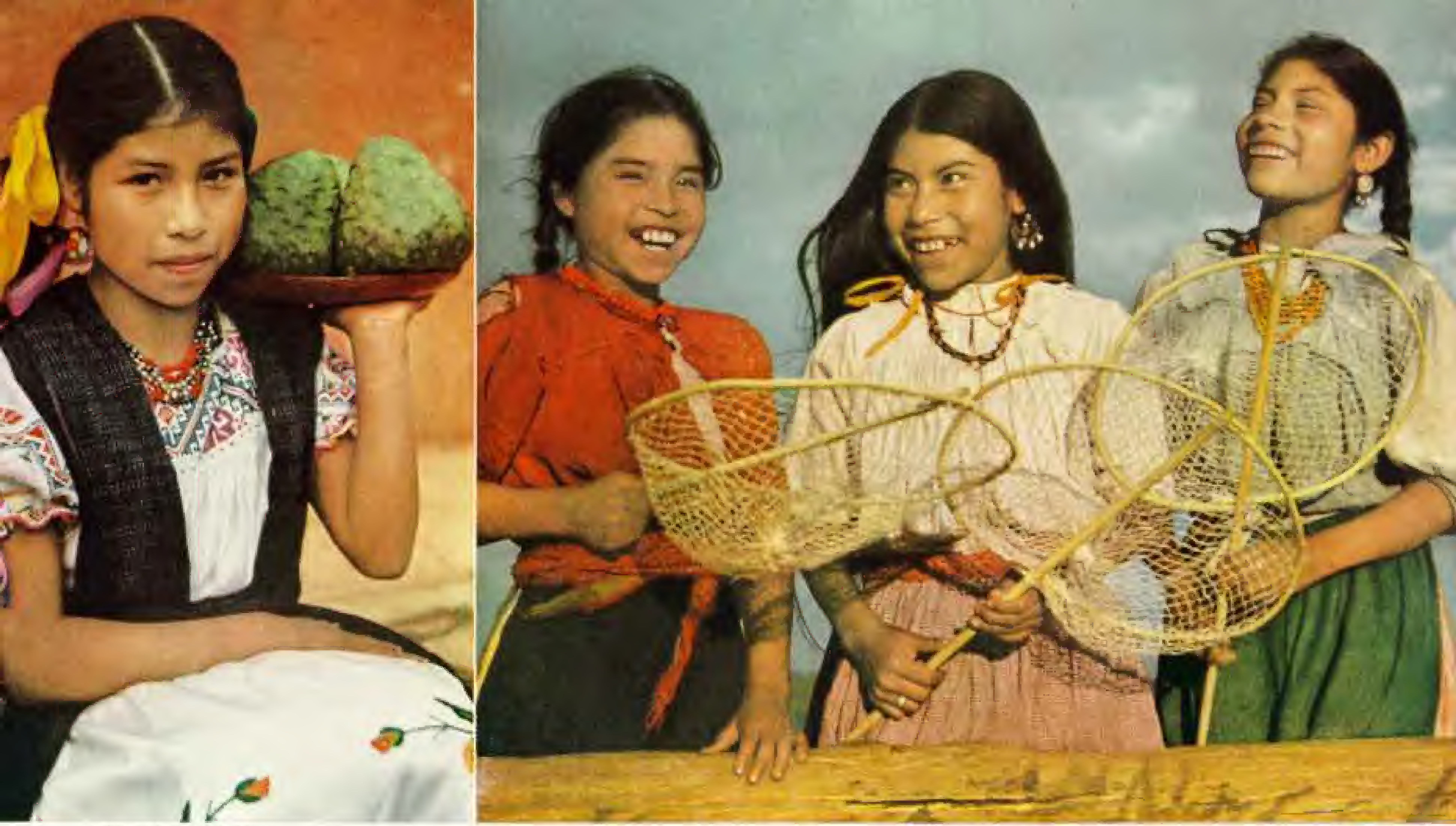
Hand on Dagger, a Mustachioed Warrior Guards Pátzcuaro's House of the Giant

Like the sculptured guardian of a Chinese temple, the giant casts a protective eye over ladies sewing in the patio. He is so old that no one remembers his creator's name. The house is a Spanish colonial treasure.

Kodachrome by National Geographic Photographer Justin Locke

Pátzcuaro's Canopylike Eaves Might Have Come Entire from Spain

In colonial times, when gold and silver flowed freely, this was an aristocratic neighborhood. Bishop Vasco de Quiroga, Pátzcuaro's hero, gave his name to the street. He lived a few doors away.



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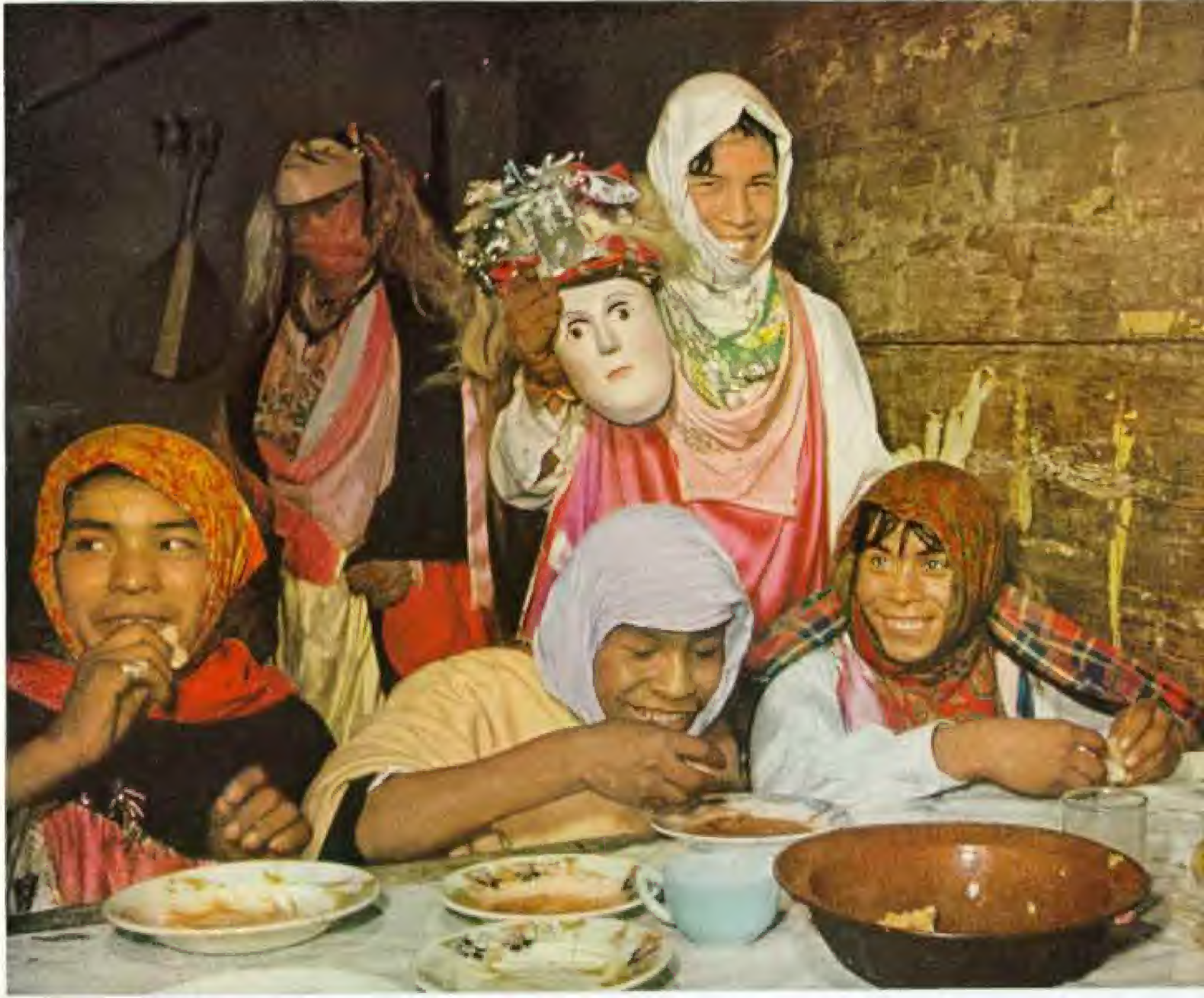
Tarasco's Dark-eyed Beauties Offer Custard Apples, Butterfly Fishing Nets, and Flashing Smiles

Left: A dancer bears cherimoyas, a tree-grown fruit, the specialty of her village, Tingambato. Right: Janitzio girls sell miniatures of the nets used for catching *tiru*, a small fish. Black bass, introduced into Lake Pátzcuaro, gobbled so many tiru that butterfly nets almost faded out. Both tiru and nets have made limited comebacks.



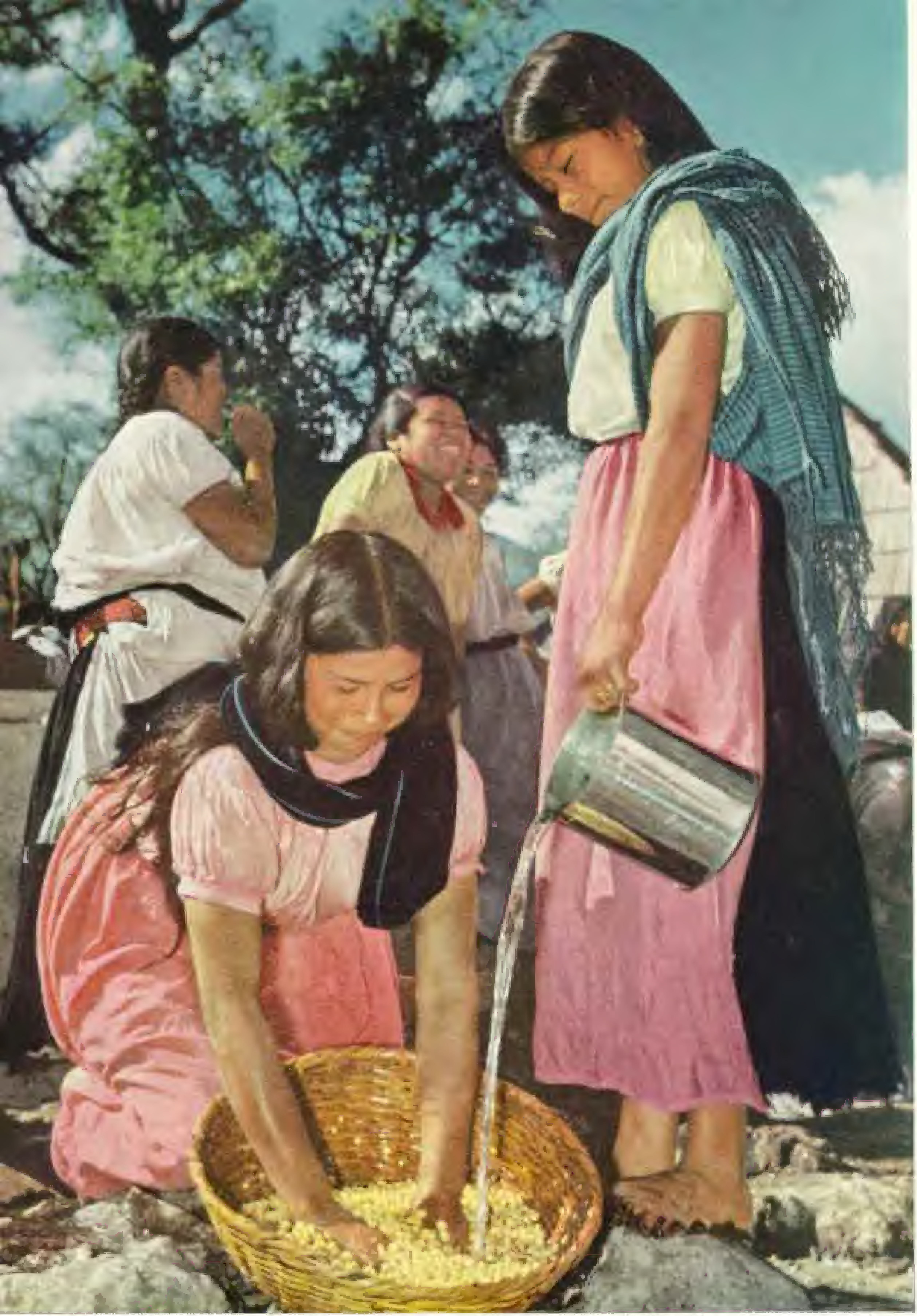
Food! Off Come Masks; Grins Light Up Faces; Bowls Are Wiped Dry

Tarascans love to dance, not as partners arm in arm and cheek to cheek, but as teams honoring their saints. They celebrate a score or more of religious festivals, most of which call for dancing. With no profanation intended, grotesquely costumed Indians dance on occasion within their churches. Some dancers masquerade as saints or devils, hermits or buffoons. A favorite number is that of the Little Old Men, in which youths masked as bearded, wrinkled patriarchs burlesque the infirmities of age.

These young swains, having danced in disguises, serenaded their girl friends, and bearded their prospective fathers-in-law, feel like American country boys who on Halloween Eve pitch the neighbors' gateposts atop barn ridgepoles. This, the Fiesta of the Three Kings, is the high point of their year at San Juan Nuevo, a highland village.

While performing in public the boys never drop masks; but now, in the privacy of their patron's home, they remove food blockades, let down their hair, and expose appetites. Beans, tortillas, chile, and atole vanish. Laughs sweep the room as pranks are recalled. "Did you see her face when I . . .?" "Wait till her father hears . . ."

Kodachrome by National Geographic Photographer Justin Locke



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San Lorenzo Girls Rinse Hulled Corn at the Fountain, Their Favorite Trysting Place

Pilgrimage to Holy Island and the Farnes

Hundreds of Pilgrims Wade Across Oozing North Sea Sands to Visit This Early Center of Christianity in Northern England

By John E. H. Nolan

A FEW miles east of England's hilly Northumbrian coast, a handful of small islands lie in the churning North Sea. They are little known to most British mainlanders; coastal sailors, however, mark them well, and carefully sail wide around their sharp, rocky promontories and treacherous reefs.

The smaller islands, some 25 of them, are called the Farne Islands. About half of them are under the sea at high tide; those that don't submerge are inhabited by thousands of birds, which build nests on stony ledges or lay eggs in the sand along the shore line.

A larger island, shaped like an ax, lies northwest of the Farnes. It is Holy Island, or Lindisfarne, three miles long by a mile and a half wide at its broadest part, but narrowing in places to only a few windswept yards (map, page 551). Unlike the Farnes, it boasts a village, four inns, and even taxicabs.

Amphibious Taxi Has No Brakes

Unlike the Farnes, too, it can be approached by land, but only at low tide, over nearly three miles of wet, oozing sands. Visitors sometimes walk across the flats barefooted; a few come in horse-drawn carts.

Being a journalist by profession, I was visiting Holy Island and the Farnes on business as well as for enjoyment. So my own visit began more prosaically, by taxicab. Eighty-one-year-old Bobbie Bell, postmaster of Holy Island for 48 years, had a car to meet me at Beal, a small railway station a mile from the Northumbrian shore.

I was greeted there by a water-splashed, hatless islander of middle age, wearing thigh-high rubber waders. He introduced himself simply as "Gow." Drawing on an old pipe, he was lounging against the battered body of a 1928 Ford. Spattered with sand, the car still dripped from its water passage.

After being forced to wait until that famous train, the Flying Scotsman, had flashed past, Gow energetically cranked the engine. It finally reacted with an earsplitting bang; then off we rattled over the still-quivering rails, tore up a steep bank, and went down a mile-long slope between fields in which black cattle were peacefully grazing.

The car had no brakes, for brake linings last no more than a month in the salt and sand. There was no halting our mad ride; when we arrived at the bottom where flats and mainland met, even a change of gear failed to stop our rusty chariot from leaping a pile of rubbish left by the receding tide. Beyond us then, through a thin veil of sea mist, I dimly discerned the island.

Planted across the sands, and leaning at all angles, was a line of 20-foot poles encrusted with barnacles (page 559). Stuck up at frequent intervals, they signposted the route through a crossing of the stream Lindis (better known as the Low) to the main part of the island. That trail, unused by anything on wheels, is called the Pilgrim's Way (pages 548-549).

A second set of poles, swerving northeastward toward the Snook at the ax handle's end, marked the motor route we followed.

The car plowed through inches of water, driving showers of spray into a crack in the windshield, and I was soaked by the time we wallowed in bottom gear through another crossing of the Low.

Since taking off across the flats, my companion had been cheerily singing:

> I'm a roving fisher lad, just landed from the sea,
> As happy as the jackdaw, squawking in a tree;
> Lively as the little fish that in the ocean swim—
> Wet or dry, 'tis all the same to Holy Island Jim.

Now, as our near front wheel stuck in a submerged pothole, his song ended with an "outlandish" curse. Gow struggled with his gears; steam rose from the radiator, and water seeped through the floor boards.

A ride over sands covered with casts from millions of lugworms (page 552) and through pools of water brought us to the last pole. Gow veered, driving along the handle of the ax past a string of sand hills, then through more water, until there loomed before us, in the words of Sir Walter Scott:

> A solemn, huge, and dark-red pile
> Placed on the margin of the isle.

Priory Marks St. Aidan's Church

It was the red-sandstone ruins of a great church, the island's Norman Priory. A delicate-looking arch, curved like the rainbow, seems to thrust heavenward (page 553).

That ruined Priory is still regarded by the islanders as the great wonder of their world. In the course of years it succeeded a church and monastery founded A. D. 635 by St. Aidan, the island's first bishop. Holy Island was

Shoes in Hand, Pilgrims Splash Across a Tidal Flat to Britain's Holy Island

Twice a day North Sea tides sever Holy Island from England's Northumbrian mainland. But at low tide oozing sands connect them, offering safe passage. These Yorkshire pilgrims, with a clergyman here and there, trudge across the land bridge to visit the part-time island.

one of the earliest strongholds of Christianity in northern Britain.

My companion explained that although the monk Bartholomew and such saints as Aidan, Oswald, Finan, Colman, and Wilfrid are held in great respect by the island folk, the best-loved saint is St. Cuthbert, the former shepherd boy who loved and protected the myriads of birds.

After becoming Bishop of Lindisfarne (as Holy Island was then called), St. Cuthbert passed to his reward A. D. 687. He died as a hermit on one of the lonely Farnes, following much penance and self-mortification, which included praying for hours while standing up to his neck in the sea.

As we sped over what appeared to be neither earth nor ocean, I thought I saw a long, low row of black dots stretching out from the island across the sands. Gow told me they were piles of stones, seaweed-covered now, that the old monks laid down to guide them to and from the mainland (page 552).

Pointing to the approaching sea, Gow spoke about the tides. Save for the neaps, they isolate the island for two hours before and three hours after high water. Jerking his thumb toward a strange, boxlike erection on spindly legs, set in the middle of the vast expanse of sand, he announced, casually, "Theet's foo seeving leef." Two of those queer-looking structures were built to give wayfarers a chance of escape if caught by a tide on the flow (page 555).

Despite these boxes, lives have been lost. One man, who had rested his cycle against a guiding pole, dropped dead when he saw the tide creeping toward him; another, driving his own car (it's wiser to hire an island taxi), panicked, climbed to its roof, and was swept away. Had he but known, he could have reached safety, as the water when he stopped was only a foot deep.

Midway down the inside edge of the ax-head, we left the sands to mount a low cutting to the island road.

Village "Nae Goot a Name"

A smooth, well-kept thoroughfare, running half a mile to the village, led us alongside carefully tilled fields where one of the island's three tractors was working.

White and gray cottages, mostly built of stone, and with blue-slated or red Dutch-tiled

© Kemsley Press

Sheets of Water Left by Retreating Tide Mirror the Advancing Procession

Pilgrim's Way, nearly three miles from shore to island, never dries completely. This is well for the lugworms (*Arenicola marina*), whose burrows honeycomb the flats. Pencil size, they swallow moist sand, extract organic matter, and deposit the residue in small mounds, which clutter the watery landscape.

roofs, greeted me as we swung under some sycamores and drew up at the Castle Hotel.

Having paid Gow the asked-for eight shillings, I asked him the name of the village.

"Eet's nae goot a name," he responded matter-of-factly.

"Not got a name?" I echoed. "Why not?"

"I kinna say." As an afterthought, he added, "Nae doot they fogoot to name eet."

But I found all the streets named, nor did those persons who welcomed me at the inn lack for names. Each, in fact, had two, a proper name and a nickname, and it was by the latter that they were introduced to me: Boona, Ta-a, Fluka, Wonka, Te-ick, Geogie-Lil, Qu-ack, Bo-Bo, Doe-Doe, and De-Da, the last belonging to a tawny-haired young creature of twenty, whose sea-blue eyes and strawberry-and-cream complexion bespoke her Viking ancestry.

I was also greeted by six spaniels, and by Jack, a jackdaw, about whom I learned more next day when he flew into my room and zoomed away with a pair of precious cuff links.

Questioning elicited the fact that the bulk of the population of about 250 is composed of 21 families, nearly all related in some degree. Four families—the Lilburns, Cromartys, Allisons, and Beadnells—trace their ancestry back four centuries.

I gathered that the little community is now faced with the problem of how to introduce fresh blood. This is not an easy matter to resolve, since the clan spirit does not favor marriage with "ootlanders," or mainlanders.

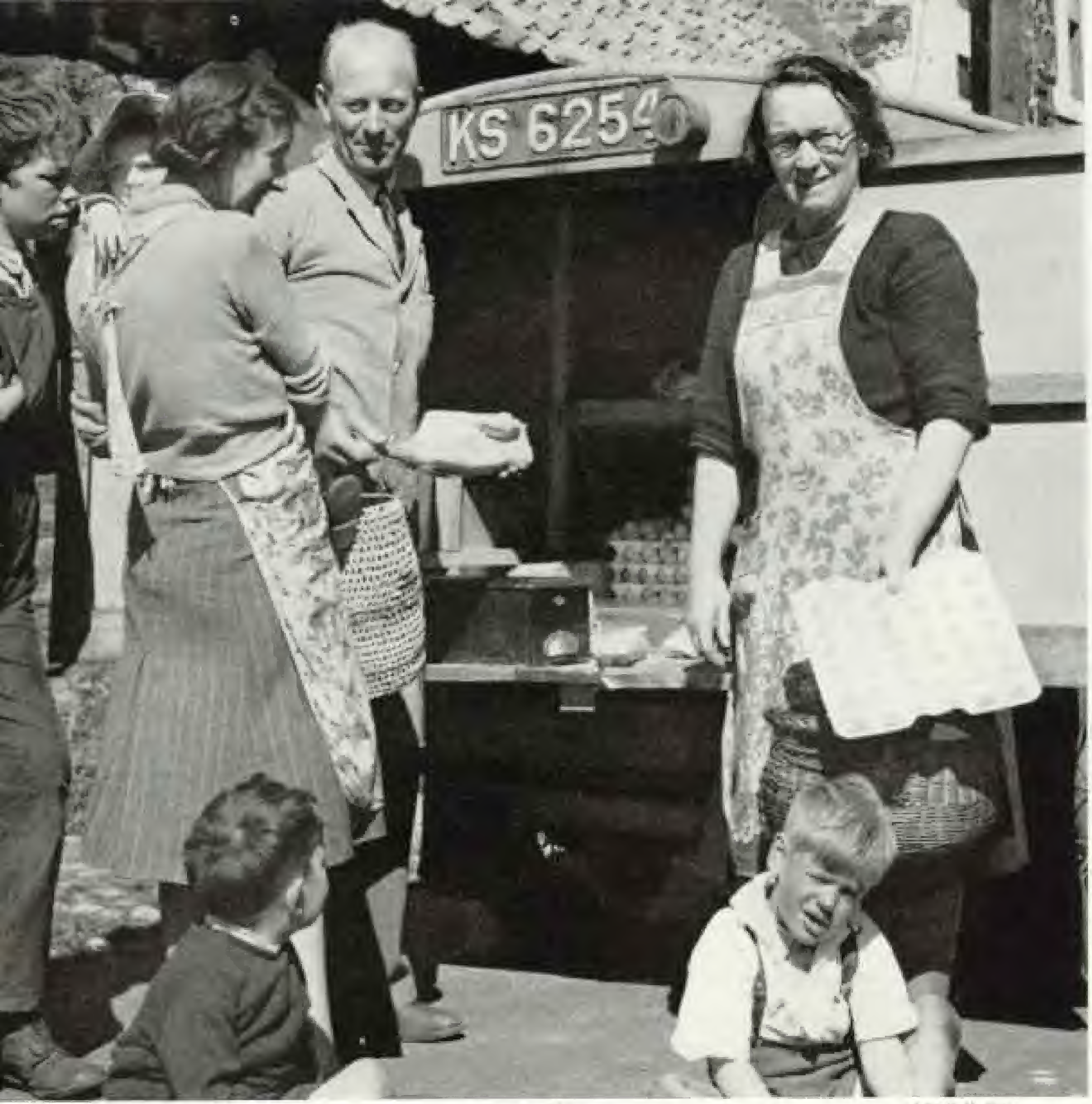
Before the last war the island supported a football team of its own; now, I found, there were only four young men between the ages of 14 and 30.

Eligible Women Are Few

Young women are nearly as scarce as young men. Forty percent of the gentler sex are between 30 and 50 years of age, and 37 percent between 50 and 80. Of the men, half are between 40 and 60.

I met individuals over 70, including seven over 80 and one over 90. There were only 38 children under the age of 15.

The typical Holy Islander is lean, wiry, keen-eyed, and capable of great endurance. I came to know him as kindhearted and hospitable. He possesses, however, an uncertain temper and is quick to resent the slightest



John E. H. Nolan

Holy Island Housewives, Lacking a Meat Shop, Welcome the Itinerant Butcher

Fishermen for generations, the islanders enjoy plenty of crabs, lobsters, and other seafood. A few raise pigs, which they superstitiously call "things" (page 554). But most of their red meat comes once a week from the mainland. Under British rationing only a few families have coupons enough for so big a leg of lamb. Each person may have considerably less than a pound of rationed meat a week.

criticism. He has a fine sense of humor. His courage and patriotism are second to none in all Britain. Out of 97 adult males, 64 volunteered in the last war, the Navy taking 60, the Army and Air Force two each.

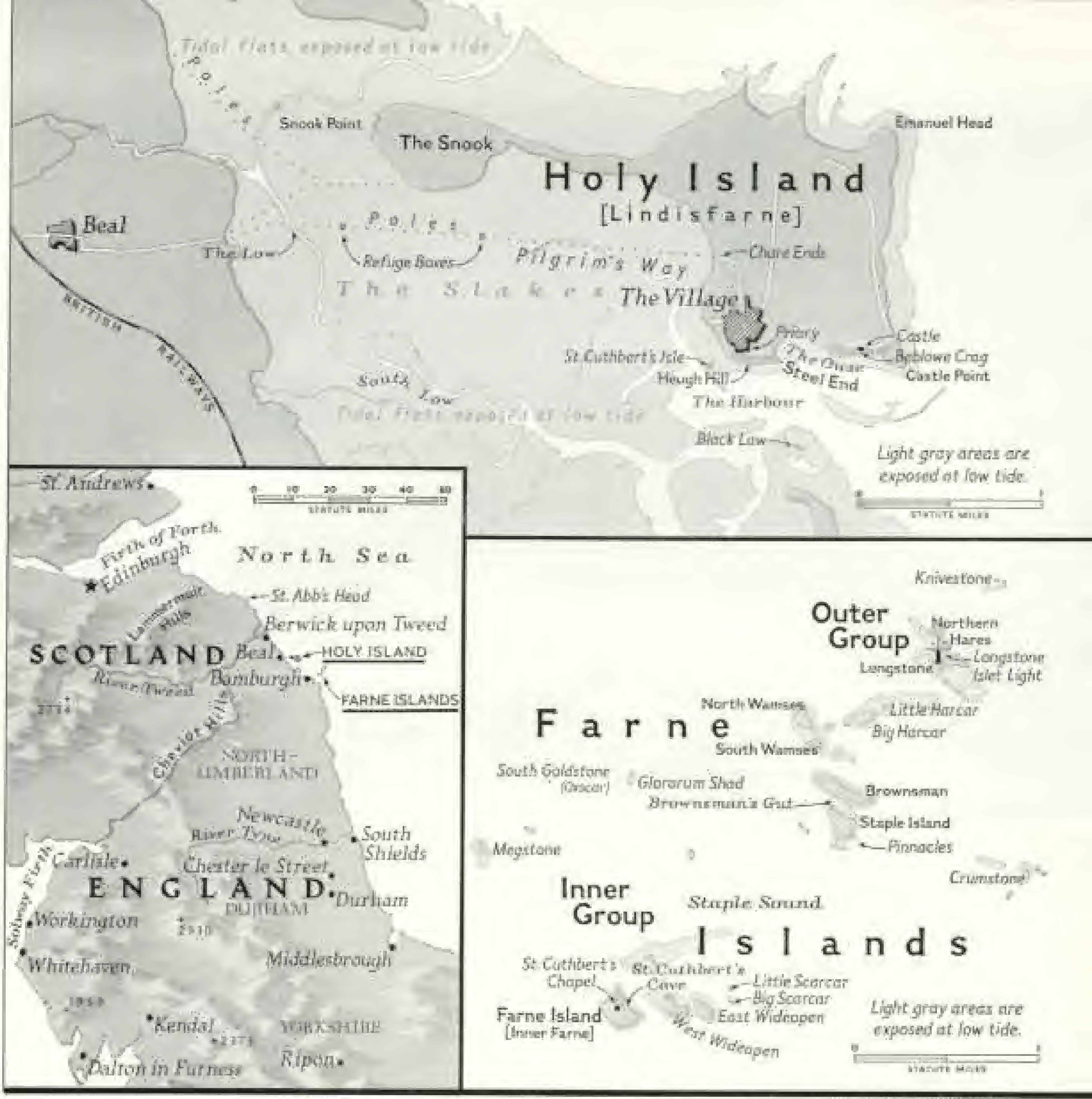
There are no police on Holy Island, and no need for any, since there is no real crime. The islanders have no courthouse; what little litigation arises is settled at Berwick upon Tweed, eight miles away. Mainland laws hold good except in one respect—the closing time for the pubs, or inns.

Thirsty strangers, visiting the island for the first time, listen enthralled when a local wiseacre starts an argument over the 10 p. m. closing regulations. He may claim that the village is outside the three-mile limit, and therefore inns can keep their bars open all night if they wish.

"Eet's nae sae far as the crow flies," one of his cronies interjects, glancing at his empty glass.

The glass is filled by one of the guileless strangers. The argument continues, fiercely now, and lasts as long as the visitors continue to pay for rounds of drinks. Nevertheless, as an octogenarian fisherman said to me, "We neen geet droonk."

After Gow, my first close acquaintance was Old Dick Douglas, bright-eyed and still


Tidal flats exposed at low tide
Poles
Snook Point
The Snook
Emanuel Head
Holy Island
[Lindisfarne]
Beal
The Low
Poles
Refuge Boxes
Pilgrim's Way
Chare Ends
The Slakes
The Village
British Railways
Priory
Castle
St. Cuthbert's Isle
The Ouse
Beblowe Crag
Heugh Hill
Steel End
Castle Point
South Low
The Harbour
Tidal flats exposed at low tide
Black Law
Light gray areas are exposed at low tide.
Statute Miles
St. Andrews
Statute Miles
Firth of Forth
Edinburgh
North Sea
St. Abb's Head
Lammermuir Hills
Berwick upon Tweed
SCOTLAND
Beal
HOLY ISLAND
River Tweed
Bamburgh
FARNE ISLANDS
2774
Cheviot Hills
NORTHUMBERLAND
Newcastle
River Tyne
South Shields
Carlisle
Chester le Street
Solway Firth
ENGLAND
Durham
DURHAM
Workington
2910
Whitehaven
Middlesbrough
1959
Kendal
2273
YORKSHIRE
Ripon
Dalton in Furness
Knivestone
Outer Group
Northern Hares
Longstone
Longstone Islet Light
North Wamses
Little Harcar
Farne
Big Harcar
South Wamses
South Goldstone (Oxcar)
Gloororum Shad
Brownsman
Brownsman's Gut
Staple Island
Pinnacles
Megstone
Crumstone
Inner Group
Staple Sound
Islands
St. Cuthbert's Chapel
St. Cuthbert's Cove
Little Scarcar
Big Scarcar
Farne Island [Inner Farne]
East Wideopen
West Wideopen
Light gray areas are exposed at low tide.
Statute Miles

Drawn by Irvin E. Alleman

Ax-shaped Lindisfarne, England's Holy Isle, Lies 10 Miles Below Scotland

Legend says that when Satan raised his giant battle-ax against Heaven's gates, God's shaft of lightning struck it from his hand. Flaming, the ax fell into the North Sea, changing into the 1,000-acre isle of Lindisfarne. Here 7th-century monks built a church and set forth to convert northern England. The name "Holy Island" came into use after Danes slew many monks. Numerous pilgrims visit this early Christian stronghold.

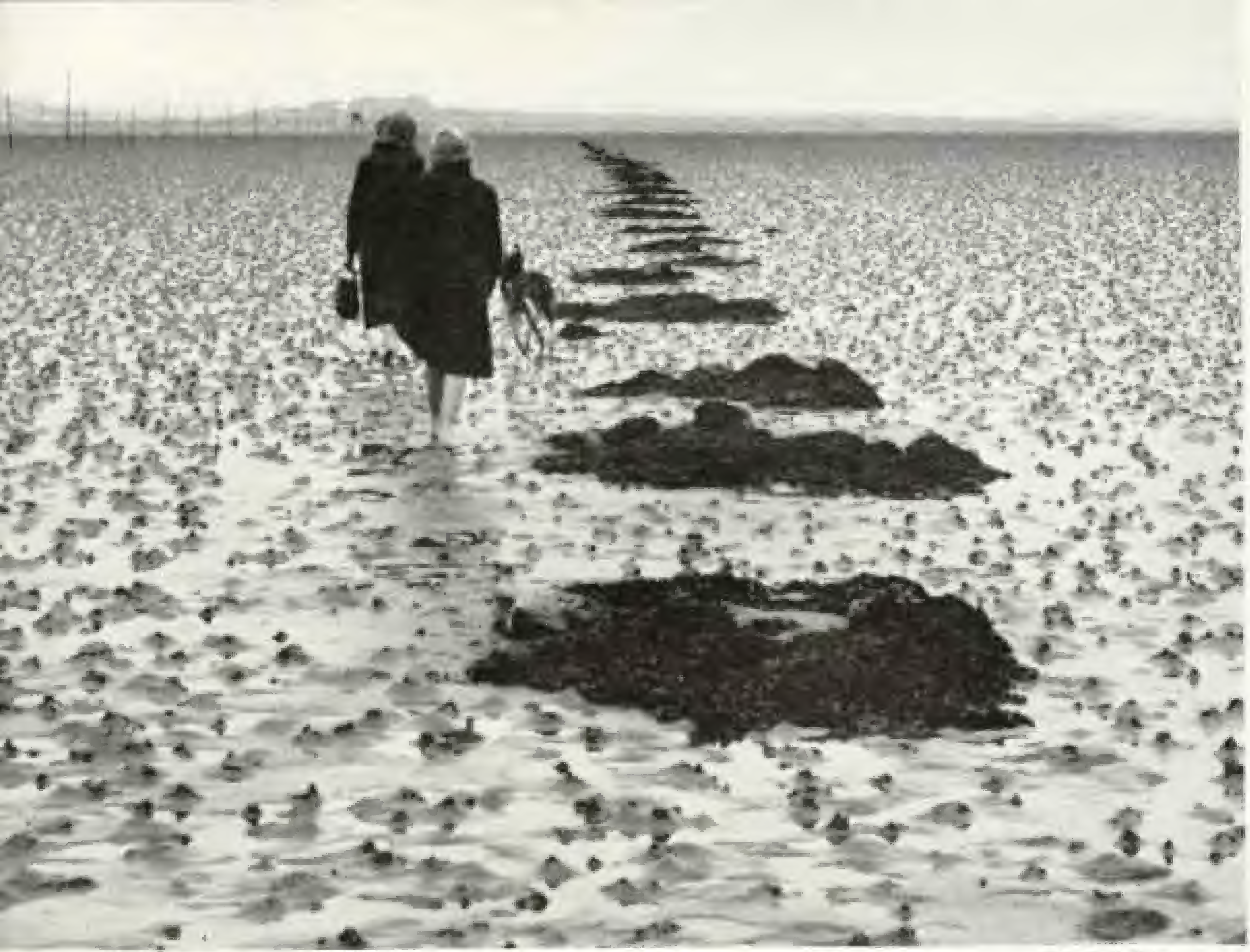
rugged for all his 87 years. One evening, after downing two rums and two beers, he was ready for more when Old Tom Stevenson, four years his senior, advised him that it was long past his bedtime. That upset Dick; so, joined by Old Bobbie Bell, six years his junior, he broke into a sea chantey. Finishing that, they rose soberly but slowly, thanked me for a pleasant evening, and went off to bed.

With the neighboring Farnes, whose merciless fangs have ripped the bottom from many a good vessel, the Holy Island area has probably claimed more wrecks than any similar-sized section of Britain's coast.

In the 1500's, after Henry VIII dissolved its monastery, Holy Island became a place of ill repute. Wreckers, manipulating false lights on the cliffs, enticed vessels to destruction on the rocks and sandbars. Even the children ended their night prayers with "Dear Lord, please send a ship ashore."

Islanders Do Skilled Job of Salvage

De-Da showed me the melancholy remains of half a dozen vessels lying partly buried in a sand ridge off the north shore. In World War II, mined and torpedoed ships were stranded there; others were wrecked because of the rigid blackout of lighthouses.



John E. H. Nolan

Villagers, Guided by Centuries-old Cairns, Tramp Through a Sea of Worm Casts

Old-time monks laid these rock piles as a guide to and from the mainland. Remarkably intact, the line still leads toward the Northumberland village of Beal in the distance. Seaweed-covered cairns, once perhaps four feet high, show loss from wind and water (page 548).

The islanders can tell some remarkable stories of salvage work. During the war, the 2,000-ton *Prins Knud*, a Danish vessel, was driven on a sand ridge, where at high tide it stood in less than five feet of water. Mainland experts, who arrived to salvage the ship, were watched with amused detachment by the canny natives. Inside two weeks the disillusioned professionals gave up, leaving the undamaged vessel, so they thought, to be broken up by the weather (page 558).

That was the islanders' opportunity. In six weeks they dug a colossal amount of sand from around the hull and cut a channel to deep water, which they banked with thousands of sandbags. Then they hired a tug and refloated the freighter.

Next day two islanders visited Berwick upon Tweed and registered their claim for salvage reward. Anxious months followed; finally a check came for £3,700.

Ta-a and Wonka told me about the strange cargoes washed ashore in war years: potatoes, tennis balls, coal, soap, oranges, unbroken phials of drugs, Chinese bank notes, cases of whiskey, canned tripe, cigarettes, candles, and enough pit props to provide firewood for months. This last was a godsend, as the island has few trees.

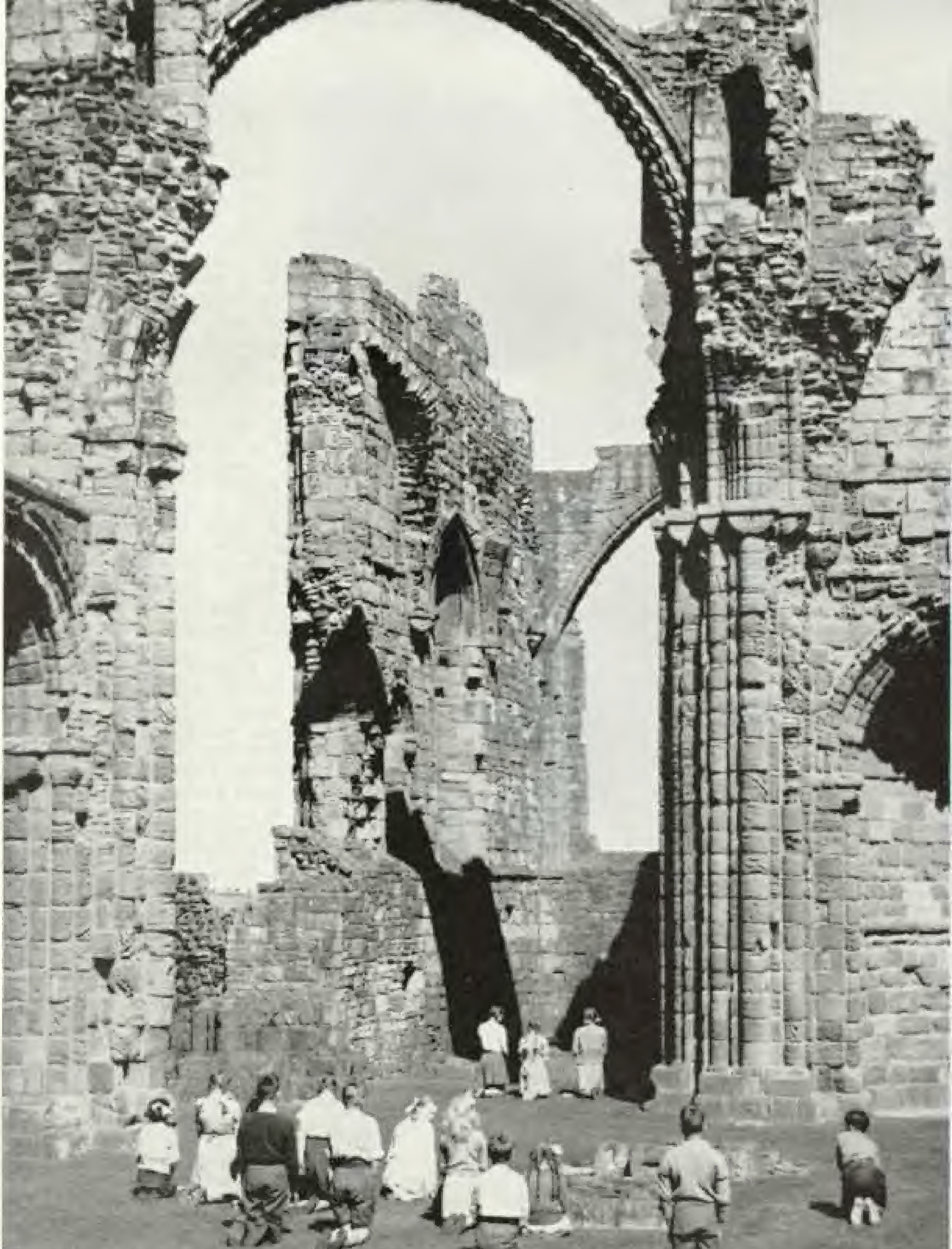
When the Chinese bank notes were tossed up from the bombed *S. S. Somali*, the islanders stuffed their pockets with thousands of *yuans* (Chinese Nationalist money). They had a sad awakening, however, when they learned that the whole note issue had been cancelled. They still keep packets of this worthless paper, hoping that someone, someday, will make an offer for the lot.

Said Bella Kyle, hostess of the Castle Hotel, "Ye kin have thees one," and she gave me a handsome blue bank note embossed with the head of Sun Yat-sen.

Where a Pig Is Not a Pig

I tried to follow the loud-spoken, rapid-fire speech of those who were gathered one evening around the fire in the Northumberland Arms. Ends of sentences seemed flattened as if put through a mangle.

The dialect is neither Northumbrian nor Scottish, but distinguished from both by many different words and idioms. By concentrating I was able to understand a little of what was being said.



John E. H. Nolan

Children Kneel Beneath the Skeleton Arches of Lindisfarne's Historic Priory

Danes twice burned a thatched abbey built here A. D. 635. Eleventh-century Benedictines erected this Priory, whose red-sandstone ruins still witness services. The grassy sanctuary marks St. Cuthbert's first grave.

© Keystone Press

Anglican Clergyman Dries His Feet after a Wet Crossing

Thanks to the rhythm of the tides, water is always low enough across Pilgrim's Way on Sunday mornings for mainlanders to reach Holy Island for church services. Here the Bishop of Whitby, in biretta and gaiters, rests after leading 500 hymn singers across the sands (page 556).

It was a heated discussion over the merits of Newcastle United Association's famous football team, though only two had seen that team play in the last twenty years.

Presently I caught a whispered aside from Fluka: "Qu-ack," he said, "did ee slay theet thing thees mawning?"

"Aye," rasped the fisherman, with a quick glance at me, "I did."

Wondering what sort of "thing" Fluka meant, I suddenly recalled a paragraph I had read in a London newspaper only the previous week: "Fishermen on Holy Island, off Northumberland, won't use the word 'pig.' They call it 'the thing.' "

Incidentally, a man from the mainland sent there to run a shop now has two names. Off the island he is Mr. Pigg; on it he becomes Mr. Thing.

The aversion to calling a pig a pig, I discovered, does not stop these people from killing and eating one. But should they meet one on the way to their boats, they will turn back rather than risk putting to sea.

When I questioned one old salt on the inconsistency of his aversion to the word (he was eating a ham sandwich at the time), he gravely replied, "Aye, nae doot eet's queer, but ham's ham, and yon's a deeferent thing a'tegither."

As I bade him a good morning, he, contrariwise, opined that it wasn't so good, a statement which I could not contradict, since the wind was then blowing at 40 miles an hour. Throughout most of the winter, Holy Island is plagued by winds and gales.

I sensed a happy, carefree air in the three little shops which sell the barest necessities. In one, less than 10 feet wide, old Sally Cromarty's broad smile welcomed us across a counter stocked with a surprising variety of merchandise (page 562).

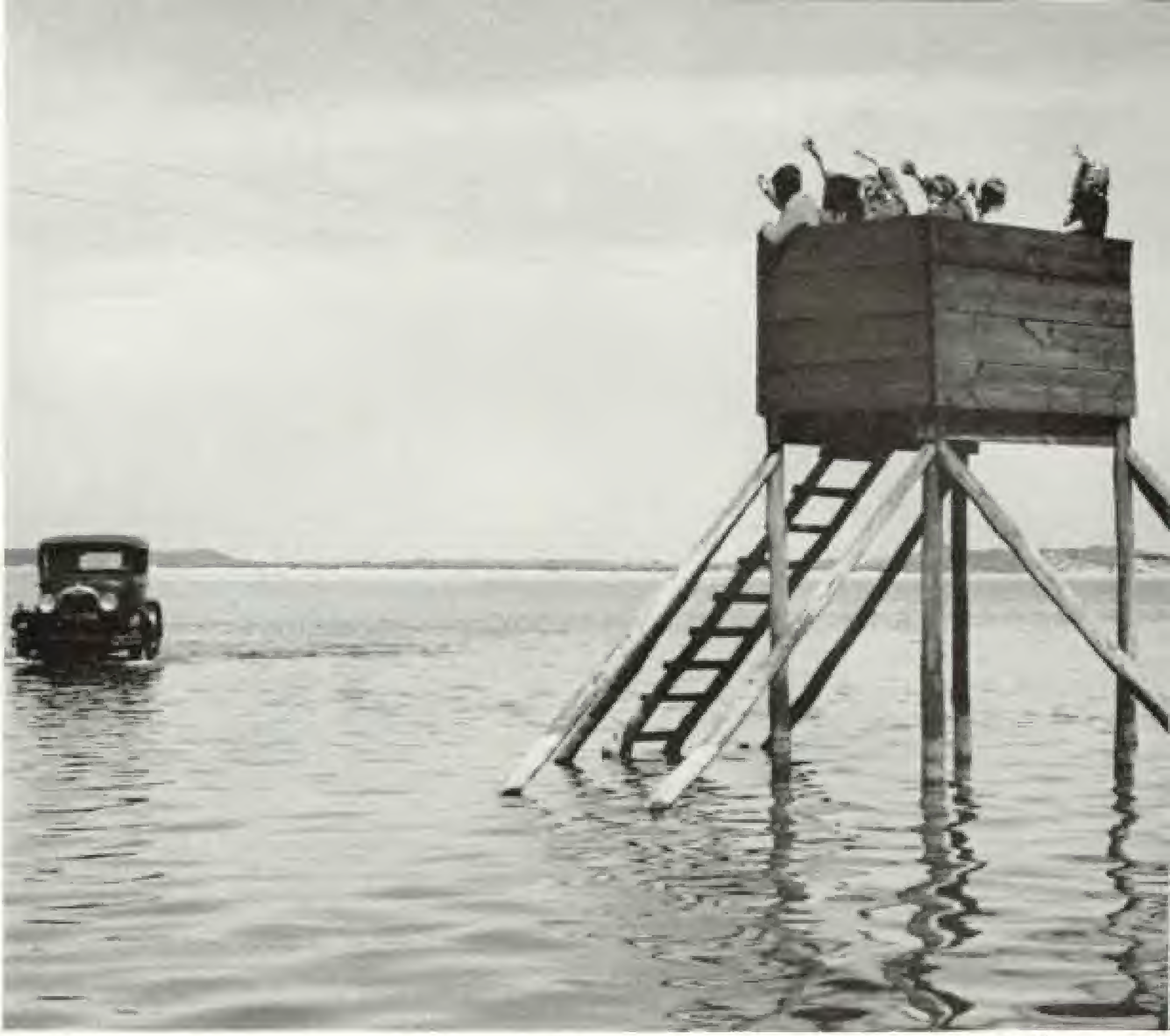
Then Sally sold me a picture postcard with all the courtesy of a bygone age. Though 84, she attends to all the business, selling canned vegetables, reels of cotton, soft drinks, hair nets, and other oddments.

In the post office, low-built and dating from the 18th century, a newly cut ham held pride of place among packets of cigarettes, sheets of postage stamps, fruit, and newspapers.

"Special Delivery," Holy Island Style

Lu-Lu, sturdy and beaming, was in charge. Deputizing for her 81-year-old father, the postmaster, she was preparing her bag of morning mail. She makes the deliveries herself. Never knocking at the houses, she walks straight in with a cheery "Geed mawning—hee's a love lettee foo ee." And when she's not attending to the shop and the mail, she's tending five cows (page 563).

Heavy merchandise, such as coal and barrels of beer, is brought from the mainland in light motor trucks. Often they sink to their



John E. H. Nolan

Spindle-legged Refuge Box Shelters Youngsters Trapped by Tide. A Rescue Car Nears

Incoming tides sweep quickly over Pilgrim's Way. Two refugee eyries provide havens for wayfarers caught in the swirling waters. Despite these boxes, lives are occasionally lost. A pedestrian died of heart failure when he saw the tide running toward him, and a panicky motorist, climbing to the roof of his car, was swept away (page 548). These island children laughed and joked as the battered jalopy drove up.

axles in the sands and have to be dragged out by a tractor.

An extra eight shillings is charged for delivering a ton of coal, which is dumped in the road outside the house. Even bread is dearer by a halfpenny. But the brewers make no extra charge for delivering their barrels. So much beer, in fact, comes over the sands that "ootlanders" firmly believe the islanders bathe in it.

Bare Facts on Bathing

Washing and bathing, especially in winter, are bugbears to island folk. With no piped water, every drop must be pumped and carried by hand from a well that lies 200 yards outside the village. Should that well fail in summer, a reserve well, its water bitter tasting because it is strongly impregnated with iron, is still farther afield.

Only one private house—the vicar's—has a bath with both hot and cold water. Rain water is caught in tanks; and a boiler does the heating. Another home has a bath, but no hot water. When a "tub" is taken, someone must carry boiling water from the stove.

The islanders are now demanding something in return for the local taxes levied upon them by the mainland authorities. They ask, "Why should we pay these taxes? We've nae street lighting, nae sanitation, nae peeped water, and nae doctor."

A great change has taken place in the economy of the island with the increased numbers of pilgrims and vacationists. Now there is a lilt in family life. Humble "tatties and heerings," the staple dish of 30 years ago, has disappeared from the table.

Crab and lobster fishing, gathering mussels and periwinkles, renting rooms to holiday-

© Kemsley Press

Robed Choristers Hiking to Holy Island Laugh as Incoming Tide Tickles Their Feet

Cold and wind-swept in winter, Holy Island is a popular resort in summer. Visitors come by hundreds to enjoy the island's memories, climate, and bird life. These choir girls, still cheerful after an hour-and-a-quarter hike, carry suitcases for an overnight stay. They will sing at the Priory's ruins (page 553).

makers, scratching the sands for brass cartridge cases ejected by practicing airplanes in the last war (they fetch £7.10.0—about $19.75—a hundredweight), and farming provide a good livelihood for nearly two-thirds of the population. A fleet of 11 antediluvian taxicabs—all Fords, except for one 1925 Austin—and coastguard work, keep the remainder in comparative affluence.

Prior to 1920, herring fishing was the mainstay of the island, but the old herring boats now do duty as sheds for storing crab and lobster gear, coal, paint, and ropes. Black and forlorn, with their sterns cut away, they stand inverted on the beach of the Ouse. Three more lie below the walls of the Castle on Beblowe Crag, where they give protection to keeper "Wheeler" Lilburn's prize chickens.

Once there were 20 of these stout fishing craft, but they were outmoded with the coming of the steam trawler. I found only seven small motor fishing vessels left; *Sarah Ann*, the largest, registers 10 tons.

Wandering up to the schoolhouse, I met Mr. George Rowe. Since his arrival 18 months before, both he and his wife had worked wonders with the children. The bairns were making rapid progress under this former Air Force educational officer.

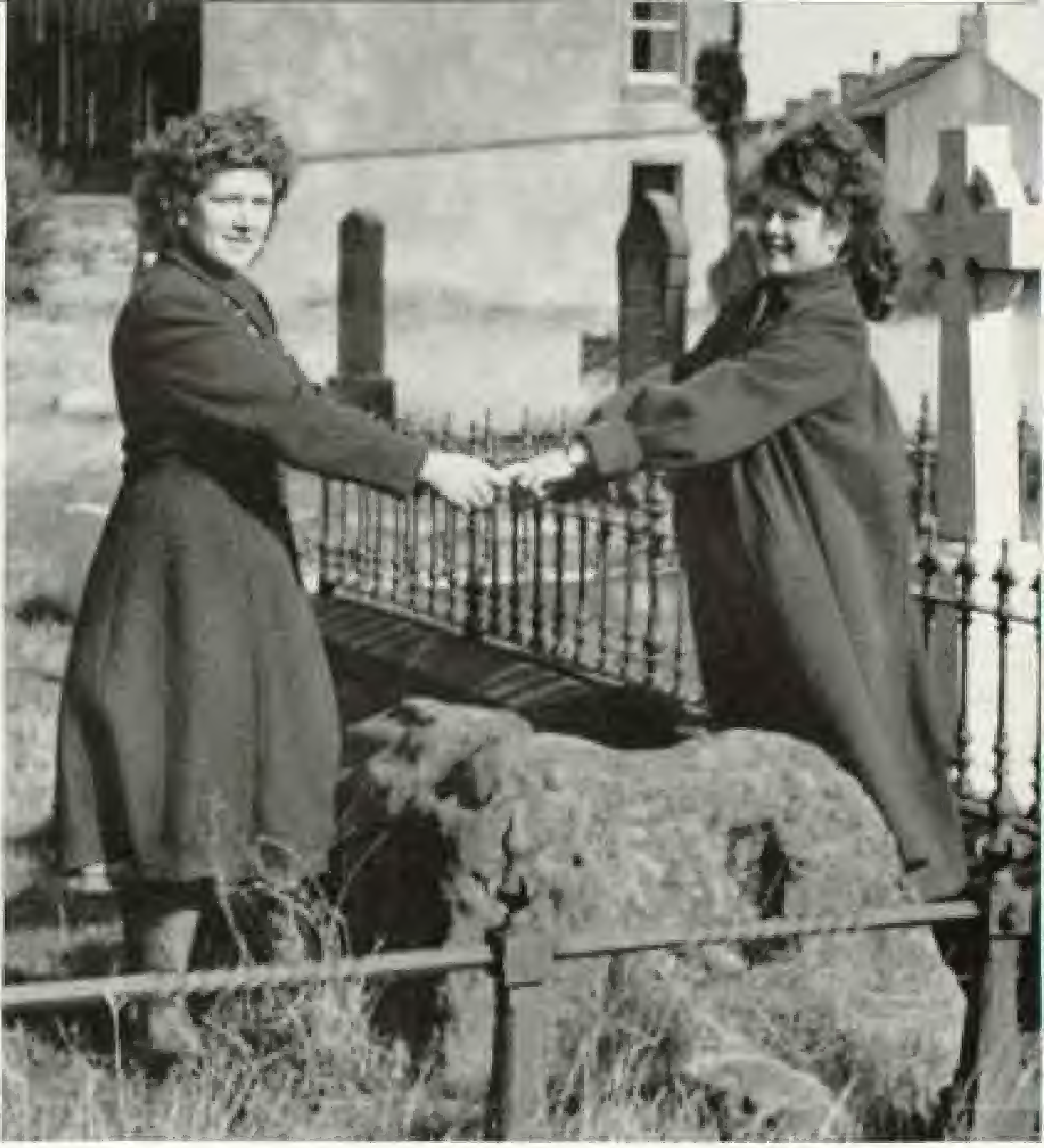
All the same, the old schoolhouse remains a headache to teachers and a refrigerator to pupils. Built in 1796, its drab gray walls and wired windows seem more a mortuary than a suitable place for new life to be molded.

Brides Jump the Petting Stone

Although no marriage had been celebrated on the island for five years, when one does occur it calls into practice an ancient custom.

Following the actual ceremony in the parish church, the bride, assisted by the two oldest men, jumps over the Petting Stone, an empty socket of a Saxon cross which rests in the churchyard (opposite). As the stone is a yard across and two and a half feet high, it is no easy matter for the bride to get over without touching it, especially if she is fat.

If she makes a clean jump, the bride gives 10 shillings apiece to the old men for the luck they have brought her. Bride and groom then walk to the lych gate, which has been tied shut with a ship's rope. Another old fisherman is seated outside, waiting to be paid a 10-shilling toll by the bridegroom.



John E. H. Nolan

Sisters Make a Wish on Island's Timeworn Petting Stone

For luck, brides leap over this churchyard stone, assisted by Holy Island's two oldest men. A clean jump brings luck to the girl and a 10-shilling reward to each man. Long ago the sandstone rock held a Saxon cross.

When the fee has been handed over, he whips out his clasp knife and cuts the rope.

The rest of the day and often half the night are spent in the inns, where the newlyweds stand drinks all around and are expected to keep on doing so until everyone has had enough. This expense, no doubt, explains why some individuals fight shy of pledging their troth on Holy Island.

Setting out one day from below Castle Hotel, I turned off the street called Front (Marygate is its real name), crossed the greensward of Market Square, where two tame white ducks waddled behind me, and came to quaint twin turnstiles. After crossing a sloping meadow encompassed by rough stone walls, I climbed the Heugh, a cliff outcrop of Northumberland's great sheet of basaltic rock, the Whin Sill.

A couple of hundred yards farther on, I came to the island's war memorial, a tall stone cross. It stands in the shadow of the newly built Coastguard lookout, one of the most up-to-date buildings of its kind in the British Isles.

Standing on the 60-foot height, I could see right across the island. To the south spread the jettyless harbor, where a few fishing craft were resting in its blue-gray waters. In the distance, on the mainland, rose Bamburgh Castle, which many people identify with the "Joyous Gard" that figured in the stories of King Arthur and his knights and to which Sir Lancelot came home to die.

Between me and that dark mass on the mainland 5,000 acres of tidal slakes, or fens, glowed pink under the dying sun, and the large cross on St. Cuthbert's Isle caught reflected light from a fast-ebbing tide (561).

Search for St. Cuthbert's Beads

On the shore of that islet two figures worked on hands and knees, turning over tiny shells and other jetsam. They were searching for the stems of the fossil sea lily, whose cylindrical joints are known locally as "St. Cuthbert's beads." Finely bored and strung into necklaces, they are sold to visitors. As with pearls, it may take years to secure a graded necklace.

Presently my gaze wandered along the northeast shore to rugged Emanuel Head, where gray seals rest on time-worn rocks and where the ribs of lost ships protrude like those of human skeletons.

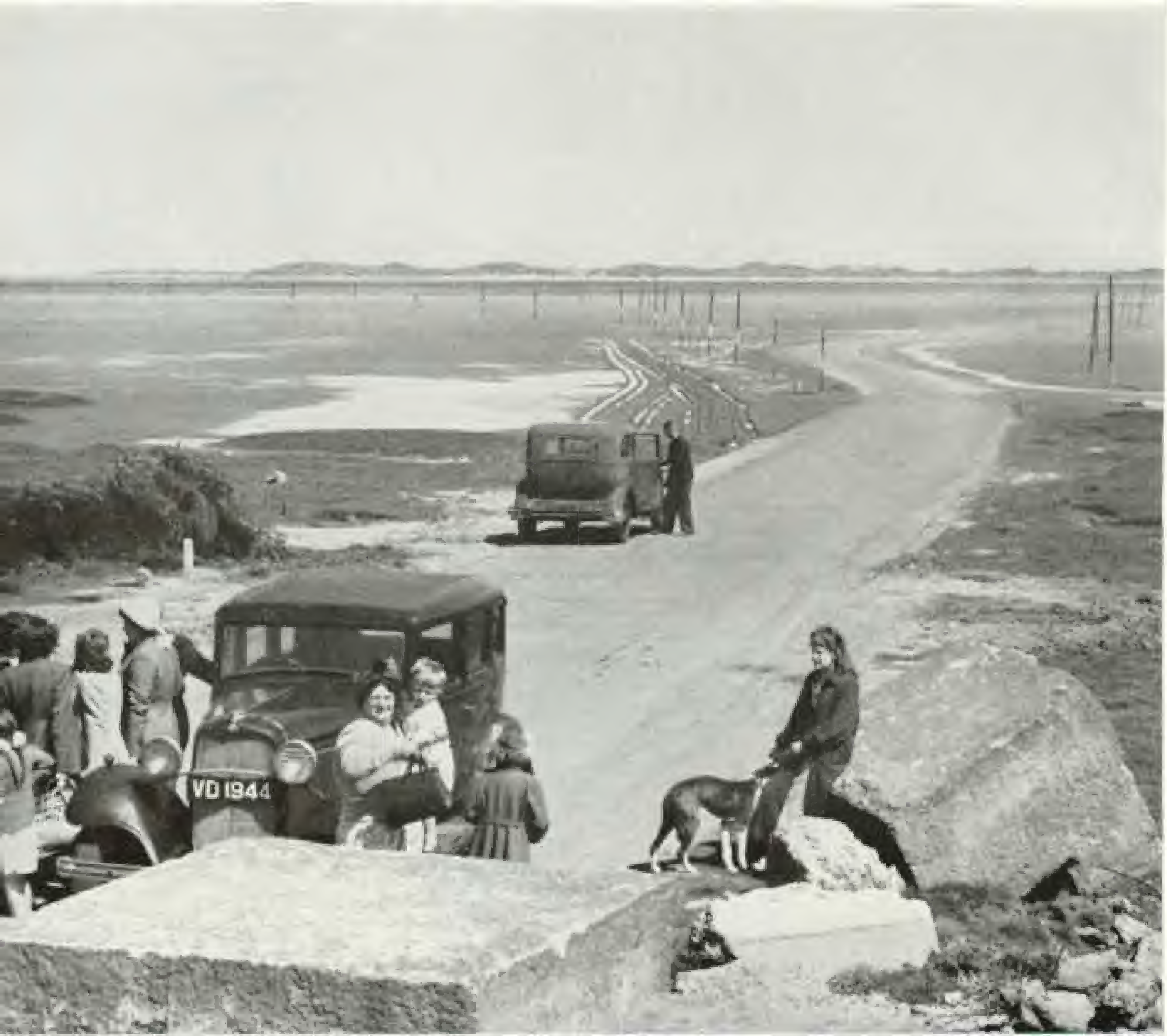
On Emanuel Head also rests a derelict Ford car, its roof covered with a thin skin of concrete. The hands that turned it out could never have guessed its ultimate destination or use. It served both as an observation post and as a machine-gun nest for the Home Guards of Holy Island in the last war. From it, on one occasion, elderly Guards converged on the unscathed crew of a shot-down German bomber, forcing their surrender.

To the east, across the Ouse—a shallow and rather evil-smelling little bay whose beach is strewn with shucks of crabs and lobsters—my eyes rested awhile on Beblowe Crag, the highest point on the island. A spiral of basaltic rock, it is crowned by a Castle such as one imagines in childhood fancy (page 560).

Erected about 1550, its 4-foot-thick walls were made of stones taken from the ancient Priory. In 1675 the rugged Castle housed the

PRINS KNUD
DANMARK

John F. H. Nolan and Tom Clarke



^ Holy Islanders and Horses Dig Out a Stranded Danish Vessel

In 1536 Henry VIII dissolved England's monasteries. With the Priory closed and all the monks gone, impoverished Holy Island turned to shipwrecking. Shining false lights on the cliffs, wreckers lured many a vessel to destruction.

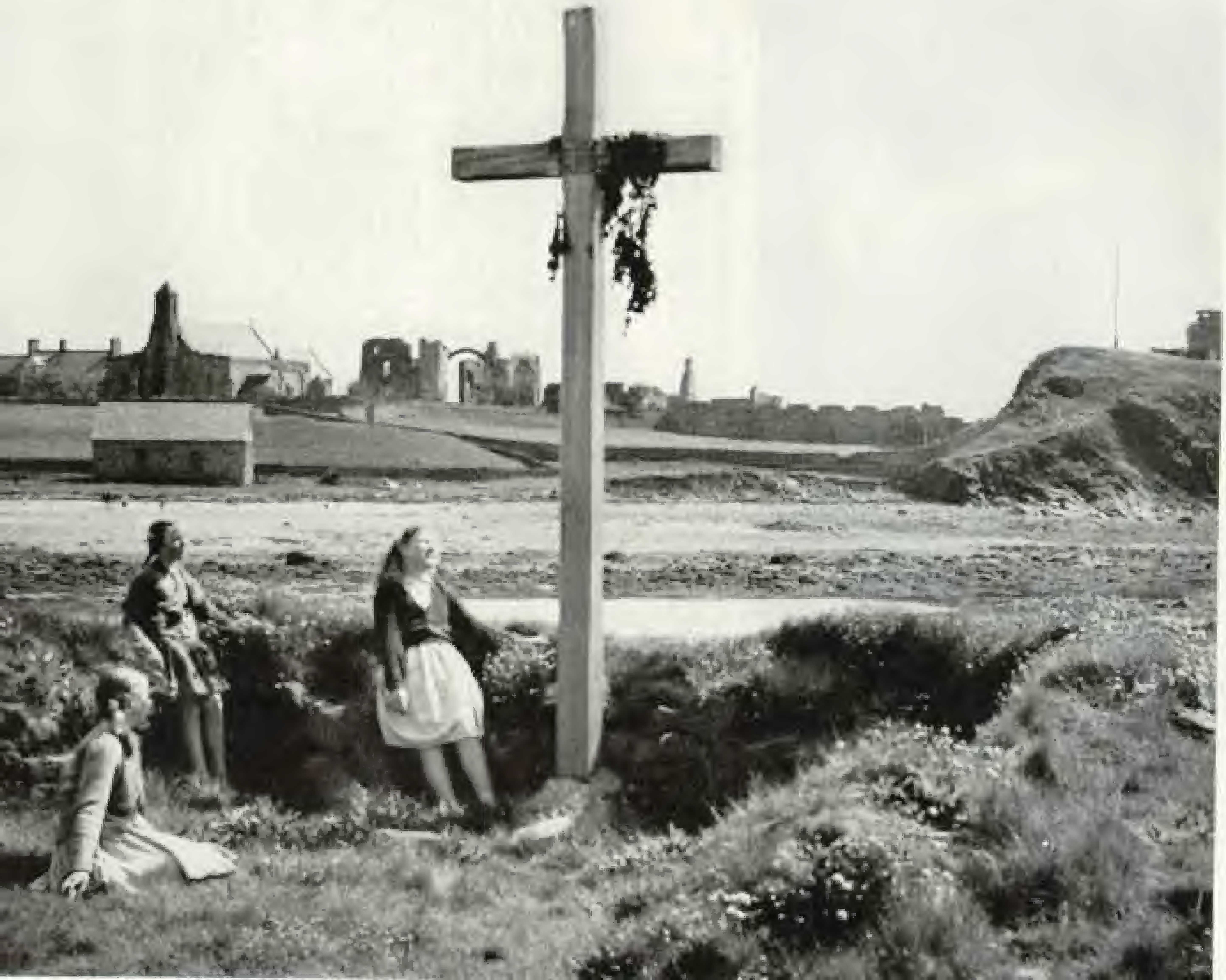
Today the islanders have many brave rescues to their credit. Sometimes they reap rich salvage rewards. During the war the *Prins Knud* beached on the island's north shore. When mainland experts failed to move her, islanders began to cut a channel. Every adult man took part in the digging, and horses hauled away sand. In six weeks the freighter floated free, and the salvagers split a £5,700 reward (opposite).

Upper panel: Some visitors rent Holy Island's antiquated taxis. Chiefly Fords of the 1920's, these high-riding vehicles navigate water and sand where low-slung cars might get stuck. A few horse carts still carry passengers to Chare Ends, where these children wait.

< For 5 hours during high tide this path to distant Holy Island disappears under the North Sea. When the waters recede, wheeled traffic goes left, following 20-foot guide poles to the island's western tip. Foot travelers bear to the right along another line of poles. Both paths avoid quicksands. Concrete blocks and rusting barbed wire at the taxi terminal call to mind the defenses against Hitler.

John E. H. Nolan

John F. H. Nelson



^ Greyhounds Exercise near the Castle on Beblowe Crag

Lindisfarne's monks for centuries lived in fear of attack by marauding Scots. From their Priory windows they sometimes saw the night sky reddened by burning mainland towns. No Scottish raider ever looted the monastery, however.

In the 16th century, when Henry VIII ordered Holy Island bulwarked against border raiders, the Castle was raised on a sheer crag above the sea. Years of inaction brought the fortress to decay. It was restored this century.

Obsolete herring boats in front of the Castle serve as chicken coops. Roofless walls of the Priory loom across the Ouse.

← Cross Marks the Spot of a Saint's Retreat

Every Holy Islander knows the story of St. Cuthbert, best loved of Northumbria's early churchmen (pages 548, 562).

A onetime shepherd boy, Cuthbert turned early to the monk's life. An intensely humble man, he spent many of his years as a hermit. Often he prayed for hours standing up to his neck in the sea, and at one time he retired for meditation to a cell on what is now known as St. Cuthbert's Isle. Tide here separates it from Holy Island and the Priory ruins. Children often drape seaweed on the cross.

John E. H. Nolan

© Wanier Hall

Sally Cromarty Waits on Customers in Her Higgledy-piggledy General Store

Holy Island boasts three small shops. Eighty-four-year-old Sally runs a place less than 10 feet wide. Like the modern drugstore, it sells a bit of everything: a soft drink, a hair net, a novel (page 554).

notorious Capt. Robin Rugg, a bibulous soldier, governor of the island, whose salary was always mortgaged in advance to pay for his wild drinking parties.

Although seeing little warfare, the Castle was captured by the Cromwellians, and later was held for two days by two followers of James, Prince of Wales, known better as Old Pretender. Today it is occupied by Sir Edward de Stein, whose liberal hands have conferred many benefits on the island. In 1944 he and his sister gave it to the National Trust.

Wanderings of a Saint's Body

From my vantage point on the Heugh the old Priory spread out below me.

To the right, just outside a ruined wall, I could see the faint outline of a cross carved in the lid of an ancient stone coffin, the last resting place of one of those courageous souls, who, 1,300 years before, had sallied forth to convert the northern part of heathen Britain.

I thought of the story of St. Cuthbert and of the many peregrinations of his body. When it was brought back to Holy Island from the Farnes, after his death in 687, the monks buried it in such a stone coffin. Eleven years later the sepulcher was opened in order to place the body in a smaller coffin, on the assumption that it would have been reduced to dust. On the authority of the Venerable Bede, we are told that the corpse was found unchanged and its joints still flexible. Even the clothing had suffered no decay. The saint was reverently reinterred in a wooden coffin to sleep once more within sound of the choristers and the music of the sea.

In 793 the Danes laid waste to the island, but did not disturb the tomb.

In 875 they came again, but the monks had warning of their coming before the ravagers beached their high-prowed craft. The holy men fled, carrying the saint with them. They also took away the exquisitely illuminated Gospels of Lindisfarne, which had been written about 700.

They crossed northern England and, after several years of wandering, took ship to Ire-

POST OFFICE
HOLY ISLAND

John E. H. Nolan

Postmistress Lu-Lu Bell Starts the Morning Rounds with a Letter for Her Father

Bobbie Bell, the island's 81-year-old postmaster, turns over most of his duties to daughter Lu-Lu. Here, taking life easy on the running board of the Royal Mail van, he accepts the day's first letter (page 554).

land. But a storm turned them back, during which the precious tome (now in the British Museum) was swept into the sea. The sea, however, miraculously washed it back to shore.

For a few more years that undaunted band roamed the northern wilderness, seeking a safe place to deposit their holy burden. With the departure of the Danes, the coffin was taken to Chester le Street, a former Roman station near Durham, where it remained for a century. Later, under the terror of another invasion, it was moved again, this time to Ripon, in Yorkshire.

Time passed. Still there was no real rest for St. Cuthbert. Eventually, the city of Durham claimed his body. But when William the Conqueror swept northward, in 1069, the monks of Durham retreated to Holy Island and returned the saint to his old sepulcher. Even this respite was not for long. A year later he was carried back to Durham, there finally to find peace in the magnificent new Cathedral, one of England's finest and still standing today.

Some five miles to the southeast from where I stood lay the Farnes, that collection of treacherous rocks that have become a fantastic bird sanctuary.

Tide Submerges Many Farne Islets

Farne Island, or Inner Farne, the largest, is barely 16 acres, but it is nearest the mainland. The Knivestone, which is completely covered at high tide, lies farthest out. Some 15 others are similarly submerged by North Sea tides; even portions of those remaining disappear at high water. There are two fairly large outlying rocks, the Crumstone to the east and the Megstone to the west, which are never entirely hidden. Staple Sound, a treacherous mile-wide gap from five to eight fathoms deep, separates the Farnes into two groups.

The remaining islands are bare rocks of varying size, except for the Inner Farne, Staple Island, Brownsman, North and South Wamses, Big Harcar, East and West Wideopen, and the famous Longstone.

Grace Darling's Light: a Shining Monument to a Heroic Rescue

Longstone's tern-haunted lighthouse has saved many a vessel from the Farnes' fangs. But its fame, as well as the name it frequently bears, comes from Grace Darling, frail daughter of the lighthouse's first keeper.

One wild September night in 1838 the 400-ton steamer *Forfarshire* drove aground on Big Harcar, an islet some 700 yards from the light. She broke in two, the afterpart sweeping away.

Glancing from the lighthouse window in the early morning, 22-year-old Grace discovered part of the ship still fast on the rock. As dawn brightened, she spied a few survivors and insisted on braving the storm to rescue them.

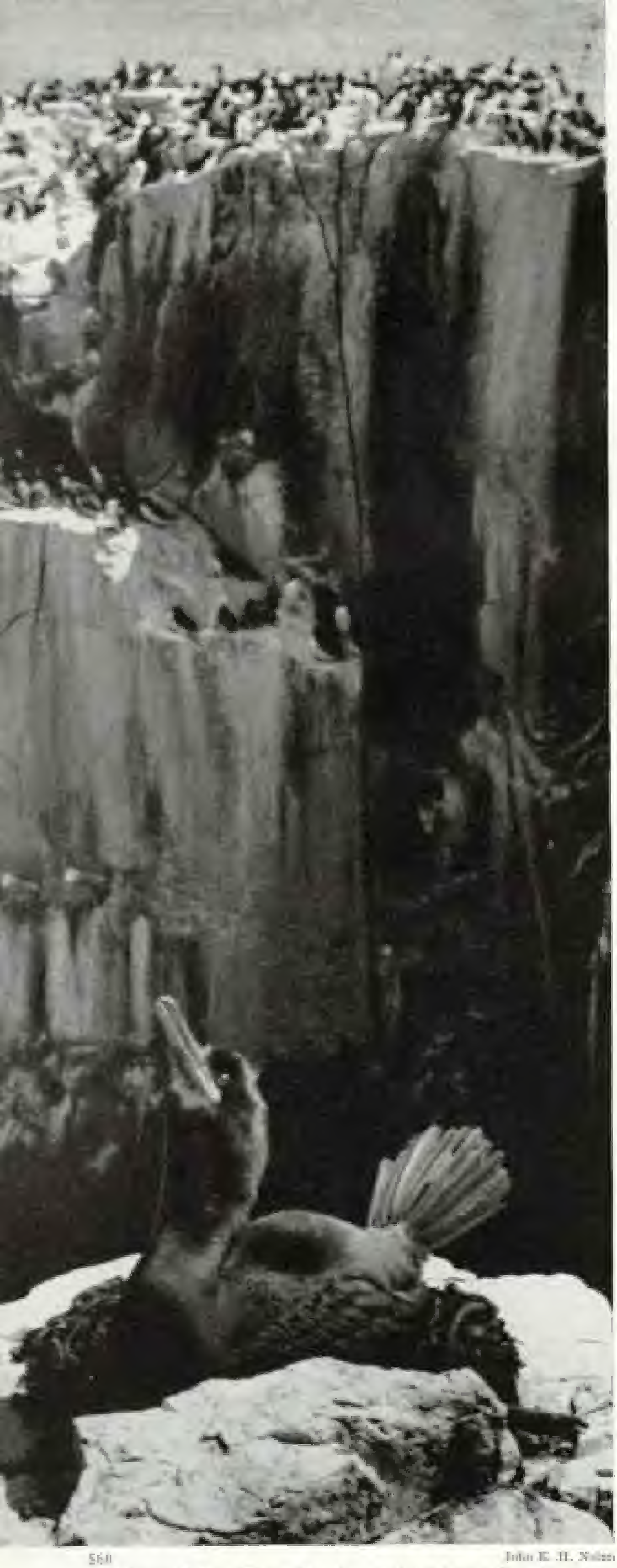
Grace's father said the venture would mean certain death, but when she jumped into a rowboat and seized an oar, he went with her. Using all their knowledge of wind and current, they carried five survivors to the lighthouse. William Darling and two rescued sailors saved four more, but 43 others perished.

Miss Darling became a national heroine overnight. Gifts and marriage proposals deluged her. The Adelphi Theater offered her £20 a night just to sit in a cardboard wreck on the stage. Wordsworth, England's poet laureate, sang Grace's praises in verse. But until tuberculosis seized her, she continued to live on tiny Longstone. She died in 1842, four years after her exploit.

◄ Pilgrims boat out to Inner Farne, where St. Cuthbert died in 687. Wheeling terns occasionally dive at their heads (page 570). East and West Wideopen and Big and Little Scarcar rise across the strait like breaching whales.

J. Allan Cash

John E. B. Nimai



John E. H. Nolan

Fussy Mrs. Shag Prefers Her Own Company

Bottle-green bird on a seaweed nest, she perches on Inner Farne's 80-foot cliff and ignores the guillemots beyond. One of the cormorants, the shag is unknown in North America.

It was still short of 6 a. m. one day when I was suddenly alerted by a booming voice telling me to "Geet oop!"

I was out of bed and dragging on my trousers before a second blast came from that human foghorn: "Dinna be late! Ye kinna troost th' weather!"

I knew that only too well. With George Kyle, second engineer of the Holy Island lifeboat and owner of the voice, I had thrice tried to go to the Farnes. Now we were to make a fourth attempt.

Through the window, as I hastily dashed water over my face, I glimpsed a dry-looking sun boring like a gimlet through the blue-gray mist that lay between Holy Island and those seagirt rocks.

We were due to sail at 6:15; so I quickly stuffed some films into a rubber pouch, seized my camera, and ran downstairs.

Below, George was stowing thermos flasks of tea and packets of sandwiches into his capacious pockets. There was no time to waste over breakfast.

The Winner Takes a Chance

Ten more voyagers were waiting outside, including four ornithologists, members of the Gull Club of Berwick upon Tweed. Their leader, elderly James R. Walker, was glancing speculatively at the sky, obviously anxious about his chance of landing on the Farnes for the fiftieth time.

I met his friendly greeting with "Is it yes or no?"

"There's a wee scud o'er the Cheeviots, but it's nae s' bad," he observed.

The *Winner*, a 6-ton Diesel-engined inshore fishing craft, her name a happy omen, lay off Steel End. It was too deep to wade out to her, so we were carried across by two dories.

Soon we were nosing through the narrow gut between Black Law and a dangerous ridge of shingle on our port beam. Fortunately the mist had cleared and the faint breeze raised barely a ripple.

Our skipper, once we were clear of the gut, passed the tiller to his mate; then, as he settled down to read the *Sunday Sun*, he said to me, "If we nae geet a swell, weel geet there al' reet." Still I kept my fingers crossed.

We soon were joined by four Arctic terns, one of the swiftest and most graceful of sea-birds. Gyrating on their swallow-shaped wings and tails, they kept dropping plummet-fashion into the sea.

J. Allan Cash

Man and Puffin Give Each Other the Eye

Swimming puffins form thousands of black dots covering the sea. Ashore, they keep house in burrows, sometimes sharing them with rabbits. This Farne visitor risks a severe bite from the sea parrot's oversized triangular beak.

Two cormorants, first cousins to those that nest on the north shore of the Gulf of St. Lawrence, also arrived to feed. Big ugly fellows, in somber black and bronze and about three feet long, they also sought their food beneath the surface, using their powerful wings in breaststroke style. They appeared, however, to prefer landing on the water before diving out of sight.

Next came a shag, wearing bottle-green. Almost as large as a cormorant and not unlike it in appearance, this bird is unknown in North America (opposite). This one was seeking food for its mate nesting on Staple Island. When it opened its beak to scold us, a yellow lining was revealed. A second later, it was hissing indignantly at two miniature buzz bombs which had dropped into the water near by. I recognized these newcomers as puffins, or sea parrots, their heavy beaked heads appearing too large for their small bodies.

By now our little vessel had reduced the 5-mile gap to two, and the Farnes, strung out and low in the water, each with a distinct slope to the northeast, loomed ahead like torpedoed ships going down by the stern.

As we closed on the Megstone, I caught a heavy, obnoxious odor of decay. One of the two women passengers hastily sought a perfumed handkerchief, the other the gunwale!

Cormorants Gulp 15 Pounds of Fish a Day

The rocks of Megstone, where 300 pairs of cormorants nest, were literally running with lime wash and semidigested fish, for each mature cormorant gorges fish at the rate of 15 to 16 pounds a day.

Our skipper, glancing up from his paper, winked, as did the veteran from Berwick upon Tweed, who seemed inured to this smell.

Largely uninhabited since 1536 except by lighthouse keepers, the Farnes, up to 1923, belonged to two families, one owning the Inner, the other the Outer group. In that year it was decided that the birds should be protected. For decades, in the breeding season, they had been ravaged by shooting parties coming in small vessels from the Tyne. Cruising slowly along the cliffs, men shot nesting kittiwakes, guillemots, and other species for sport.

The Bird Protection Act put an end to that, and later the Farnes were bought through public subscription from the owners and placed in custody of the National Trust in 1924.

The sea birds on the islands today are among the tamest in Europe, and in great variety.

Here is the southern limit of the Arctic tern's breeding range and almost the northern limit of the roseate tern.

From May until the end of July, four bird watchers are employed to protect the birds of the Farnes, which mass on every pinnacle and ledge and in every crevice and chasm on the larger islands. Some scarce land birds also find odd corners for their nests: the rock pipit, wheatear, meadow pipit, pied wagtail, ringed plover, and redshank.

As we veered away from the Megstone, we saw the dark rock of South Goldstone (Oxscar) fast vanishing beneath the tide. We steered between them, heading toward the Outer group of islands.

From now on, George Kyle held the tiller. As we edged toward the North Wamses, I was startled momentarily by three strange apparitions—three bewhiskered, mummified-looking heads, which had popped above the surface to watch us go by.

These were representatives of the race of the gray seal, and the Farnes are their only breeding grounds on the east coast of Britain.

This species, found only in the North Atlantic and dependent waters, is the larger and rarer of the two British seals. It is protected in British waters by a special Act of Parliament.

Although the gray bull seal may measure from 7½ feet to 10 feet in length, most are about 8 feet long. The normal weight is between 560 and 650 pounds. The cows are smaller and lighter.

Music has a great attraction for seals. It was the late T. Russell Goddard, an authority on the Farnes, who said that he had only to sing "Blue Bells of Scotland" to have his friends appear.

The seals I saw varied considerably in color. One was a rusty black or dark gray all over; the second had gray upper parts, but the belly and especially the neck and chest were heavily blotched with cream. Their favorite food, so Mr. Walker informed me, is the lumpsucker; but they also eat large quantities of bivalve mollusks, including the common mussel.

As we passed Big and Little Harcar on our starboard beam, I saw the latter disappear except for one small hump at the southern extremity.

Grace Darling's Lighthouse

On rounding the Northern Hares, at the end of the Longstone, we gained a full view of Longstone Islet Light, Grace Darling's lighthouse, a massive column of red stone towering above its rock base (page 564).

Well I knew of the courage and fortitude that light had twice witnessed since it was erected in 1826. In the dawning hours of September 7, 1838, Grace, daughter of William Darling, the lighthouse keeper, glanced from the window to see a ship, the *Forfarshire*, broken in half on the Big Harcar. Joining her father, she and her mother helped him launch their little coble. Together they rowed nearly a mile through raging sea and rescued five of 11 survivors. Four others were rescued later by the father and two sailors.

By heroic effort they brought the survivors safely to the Longstone. Honored as a national heroine, she died four years later of tuberculosis and was buried where she was born, at Bamburgh.

In World War II four German bombs crashed on the Longstone. One demolished the subsidiary tower housing the unit that powered the great foghorn. The lighthouse crew fought flames from burning oil tanks under machine-gun fire from the Heinkel above. Happily, they escaped unscathed.

Birds Make Rocky Pinnacles "Sway"

As we rounded the southern end of the Longstone on our run down to Brownsman's Gut, I caught myself gaping at three towers of natural rock. Some 60 feet high, they appeared to be gently swaying (opposite).

Mr. Walker nudged my elbow. "Those are the Pinnacles. A grand sight, aren't they?"

I asked why they swayed.

"That's an optical illusion," he replied.

Then he told me that the impression of movement was caused by the thousands of guillemots packed on the flat tops of the rocks. "They're forever jostling and pushing," he said. "Their eggs are often kicked off and drop into the sea."

As we turned away from those pillars, I saw two birdbanders busily engaged in ringing the leg of a kittiwake. From distant Newfoundland and Davis Strait reports have been received of birds which have been banded on the Farnes.

Birds were everywhere on Staple Island. Never before, even on Lundy Island,* had I seen so many. Thousands filled the air; more thousands squatted on nests. They took little notice of us as we climbed up the naturally formed rock steps.

The noise was deafening. "K'yow-k'yow . . . ki-och-ki-och" was the herring gull's litany. The kittiwakes joined in the chorus, "kitti-way-ake"; and I could have sworn that one kept repeating "keep-awaaye." A grating sort of growl joined in as bass, the "ar-harr-harr . . . ar-harr-harr" of the puffin.

A little way off, two bird watchers were collecting eggs of the herring and lesser black-backed gulls. Their numbers are rigorously kept down on the Farnes, as both species are pests in a bird sanctuary. They are capable of killing mature terns and even the tough little puffins.

Like the Inner Farne, a small portion of Staple Island is covered with boulder clay, which in places is 10 to 12 feet thick. On top of this is a layer of peaty soil, which gives sustenance to at least 50-odd species of

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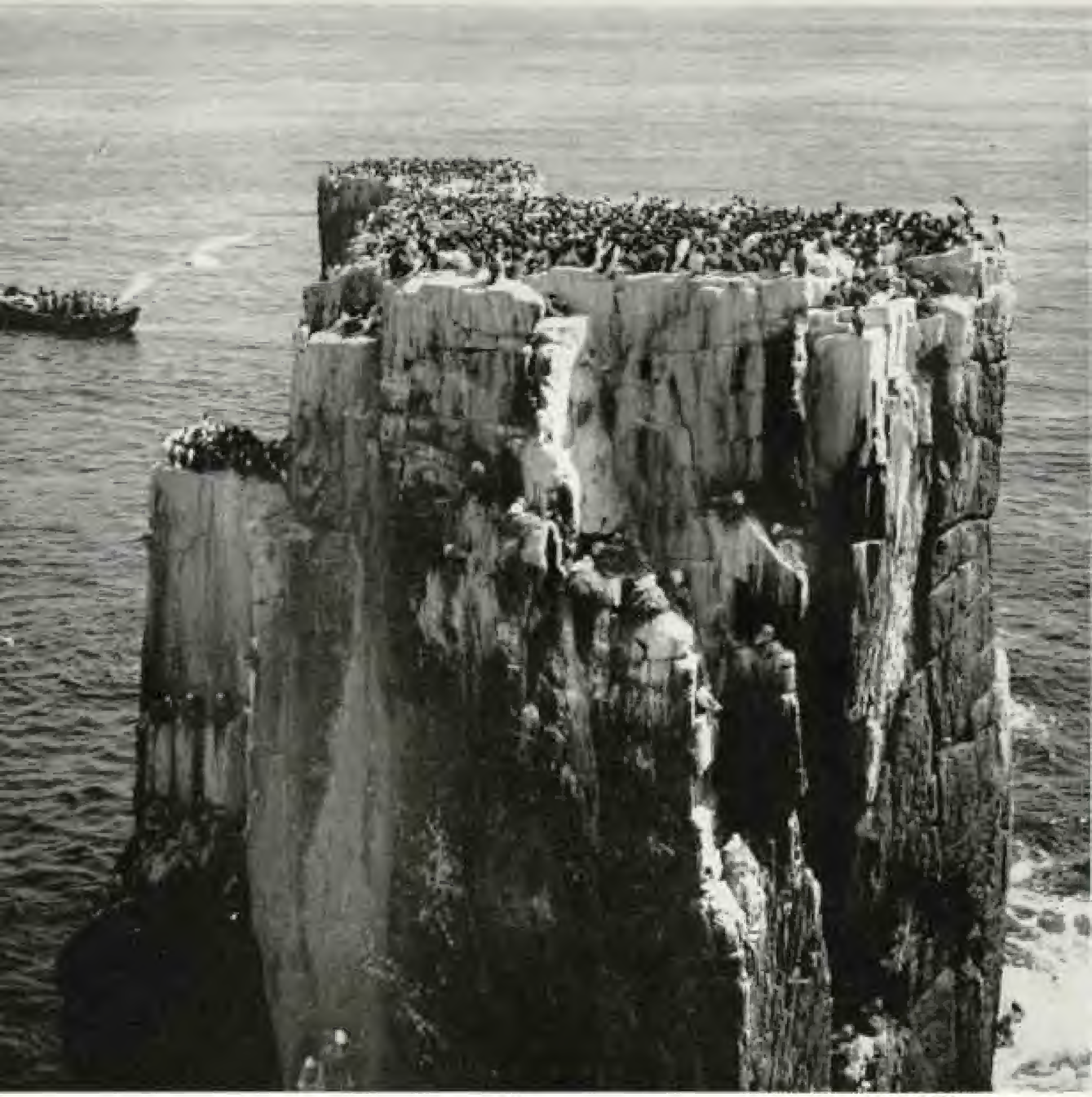
* See "Lundy, Treasure Island of Birds," by Col. P. T. Etherton, NATIONAL GEOGRAPHIC MAGAZINE, May, 1947.



John E. H. Nolan

Guillemots Cram the Flat-top Pinnacles Like Excursionists on a Steamboat

Three towering Pinnacles off Staple Island swarm with sea birds in the breeding season. Seen from a distance, the rock stacks appear to sway because of the birds' constant jostling. Penguinlike guillemots crowd the tops so tightly that eggs often drop 60 feet into the sea; kittiwakes nest in crevices lower down.

plants. The sea campion is most plentiful on the Farnes.

One interesting foreigner I noted was the *Amsinckia intermedia.* It belongs to the borage family and is a native of California. This plant was probably introduced accidentally many years ago, when light keepers lived on the Inner Farne and kept poultry.

I saw not a single tree on any of the islands, though perhaps long centuries ago they may have been wooded.

I found only three buildings on Staple and the Brownsman. Two, in ruins, were former beacon towers erected in the 17th and late 18th centuries. The third, a cottage, was built with stone taken from the towers and now houses the two bird watchers.

Before leaving Staple with its kittiwakes, shags, guillemots, terns, fulmar petrels, puffins, and oyster catchers, I caught sight of four curious birds. At first I thought they were guillemots; their beaks, however, were unlike those of guillemots, and, instead of having dark-brown heads and upper parts, they were black. They were razorbills, nearest living relative to the extinct great auk.

The female razorbill normally lays only one egg and incubates it on the naked rock ledge. This bird is rare on the Farnes, for the marauding gull is forever seeking such an easily gained meal.

After we left Brownsman's Gut, Staple Sound gave us a fair passage across its mile-wide channel. Here and there the sea was so translucent that I might have been peering down into water of a Pacific atoll.

We cautiously circled the East Wideopen, where drowned sailors were once buried by the monks of the Inner Farne, and came into St. Cuthbert's Cove, on Inner Farne, its only landing place.

When I jumped ashore, I knew my feet were treading the same path that St. Cuthbert used 13 centuries before. At the very spot where our craft was now resting, this saint used to pray for hours at a stretch.

Zooming Terns Part Author's Hair

For the next few moments ashore, however, I was more occupied with the present than with the past. Hundreds of agitated Arctic terns were wheeling and slipping, zooming and dipping to within an inch or two of my head. One, in a dive, actually parted my hair with its swallowlike tail.

I turned to watch how my companions were faring. All except the veteran from Berwick and George Kyle were busily ducking and side-stepping.

Thousands of these birds nested close to the water's edge, where entrance was barred by strands of barbed wire. Some eggs had been laid below watermark, and now a bird watcher was removing them. He put each clutch into a new depression in the sand which he scooped with his hand.

"They always find their own eggs," said George Kyle, "though how they do, nobody knows."

The Arctic tern's cousin, the Sandwich tern (*Sterna sandvicensis*), is found mostly on the Brownsman and Longstone. It is a close relative of Cabot's tern, *S. s. acuflavida*, which breeds on the Atlantic coast from Virginia to British Honduras. The common tern, however, is not so common on the Farnes, though a few score keep the Sandwich company on the Longstone.

A short, sharp climb brought us to some ancient buildings. Passing through a wooden gate, we came into a neglected courtyard. A stone font, the history of which has been lost, stood in the center of the yard; to the right was an old chapel.

First erected about 1255 and practically rebuilt in 1370, this chapel was restored in 1848. It is the supposed site of St. Cuthbert's cell, which that saintly hermit divided into two. One part served as living quarters, the other as his oratory.

Another site bearing the same claim is Pele Tower (*pele*—Middle English for peel tower, or small castle), which faced us as we entered. This massive stone edifice, however, was not completed until 1500. The Benedictine monks had lived on the Inner Farne 250 years before they raised this building.

Which of these two claims is correct matters little. Somewhere within those few square yards of rough soil and rock, St. Cuthbert, the former Northumberland shepherd boy, made his home between 676 and 684. In the latter year, much against his will, he was persuaded to accept the Bishopric of Lindisfarne. But two years later, being convinced that his end was near, he returned here and died on March 20, 687.

Inside the tower, we followed a winding stairway up to the beacon. There my Berwick friend showed me where the monks kindled the fire that gave warning to passing vessels. "This was probably the first lighthouse on the northeast coast of Britain," he said.

As we descended those timeworn steps, my companion told me to strike a match. I was thankful I did, for another step would have plunged me into a stone cistern, filled with ice-cold spring water, that the early monks had used.

St. Cuthbert's Duck Sits Silently

When we were again outside, my friend told me to keep my eyes on the ground so as not to tread on any of St. Cuthbert's ducks, known to ornithologists as the eider (*Somateria mollissima mollissima*).

Sure enough, as I deviated a little to one side to avoid a stone, I missed one bird by inches. It sat with its head close to the ground, making no move. This breed of duck, linked to St. Cuthbert's name, was carefully protected by the saint.

In a round and soft nest of sea campion, lined with down plucked by the duck from its own breast, were five eggs. They incubate in 28 days; during that period Mrs. Eider may leave the nest only once or twice. If she does, she conceals the eggs from prying gulls under some down and herbage. During the four long weeks she eats nothing, but is sustained by the fat of her own body.

There were more than 300 eider nests in and around that old monastic courtyard, living evidence that St. Cuthbert's presence may still be felt by this strangely silent bird.

It was time for us to leave the Farnes. The eider stayed silent, but the other birds called after us, "Ki-och-ki-och . . . ar-harr-harr. Keep awaaye . . . keep awaaye . . ."

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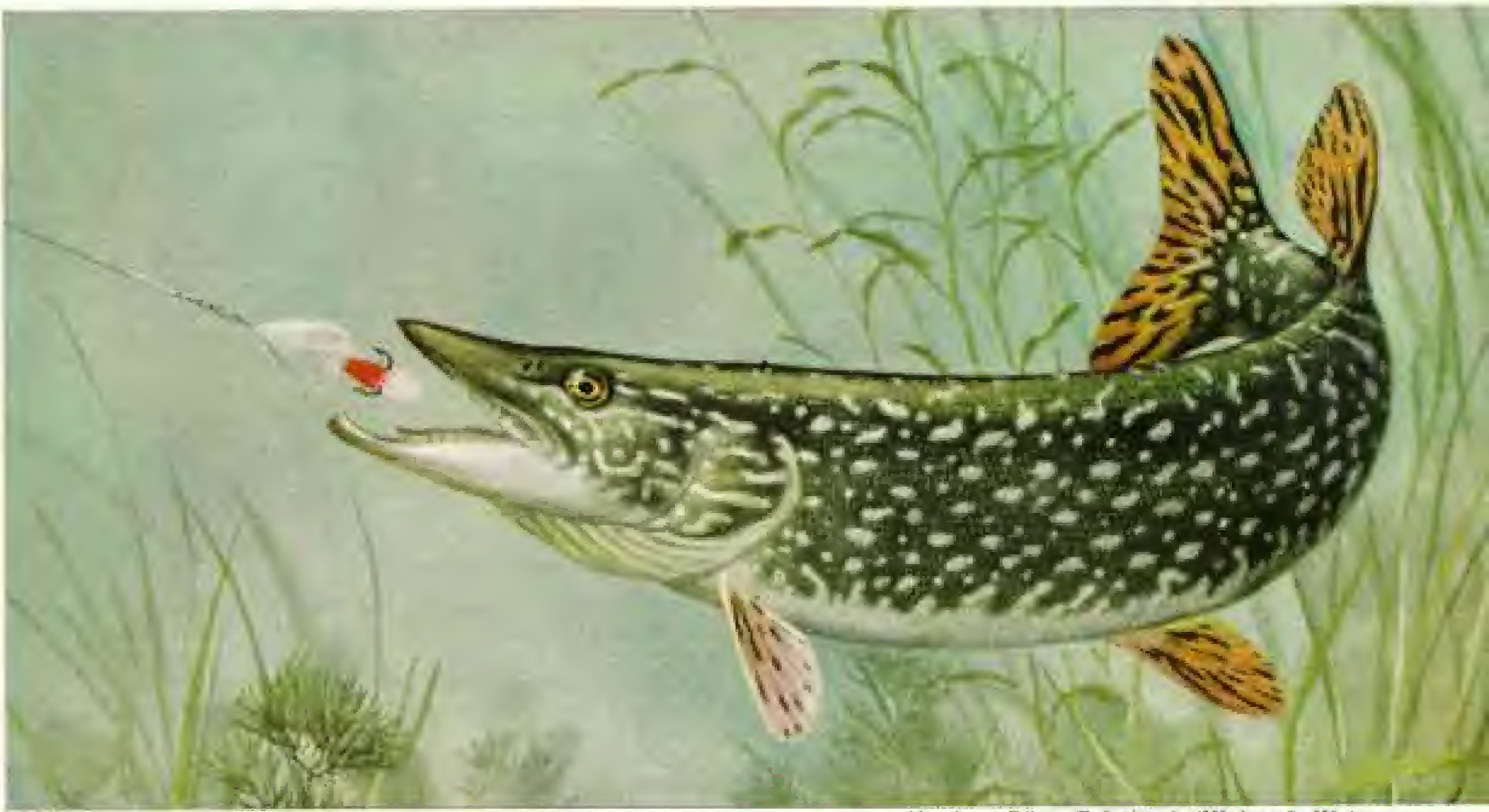

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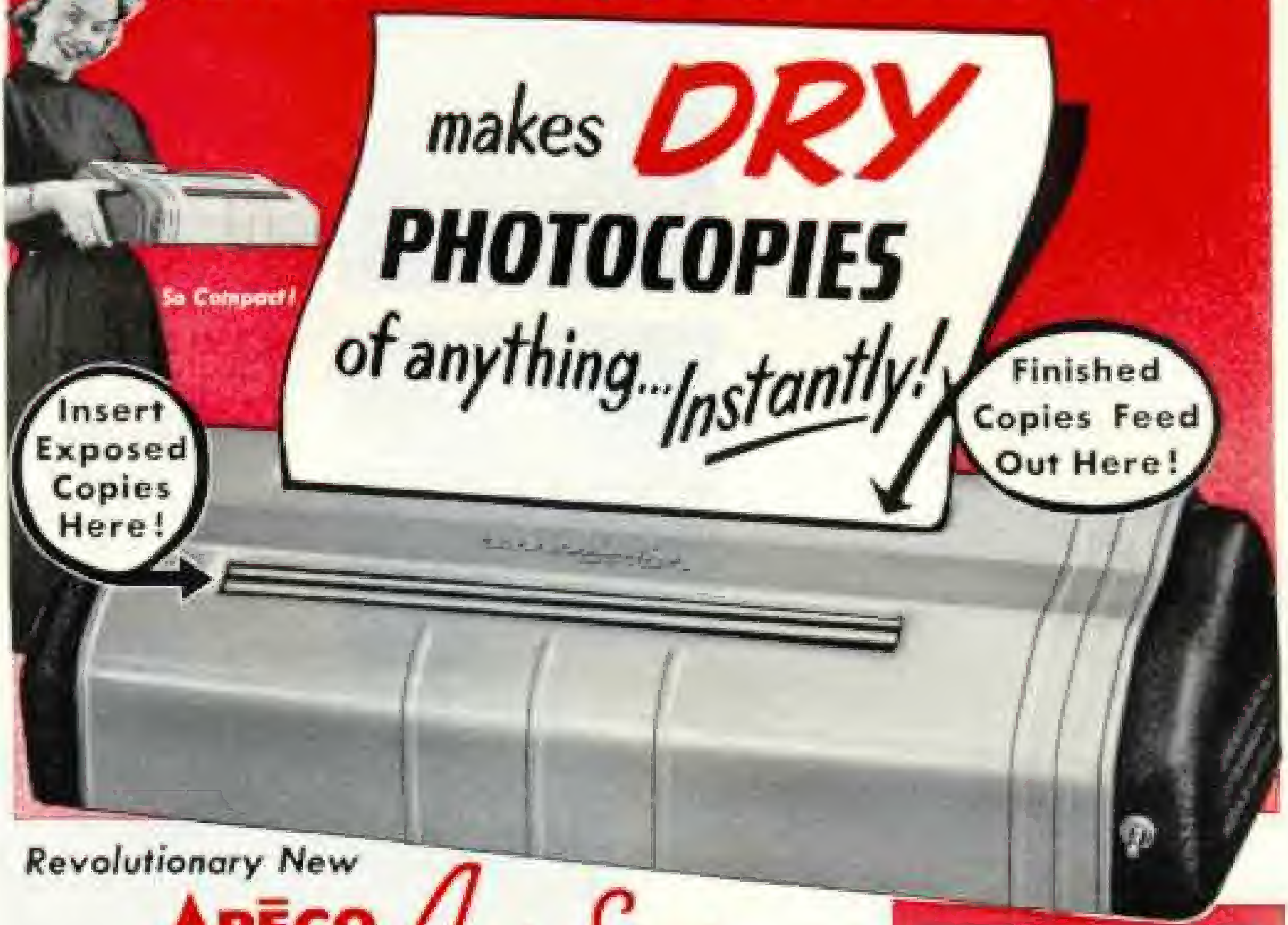

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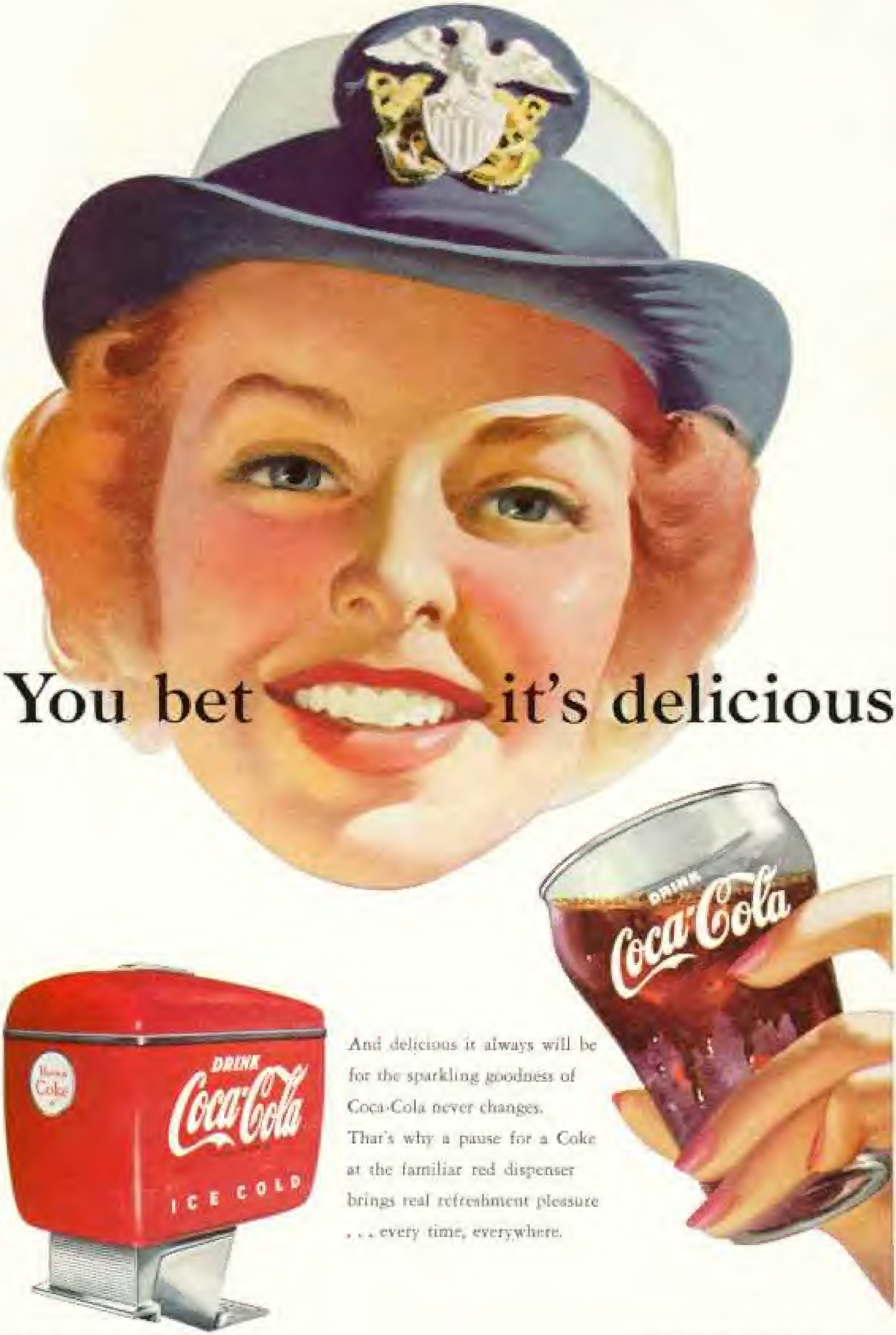
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