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A New Volcano Bursts from the Atlantic

Off Fayal, in Portugal's Verdant Azores, a Jack-in-the-box Eruption Smothers Villages, Awes Visitors—and Even Catches Whales

By JOHN SCOFIELD

Senior Editorial Staff, National Geographic Magazine

With Illustrations by National Geographic Photographer Robert F. Sisson

"THERE may have been more impressive eruptions," my friend said beside me in the dark, "but this is the first time nature ever provided a grandstand."

From our windy cliff top, which towered higher than the Washington Monument, we could see into the very throat of the volcano. Suddenly it looked as if someone had set off all the Roman candles in the world. A steady half-mile-high jet of incandescent boulders, some of them the size of small automobiles, soared into the air and then slammed down onto the ash-covered slope, to lie briefly glowing there like angry red fireflies.

To the left of the main vent, ropy lava sprayed in a dazzling fountain, painting the coiling steam clouds a gaudy orange. Lightning knifed through the inferno above the vent, and rending cracks of thunder broke the soft swish of the eruption. Behind us a full moon climbed slowly up from the sea.

Isle Appears, Then Disappears

"Atlantic Gives Birth to an Island," the newspapers had announced when this jumping-jack volcano first raised its head near 12-by-8-mile Fayal, in the Azores (map, page 740). "Azorians Aren't Sure It's a Blessed Event; 3,000 Flee."

A month later the papers could take a more optimistic tone: "Isle Disappears into Sea." Then with disheartening promptness came a new catastrophe, and another headline: "Volcano Erupts Again."

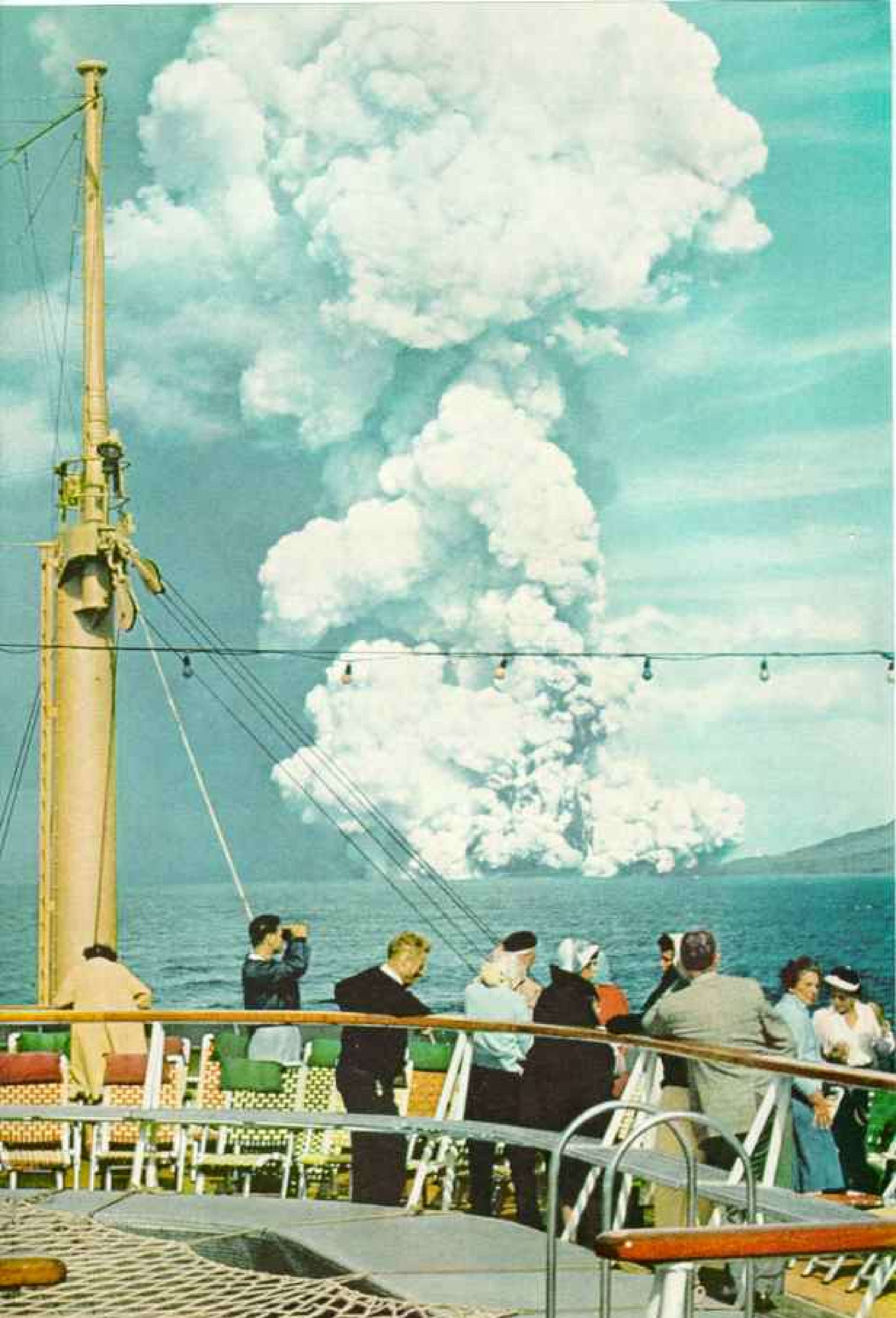
From that second beginning the submarine newcomer steadily enlarged its domain, coughing up a cone 200 feet high. Where 150 feet of salt water had rolled, it built a sandy peninsula that lengthened the island of Fayal by more than half a mile.

Volcano-watcher's Permit Required

National Geographic photographer Bob Sisson had spent nearly a month on Fayal documenting the monster's changing moods. Now it was my turn to have a look at this youngest and, for the moment, most violent of the world's 500 active volcanoes. And the volcano must have known I was coming. Its middle-of-the-night lava flow climaxed a day in which Ilha Nova, as the Fayalenses call their intractable new neighbor, had brought out every threatening trick in its bag.

First I had had to get, of all things, a volcano-watcher's permit. In exchange for a declaration that there would be "no responsibility for anybody if some accident . . . happens to me," I was handed a typewritten sheet authorizing me to come and go as I chose on the western end of the island.

"We had to close the area," the port captain of Horta, Fayal's pin-neat capital, told me. "The volcano became a place to picnic; mothers took their children out there."



An Island Aborning Thrusts Its Head Above the Sea

Absorbed in the problems of everyday life, man rarely has time to consider the mysteries that lie beneath his feet. Earth's thin, fruitful crust hides temperatures hot enough to vaporize iron and pressures so great that rock, heated far beyond its melting point, remains in a state of glassy solidity.

On September 27, 1957, these elemental forces breached a fracture in the planet's brittle shell a few hundred yards from the island of Fayal, in the Azores. Bursting from the sea floor, the world's newest volcano belched gases and steam and flung thousands of glowing lava bombs half a mile into the sky.

A plume of water vapor billowed 20,000 feet above the fuming pit. Villagers fled before a downpour of ash and salt-laden rain that turned lush pastures and hydrangea-framed vineyards into heartbreaking wastelands.

Always alert to portray earth's shifting moods, Dr. Maynard Owen Williams, now retired after 33 years as Chief of The Society's Foreign Editorial Staff, made this photograph aboard the S. S. *Independence*. The American Export liner, giving its Europe-bound vacationers this dramatic view of the volcano, only five days old, found it busily enlarging its cinder cone, which here rises some 50 feet above the sea. A month later, when Ilha Nova —Portuguese for "new island"— had grown to a height of nearly 300 feet, earth's inner pressures abated and the cone disappeared overnight beneath the waves. But this was only the end of the first chapter (next two pages).

Kodachrome by Maynard Owen Williams

Biography of a Sea-born Jumping Jack

These drawings, based on observations by Portuguese volcanologist Frederico Machado, chronicle six months in the life of Ilha Nova. The new volcano loosed its first ash and steam (1) following a week of tremors. In three days it had risen 150 feet from the sea floor. A kidney-shaped cone developed (2), only to disappear during the night of October 29-30 (3) as dramatically as the legendary Atlantis, which Plato located in this same quarter of the ocean.

On November 4 the volcano tried again; an islet raised its head, but foundered the next day. On November 6 gases once more boiled from the Atlantic (page 742), heralding the appearance of Ilha Nova II. Diagrams 4, 5, and 6 show how this second island has grown into a half-mile peninsula. Capelinhos Light, on the cliff opposite, indicates scale; it is 115 feet high.

Drawn by John L. Lotspeitz, © N.G.S.

"So far no one has been killed or injured," the captain added, "but only by good luck. One man actually slid into the crater. He might be there yet if his friends hadn't linked their belts together and pulled him clear."

Another Fayalense risked his neck in a mad sprint to the first island and flew his shirt from a bamboo pole in lieu of a flag to claim Ilha Nova for Portugal. He could have saved himself the trouble; the volcano lies far inside Portuguese territorial waters. And as if to remove any doubt, a few weeks later the volcano obligingly attached itself to Fayal.

Fences Bloom in Summertime

With the permit tucked in a shirt pocket ("To be found on your body," the port captain joked), I drove westward across a landscape as green as Ireland's, where sleek cows cropped shank-high grass and a windmill clattered on every hilltop. But government official João Manuel Menezes brushed aside my enthusiasm.

"You are seeing our island in winter," he said, and pointed to thick hedges of hydrangea that framed each little rectangle of grass. "In summer, when our fences are in bloom, Fayal looks as if somebody had draped it with a blue fish net."

As we neared the volcano, crowned now by a towering thunderhead, the green disappeared, at first with a subtle graying of color, then as if someone had turned off a light. In its place were dead cornstalks thrusting up from fields smothered by blankets of ash the shade of stale chocolate. Houses and road lay covered; only an occasional limewashed wall punctuated the featureless countryside.

We paused by a stone house in Capêlo, one of the villages most often scorched by the

Kodachrome by National Geographic Photographer Robert F. Sisson © N.G.S.

November 7: A 300-foot Jet of Ash Announces the Birth of Ilha Nova II

Islanders crowd the ash-blanketed cliff. Beyond, at the foot of a needle of tuff from an old eruption, gulls rest unconcernedly on the wave-beaten remnant of Ilha Nova I.

Ominous Ribbons of Falling Ash Link Cloud and Waves

volcano. A woman stubbornly swept her stone-and-mortar threshing platform, then looked helplessly toward the volcano's dark plume overhead. Near by, a whole family worked to clear the ash from a roof and reset the scattered tiles.

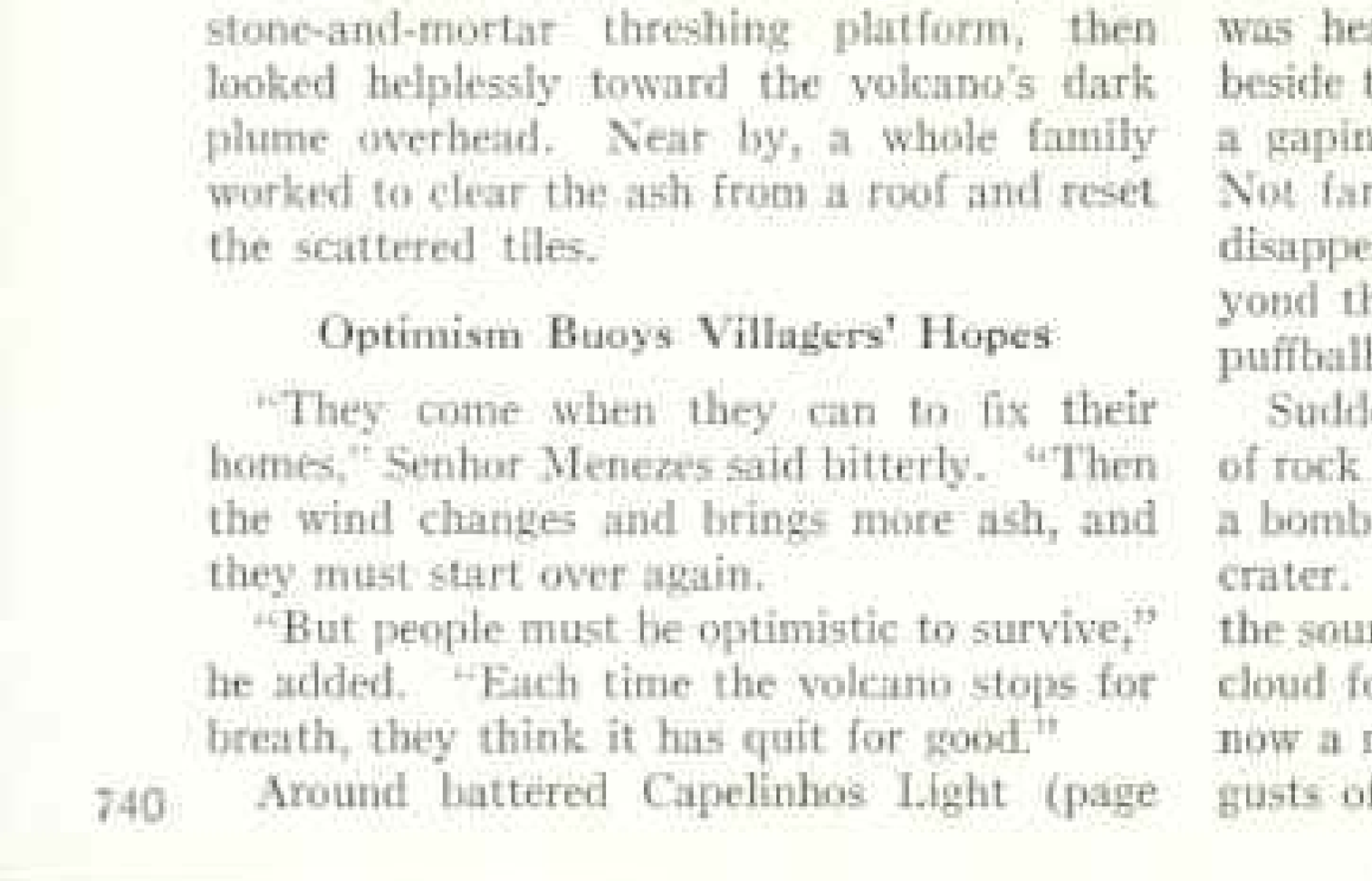
Optimism Buoys Villagers' Hopes

"They come when they can to fix their homes," Senhor Menezes said bitterly. "Then the wind changes and brings more ash, and they must start over again.

"But people must be optimistic to survive," he added. "Each time the volcano stops for breath, they think it has quit for good."

Around battered Capelinhos Light (page 746), only 800 yards from the main vent, ash was heaped in mountainous drifts. A shed beside the tower lay buried to the eaves, with a gaping hole where the roof had collapsed. Not far away a whole fishing settlement had disappeared beneath the deadly shroud. Beyond the lighthouse the volcano sent up lazy puffballs of steam.

Suddenly a bundle of charcoal-gray spears of rock and vapor, each streaming aloft behind a bomb of hardened lava, blossomed from the crater. Silently, as in a motion picture with the sound track turned off, a broad mushroom cloud formed atop the column, which towered now a mile into the air. Brown, oily-looking gusts of volcanic dust swelled from the vent,



as an East Wind Blows the Volcano's Towering Plume to Sea

and steaming blocks of lava peeled in graceful parabolas from the dark central mass.

The wind veered and a brown wall of ash and dust hundreds of feet high bore down on us. We ran before it, our boots crunching on the cinders. Then, peering from the shelter of the lighthouse door, we watched the particles slant to earth through the bright sunlight in a strange golden rain.

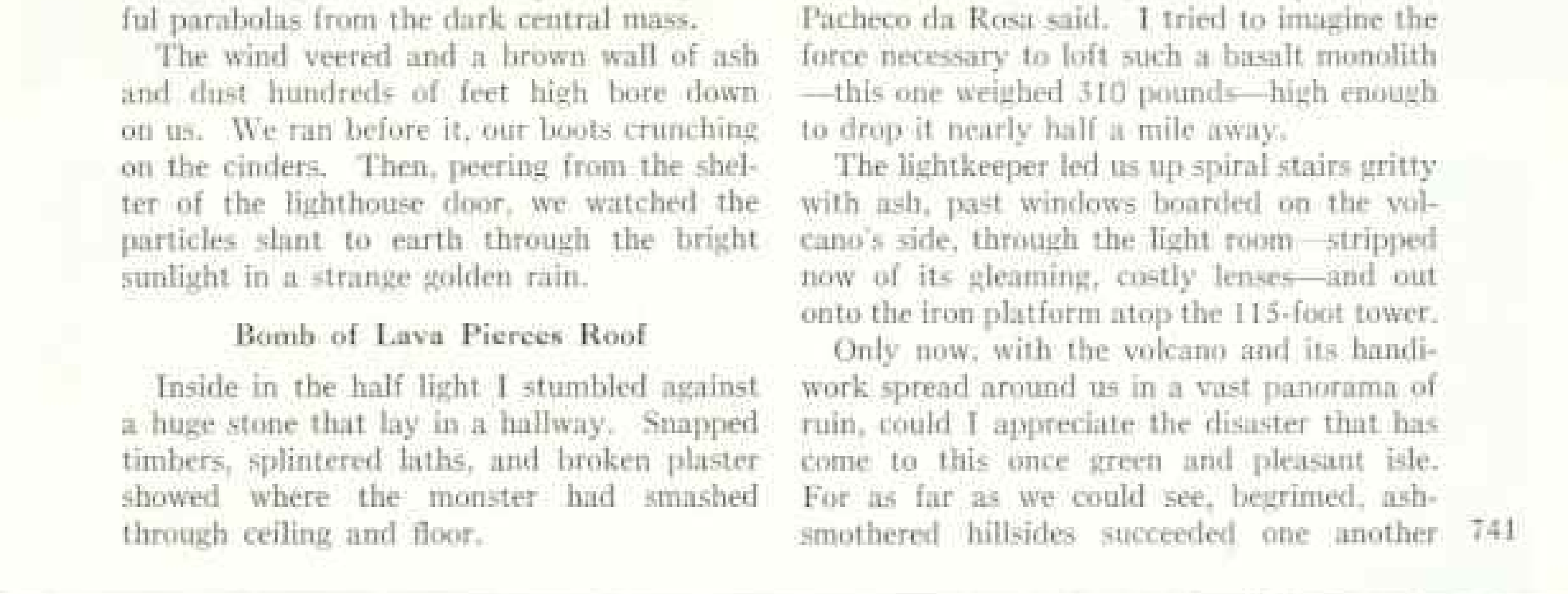
Bomb of Lava Pierces Roof

Inside in the half light I stumbled against a huge stone that lay in a hallway. Snapped timbers, splintered laths, and broken plaster showed where the monster had smashed through ceiling and floor.

"*Basalto*," assistant lighthouse keeper Tomáz Pacheco da Rosa said. I tried to imagine the force necessary to loft such a basalt monolith —this one weighed 310 pounds—high enough to drop it nearly half a mile away.

The lightkeeper led us up spiral stairs gritty with ash, past windows boarded on the volcano's side, through the light room—stripped now of its gleaming, costly lenses—and out onto the iron platform atop the 115-foot tower.

Only now, with the volcano and its handiwork spread around us in a vast panorama of ruin, could I appreciate the disaster that has come to this once green and pleasant isle. For as far as we could see, begrimed, ash-smothered hillsides succeeded one another



Kodachrome by National Geographic Photographer Robert F. Sisson © N.G.S.

A Frothing Caldron Marks the Volcano's Lair

On November 6, when photographer Sisson reached Fayal, he thought he was too late to photograph the new island. Only this patch of bubbles showed the scene of its violent birth and death. Sulphurous water rings it. Elevation at right, known as Cabeço Verde—green top—for its cloak of vegetation, now lies beneath a dark mantle of ash.

Two days later, evening's waning light sets off the volcano's reawakening fires like a jewel on blue velvet. Ilha Nova II is born.

Atlantic winds generally blow the cloud of ash and chemical-laden vapor out to sea, where the pumice floats briefly in sinuous lines. Less often, dreaded west winds send the noxious plume arching over the island. On February 10 Pico, Fayal's neighbor 17 miles away, awoke to find itself dusted by the volcano's gritty breath.

across the blasted, lunar landscape. At least a quarter of the island lay under the destructive pall.

"They say volcanic ash enriches the soil," Tomáz commented. "Here some of the villagers have planted as many as three crops. But each time ash smothers the seeds. They sold their cattle when ash destroyed the pastures. Now they have nothing."

Hundreds of feet below us the narrow shadow of the lighthouse pointed directly toward the erupting crater, casting an accusing finger across the faintly golden sheen of the volcano's sandy approaches.

Quakes Preceded Island's Birth

"It started there," Tomáz said, and pointed to a spot a little beyond where the crater now lay.

"We knew something was going to happen," he said, "because of the earthquakes. Then, early on the morning of September 27, I saw three jets of steam and ash squirting up from the sea."

U. S. Air Force, (Official)

Two days later the volcano had its head out of water; by the next day a cloud of vapor towered four miles above the pit and 10 miles out to sea.

"On that first day," the lighthouse keeper went on, "the people from Capêlo made a big pilgrimage to the volcano." He motioned toward the cliff below, which even now was dotted with half a dozen tiny figures. "Old women were crying for fear Fayal would blow up. The men were quiet, but they were afraid too.

Ilha Nova Puffs Contentedly After an Angry Outburst

A sea wind has driven vapor clouds aside, baring the volcano's steaming maw. Air Force photographer Allen C. Love, who made this picture early in October, saw a similar pillar of cloud soar four miles into the air on a calm day. "It was an awesome sight," Airman Love recalls. "We flew over at 10,000 feet; there was as much cloud above us as below."

"They were all asking God to stop the volcano. They brought the Espirito Santo—a silver crown with a dove on it—from the church, and marched right up to the lighthouse.

"Now the people are less terrified," he said, and pointed to where a distant huddle of men were digging a road free of ashes that had fallen the night before. They worked doggedly, unmindful of the geyser of rock and steam that pulsed awesomely into the sky behind them.

Birds, too, acquire the same disinterested point of view; as I watched, a flock of seagulls winged within yards of the volcano's soaring column.

Stone Tower Sways and Shakes

I wanted to photograph the volcano from this dramatic but windswept vantage point, and leaned hard against the iron guardrail to steady myself. At once I became aware of something the wind had concealed up to this point: The tall stone tower was shuddering and swaying alarmingly. Tomáz laughed at my expression of dismay.

"You should have been up here during the earthquakes that preceded the volcano," he said, "when the lighthouse *really* swayed!"

As we reached the ground, a gusty wind swung the cloud of sulphurous gases and ash toward the light. The sky darkened menacingly, and pellets of wet mud drummed down on us like wind-driven hail.

The windshield of our car disappeared completely in the rain of mud, and the rear wheels spun in the fresh ash. Outside it looked like that moment between dusk and darkness when headlights are useless and objects blend hopelessly into each other. I looked at my watch. Lunchtime!

For another mile we felt our way through the flying ash. Then we were beyond the fall-out and in a driving rain that condensed from the plume of vapor above us. As if to apologize for its bad manners, the volcano washed our car free of the grimy mud before it let us slip back again into a world of sunlight and greenery.


HO-10-90

After this look at Ilha Nova, I could understand the awe felt by the ancients for these fiery outbursts. To superstitious Romans, eruptions came from the forges of Vulcan, the god of fire—hence our word volcano.

The Romans had every faith in their explanation of volcanoes; today's scientists are somewhat less certain. Man, who talks confidently about flying to the moon, must still admit that he knows more about some aspects of stars billions of miles away than he does about the earth beneath his feet.

Most of the evidence, gained by precise timing of earthquake shock waves as they move through the earth's interior, supports this theory:

Imagine our globe as a hard-boiled egg. Beneath a fragile shell some 30 miles thick lie layers of rock heated to temperatures as high as 5,000° F., but held in a state of glassy solidity by the enormous weight above them. At the center lies the yolk, a moon-size blob of nickel-iron so hot that even the incredible pressures surrounding it cannot keep it from assuming a liquid—or perhaps even a vaporized—state.*

Brittle Crust Develops Weak Spots

The white of our egg concerns us here. The granite crust above it, shifting and buckling restlessly, develops weak spots, and the pressure drops. Areas of the superheated basalt liquefy and, like champagne when the cork is pulled, release enormous quantities of trapped gases. Slowly the bubbling magma, as geologists call the hot, sirupy rock, forces its way upward through the crack.

Often, as it nears the surface, the glowing column encounters water. Then steam adds its bit to the monstrous forces at work—forces that dwarf even man's vaunted H-bomb.† A final explosion occurs as the mixture breaches the surface, and a volcano is born.

"Which is just the way these islands were created millenniums ago," meteorologist José Agostinho said. "The Azores, which lie on the Mid-Atlantic Ridge, are the tips of old volcanoes sticking up from the sea.

"And if future map makers are to be precise," he added, "they will have to take into account the extent to which Ilha Nova has changed the face of the earth—the square mile or so that the volcano has added to the area of Portugal."

Once again I had to remind myself that this sea-girt handful of islands is as much a part of Portugal as Long Island is of the United States.

Sea Floor Has Sired Other Volcanoes

I asked gentle, scholarly Colonel Agostinho —he has combined careers as soldier and schoolteacher with those of volcanologist and chief weatherman for the Azores—if he had predicted the appearance of the volcano.

"No man can anticipate such things," he said. "All we might have done was to point out the fracture, the crack in the earth's crust, through which at least three previous eruptions on Fayal have found their way—the last one in 1672—and say, 'If another comes, perhaps it will appear somewhere along this line.' "

Many other volcanoes have popped from the ocean floor. ("After all," the colonel reminded me, "in terms of local geography, the sea bottom lies closest to the magma.") Bogoslof, in the Bering Sea, has appeared and disappeared half a dozen times since 1796. Myojin, 250 miles south of Tokyo, raised its head three times in 1952-3; one of its outbursts destroyed a Japanese research vessel and the 31 men aboard.

In 1885 a new island, christened Falcon, added itself to the Tonga group. It disappeared several times, to reappear finally in 1927. And in Ilha Nova's own back yard a submarine volcano in the spring of 1811 built Sabrina, off Fayal's sister island of São

* See "Our Home-town Planet, Earth," by F. Barrows Colton, National Geographic Magazine, January, 1952.

† In 1883 a volcanic blast destroyed the island of Krakatau in the Dutch East Indies. Scientists later found 900 feet of water where the island's 2,600-foot peak had stood. The explosion was heard 3,000 miles; sea waves started by the blast killed 36,000 people.

Ilha Nova's Skyscraping Plume Makes Its Own Weather

Tons of sea water leak constantly into the volcano's gaping chimney, to be ejected almost immediately as superheated steam. The vapor, rising through layers of cool air, condenses into torrential rains complete with thunder and lightning (pages 754-5). Here, only a few hundred yards from the crater, the rain has combined with ash to fall as a sticky, saline mud that plasters this automobile's finish. Observers atop Capelinhos Light, 800 yards from the main vent, can feel the stone tower shudder during eruptions.

Kodachrome by National Geographic Photographer Robert F. Sisson © N.G.S.

Strangled Villages Trace the Cloud's Destructive Path

When pre-eruption earthquakes rocked Fayal, frightened villagers in Capêlo (above) and Norte Pequeno slept out-of-doors but returned to their homes when the tremors subsided. Since then they have watched helplessly as repeated rains of air-borne ash have buried their gardens and fields. Here, in November, only a few hardy plants survive in the lee of buildings and stone walls.

A six-foot drift by early February had blocked the doorway of this whalers' shelter at Capelinhos, a summer fishing settlement near the island's western tip.

Bucket brigade passes freshly cleaned roof tiles to workers in Norte Pequeno. Roofs collapsed under foot-thick layers of wet ash.

Watercolors by John Seofield (left) and Robert F. Sisson, National Geographic Staff © N.G.S.

Scorched and Forbidding, the Volcano Re-enacts Earth's Fiery Youth

Eons ago, when eruptions thrust from the sea to create new land masses, much of our world must have resembled this tortured landscape. Eventually the volcano will die. Then, slowly, as erosion smooths the peninsula's pock-marked face, wind-blown seeds will gain a foothold. Ilha Nova may one day bloom as luxuriantly as the rest of Fayal.

Miguel; a few months later it disappeared.*

Colonel Agostinho, who directs the islands' meteorological service from an observatory on Terceira, 80 miles away, had seen Ilha Nova only from the air. But fortunately for science in this International Geophysical Year, two equally devoted Boswells have been on the spot to record the volcano's every shift of mood.

Lightkeeper Pacheco has clung to his post despite earth tremors, flying bombs, and clouds of sulphurous gases that all too often invade his battered tower. He maintains a detailed diary of the volcano's doings and cranks up an antiquated field telephone every few hours to pass the news to worried officials in Horta across the island.

Whenever the volcano puts on a particularly impressive show, Pacheco's call sets a phone jangling in the home of public works administrator Frederico Machado. The patiently compiled charts and observations of skilled volcanologist Machado, which provided the basis for the drawings on page 738, may one day constitute the most detailed biography ever assembled of a volcano's birth and death.

I asked Senhor Machado a question for which I really expected no answer. What was the future of Ilha Nova?

"It will stop in one year, perhaps," he said without hesitation, "based on what we know of previous volcanoes in the Azores.

"Of course," he added with a quick smile, "it might have stopped since Pacheco's last phone call. Or it may outlive us all."

Fortunately, the volcano's contributions have not all landed on the debit side of the ledger. Most Fayalenses living near Horta, 12 miles away, remain apprehensive but largely unaffected. A handful of Azorians have even profited by its intercession.

"Everybody wants to see the *vulcão*. I guess I've been to Capelinhos a thousand times," a leather-jacketed cabby boasted one afternoon in the Café Sport (page 780). "Made enough escudos to buy a new taxi."

Whaleman Francisco dos Santos, sitting in his accustomed chair by the door, came alive. "About a month after it started," he announced, "it helped us, too."

Sulphurous Sea Makes Whales Easy Prey

I offered him a drink of the sirupy anise beloved by these stout sea hunters. He drained the thimbleful with one quick gulp.

"We chased a pod of sperm whales that day," he said, "five launches and eight boats of us. The volcano was very strong and the wind blew the cloud over us. Black rain fell and we could smell the sulphur. The sea turned green as soup.

"Those whales, they went into that bad water and we went after them. They lay like dead, too sick to run away.

"We kill until we got no more harpoons." He smiled happily at the memory. "Boats come from Pico and São Jorge and they kill.

A homemade protractor helps Tomáz Pacheco da Rosa estimate the eruption's height. An assistant lighthouse keeper at Capelinhos until flying rocks, earth tremors, and sulphurous gases closed the beacon, he has stayed on as the Portuguese government's official observer.

* See, in the National Geographic Magazine: "The Explosive Birth of Myojin Island," by Robert S. Dietz, January, 1954; "Riddle of the Aleutians," by Isobel Wylie Hutchison, December, 1942; and "Falcon, the Pacific's Newest Island," by J. Edward Hoffmeister and Harry S. Ladd, December, 1928.

When the sun went down our boats were full of ashes but we had 19 *baleias*. That was the first good thing the Ilha Nova did.

"And maybe the last," he added thoughtfully. "After that she put no more whales to sleep for us."

But for every whaler made happy, and for every taxi driver blessed with a new automobile, hundreds of humble islanders have been pushed a little closer to the nightmare of homelessness and hunger that has haunted them since the volcano came.

In Capêlo, in a house once gaily pink but sullied now by the volcano's ugly breath, I visited one of Fayal's many "Luso-Americano" households. At 16, Delfina Vargas went to live in Rhode Island. There she married Henry Lacerda, another Fayalense, and together they returned to the island of their birth.

"We had a fine life here before the volcano," Mrs. Lacerda recalled wistfully. She stumbled often over words almost forgotten in the 30 years since she came home to Fayal. "The land was green and good," she said. "We cultivate our fields; I do my housework. We have nice peaches, grapevines, *laranjas*, what you call oranges, and pears and apples."

Taxis Carry Villagers to Safety

Her husband sat opposite us, shyly silent but nodding often in agreement. I asked Mrs. Lacerda how the trouble had started.

"First came earthquakes," she said, adding an extra syllable to the word, "not long but hard, like this." She shook her clenched fists and the memory brought a quick flash of fear to her eyes.

"When there were too many earthquakes, we take Our Lady of Fatima out of the church and walk with her, many of us, praying in the streets. But it do no good.

"Sunday night, October 6th it was, all night was lightning and thunder. We leave our lights on all night, we was so afraid. In the morning it keep raining ashes and salty water, and the sun never come.

"Then the police told us, 'Get ready.' All the machines from Horta, all the trucks and taxis, come to take us away, so nobody had to walk. We didn't took nothing to eat or even clothes, just what we had on. My husband and I went to Santo Amaro, near the city.

"The government gave everybody two breads every day and a quart of milk, some cheese and meat and some vegetables. We stay nine days and then they let us come home."

Cornfields Smothered by Falling Grit

Walking nimbly despite her 62 years, Mrs. Lacerda led us to the fields she owns jointly with her two sisters. Half a dozen terraced corn patches lay under deep blankets of ash.

"For five days," she said, "salty black rain came from the volcano."

We labored slowly uphill again across the drifted fields.

"Not so young any more," Mrs. Lacerda gasped and stopped for breath. "If the volcano stop today," she puffed, "in two years maybe we can plant again. It will take that long for rain to wash the salt away."

In her mother's simple home, black mud eight inches deep had buried the floor; ash still clogged the cellar to within a few inches of the beams. Now the family treasures, topped by a faded, water-stained portrait of long-dead grandparents, rested out of danger on stones and billets of wood. In the rafters ears of dry, unshucked corn rustled gently when a breeze swept through the open door.

"We got enough corn to last to September," Mrs. Lacerda said. "This year we'll get along pretty good. But next year. . . ." Her voice trailed off.

"We ought to go to the States," she announced with sudden elation. "I have a niece, my brother's daughter, in Washington, D. C." But her happiness at the prospect vanished as quickly as it had come. "I had my passaport," she admitted sadly, "but the time ran out. And it costs so much now to go to America."

Henry Lacerda overcame the shyness that had gripped him all morning. "This volcano won't stop," he said fiercely.

I tried to reassure him. "These people, they gotta be moved," he said as if he had not

Earth's Nether Fires Loft Half-ton Blocks as if They Were Pebbles

Volcanic bombs—masses of hardened lava that sometimes soar more than a mile above the crater—pockmark Ilha Nova's sandy peninsula. Here two islanders, caught unawares as they examine a jagged mass of basalt, turn to run when a geyser of vapor and rock fragments streaks soundlessly aloft behind them. Seconds later a new shower of steaming bombs thudded onto the ash-cushioned slope near the photographer and his companions.

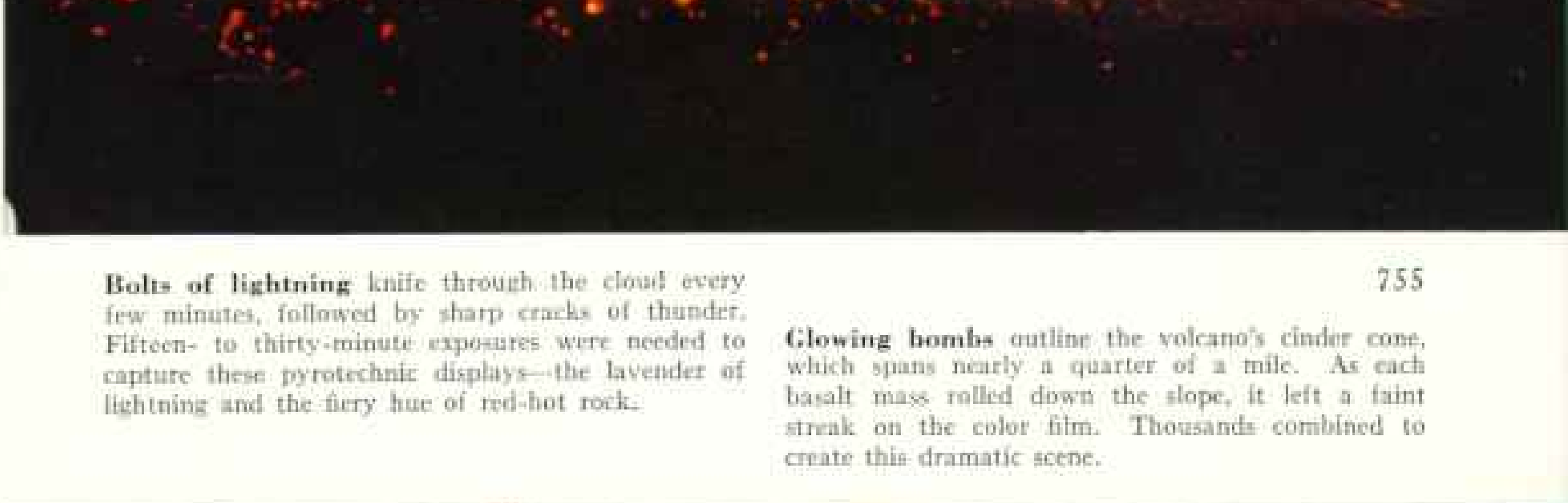
Kodachrome by John Scofield, National Geographic Staff © N.G.S.

Autochromes by National Geographic Photographer Robert F. Sisson © N.G.S.

Nightfall Turns Ilha Nova into a Devil's Playground of Brimstone and Fire

Bolts of lightning knife through the cloud every few minutes, followed by sharp cracks of thunder. Fifteen- to thirty-minute exposures were needed to capture these pyrotechnic displays—the lavender of lightning and the fiery hue of red-hot rock.

Glowing bombs outline the volcano's cinder cone, which spans nearly a quarter of a mile. As each basalt mass rolled down the slope, it left a faint streak on the color film. Thousands combined to create this dramatic scene.



heard me. "They'll hafta move us away. And everybody from Norte Pequeno."

Sharing the western end of the island with Capélo, Norte Pequeno too has lived in fear since the eruption began, suffering equally from smothered lands, crushed houses, and, worse, from the nagging belief that even these disasters are only portents of greater trouble to come.

Children Lunch on U. S. Cheese

When I visited the village's one-classroom school, 30 children rose and extended their right arms in a friendly salute of welcome. In the adjoining hall their lunches waited—an inch-square block of golden cheese, a miniature loaf of the good local bread, and a bowl of milk for each youngster. On a shelf bright tins of cheese and milk powder stood in rows; each bore the words: Donated by the People of the United States. Thanks to surplus American food distributed by Caritas, a relief organization active in Portugal, people were being fed who might otherwise have gone hungry.

Little Maria Peixoto, who looked ready to fly away under an enormous red hair ribbon, counted off her family on stubby fingers: father, mother, two uncles, two other children. "We have land," she told me soberly, "but it is covered with ashes." Then in a frightened whisper came almost the same words Mrs. Lacerda had used. "For this year we have enough corn. After that. . . ."

I asked handsome nine-year-old José Correia about his family. "My father is a carpenter," he said. "But now he works on the roads."

Supplementing token sums sent by the Pope—Fayal is a Catholic island—and by the Portuguese-administered Gulbenkian fund, the local government gives villagers 20 escudos a day, about 70 cents—the prevailing laborer's wage. Most of them help clear roads of ash; others receive this welcome aid even when their time goes into repairs for their own damaged houses.

"And what do you think of the volcano?" I asked José.

"It might kill me," he replied with sudden emotion.

"He dreams that lava and stones are crushing him," the teacher, Maria Izilda, explained gently as she tried to still the boy's fears. "So many of them are frightened. They think the whole island may blow up."

The teacher took a more realistic view of the danger, though she too shared the fear that the eruptions would never stop. "I'm not afraid of lava or cave-ins," she said as I turned to leave. "There is our real danger." She pointed to mounds of ash still drifted about the village houses and over its fields.

A west wind all too quickly turned Maria Izilda's apprehensions to grim reality. Next day at Praia do Norte, Pequeno's neighbor to the east, an inch of fresh ash lay softly on the land, smoothing the contours of hedges and houses like wet snow. And ahead, over José Correia's troubled village, streamers of salty, air-borne ash draped an ominous curtain above doomed fields and buildings. Less than a week later the people of Norte Pequeno were forced to give up their struggle. After another frightening downpour the local government recognized the hopelessness of their position and evacuated the village—perhaps forever.

Steamship Gets a Grimy Bath

The time came when I had to leave Fayal. I boarded the 1,025-ton motorship *Arnel* late one night and awoke next morning within sight of the green island of Terceira. I could hear water hissing against decks and bulkheads; despite a pitching sea, crewmen were washing down their neat little ship.

Capt. José Rodrigues Bernardo invited me onto the bridge, where a seaman spun the wheel to offset the wind's quixotic tugging.

"You notice the ashes this morning?" the captain asked. "Plenty, plenty from the volcano." He ran a finger tip along the window ledge before him. It came away smudged.

"Bad, very bad," he said and wagged his head dolefully.

"You know," he went on, "I hate to turn my back on Fayal. I always leave wondering if it will be there when I come back again."

Distances Deceive on the Volcano's Sandy, Featureless Approaches

These men, halting near a shallow lagoon of sea water, seem close to the crater's edge. Actually the eruption rises a quarter of a mile beyond. "Stalking the volcano had its thrills," says photographer Sisson, one of two National Geographic men on the spot. "It had a nasty habit of blowing off in the middle of what I had calculated would be a quiet period. Once, after a shower of flying fragments had fallen all around me and forced me back, I happened to put a hand in my jacket pocket. In it was a piece of volcanic rock, still warm."

Autochrome by National Geographic Photographer Robert F. Sisson © N.G.S.

To Europe with a Racing Start

CARLETON MITCHELL

LONG AFTER the remainder of mankind has developed the intelligence to come in out of the rain, a curious breed continues to defy the elements, blithely ignoring an old nautical saying: "He who would go to sea for pleasure would go to hell for a pastime."

These are small-boat sailors, men who sail the ocean for sport. And at noon of a Saturday in June, 1956, we were surrounded by them: 89 sailing craft approaching the starting line off Newport, Rhode Island, for the 50th anniversary race to Bermuda, 635 nautical miles over the horizon.

Aboard the 38-foot yawl *Finisterre*, one of the smallest boats in the biggest fleet in the history of the event, our start was inauspicious for a passage not only to Bermuda, but to Europe, some 2,800 sea miles beyond. In fact, as the starting gun boomed we were

moving backward, becalmed in the grip of a tidal current sweeping under the stern of Brenton Reef Lightship. Our sails hung limp and useless.

Sailors Match Wits with the Sea

Almost alone among modern men the small-boat sailor is wholly in contact with nature, pitting his strength and knowledge against the mightiest adversary on this planet in a contest he does not always win. Calms, gales, currents, waves, wind systems, tides, reefs, fog, and drift ice are all part of what I think of as the sailor's three-deck world: the surface of the sea, the ocean of atmosphere above, the hidden depths beneath.

The sailor lives and progresses by the factors of his world. He is instantly aware of every change in conditions and must sail his ship accordingly.

On *Finisterre*, as a faint breath struck in from the southwest, we set our big nylon balloon jib and crept past the lightship. Within minutes the wind freshened and hauled farther west, so we broke out a spinnaker, an even bigger and lighter sail. A few more minutes and the wind swung again, and back up went the balloomer.

Working without cease, we gradually moved through our class, which held the smallest boats of four divisions and was the last to start. At dark we seemed to be leading.

Seven in a Salty Crew

We were seven in crew, a well-salted group who had spent much of our lives in small boats. I was skipper and in charge of the starboard watch. Mate and port watch officer was Richard H. Bertram of Miami, who had sailed the transatlantic race of 1952 in the same capacity aboard *Caribbee*. His skill and seamanship guaranteed me peaceful sleep during my turns below.

On deck with him would be Lockwood M. Pirie of Chicago, former world Star Class champion and erstwhile skipper of *Hoot Mon*, a famous competitor. The third member of the port watch was Corwith Cramer, Jr., of Woodbridge, Connecticut, who also acted as navigator (page 776). After graduation from college, he had served a hitch in the Coast Guard and aboard the ketch *Atlantis* engaged in deep-sea research for the Woods Hole Oceanographic Institution.

The second member of the starboard watch was Henry K. Rigg of Annapolis, Maryland, one of the finest racing sailors afloat, who had been with me on most of the major races of my career. A big man, virtually capable of picking up *Finisterre* and carrying her away, he bore the nickname "Bunny." The third watch member was Edward B. Freeman of Old Saybrook, Connecticut, a splendid sailor and

The Fleet Starts from Newport for the Long Thrash to Bermuda

As skipper of *Finisterre*, a 38-foot yawl, I set out to cross the Atlantic under sail. On the first leg of the passage, my crew and I made the 50th anniversary Newport-to-Bermuda race. Thereafter we followed a lonely, little-traveled course, driven east by prevailing westerlies. From North America to Europe we sailed 3,440 nautical miles in 22 days 11 hours.

Here gathers the largest fleet in Bermuda race history—89 boats. The big Class A yachts cross the starting line (foreground); *Finisterre* waits among the Class D boats off the stern of U.S.S. *Rhodes*, a destroyer escort acting as committee boat and patrol vessel during the race.

Bermuda News Bureau

helmsman, who had helped with the finishing touches in building our little ship.

And finally there was Henry Davis of Annapolis, our professional seaman. Henry was versed in all branches of the sailor's arts on deck and below, and on him devolved the responsibility of maintenance. Much of *Finisterre*'s success was a result of his care and skill.

"What do you do at night?" is the question asked most often by landsmen. The answer is simple: you sail. The ocean never rests; neither can you. Even if you are not racing, the open sea is too deep to anchor—*Finisterre* would be hard put to carry enough rope to reach the bottom of the ocean. Besides, there is an axiom: "Races are won at night."

The moon was bright. *Finisterre* glided quietly over a silver sea, only the rolled water and trail of bubbles in her wake showing the miles spinning astern. A warm breeze, still smelling of the land, shaped the sails like carved ivory. The barometer held high and steady.

At dawn we were almost alone. One sloop of a larger class was close abeam to leeward, and two other sails appeared as tiny triangles on the horizon to windward. Thus, of 89 boats in the race, only three were now in sight—a reminder of the ocean's vastness and loneliness.

Maury's Swift "River in the Ocean"

Our plan for the race was based on study of the sailor's world. We knew that approximately the first third of our passage to Bermuda would be sailed over the gradually deepening waters of the continental shelf and slope, the mighty buttresses supporting the land masses of North America. The second third would be subject to the influence of the Gulf Stream. The final 200 miles would be over the true ocean abyss, thousands of feet deep.

In these separate but merging divisions we could expect different conditions of wind, sea, and current. By far the most important factor would be the current. The United States Navy's Matthew Fontaine Maury, pioneer scientist of ocean navigation, wrote in *The Physical Geography of the Sea*:

"There is a river in the ocean: in the severest droughts it never fails, and in the mightiest floods it never overflows; its banks and its bottom are of cold water, while its current is of warm; the Gulf of Mexico is its fountain, and its mouth is in the Arctic Seas. It is the Gulf Stream. There is in the world no other such majestic flow of waters. Its current is more rapid than the Mississippi or the Amazon, and its volume more than a thousand times greater."

Hitching a Ride on the Gulf Stream

Our strategy was to let the Gulf Stream current help us along. Before the race, all competitors had been given a pamphlet prepared by the Woods Hole Oceanographic Institution. Its title: *A Prediction of the Unpredictable Gulf Stream*.

While the pamphlet defined actual boundaries of the "river in the ocean" within reasonably exact limits, it also mentioned "countercurrents," snakelike coils of current which might wander off in any direction, and even "jet streams," narrow bands flowing much faster than the surrounding water.

The Woods Hole scientists placed the northern limit of the Gulf Stream along our course at about latitude 39° N. The exact edge could be found by an abrupt rise in water temperature. The axis, or area of maximum velocity of flow, might be expected to begin some ten miles beyond, sweeping to the east at five knots—faster than many small boats can sail, except under the most favorable conditions.

Therefore, we planned during the first third of the race to steer to the west of the rhumb line, or direct compass course, from Newport to Bermuda. At the Gulf Stream we would change course to bring the current on our beam, so that we would cross at right angles and not "buck" the flow. If our plan was sound, the stream would then carry us back to the rhumb line on the far side, helping rather than hindering us (map, page 766).

At daylight Sunday we began taking temperature readings of the water every half-hour. At 5 a.m. the mercury stood at 61° F. Slowly it rose during the morning as we sailed over

Sleigh-riding *Finisterre* Traces Patterns of Foam on a Passing Sea

This is the ship of my dreams. Small enough for me to sail alone, yet big enough to cross an ocean; fast enough to race, yet easy to handle in cruising. Her name, *Finisterre*, means "land's end," a phrase of symbolic promise to me.

Here, carrying spinnaker, main, mizzen staysail, and mizzen, *Finisterre* "bruises Gorl's water," a Bahamian phrase for going fast. I hold the theory that on hot, still days the sun heats up the spinnaker's red top, and thermal currents thus generated help drive the boat.

Kodachrome taken from a blimp by National Geographic Photographer B. Anthony Stewart © N.G.S.

A Turbulent Wall of Sea Rears Up Astern

A small boat in the open sea is very much alone. Despite modern design and materials, it faces the same elemental forces of wind and wave that sailors have battled through history. In the Bermuda race we

Kodachrome by Norris Hart © National Geographic Society

stood the lash of big-boat weather for more than three days and nights. Wave crests sometimes washed our crew as with fire hoses. On occasion we slid down the faces of moving mountains as though on a roller coaster. Here *Kormoran*, a 56-foot yawl, crosses the northern Gulf Stream on the 1955 trans-atlantic race from Newport to Sweden. To keep from broaching, she runs with mainsail and mizzen doused.

deeper water. By noon we were beyond the 100-fathom curve and the temperature was 69°, where it remained constant, giving us a base line for future calculations.

The wind freshened. A veil of cloud slid under the sun, and the barometer began to fall. The sky took on the hard look that to a sailor means trouble. *Finisterre* roared through the building sea at almost maximum speed. Crests began to slap on deck and hiss white along the lee waterway.

A Tough Problem for the Skipper

During the late afternoon I watched our jib carefully. It was the same gossamer nylon ballooner which had ghosted us past the lightship at the start. Now it bulged dangerously, but was still the most effective sail on the boat. Any other jib would mean a loss of speed.

At 7 p.m. Dick Bertram, in charge of the relieving watch, asked: "What about the ballooner, skipper?"

It was a difficult decision. If the wind went soft near the finish, we might need it even more than we needed it at the moment. Yet the falling barometer, coupled with a rising wind and the look of the sky, seemed to indicate an advancing front, which would bring still more wind.

"Let's take a chance on its holding," I answered.

Two hours later I was awakened when the sail split to ribbons along the seams. I came on deck as the port watch was muzzling the tattered remnants and hoisting a heavy Dacron genoa jib. The night had changed character; gone was the moon and the feel of fair weather. *Finisterre* lurched to lumpy seas, and spray pelted into the sails. I stood at the mizzen shrouds to watch.

She had been built for this, my dream ship: to carry sail and drive hard, to go anywhere in safety and in comfort. All my life I have sailed, and all my life thought of the perfect little vessel. She had to be small enough to be handled by me alone, yet spacious enough below decks to accommodate a crew in harmony for extended periods; shoal draft enough to lie snug in tiny harbors or explore the byways of the Chesapeake or the Bahamas. She must be rugged enough to cross an ocean; fast enough to be exciting to race, yet easily handled, stable, and sea-kindly.

In short, the ship which had never existed and never could, in theory. I knew all too well the accepted dictum of marine design: "Every sailing vessel must be a compromise." And I wanted everything!

Yet during the night watches on my previous boats, *Carib* and *Caribbee*, I had dreamed, and gradually a little ship had taken form. She would be a centerboard vessel, having a retractable bronze plate dropping through a lead keel to increase draft when desired. This is a type largely neglected by yachtsmen, although it was America's most distinctive development in design during the age of commercial sail.

My boat would have aboard every comfort that could be crammed into a small hull, yet would incorporate every feature on deck and in her rig to make her the most advanced of racing craft. Nowhere would weight be saved where it would contribute to strength.

I had named her in my mind during the 1952 transatlantic race. As I studied charts of the European coast, my eye had been drawn to the cape at the northwestern corner of Spain.

Finisterre! When Roman legionaries first looked out over the vastness of the Atlantic from the headland's heights, legend has it that they thought they had come to the boundary of the earth, and called it *Finis terrae*, in Latin literally "end of the land." Such a perfect name for a ship seemed a good omen, and I knew then I had to build a vessel worthy of the name.

Love and Care Go into Building

Finisterre first took form on paper in the New York drafting office of Sparkman & Stephens, famous marine architects. Later Seth Persson transmuted her into wood-and-metal reality in a quiet shed on the bank of the Connecticut River, near Old Saybrook. In a garage in Annapolis, Maryland, I had constructed a full-scale plywood mock-up of her cabin, planning each interior detail.

Later I moored *Caribbee* in the Connecticut and daily commuted to Seth Persson's shed by dinghy, watching the materials that went into her and taking pleasure in the hidden factors of construction which I knew would make her able to face any sort of weather on any sea.

While *Finisterre* took form, experts shook their heads. She was to be 38 feet 7 inches over-all and 27 feet 6 inches on the waterline, yet have a beam of 11 feet 5 inches and a draft of 3 feet 11 inches with the centerboard

Kodachrome by Gilford D. Hampshire, National Geographic Staff © N.G.S.

Queen of Bermuda Squeezes Through Two Rock Passage on *Finisterre*'s Route to Hamilton

In this simplified version of a North Atlantic Pilot Chart for July, wind roses appear as circles with feathered arrows. Lengths of the arrows, and percentage figures on the longer ones, indicate frequency

The Pilot Chart Serves the Sailor as a Weather Map of the Sea

raised. Being only a little more than twice as long on the water as she was wide, my dream ship looked remarkably like a watermelon.

Into her capacious interior went a refrigerator, an automatic pilot, a shower bath, bookshelves, a depth finder, a radiotelephone, and innumerable other items contributing to the good life but usually not found in a boat intended to race, where weight is considered fatal to speed. An engine was provided for motive power in calms, to generate electricity, and to turn the icebox compressor.

Hi-fi Concerts on the High Seas

There was even a hi-fi system, a truly international assembly consisting of a Swiss windup turntable, a battery-operated German FM radio and amplifier, and two Dutch speakers. We could enjoy concertos at sea by putting the record player on the gimbaled table.

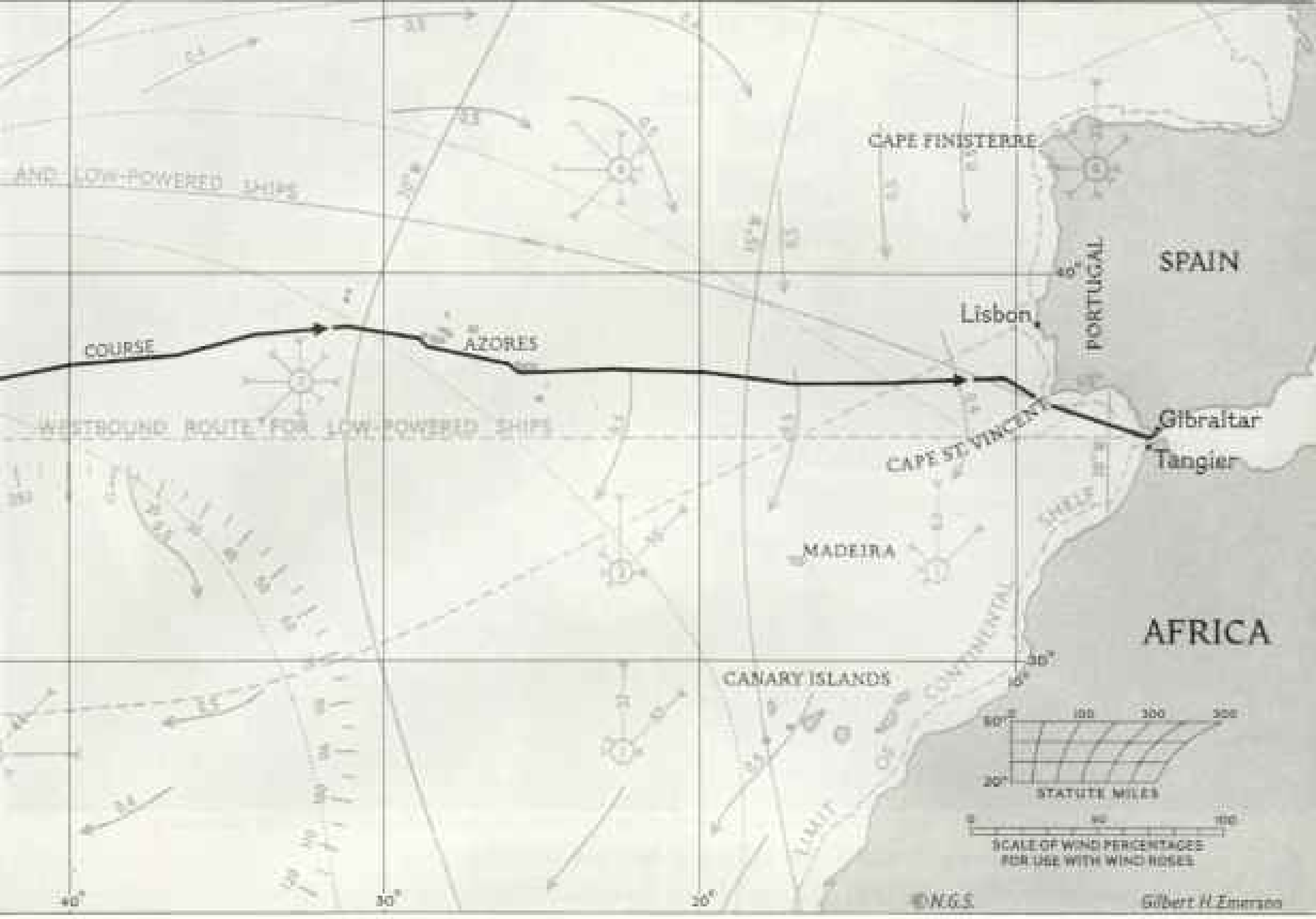
As I stood on the deck watching my little ship rush through the night, I was content. My dream of the perfect boat had come true.

Although we had continued taking the water temperature each half-hour, there had been little variation from the noon reading. At 10:30 p.m. it was still 69°. But at 11:00 it had jumped to 79°, an astonishing increase. It was an almost eerie feeling to picture that great flow of warm tropic water under us sliding inexorably to the north and east, influencing the character of all the lands and peoples bordering on the North Atlantic Ocean.

Immediately we altered course. Here conditions were different, as sailors have found through the centuries. Because of the current, the seas are steeper and more confused; because of the difference in temperature, squalls of wind and rain are frequent.

Ghostly bursts of foam gleamed through the darkness as waves broke. Water thundered heavily over the lee deck and swept aft in torrents. Occasional overpowering blasts of wind forced us to shorten sail temporarily or run off before. Rain became continuous, but we hardly noticed it because of the spray. Jet-black squalls dotted the sky like plums in a pudding.

So it went through the night and next day, even after we were past the main flow of the current. The climax arrived about midnight



of winds from each direction. Feathers tell average monthly force, from one (three knots) to 12 (hurricane). Numbers within the roses show percentages of calms and variable winds. A compass rose appears at center. Solid gray curves report how much the magnetic compass varies from the true north-south heading. Dotted lines detail water temperature. Currents appear as arrows; numbers show speed in knots.

Monday. The cloud cover was too solid to permit even a glimmer of moonlight. Rain was falling in blinding sheets. Spray stung like flung shot.

Bunny Rigg, huddled by my side in the cockpit, suddenly called: "Bad squall coming, skipper. Looks like the worst yet!"

Nature on Rampage Wallops Ship

I had been watching it. An ominous arch extended across the sky to windward. It was dark by contrast even against the ebon background. As we looked, it seemed to writhe and flatten.

"Can't hold course!" gasped Ned Freeman from the wheel. "We're getting a shift!"

The squall struck with a roar. We were blinded and deafened. Rain and spray blasted in our faces as from a high-pressure hose, physically painful. Lightning flared continuously, while simultaneous crashes of thunder shook the deck under our feet. *Finisterre* lay over, forced down by an enormous solid weight of wind. In the lurid light the sea looked calm, momentarily knocked flat.

I crouched to watch the compass. Ned did a superb job of following the shifting wind. Had he allowed an accidental jibe, we would have lost either main boom or mast, possibly both. At the same time, it was necessary to run off almost dead before the squall to keep from being overpowered.

Within minutes the wind had described a 180-degree shift as the front passed and the new weather system behind took charge. It was now blowing from the east-northeast, and we were heading away from Bermuda as fast as *Finisterre* could travel.

We were driving at nearly nine knots directly into the old running sea, porpoising and plunging from crest to trough with crashes that felt and sounded as if we were bouncing over sunken rocks. All hands joined to jibe ship, and we came back on course on almost exactly the same point of sailing, but with the wind on the opposite side. Moments later the genoa blew out with a roar, and another sail had to be hoisted in its place.

From there all the way to Bermuda the wind held fresh from the easterly quadrant. *Finisterre* stormed along under almost full sail, when many larger boats near by were well

Kodachromes by Gilford D. Hampshire (above) and Charles Allmon, National Geographic Staff © N.G.S.

The Royal Bermuda Yacht Club Offers a Retreat for Men Only

The welcome mat for ladies goes out only during festivities following international races. Here yachtsman Sir Eldon H. Trimingham examines a model of Bermuda's famed racing boat, the fitted dinghy, so called because a fin keel is fitted to its hull. With him is Sir N. Bayard Dill, chairman of the islands' Trade Development Board. A half model of *Finisterre* now hangs on the back wall with other Bermuda race winners.

The crew gyrate like acrobats to keep a 14-foot dinghy on her feet under tremendous press of sail. One man usually crouches in the hull, bailing furiously; others use bodies for ballast. In light weather men dive overboard to give their boat a push near the end of a race.

shortened down. Our main worry became finding the islands. The clouds prevented our taking sun or star sights.

Tension mounted. In few other sports is suspense so long maintained. By Tuesday midnight we knew we must be making the crucial final approach if our dead-reckoning calculations had been correct. Suddenly there was a patch of open sky. Corey Cramer, our navigator, had gone below exhausted after hours of waiting. The seas looked big in the moonlight, but the horizon seemed clear. In desperation I called for a sextant and sighted Polaris and Altair while Bunny Rigg held me from going overboard. Calculation put us 40 miles ahead of our reckoning. We altered course, and before dawn picked up the loom of lights.

Photographer Brings Vague Tidings

At 9:10 a.m. Wednesday, Bermuda time, *Finisterre* swept across the finish line off St. David's Head, carrying full sail. Other boats were in sight, but we could not identify them. Suddenly tension was gone, and we were tired. We dropped our spinnaker and hoisted a small jib for the sail to Hamilton.

As we made our way among the reefs, a motorboat plunged toward us. A man in the stern held up one finger, then tried to balance himself to make a photograph.

"He must mean we won!" exclaimed Woodie Pirie.

We had all been fooled into premature celebration before. "Ask him," I said.

"Did we win?" yelled Woodie.

"You did fine!" the man called back.

"Who did win?"

"You have a chance!" came the reply.

"Don't ask again," growled Dick Bertram. "He'll put us back to last!"

We did not know how the race had come out until two hours later, when *Finisterre* was escorted to the place of honor off the Royal Bermuda Yacht Club (opposite). We had won and set a new corrected-time record! Soon we were hearing stories of endless squalls and heavy seas, blown sails and bad visibility. One boat had turned back. Another was wrecked on a reef. Many were still at sea, and some were not to finish for days. It had been big-boat weather, the hardest test in 20 years, yet *Finisterre* was the smallest boat to win the modern Bermuda race.

Our days in Bermuda were busy. There was boat talk on the lawn of the Royal Bermuda Yacht Club, and sunning, swimming, sightseeing, and shopping.* But there was also the problem of getting *Finisterre* stowed for sea again.

I had shipped ahead crates of food, extra sails, charts, and every other item I thought we might need. There are no shopping centers at sea. When all was assembled on the dock, it looked hopeless—like pouring three gallons into a pint pot!

Yet on schedule, one week after arriving, we set sail eastward. My first log entry read: "Wednesday, 27 June, 5:00 p.m. Bermuda reduced to hazy outline, but Gibb's Hill Light still clear. Sailing through coveys of flying fish and Portuguese men-of-war; longtails overhead. Warm. Johnny eating ice cream forward, Frank streaming fishing line aft."

Although we had been seven for the race to Bermuda, Dick Bertram, Bunny Rigg, Woodie Pirie, and Ned Freeman had to return home. Frank MacLear, an engineer and veteran ocean sailor, and John Parkinson III, a Harvard senior on summer vacation, came aboard in their places, giving *Finisterre* a crew of five for the remainder of the voyage.

We divided into two watches of two: myself and Corey Cramer, Frank and Johnny. Henry Davis still was not to stand a regular watch. All of us but Johnny had sailed the Atlantic before. He regarded his first ocean crossing as a debutante might look upon her coming-out party.

The Sea Offers Irresistible Challenge

We were not making the passage as a stunt, nor were we thinking of adventure with a capital "A." We were aboard simply because we loved sailing. There is something about small-boat voyaging akin to the compulsion that makes other men desire to climb distant and difficult mountains. Both hold a challenge and a sense of fulfillment which stem from the feeling of coming to grips with the elemental forces of nature.

"Don't you find the sea monotonous?" I have been asked. To a sailor nothing on this globe is less so. Every ripple and cloud has meaning, each mood has beauty. As a farmer can love land, so can a seaman love water and take endless pleasure from the contemplation of it.

Again we had a plan based on study of the

* See "Bermuda, Cradled in Warm Seas," by Beverley M. Bowie, National Geographic Magazine, February, 1954.

Finisterre Sailed in Triumph Across Hamilton Harbour

In the three-hour run from the race finish line to the harbor, we spruced up *Finisterre*—just in case she had won. We tried to make her look as if she had been out for a Sunday sail on Long Island Sound

Kodachrome by Gilford D. Hamaliire, National Geographic Staff © N. G. S.

rather than a squall-ridden grind across the Gulf Stream. As we approached the Royal Bermuda Yacht Club (left), the commodore and flag officers came out to meet us and brought the news that we had taken first in fleet. They escorted us to a place of honor amid a forest of masts. In this view racing Internationals break out spinnakers. Buildings of Hamilton, Bermuda's capital, gleam in the sun.

sailor's three-dimensional world of sky, surface, and depths. We wanted to sail to Europe as quickly as possible, but also as comfortably. The Pilot Chart of the North Atlantic Ocean, issued by the U. S. Navy Hydrographic Office, indicated we would have almost ideal conditions along the southern edge of the prevailing westerly winds. Here we could expect to find favoring breezes and mild weather.

If we went by the northern route, the Pilot Chart showed we could expect colder temperatures, a higher percentage of fog, more likelihood of gales, and even danger from drifting icebergs. If we strayed too far south, we might go dead in the calms of the Sargasso Sea.

It can help a landsman in understanding something of the sailor's world to think of the North Atlantic Ocean as a huge basin. To the north lie the Arctic wastes of ice and rock; to the south the steaming calms of the Equator; to the west the land masses of the Americas; to the east the continents of Europe and Africa.

Winds Power the Currents

Prevailing winds blow roughly in a clockwise circle around the outer perimeter of the basin, setting up currents as a boy might start water circulating by blowing in a tin pan. Across the southern section the trade winds blow from the east with a relentless pressure, driving currents westward into the Caribbean Sea and the Gulf of Mexico, then out through the straits between Florida and Cuba.

Thus the Gulf Stream is born. Wind pressure accounts for a large part of its flow, but tides, temperature, salinity, and the rotation of the earth also play roles. This last, producing the so-called Coriolis force, causes ocean currents to bend to the right in the Northern Hemisphere, to the left in the Southern. So the Gulf Stream, flowing north along the continental slope, gradually turns east to become the North Atlantic Current.

In the center, away from winds and resulting currents, lies the Sargasso Sea, once feared by sailors as a windless trap, dappled by apparently solid islands of floating weed. Here are the horse latitudes, named, some say, because slow passages forced jettisoning of animal cargo when water and fodder ran short.

We left Bermuda with a sunny sky and moderate southwest wind, perfect sailing conditions. Quickly we shook down into a sea routine. The fishing line Frank put over the stern brought in a fine fat dolphin, breakfast for all hands on the third day.

After Night Watches, a Royal Menu

Finisterre has small sails, even the largest being within the power of one man to handle. Two men on deck could do any job of sail shifting; one steered and handled sheets from the cockpit while the other worked forward.

Although watches rotated throughout the 24 hours, we had abandoned the traditional "four on and four off" of the sea in favor of a modern modification. We divided the day into two six-hour watches and the night into three of four hours. This allowed each man a chance to get "slept out," as well as to accomplish such personal chores as laundry and keeping a personal log.

Running the engine half an hour each day kept the batteries charged and the refrigerator chilled. We ate magnificently—crab meat from Japan, cheese from Holland, pineapple from Hawaii, chicken from Kansas, grouse from Scotland. The miracles of modern packaged food made our diet far different from the salt horse and weevily biscuit of scurvy-ridden old-time sailing ships.

Crew Goes Swimming in Mid-ocean

After four days of light westerly breezes, clear skies, and moonlit nights, the wind dropped out entirely, and we went swimming. The ocean was as calm as a park lake and so clear we could see the rotor of the patent log (the propellerlike device ships tow to measure distance and speed through the water) dangling 100 feet below us. *Finisterre* was truly "a painted ship upon a painted ocean."

A lonely ocean, too, as nothing had appeared to break the clean, sharp circle of the horizon since Bermuda had disappeared astern. We were sailing a part of the Atlantic rarely traveled by steamships. Somehow it was slightly unreal to swim away and look back and see our little ship, an infinitesimal

Treasures Washed Up by the Sea at Bermuda Create Underwater Scenes

Using shells, starfish, sea fans, mother-of-pearl, flowers, and grasses, Mrs. Nancy Hutchings of Paget Parish makes panels for screens. The artist embeds her designs in layers of melted plastic on sheets of glass. Each arrangement is carefully laid out in advance (lower left).

Kodachrome by Gilford D. Hampshire, National Geographic Staff © N.G.S.

speck on the trackless waste of the ocean, and think how completely we were cut off from the rest of mankind.

A voyaging yacht, once clear of the land, is on its own. In a vessel with less room than the smallest city apartment, we had to carry the food, water, clothing, bedding, linens, medicines, and other items that might be required by five men for a month. We had to provide our own propulsion equipment—sails, rigging, and engine. We had to make our own electricity, and carry books, charts, and instruments to determine our position.

Appendix Removed as Final Precaution

Regardless of what might go wrong, we had to be able to repair it; we had to be ready with tools and spares and materials to tackle anything from a balky stove burner to a jury mainmast. All had to be planned in advance. Part of my personal preparation was the removal of a seemingly normal appendix. On such a passage nothing should be left to chance. Only then is the voyage not a stunt but a pleasurable experience.

After our swim, a change came over the sky. A freshening wind came in from the northwest. We hoisted a spinnaker and once more our wake boiled astern. But this time clouds began to gather; the wind slowly backed to southwest and freshened, although bigger and bigger swells rolled in from the northwest.

Caught between seas from two directions, *Finisterre* pitched and tossed. Gone was the feeling of tranquil laziness. We drove off hard before the overtaking front.

Gradually sky and sea became gray and forbidding. From nowhere came storm petrels, tiny birds which seemed to flutter helplessly in the troughs and valleys of the waves, yet always rose over the breaking crests. Sailors call them Mother Carey's chickens, perhaps stemming from *Mater cara*, the blessed Virgin Mary to whom medieval voyagers prayed during times of stress.

An old superstition holds that Mother

A Proud Skipper Accepts the Coveted Bermuda Trophy

Smallest boat to win the modern classic, *Finisterre* took first place by 14 minutes. We set a new record of 64 hours, corrected time (actual sailing time minus handicap of 26 hours 26 minutes). Here Bermuda's Governor, Sir John Woodall (left), presents me with a replica of St. David's Light, the finish-line marker. My friend Harvey Conover (right) participates as Commodore of the Cruising Club of America. Although a highly experienced yachtsman, he was lost recently while sailing between Key West and Miami. The sea still claims its toll.

Bermuda News Bureau

Carey's chickens appear as harbingers of storms. Modern ornithologists believe this has some basis of fact. Storm petrels feed principally on floating plankton. During calms they range far and wide, but in rough weather they tend to hunt in the smoother water of a ship's wake.

July Fourth Masthead Ride

We drove *Finisterre* hard, marveling at her performance. On Wednesday, July 4, we made 175 miles, an exceptional day's cruising run for a vessel 27½ feet on the waterline. The log noted "BANG! BANG!" in celebration, but our only observance of the Glorious Fourth was hoisting Frank to the masthead to reeve a second spinnaker halyard.

He came down an hour later somewhat pale, claiming he had had more rides than ever devised by Coney Island—not only the roller coaster, the Ferris wheel, the merry-go-round, and the whip, but a couple of inside loops as well!

On Thursday the day's run increased to 180 miles, but it was blowing so hard and the northwest cross swell had become so large after breakfast that we changed from spinnaker to genoa jib and rolled a reef in the mainsail. By midnight it became necessary to reduce sail further. *Finisterre* tobogganed down the big swells, leaving astern a broad, ghostly path of foam.

Dawn Friday was a lurid nightmare of red streaks breaking through chinks in racing scud. A huge sea rolled in from the northwest. Intermittent squalls lashed at us with stinging rain and savage bursts of wind. Corey and I shared the deck during the morning watch. We shivered under our oilskins. "You're sure we're not lost?" I asked. "Sure we aren't off Labrador?"

Finisterre Crawls Across the Chart

Suddenly there was a squall that shrieked through the rigging even as we were deluged with torrential rain. Behind it came a patch of sunshine and a wind shift. The storm center had gone by to the north; we had been only on the fringe of what might have been a severe gale in higher latitudes. Tropic weather returned, more pleasant by contrast. Light sails again bloomed from the masts.

I have found on long passages that in the early stages you seem to get nowhere. Each noon a dot is put on the chart, and a line drawn forward from the previous dot. Compared to the distance remaining, progress seems infinitesimal. You think back over the hours and days you have been at sea, and become discouraged. So far to go!

But you settle into a sea routine and live only for the moment; suddenly you find you have passed the halfway mark and are going downhill. The daily lines seem to leap to close the gap. There is finally a feeling almost of surprise as you look out over the ocean and see land.

So it was with us. At dawn of Monday, July 9, we stared at the lightening sky to port, and under the bank of clouds appeared another shape, low along the horizon, and more solid. There lay Flores, the most westerly of the Azores.

It reminded us of the third dimension of our world, the hidden depths. Since leaving Bermuda, we had been sailing across the ocean abyss. Now, according to our hydrographic charts and the fascinating Map of the Atlantic Ocean prepared by the National Geographic Society, we were over the mightiest mountain range on this planet.

Peaks Jut from Sea to Form Islands

Under our keel lay a world of filtered sunshine paling into impenetrable darkness, of deadening cold and intolerable pressure, of vast area and utter silence. Among mountains more majestic than the Andes and gorges greater than the Grand Canyon were moving inconceivably numerous and varied types of life, engaged in a fierce and endless struggle for existence.

The Mid-Atlantic Ridge extends for 10,000 miles, from the Arctic to the Antarctic.* Most of it is submerged a full mile, but the Azores are peaks that reach the surface. Pico, the mightiest, rises 24,000 feet from the ocean bed, soaring 7,615 feet above the sea (map, page 740).

At 9:30 p.m. we picked up the loom of Capelinhos Light on Fayal, five quick flashes every 20 seconds stabbing through the gloom. By midnight it was nearly abeam, and with the first faint light of dawn we crept behind the protecting arm of Horta's breakwater to drop anchor.

As the day brightened, I sat on deck and watched. I was too overcome by beauty to

* See, in the National Geographic Magazine: "New Discoveries on the Mid-Atlantic Ridge," November, 1949; and "Exploring the Mid-Atlantic Ridge," September, 1948, both by Maurice Ewing.

need sleep. Seldom had I seen anything so theatrically lovely. Around the curving waterfront of the town shuttered houses wore soft pastel colors; behind rose rugged volcanic outcroppings, while above stretched terraced green fields capped by windmills.

Over all brooded the culminating peaks of Fayal and Pico, wrapped in somber clouds of gray and silver, which gradually became gold and pink as the sun lifted. Fayal Channel lost the stored blackness of the night and became deep blue.

My first impression of Fayal has not changed. To me it is one of the magic places of this world, simple, unspoiled, a place of peace and beauty.

Portugal's Prince Claims Azores

In his 19th-century work on the northern Atlantic Ocean, the geographer Alexander G. Findlay gave one account of how men first came to the Azores:

"These islands are said to have been discovered . . . by Joshua Vandenberg, of Bruges, in Flanders, who, in a voyage to Lisbon, was driven to them by stress of weather.

"At Lisbon, he boasted of his discovery; on which the Portuguese . . . set sail and took possession of them, calling them *Azores*, or *Isles of Hawks*, from the many hawks and falcons. . . ."

Another version tells that Prince Henry the Navigator, possessing an old Genoese chart that showed the islands, sent two expeditions to rediscover them in the 1430's, 60 years before Columbus reached the New World.

Later visitors found the birds were buzzards, not hawks, but the name remained.

The islands still belong to Portugal, although many of the inhabitants bear traces of Flemish ancestry, for the Flemish colony at one time was so large the group was also called the Flemish Islands.

Suddenly a voice broke into my reveries: "Welcome!" I looked down. A smiling young man in a rowboat had come alongside.

"Welcome to Horta," he repeated in good English. "My father owns the Café Sport. Can I do anything to assist?

"There is a whale brought in at the factory," added the young man. "Beeg! You want to see him, no?"

Whales Still Harpooned by Hand

We rowed ashore and walked through narrow, cobbled streets to a cove on the south side of the island. The whale floated near an inclined ramp. The carcass looked unreal, like a submarine sheathed in blue-gray rubber.

"Beeg!" said our friend. "Fifty, fifty-five tons."

The Azores are among the few places in the world where whales are harpooned by hand. The boats used are almost identical to those in the museums of New Bedford and Nantucket, and the implements are the same. In 1955, when 203 whales were taken off Fayal, several boats were smashed. It is a lucky season when no one is seriously injured.

Far up the mountainsides, from little huts, spotters sweep the sea with binoculars (page 781). When they see the telltale wisp of a spout, they telephone the news. Whaleboats are drawn up above the surf in tiny coves, and whalers wait close by.

On the Portuguese equivalent of "Thar she blows!" men scramble to their boats and run them down to the sea, while dogs bark, children tumble underfoot, and the women cross themselves. Each boat carries religious symbols in the bow, under the harpooners' knees.

Launching the boats through the surf is generally a feat to try the stoutest heart. Motorboats also come out from near-by harbors, to tow the whalers across the sea while the land spotters direct the chase by radiophone.

When a whale is spotted, it must be stalked.

We Drive Hard Under Reaching Sails; the Miles Spin Astern

Corwith Cramer, Jr., watches the compass within the glass-domed binnacle, and wrestles the wheel to maintain course at this nine-knot clip. Life ring (left) carries a canister of chemicals that produce flame and smoke as a guide to rescuers by day or night.

The Skipper Takes the Wheel While Shipmates Lounge Below

Finisterre's main cabin is no bigger than a walk-in closet, yet it accommodates as many as seven. Seats turn into bunks, and we swing extra berths from overhead hooks. The folded table (foreground) is set in gimbals and remains horizontal regardless of the ship's movement—an unsettling sight for visitors who have not realized how much the boat is rolling. Galley fits against bulkhead beyond Lockwood Pirie (right). Navigating instruments behind Richard Bertram include radio direction finder, depth sounder, barograph, and recording log.

Kodachromes by Carleton Mitchell (above) and National Geographic Photographer B. Anthony Stewart © N.G.S.

Flags Broadcast the Arrival of Ships at Bermuda

Top two flags at left signify a foreign steamer at Murray's Anchorage; next two, a British steamer at Grassy Bay. Three flags at right mean a British man-of-war is entering the channel.

Gibb's Hill Light, a cast-iron structure dating from 1846, was our last glimpse of Bermuda as we headed east on the second leg of our transatlantic voyage.

Cedar boats at the Government Aquarium and Museum tell of Bermuda's close ties with the sea. Two-masted schooners like *Kingbird* transported rum, molasses, and salt in the late 19th century. *Victory*, the fitted dinghy in background, was a well-known racer. Mahogany rowing gig (foreground) once carried pilots as far as 100 miles to guide ships through the shoals. Curator Louis S. Mowbray stands at right.

Bermuda offers a haven of calm in a turbulent ocean, a place to rest and reprovision. As Shakespeare wrote of these islands in *The Tempest*, "Here is everything advantageous to life." I consider Coral Beach a case in point, and it is one answer to the question, "What do sailors do when not sailing?"

Photographs by Charles Allmon (below) and Gilford B. Hampshire, National Geographic Staff, and (left) Carleton Mitchell © N.G.S.

If not alarmed, it cruises along sounding and coming up for air at regular intervals. The whaleboats have sails to be used when conditions are favorable, but otherwise the men settle down to rowing with heavy sweeps —four hours, six hours, sometimes more (page 783). Occasionally they stop to bail or swig from a leather bottle the strong, sour red wine of Pico, or gnaw from a slab of cheese.

Iron Hurled at Close Range

The last short approach is made with paddles, for they are quieter and the boat is more maneuverable. But one thing must be accomplished: the bow of the boat must be put almost over the body of the whale. The harpoon can be darted only a short distance—there is no easy and safe way to do the job (page 784).

When the iron strikes home, the whale reacts like any other animal feeling sudden, unexpected pain: it makes a violent and convulsive effort to escape. The mighty flukes lash the water as the creature dives. The oarsmen back-water furiously.

Line snakes out of tubs between the rowing thwarts and smokes through the bow chock. Gradually, it is snubbed so the swimming monster takes the weight of the boat. The men momentarily relax, but the final battle is only beginning.

Here is no explosive harpoon killing on contact. Line must be retrieved by hand. And the whale must be dispatched by hand, the boat coming alongside again and again until lances reach a vital spot, and the huge beast dies.

Even then the hunters still face danger. Sometimes the kill takes place many miles offshore. Motorboats tow the carcass to the factory, but the whaleboat must stand by until they arrive. Frequently the weather worsens.

Men of the Azores Still Fight the Whale as Ahab Fought Moby Dick

Here in the Café Sport on the island of Fayal, I was made at home by men who battle the sea and its largest creatures. These mariners await the lookouts' signal (opposite page) that a sperm whale is blowing. They regularly risk their lives in the same type of canoelike boats (center) used by their ancestors who sailed with New England whalers.

National Geographic Photographer Robert F. Sisson

Kodachromes by National Geographic Photographer Robert F. Sisson (above) and Norris Burr © N.G.S.

Blox, blox! cries the cliff-top lookout after sighting two blowing whales through the binoculars. His partner calls the news, and men scramble for boats. Lookouts track whales as far as 30 miles from land. They report locations to radiotelephone-equipped motor launches with whaleboats in tow.

Gray icebergs, sperm whales loom into view. Motor launches lie off a mile distant so as not to be heard. Set free of towlines, whaleboats sail or row in for the kill (page 784). Since sperm whales range these waters in pods, each must be taken by surprise lest it alarm the group.

Often boats are out all night, loath to leave their catch.

As we watched, a winch hauled the whale up the ramp, the final act in the drama. No sooner had the huge body reached the flat stone surface of the factory than men armed with razor-sharp cutting spades attacked from all sides. Blood ran deep in a gutter leading to the sea as slabs of blubber and flesh were sliced off with unbelievable ease and dispatch.

When the whale was demolished, we moved to the Café Sport, a tiny room facing the harbor (page 780). A few small tables stood under a single unshaded bulb. Prints and photographs of ships were tacked on the plaster wall above a wooden bench. Opposite stood a model whaleboat and scrimshaw carvings from the teeth of whales. It was a place by and of the sea. We felt at home.

In honor of visiting Americans, ice had been provided. When we entered, the fishermen who had been sitting at the tables—for it was now blowing too hard to go offshore—got up to make room, an example of the courtesy we were to find everywhere on Fayal. We toasted the cafe and our hosts, the Azevedos, father and son.

Later we drove to the whaling settlement in a cove near Capelinhos lighthouse, and the fishermen by gestures and broken English described how they used their boats and gear.

Flowers Garb a Land from the Past

An ancient taxi carried us upward through narrow streets to open fields beyond and above Horta. The roads were carefully tended, bordered by stone walls overgrown with roses and hydrangeas. Azorians love flowers, and the damp, mild climate is kind to all growing things. Patterned terraces under cultivation ran up to the cloud cover.

Everywhere we had the feeling of stepping into the past. The neat little houses bedded in flowers seemed to be from old paintings. Working windmills capped the hillsides (page 787). Ox-drawn carts rumbled along narrow lanes, solid wooden wheels bumping over stones. Other oxen walked in circular basins of stone, winnowing grain. When the moving hoofs had separated the wheat, the chaff was tossed into the air with pitchforks to blow away, leaving the grain in the basin.

We climbed Pico Gordo to look down into the crater lake of the Caldeira, while clouds swirled around us occasionally, and the wind blew in gusts difficult to stand against.

Below us the sea broke heavily against the rocks and black-sand beaches of Fayal. These gave more evidence of the volcanic origin of the Azores. We knew that Fayal had not suffered an eruption since 1672; we could not know that little more than a year after our visit a new cone would suddenly rise from the sea just off Capelinhos Light, eventually adding a cindery half mile to the island's length. [In the preceding article, "A New Volcano Bursts from the Atlantic," John Scofield describes the spectacular event.]

White Weather Roars off Pico

Pico, too, looming from the sea across Fayal Channel, is a volcanic peak. "When the summit of Pico is enveloped in clouds, stormy weather and rain may be expected," stated the Sailing Directions, and continued: "Great clearness of atmosphere usually precedes a southerly gale." In other words, bad weather either way.

During our entire stay the heights of Pico were shrouded by heavy clouds, and the wind howled. On the second afternoon it seemed to moderate. While not liking to leave a snug harbor, we were trying to keep a schedule, and we had confidence in *Finisterre* to take whatever came. Before sunset we nosed out from behind the breakwater under reefed main and tiny jib.

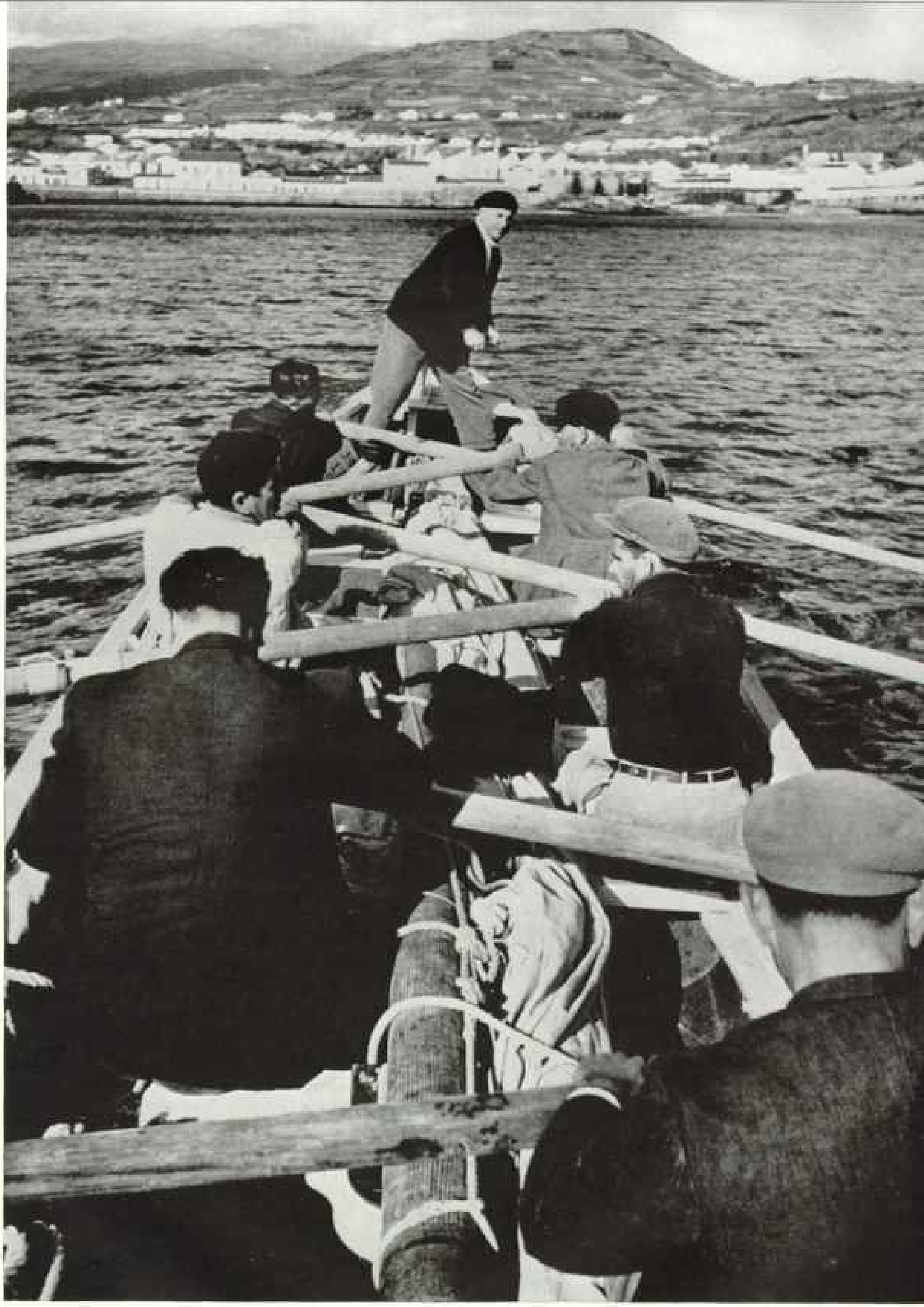
Fayal Channel was a seething caldron. Heavy northwest swells were meeting another sea running from the south, and tidal currents further confused both. *Finisterre* was tossed like a fishing float.

We thought we would have smoother water under the lee of Pico, but there we encountered the largest seas and heaviest winds of the entire Atlantic crossing. As Point Espartel came abeam, the upper slopes of Pico suddenly were whipped clear of cloud; grim and forbidding, the towering peak loomed in the strange red light of sunset.

Suddenly a savage wind lashed at us, a white squall rushing down from the heights. At once crests formed on the huge swells. Running dead off, we rolled in so deep a reef that only a small triangle remained of our mainsail. Still *Finisterre* lay far over.

In the open sea beyond Pico we expected heavy going, but the wind moderated and only the swell remained. Through the night and next day *Finisterre* rode like an express elevator up and down the rolling mountains.

(Continued on page 786)



National Geographic Photographer Robert F. Sisson

Sails Furled, Mast Unstepped, Fayal Men Bend to Their Oars in the Race to a Whale

Hurled with All a Man's Force, a Harpoon Drives to Its Mark

Ilha Nova, Fayal's new volcano, fumes on the horizon as a crew goes "whaling for victory" in fierce competition with other boats. Oarsmen try to bump the whale's side—"wood and blackskin"—before the harpooner darts his first iron.

No man wears a life jacket, but all must be expert swimmers, since a whale's flukes oftimes splinter a boat.

Knee braced against the thwart, a harpooner takes aim. Wooden shaft of the 9-foot harpoon usually breaks free when the steel head buries in the whale. Tubs amidships hold 1,440 feet of line for playing the beast. When he tires, the boat draws near again, and the lance delivers the fatal wounds.

I see the drama ended. Moby Dick lies in a bath of blood near the flensing platform of Horta's whale factory.

Kodachromes by National Geographic Photographer Robert F. Sisson and (right, below) Carleton Mitchell © N.G.S.

Before dark we were in the harbor of Ponta Delgada, on the island of São Miguel.

At once we found a difference. Where Horta was a quiet, out-of-the-way harbor, Ponta Delgada was a busy commercial port. A pilot boat came alongside and told us where to anchor.

Ashore we blinked at the lights of a city. As is the Latin custom, seemingly the entire population was taking an evening promenade in the square to the music of a small band. Coming from the lonely sea, we were overwhelmed by civilization.

Shops were well stocked. At a restaurant we were introduced to a dish suited to hungry voyagers. Ordering "bistek," we were served a huge steak smothered with fried eggs!

Three Yachts Crowd Harbor

We found two English yachts with friends aboard at anchor in Ponta Delgada. One was *Foxhound*, a famous cutter which had crossed the Atlantic to sail in the Bermuda race; the other was *Carrina*, making her way home for a refit after a year in the Caribbean. We visited and swapped experiences.

"This is the first time our harbor has been so crowded," exclaimed an Azorian acquaintance. "Three yachts at once! Ordinarily we do not see so many in a year."

Our one important task in Ponta Delgada was taking aboard fresh water for the passage to Gibraltar, which we estimated would take between a week and ten days. At sea, our consumption averaged about half a gallon per man each day. We had taken on no water since Bermuda and were running low.

But it was not so simple as we anticipated. "Don't put this local water in your tanks," a shipping agent told us. Sailing Directions echoed the warning: "Water . . . should be boiled before drinking."

It is difficult to boil enough water for five men on a small alcohol stove. In desperation I traced down the source of the bottled water we drank at a restaurant. We found a tiny store on a side alley. The proprietor assured me his water was the finest on the face of this terrestrial sphere, good for any ailment of man or beast, exactly what was needed by a small American yacht bound for Gibraltar.

The following morning a cart came to the dock, piled high with cases. They were labeled "Agua Radio-Active" and bore a long list of chemical ingredients in Portuguese. It took 320 bottles to top off our tanks. They were of all sizes and shapes, and had obviously at one time or another contained every liquid put into glass on the continent of Europe. Endlessly we passed them from dock to deck, drew the corks, and upended them over a funnel leading to our tanks.

Halfway through, a policeman came to the quayside to find out what we wanted with so much water. He refused to let us load more until I had taxied across the city and secured written permission from the chief of police!

Beyond the wind shadow cast by the mountains of São Miguel the Pilot Chart foretold we would find the Portuguese trades, the easternmost winds of the gigantic circulatory system of the North Atlantic basin. These winds blow from north to south, from approximately the latitude of Cape Finisterre to the Canary Islands off the coast of Africa, where they merge into the northeast trade winds. For centuries they have played an important part in the commerce and naval strategy of Europe.

Sailing was glorious, the finest of my life. No sooner had we cleared Point Arnel than the wind came in fresh and true. We set reaching sails and were not to change them for nearly a week. By day *Finisterre* raced across deep-blue water under clear skies, while her bow wave glittered in the sunshine. By night the watch on deck was dazzled by innumerable stars, and the wake creamed phosphorescent astern.

Each entry in the logbook was a lyrical description, until Johnny finally noted: "We are running out of things to say about these perfect conditions."

Water Fouled with Copper Taste

But our passage was almost spoiled by the Agua Radio-Active. Before breakfast the second morning I went below for a drink. As I lifted the glass, I was aware of a strong, revolting metallic smell. The taste was worse. I could not force myself to swallow. Corey had the same reaction.

It was a bad situation: tanks full of water

Wind-filled Sails Drive the Arms of a Flour Mill on Fayal

Walking this rose-bordered road, I discovered sails working for a landsman. On this day of high wind the miller reefs his jibs to control speed. When he must use all the force of a light wind, he unrolls the canvas and thus sets his biggest genoa jib, as we do on *Finisterre*. The top of the mill rotates so that arms face the wind.

Kodachrome by Carleton Mitchell © National Geographic Society

we could not drink, with a 1,000-mile passage ahead. To sail back to Ponta Delgada against the fresh trade wind could take two days, and we would be faced with the same problem.

All hands sipped and conferred. We agreed the water had a coppery taste, perhaps from a chemical reaction caused by standing overnight in the pipe. Carefully, with a small glass, we dipped up some from a handhole in the tank. It was unpleasant in taste but possible to swallow, and it did assuage thirst.

The experience gave us an increased feeling of sympathy for the voyagers of old, whose water frequently became "most loathsome" in the casks, sometimes beyond men's ability to drink it, even though water meant life.

At dusk of the sixth day the light on Cape St. Vincent, Portugal, shone over the bow. At 10:45 we had brought the southwestern corner of Europe abeam. *Finisterre* had completed the continent-to-continent passage of the North Atlantic Ocean, covering a distance of 3,440 nautical miles in an elapsed sailing time of 22 days 11 hours.

This meant an average of 153 miles a day, a speed which we believe to be a record for a boat of our size. Small-boat cruising passages rarely average more than 100 miles a day. Even in the heyday of sail, ships many times *Finisterre's* length often took longer.

Finisterre Nears Historic Waters

Still the miles rushed astern as we ran along the Portuguese and Spanish coasts. The Strait of Gibraltar lies at the end of a huge funnel-shaped bight of the eastern Atlantic, formed by the pinching together of Europe and Africa. It is an area famed for savage seas during westerly gales, but it is also water with a history. In a very real sense, it was man's stepping stone to the broad ocean highways of the world. The Mediterranean was the cradle of maritime enterprise. When ancient sailors penetrated beyond the Pillars of Hercules, these were the first open horizons they saw.

Of the countless fleets that had sailed these waters through the centuries, I thought particularly of two brave little expeditions standing forth from shallow, winding rivers in the coast we could dimly see to port. Christopher Columbus left the Tinto River August 3, 1492, on his voyage of discovery, and Ferdinand Magellan sailed out of the Guadalquivir September 20, 1519, on the first circumnavigation of the earth.

Having just completed a crossing of the ocean in a vessel smaller than the flagship of either fleet, I could feel myself a kindred spirit. Yet they had been sailing literally into the unknown, groping out past the limits of man's knowledge.

Where we had charts showing precisely what to expect and instruments to fix our position, they did not know the size and shape of the land they might be approaching, or even if there would be land. They did not know if the inhabitants would be friendly or hostile, or if they would be able to replenish their supplies, or even if the wind would permit eventual return to their homes.

Taking Bearings on Two Continents

Twenty-four hours after passing Cape St. Vincent we could see the flash of powerful lighthouses on both sides of the ship. For the first time in my experience I was able to take simultaneous cross bearings on two continents. We had entered the Strait of Gibraltar.

Before daylight the great mass of the Rock loomed above us. Usually a strong wind blows through the narrow gap. Calms are rare. But for once neither the Levanter, the east wind, nor the Ponente, the westerly, was on duty. There was not a breath of air stirring.

Under us the water lay flat, reflecting lights outlining the mountainside above. *Finisterre* drifted to a stop. Somehow I did not want the passage to be over. I felt an exaltation at having crossed the ocean, yet a sadness at having arrived. But as I looked toward the east, I realized the Mediterranean lay ahead. Far away I could see the loom of a single light, beckoning, and I could feel the lure of that most ancient and historic of seas, which we would soon sail.

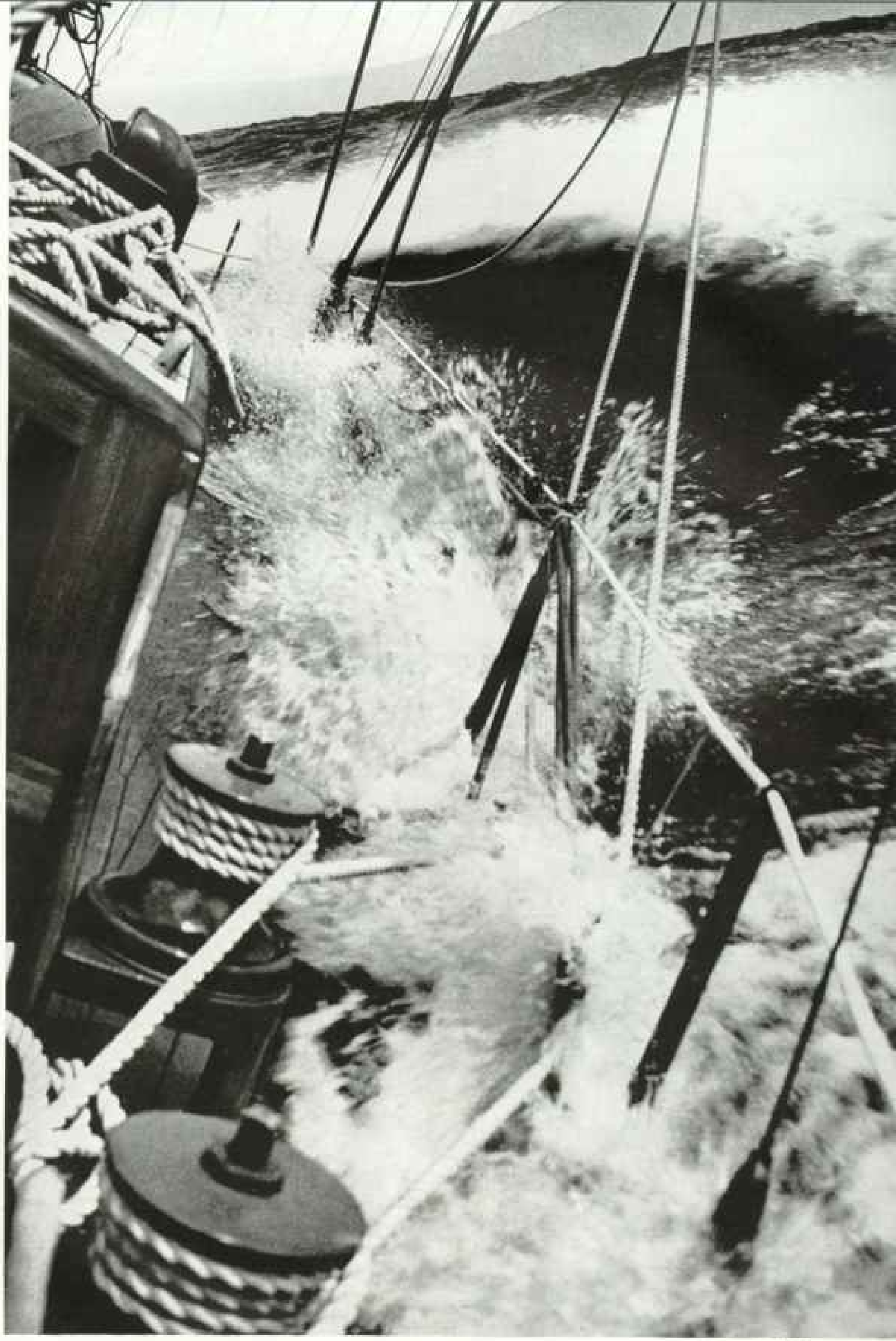
Gradually stars faded. Gibraltar began to take form, stark and forbidding, somehow the perfect symbol of impregnable might. From near the summit a light began to flash. "What ship?" blinked a query.

"*Finisterre*," we winked back. "American yacht."

There was a pause. The sun was almost over the horizon. A peculiar flat cloud over the Rock began to glow pale rose, as though illuminated from within (page 790).

"Welcome," suddenly signaled the light. "Xpecting U. Come in."

Reluctantly we turned on the engine to power the last mile. It was day, and *Finisterre* had arrived. The Atlantic Ocean lay astern.



Beating to Windward, a Seagoing Yacht Dips Her Lee Rail Under

Gibraltar's Mighty Rock Marks the End of Our Atlantic Crossing

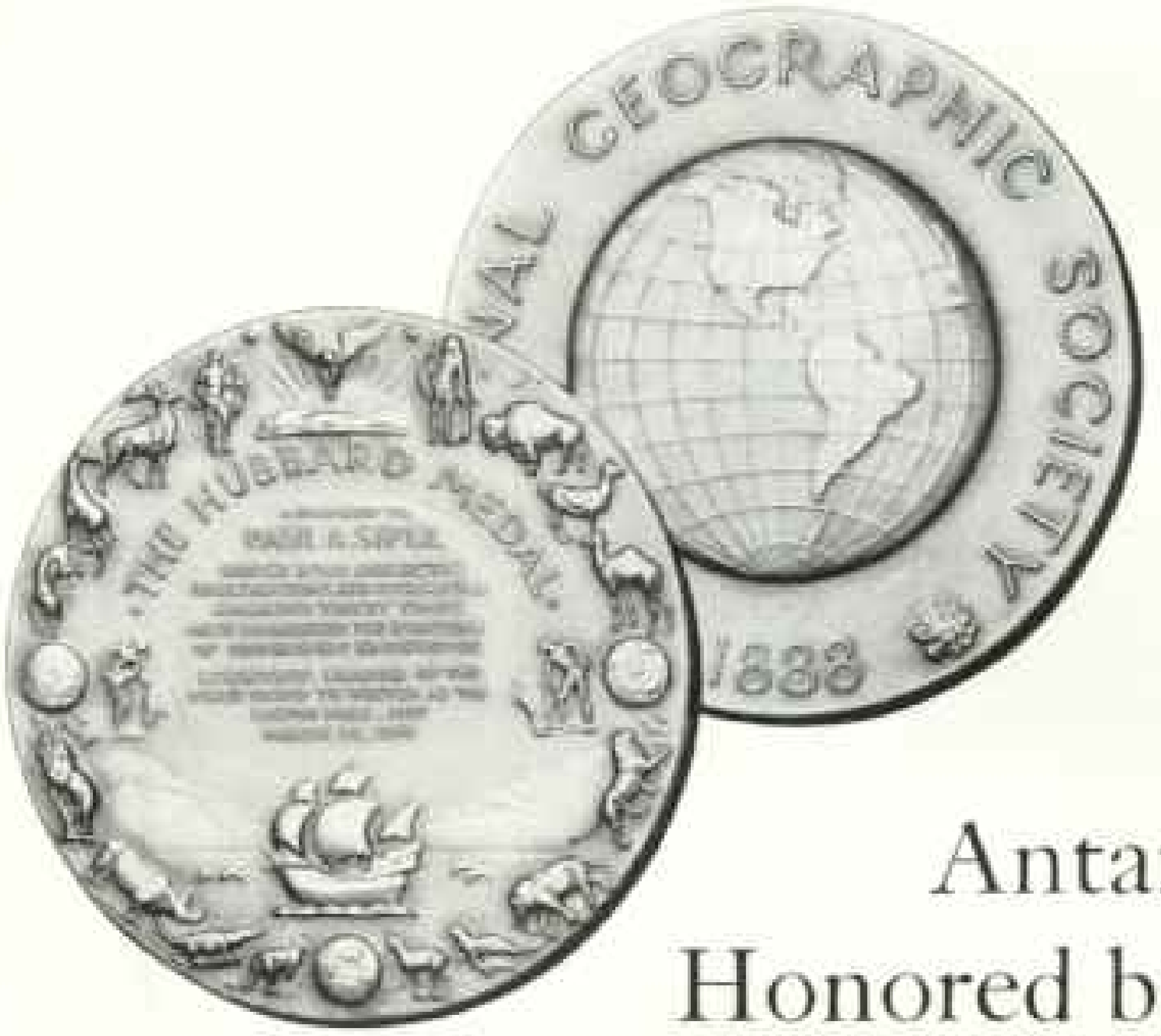
To the ancients, the Rock was one of the Pillars of Hercules that guarded the gate to the known world. To the Moors, it was the bridge to an empire in Spain.

To us, as the Rock loomed before inbound *Finisterre*, it seemed "a beacon spreading its rays over the seas," to borrow an old Moorish description. It was our final landfall, the end of a successful passage.

In modern times the citadel has proved a strategic bastion. Little more than two square miles in area, Gibraltar is Britain's smallest colony; yet it serves as an important center of communications, trade, and sea power in the Mediterranean.

Here Gibraltar wears its umbrella of cloud, a permanent fixture in summer months when the Levanter, a warm, moist wind from the east, strikes the Rock and condenses.

The lighthouse rises from Europa Point. Beyond lies a berth for *Finisterre* and rest for her skipper and crew.



Hubbard Medal of the National Geographic Society, first struck for Peary in 1906, has now been awarded 17 times for historic geographic achievements.

Antarctic Scientist Honored by The Society

DR. PAUL ALLMAN SIPLE, scientific leader of the first group of men ever to winter at the South Pole, received the National Geographic Society's highest honor for exploration, its Hubbard Medal, at Washington, D. C., on March 28, 1958.

The Chief Justice of the United States, a Trustee of The Society, presented the medal to the Nation's Mr. Antarctica "for his extraordinary feat, for the increases he has made in geographic knowledge, and for his superb leadership in the International Geophysical Year."

Dr. Siple, who has spent more time in Antarctica than any other man, thus joined the roster of outstanding explorers of this century who have won the Hubbard Medal.

"This medal has a very special meaning to me," said Dr. Melville Bell Grosvenor, The Society's President and Editor, in introducing Chief Justice Earl Warren and Dr. Siple before distinguished audiences at Constitution Hall. "It is named for my great-grandfather, Gardiner Greene Hubbard, who was the first President of our Society." He recalled being present as an 11-year-old boy "the day that the North Pole met the South Pole, when Admiral Peary presented our medal to Roald Amundsen.

Three South Pole Veterans Meet Again

After receiving the Hubbard Medal, Dr. Siple greets Lt. (jg.) John Tuck, Jr., who commanded military personnel at the polar station, and Bravo, Antarctic-born malemute-husky, first dog to winter at the Pole.

Instead of selling Bravo as surplus property, the Navy, at Dr. Siple's behest, had just proclaimed him a VID (Very Important Dog), given him this honorable discharge, and placed him under the orders of Lieutenant Tuck, who bottle-raised him from birth.

Illustrations by National Geographic Photographer John E. Fletcher

Chief Justice Warren Presents the Hubbard Medal to Dr. Paul A. Siple

Dr. Melville Bell Grosvenor (left), President of The Society, and Dr. Thomas W. McKnew, Vice President and Secretary, join in honoring the scientist-explorer. Dr. Siple was responsible for the scientific success of the United States IGY program at the South Pole, where he and 17 companions braved the longest, darkest, and coldest winter yet endured by man.

"Today," he said, "witnesses another of these epics in the history of The Society."

In conferring the medal, the Chief Justice observed that it has been awarded to such explorers as Peary and Amundsen, Sir Ernest Shackleton, Admiral Richard E. Byrd, "the late beloved chief of the man we honor," and the British conquerors of Mount Everest.

"Our Hubbard medalist today is of the same stature as the great explorers I have mentioned. Six times he has journeyed to the forbidding continent of Antarctica, the first time with Admiral Byrd as a young Eagle Scout selected from among 600,000."

The Chief Justice mentioned Dr. Siple's successful efforts to prevent sale of Bravo, the mascot of the Pole party, as surplus Navy property. This concern even for a dog, he said, "indicates one of the qualities which have so endeared him to all his associates in his years of brilliant Antarctic exploration.

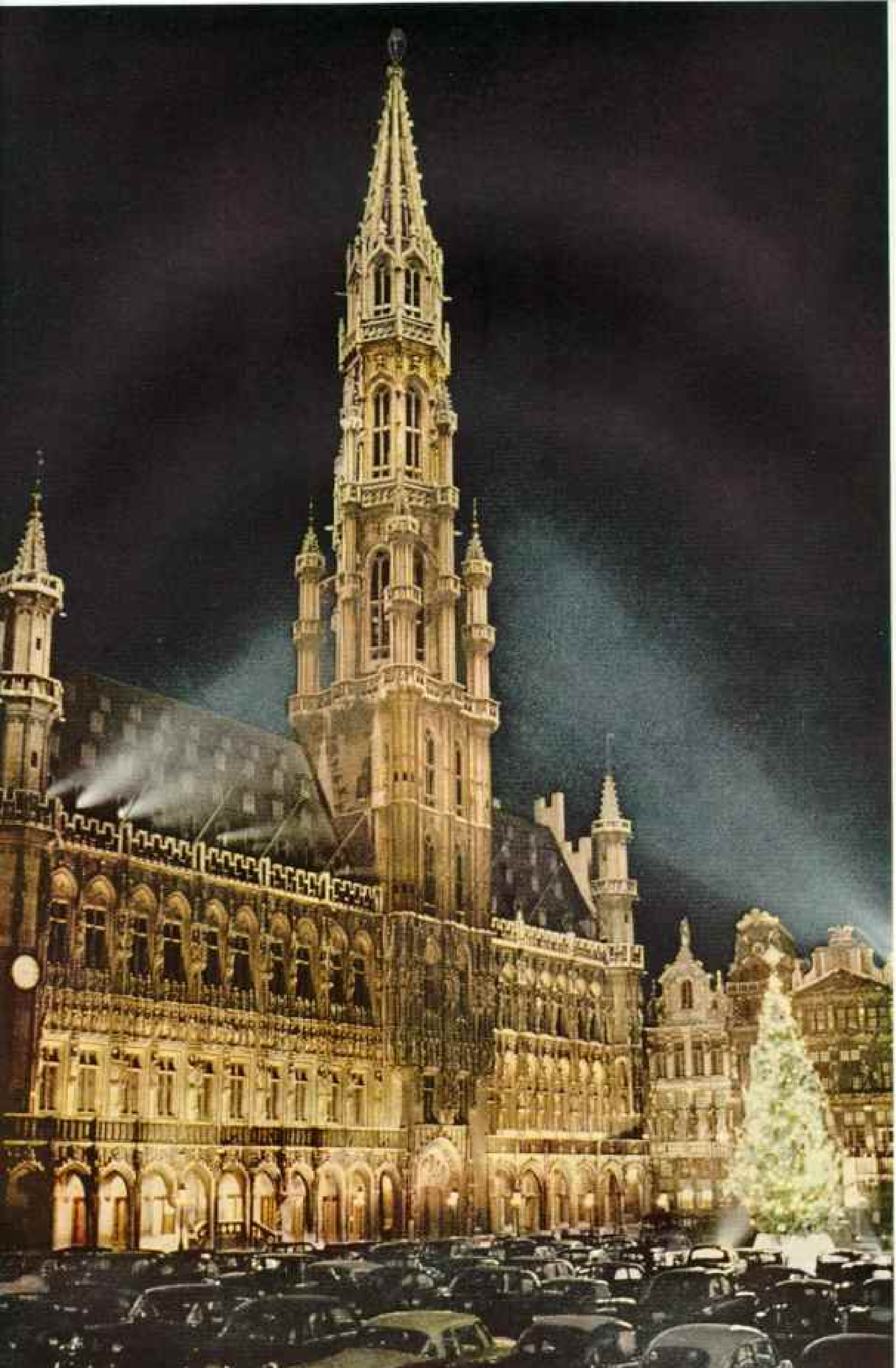
"On behalf of all the members of the National Geographic Society throughout the world, I take pride in handing to you, Dr. Siple, the Hubbard Gold Medal, which bears this citation: 'To Paul A. Siple, whose bold Antarctic explorations and researches spanning thirty years have broadened the horizons of geographic knowledge.'"

In accepting, Dr. Siple pointed out that in modern exploration "a man isn't out there by himself doing a job. He is surrounded literally by thousands of people . . . backing up the expedition, people back home, the men beside him. It is impossible to single out any one man.

"On behalf of all those who in this decade, particularly, have been taking part in the exploration and uncovering of a continent, I humbly express my thanks."

Before afternoon and evening audiences totaling 7,000, Dr. Siple, with the aid of magnificent color motion pictures, vividly described the historic winter at the Pole.*

* See, in the National Geographic Magazine: "Man's First Winter at the South Pole," April, 1958; and "We Are Living at the South Pole," July, 1957, both by Paul A. Siple.



Belgium Welcomes the World

Millions of Visitors to the 1958 World's Fair in Brussels See an Atomic-age Exposition in a Time-mellowed Land

By Howell Walker

Foreign Editorial Staff, National Geographic Magazine

With Photographs by the Author

AT A TIME when rockets and satellites were making history in space, down-to-earth Belgium proudly launched "The Greatest World Event of 1958."

I saw this announcement spelled out in bold yellow letters on a sign near Brussels. It referred, of course, to the World's Fair now drawing visitors from around the globe to the Maryland-size nation wedged among France, Germany, and the Netherlands.

Fair Depicts Life of Nations

As a crossroads of Europe, Belgium offers an eminently logical site for the first international exposition since New York's extravaganza in 1939-40. And it is characteristic of the energetic Belgians to use their geographic advantage well. Of the 30 World's Fairs staged over the past century, 10 have taken place in Belgium.

The fairgrounds cover 500 acres of Heysel Park, four miles from the center of Brussels (map, page 804). Besides the host country and the Belgian Congo, 43 nations and 10 international organizations are represented.

The focal point of the Fair is a 335-foot-high steel and aluminum tower known as the Atomium (page 798). It stands like a weird, leafless tree hung with nine shining spheres, each nearly 60 feet in diameter. Signifying the atomic make-up of a metallic crystal, it symbolizes the peaceful uses of the atom.

The Fair itself is dedicated to peace and the international exchange of ideas benefiting mankind. To that end, displays point out progress in the atomic field. The United States pavilion, for example, shows the development of nuclear power and the uses of radioisotopes in industry, medicine, agriculture, and scientific research.

Each nation sets its exhibits against a background typical of its land and people. The Netherlands stresses the sea, her epic friend and foe. Finland proves how much she can do with timber. Great Britain honors her royal tradition, widespread trade, and industry. Russia gives space to heavy machinery and presents the Bolshoi Ballet. The United States, around the walls of its pavilion, projects movies depicting the life of America.

The Belgian section, covering almost half the fairgrounds, expresses virtually every phase of life in Belgium; it also provides a vast arena for festivals, plays, concerts, and sporting events, as well as a World Art Center and a Hall of World Cooperation.

In its largest sense, the Fair is a summing up of what man has done and can do for man. The accent is cultural. The hope: mutual understanding among all peoples. So, between the opening on April 17 and the October 19 closing date, a fair official told me, Brussels expects 35 million or more guests.

Glory of the Grand'Place

Less than two hours after leaving Paris, a Belgian helicopter on a regular hop settled close to the heart of Brussels. It landed me an easy walk from the Grand'Place, where a breath-taking array of centuries-old façades encloses the market square (page 796).

I first approached the Grand'Place at dusk by a narrow street. Emerging into the square was like entering a majestic theater just before curtain time. As I arrived, the "stage" lights came on and flooded the scene with a luxurious glow. The effect was stunning, resplendent, almost too lavish to be real. It looked far more like an elaborate backdrop for a pageant than the workaday center of a 20th-century metropolis (opposite).

This market place is a link with the past.

Brussels City Hall Lifts a Luminous Spire Above Floodlit Grand'Place

Wherever the World's Fair visitor turns, he sees this tower on the Fair's official emblem (page 804). Here, in the Belgian capital's central square, he can see the tower itself amid the headquarters of medieval guilds (next page). Scintillating Christmas tree was a Finnish gift.

Kodachrome by Howell Walker, National Geographic Staff © N.G.S.

Statues Crown Brussels Rooftops; Gilded Façades Dress the Buildings

Old-time trade guilds made their headquarters in ornate 17th-century structures like these on the west side of Grand'Place.

The buildings retain original names of inns and noble abodes that stood here long before the guildhalls were built. At left, the House of the Fox, of the haberdashers guild, is topped by a statue of St. Nicholas. The Horn, for boatmen, wears a gable in the form of a ship's stern. Others, running to the right, are the She-wolf, of the archers; the Sack, cabinetmakers; the Wheelbarrow, grease and tallow traders; and the bakers' hall, with gilded dome.

French cannon that bombarded Brussels in 1695 destroyed or damaged many of the buildings around Grand'Place. Today's façades look much as they did when rebuilt at the end of the 17th century.

Flowers for sale brighten the paving stones of Grand'Place. This vendor offers roses, carnations, and chrysanthemums. On Sundays bird dealers set up tiers of cages and sell pigeons and canaries.

Photographs by Luc[illegible] de Myer (left) and Georges Chamiaux

United Press

Symbol of Nuclear Energy for Peace, the Atomium Towers Above the Fair

At the heart of the Brussels Fair this 335-foot structure awes visitors by its gleaming immensity. It represents a crystal of metal magnified 150 billion times. An elevator and escalators within the tubes lead to atomic exhibits and to a restaurant in the topmost "atom," which holds 250 on three floors. Cars dangling from cables traverse the fairgrounds. After dark lights flicker on the atomium's nine 59-foot aluminum spheres to simulate restless electrons. Changing colors splash on the watery steps below.

Half a mile away rises the United States pavilion, world's largest free-span circular building, 340 feet across. Exhibits reflect the Nation's colorful past and present.

Elsewhere Brussels seems bent on becoming as modern as possible. You have only to walk from the Grand Place to see the Brussels of 1958. Huge office buildings of glass and steel crowd little brick shops and gaily gabled Flemish dwellings; massive government establishments monopolize entire blocks. Four-lane freeways run circles around the city; traffic tunnels undercut it; sidewalks shrink as streets widen to take more automobiles.

Helicopters Ease Fair Traffic

The World's Fair unquestionably prompted some of the major changes, especially those to expedite traffic. Anticipating a daily average of 175,000 visitors and up to 700,000 on peak days in July and August, Brussels has concentrated on speeding the flow to and from the fairgrounds. Helicopters shuttle fair-goers directly to the site from the city's doorstep, or from Paris, Bonn, or Rotterdam.

Where will so many persons find lodging? The capital area can handle thousands. One of the motels close by the fair site, for example, has 2,500 double rooms—5,000 twin beds. Trailer camps and tent towns hold 20,000 more people. But cities and resorts everywhere in Belgium must absorb the overflow. If this seems inconvenient, remember that Brussels lies in the center of a country you can drive across in a few hours.

Belgium is the natural meeting ground of two distinct civilizations—Latin and Germanic. Its 9,000,000 population splits into two language areas. Broadly, the Flemish-speaking element occupies Flanders and other provinces in the northern half of the land; French-speaking Walloons live in the southern half, called Wallonia. Brussels is in the Flemish region, but, as the nation's administrative center, remains officially bilingual.

Foreign Trade Sharpens Tongues

Though French is spoken all over Belgium, you rarely hear Flemish (a Germanic language) in Wallonia. Too difficult a tongue, the Walloons say; I believe them, having tried it myself. A surprisingly large number of Belgians can speak English and several other languages—a natural result of their business dealings with adjacent foreign countries.

Belgian geography has not only induced trade; it has exposed this gentle land, ill defended by nature, to some of the most violent warfare known. In fact, throughout history—from Caesar to Hitler—the long-suffering Belgians have had to submit to intermittent foreign occupation. They can never forget the battles that ravaged Flanders fields and raged through the hills and forests of the Ardennes. Nor, on the other hand, can they forget they are Belgians; no invasion has ever conquered their spirit.*

Among themselves the Belgians differ widely. The Flemish fisherman is as different from the Walloon coal miner as the Brussels banker from a stevedore at Antwerp. Yet, in a national crisis, they act as one. As early as Roman times, Caesar, referring to all the peoples of Gaul, said, "the Belgae are the bravest."

For the next 19 centuries Belgium had to struggle with outside forces which tried to split up or control the country. Victory came only in 1830, when she gained independence from the Dutch and became a kingdom composed of nine provinces.

As a constitutional monarchy, the kingdom shows marked democratic leanings. The constitution forthrightly states that "all power is derived from the Nation" and that all Belgians are "equal in the eyes of the Law."

A Free People Honor Their King

But this should by no means suggest that the Belgians have not the utmost respect and affection for their 27-year-old King Baudouin (page 800). Quite the contrary.

One evening I attended an operetta in Brussels. During intermission the King walked from his royal box to a reception room to greet the actors. The audience crowded as close as allowed to get a glimpse of His Majesty. So did I. When he passed, enthusiastic shouts of "*Vive le Roi!*" shook the chandeliers.

Though Belgians differ as individuals, they all have one daily delight in common: they love good food and plenty of it. Eating in Belgium can be, I think, as adventurous as in France.

The people of Brussels, or Bruxellois, long ago acquired the nickname of "chicken-eaters," and with good reason. Rarely have I tasted anything so succulent as roast *poulet de Bruxelles;* its flesh fell from the bones almost at my first hungry glance.

Everywhere in Belgium I broadened with pleasure the education of my palate. At Ghent I had my first *waterzooi*, a buttery broth well endowed with white meat of chicken. Ostend introduced me to tomatoes stuffed with small, sweet North Sea shrimp.

* See "Belgium Comes Back," by Harvey Klemmer, National Geographic Magazine, May, 1948.

Royal Eyes Focus on the Globe

In Laeken Royal Palace, Brussels, former King Leopold III points to Pacific islands he studied on a trip to the Far East. His eldest son, Baudouin (right), became King in 1951 following Leopold's abdication. Princes Alexandre (left) and Albert are Baudouin's brothers.

This palace, built in the 1780's, sheltered Napoleon on several occasions.

United States Ambassador and Mrs. John Clifford Folger descend the stairway of the embassy in Brussels.

Ektachrome by George Chamberlain (above); Kodachrome by Bonnie Walker, National Geographic Staff © N.G.S.

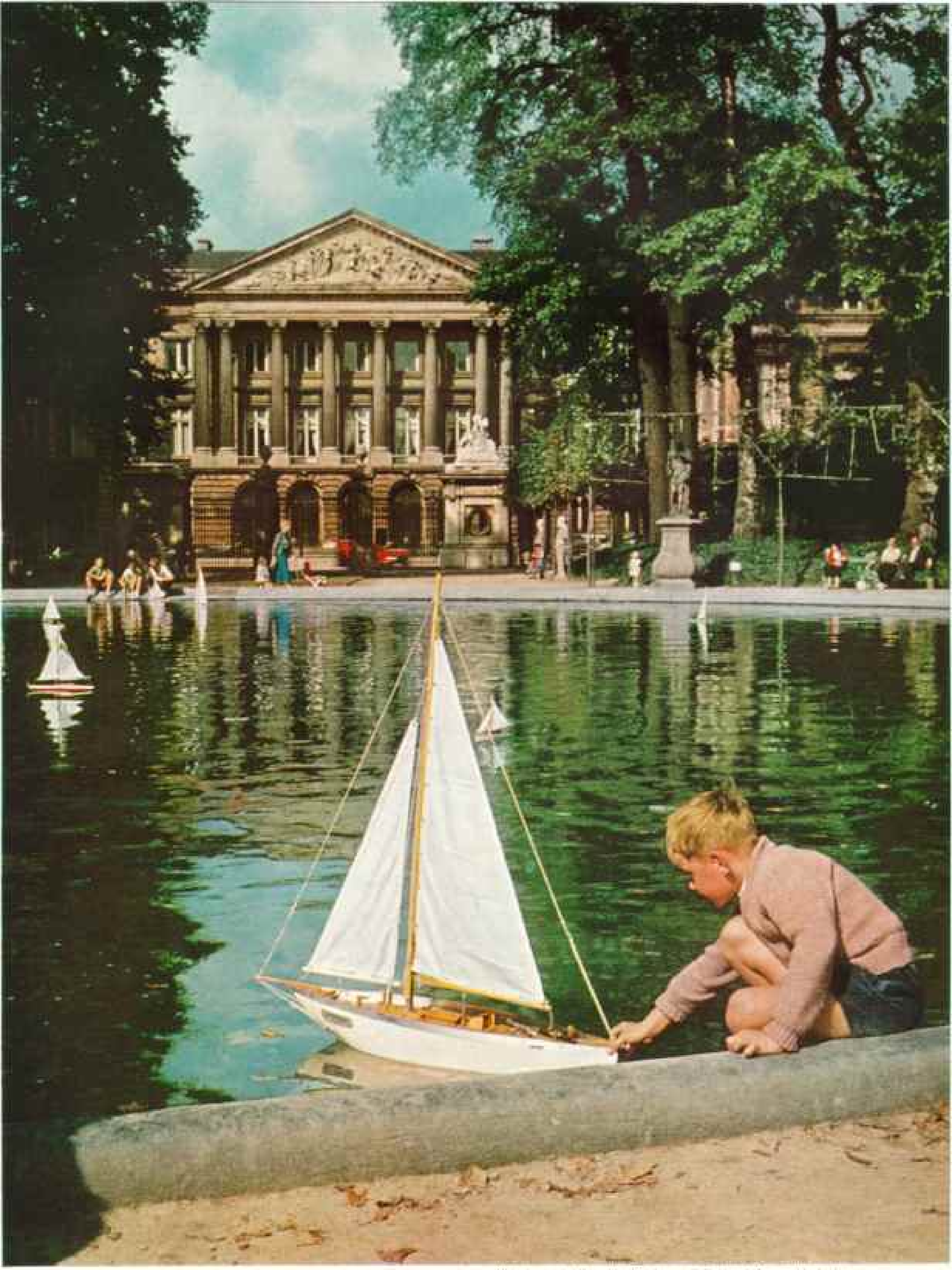


Illustration by Benedikt Taschen © National Geographic Society

Brussels Sailor Launches His Boat Before the Doors of Parliament

In 1830, when Belgians revolted against Dutch rule, the decisive battle raged across this park. Winning independence, the new nation became a constitutional monarchy. Its elected representatives make the country's laws in the pillared Palace of the Nation.

Liége served me eels varnished with butter and garnished with parsley, chervil, sorrel, sage, lemon, and finely chopped onion.

I ate thick-backed hare with rich brown gravy in Antwerp; the smoked, thin-sliced ham of the Ardennes, and the honey cake of Dinant. As to the universally popular *moules et frites* (mussels and fried potatoes), I didn't eat them—I inhaled them. Brussels sprouts? Never saw them on a restaurant menu.

Belgium grows delicious grapes the year round, but makes little wine (page 827). Well-stocked cellars contain fine vintages, imported mainly from France. Most Belgians, however, customarily drink beer, the national beverage (pages 812-13).

Belgium Tempts Guests to Linger

For a preview of what Belgium's many guests would see this year, I drove out of Brussels with no desire to race over the *autostrades* that radiate from the capital. Friendly cities and intimate villages everywhere invited me to linger among their art treasures, festivals, and traditional folkways. Farmhouse or chateau equally fascinated me in this land of sweeping fields, beech forests, weather-worn hills—all laced with rivers and sliced by canals.

Usually the look of a region and the voice of its people left no doubt as to whether I was in Flanders or in Wallonia. But along the coast in summer I began to wonder.

Holiday crowds of Flemings and Walloons mingle on the beaches as naturally as grains of sand. They stroll up and down the esplanades, sit at open-air cafes, visit the casinos, and fill the shopping streets of 20-odd popular seaside resorts from De Panne in the west to Het Zoute in the east.

Midway along this shore stands Ostend, queen mother of Belgian resorts, fishing port, and terminus of the Dover mail boat. An immense casino replaces one leveled during World War II. It floats like a giant luxury liner on a sea of sand (page 822).

One finds vacationists of all ages on the sand, but adults make sure the youngsters have the best time. Large areas set apart for games, contests, swings, slides, and pony rides turn the beach into a child's paradise.

Later I noticed that the accent on youth holds throughout Belgium, not just in holiday spots. When I spoke of it to a Belgian, he said, "But why not? It's the children who will keep the nation alive."

Also, it is the sons of today's fishermen who will keep Belgium's fishing fleet afloat. To make certain they do, the coastal town of Heist runs a school specifically for showing these boys the ropes.

Heist, like other fishing ports, each year pays homage to the source of its livelihood. In this Blessing of the Sea, youth takes a major part. At Heist I watched lads in red oilskins and sou'westers parade with boat models, nets, lamps, and other gear of their fathers' profession. Girls, too, joined the pageant, some of them dressed as their grandmothers and great-grandmothers did. I saw few adults in the procession (page 824).

The regular fishermen were out in their boats, then assembling offshore. When the parade had passed, a priest approached the waterfront altar to consecrate the North Sea, the fleet, and the crews. All the craft, under a fluttering of many pennants, replied to his gestures by sounding their sirens.

The solemnity ended, jollity took over. Heist danced in the streets and sang in the cafes. Heist banqueted, toasting the men of the sea and the youth who would someday take their places.

Business Booms with Earthquakes

At first glance the Belgian coast looked to me like Atlantic City extended, a 40-mile-long playground. Subsequently I learned better in Zeebrugge. This industrial port, twice knocked out by world wars, has quite recovered. Able to handle any type of ocean-going vessel, the harbor clears a mounting traffic of coal, oil, bricks, fertilizers, molasses, and cobblestones.

Near the port I went through a glass factory which has the largest furnace of its kind in the world. The plant employs 1,200 workers, daily producing enough plate glass to cover

Women Spin and Gossip. Crowds in Wingene Strain to Catch the Prattle

This summer, as in each recent year, tens of thousands of spectators will squeeze into Wingene (population 7,300) to watch a thousand costumed folk reconstruct the good old days as seen by the 16th-century Flemish artist Pieter Bruegel the Elder (pages 806-7).

Here housewives on a float depict a scene from a Bruegel-painted proverb, "One holds the distaff whilst the other spins," referring to the spread of evil gossip. Playing cards overhead represent another Flemish saying, "It depends how the cards go."

Kodachromes by Bowell Walker, National Geographic Staff © N.G.S.

World's Fair, 1958

Official emblem of the Fair, the star-and-globe symbolizes the "reunion of all nations of the world, under the sign of Man. . . ." While the star betokens the dynamism of the human race, the unequal size and length of its points show how man's efforts vary in duration and intensity. The globe signifies the international scope of the Fair, the "58," the year; and Brussels City Hall, the place.

Bus Station
Heliport
Parking area
BELGIUM
Heysel Stadium
U.S.S.R. Pavilion
U.S. Pavilion
Vatican Pavilion
French Pavilion
Hall of World Cooperation
INTERNATIONAL
FOREIGN
United Kingdom Pavilion
Royal Palace of Laeken
ROYAL PARK

1. Atomium
2. Garden of the Four Seasons
3. World Art Center
4. International Hall of Science
5. Brussels, Past and Future
6. Benelux Gateway
7. Aerial Bridge
8. Amusement Park
9. Main Entrance and Reception Hall
10. Amphitheatre

Notre Dame Church
Outer Harbor
Melsbroek Airport, 4 miles

Elevated freeway speeds visitors from the heart of Brussels to the fairgrounds.

Central Customs Office
Heliport
North Station (Gare du Nord)

BRUSSELS

Plaza Hotel
Place de Brouckère
Traffic tunnels
Place Charles-Rogier
Albert I Hotel
Palace Hotel
Atlanta Hotel
Hotel Métropole
Hotel Astoria
Grand Hotel
Théâtre Royal de la Monnaie
La Bourse
Grand Place
City Hall (Hôtel de Ville)
Hotel Amigo
Collegiate Church of St. Michel and Ste. Gudule
Parliament (Palace of the Nation)
Hotel Gallia et Britannique
Central Station (Gare Centrale)
Brussels Park
Fine Arts Gallery
United States Embassy
Museum of Modern Art
Museum of Ancient Art
Palace of the King
Luxembourg Station (Gare du Luxembourg)
South Station (Gare du Midi)
Palace of Justice
Traffic tunnels

Equivalents
Chaussée . . . highway
Rue . . . . . street

STATUTE MILES
©N.G.S.
Irvin E. Alleman

At Porte de Hal, a gatetower, sightseers glimpse the last vestige of the early fortifications.

Antiquities of the world lure museum-goers to the Palais du Cinquantenaire. One wing displays military mementos; the other, art and archeology.

seven football fields, a purpose to which, of course, it is not normally put.

A friendly fellow led me over the works, from cold sand pile past white-hot molten mass to labeled crate. For those who sometimes feel like smashing glass for the pleasure of smashing glass, here's the place to do it.

The immense finished sheets emerge from cooling chambers with ribbed borders about four inches broad, which permit mechanical handling. Experienced operators remove these margins and let them crash on the concrete floor. Sweepers gather up the pieces, only to break them into smaller pieces and send them back to the melting pot to make more glass for them to break.

In a warehouse I watched men with diamond cutters crop the plate to size; others packed it with straw in wooden crates for shipment. Each case showed a sign in four languages, pleading with handlers to keep it dry; otherwise the soggy padding would discolor the glass.

The plant exports 95 percent of its production, much to the United States. I saw crates bound also for Mexico, New Zealand, Cuba,

© National Geographic Society

Flemings in the Flesh Relive

Looking as if they had stepped out of the painting of a wedding dance, characters in Wingene's annual Bruegel Fest eat, drink, and make merry.

One man (upper left) quaffs a frothy draft of Flemish ale; his ravenous friend munches dark bread and a pancake. The affectionate couple opposite share a bowl of rice pudding.

Pieter Bruegel the Younger, adhering to his father's love of

a Bruegel Scene Done in Oils

rustic subjects, painted the gay event above, which closely resembles the Elder's "Wedding Dance in the Open Air" now in the Detroit Institute of Arts. This picture belongs to the Fine Arts Museum in Ghent.

The stout bride, flanked by two old women, sits at the festive board. The groom, lost in the crowd, usually plays an inconspicuous part in Bruegel wedding scenes.

and Java, Sicily, Argentina, Austria, and Venezuela.

"Earthquakes," said my glass-minded friend, "help our business."

Hardy Belfry Makes Sweet Music

No earthquake, not even war, has moved the lofty bell tower of Bruges (page 810). The Belfry has stood as a regional landmark since the 13th century. Long before reaching Bruges, I saw it towering like a crowned giant over the flat expanse of West Flanders.

As I wandered about this city of hump-backed bridges, swan-graced canals, and mellow brick dwellings, I rarely lost sight or sound of the Belfry. It frequently guided me back to the central square when I might have lost my way in unfamiliar streets. The music of its 47-bell carillon never let me forget the time of day. On the hour these chimes played short extracts from two of Schubert's military marches; a Mozart aria at the quarter-hour; a Flemish folk song for the half-hour; and "Carnival of Venice" at the three-quarters.

Every five years, most recently in 1957, the Belfry becomes the backdrop for a spectacular drama. A company of 2,000 residents presents the two-hour play of the Holy Blood. Stands in the market place hold nearly 10,000 spectators; hundreds sit at upper windows around the square.*

One afternoon I wedged myself among thou-

* See "Bruges, the City the Sea Forgot," by Luis Marden, NATIONAL GEOGRAPHIC MAGAZINE, May, 1955.

A Maze of Channels and Quays, Antwerp Port Links Canals and Sea

Sprawled near the ocean head of a vast inland waterway system extending into the Netherlands, Germany, and France, the harbor handled some 40 million metric tons of cargo last year. Traffic in steel and iron alone earns it the sobriquet "steel lungs of Europe."

World War II bombs and rockets heavily damaged the port. Since then, $180,000,000 has poured into restoration and expansion; another $85,000,000 is scheduled for investment.

Ship repair and maintenance work are double that of any other continental port.

A cutter prepares a diamond for cleaving. Using a diamond as knife (below, right) the craftsman meticulously cuts a groove along the grain of a rough stone mounted on a stick. Metal box serves both as hand brace and container to catch diamond dust.

The diamond splits with a hammer tap on a blunt wedge set in the stone's groove (left).

Belgium's gem industry has installed a workshop at the World's Fair where visitors can see diamonds sorted, cleaved, cut, and polished.

Belgian Government Information Center (left) and Howell Walker, National Geographic staff

sands of others to enjoy near-by Wingene's annual Bruegel Fest (pages 803, 806-7). When police finally cleared the main street, local Flemings in costume brought to life the 16th-century scenes immortalized by the two Pieter Bruegels, the Elder and the Younger.

Trumpeters, drummers, flag-flourishers, and horsemen with pennons headed the procession. Then, one by one, came Bruegel versions of Flemish proverbs and children's games; also such favorite subjects as "The Harvest" or "The Perfidy of the World."

The festival reached its peak in a meadow on the edge of town. At rustic tables in the open, players feasted on yards of sausages, dark bread, Wingene cheese, bowls of rice pudding, pancakes—all washed down with barrels of beer. Those who could rise from the benches jigged through country dances; bagpipers puffed out cheeks already flushed with food and drink. The scene would have delighted the Bruegels themselves.

Windmill Grinds Pigeon Feed

Beside a tree-lined canal I drove toward tranquil Damme. Napoleon ordered the waterway built by Spanish prisoners in 1810, during a continental blockade that closed the country's coastal ports. But I gave little thought to the Emperor's worries as I moved through this region of rural peace.

It was a rare morning in Belgium's rainy summer of 1957; the sun made everything gleam, even cows. Green meadows stretched endlessly over the level Flemish land. Here and there a few farm buildings huddled comfortably. Wind-bent poplars and pollard willows bordered fields, and anglers dozed along the canal banks.

On the edge of Damme I stopped to photograph a white windmill, prominent as a lighthouse against the sky.

"Does the mill still work?" I asked a Fleming, because the sails weren't moving.

"Yes, it grinds from time to time," he said. "Makes pigeon feed." Belgians love pigeons and breed them extensively for racing.

A bird of a different feather lives in the legendary archives of Damme. It is an owl (*uil* in Flemish) which, along with a mirror (*spiegel*), forms the last name of Tijl Uilenspiegel in *The Legend and the Heroic, Joyous and Glorious Adventures of Uilenspiegel and Lamme Goedzak in the Country of Flanders and Elsewhere*, by Charles de Coster. In this 19th-century Flemish version of the older German story, Tijl revolts against the Spanish occupation of his land during the 1500's. With pranks and trickery he continually outwits and harasses the enemy.

Lamme Goedzak, comrade in roguery, serves Tijl Uilenspiegel as Sancho Panza served Don Quixote. Both characters incarnate the love of liberty, the good humor, the spirit, the very essence of Flemish folk.

Damme today claims the grave as well as the birthplace of Tijl, while the sign of a cheerful inn on the market square keeps Lamme Goedzak's memory green.

It was the Spanish under Emperor Charles V who were relentlessly harassed by Uilenspiegel. Even the Emperor himself, though a native of Ghent, had his troubles. Indeed, the entire population of Ghent rose in rebellion against his heavy taxes. The revolt prompted one of his Spanish officers to advise total destruction of the city, but the Emperor had too much esthetic sense to do anything so drastic.

Men Vie with Medieval Crossbows

Thanks to Charles, I found many of Ghent's medieval monuments still standing like richly sculptured figures on a gigantic chessboard. The soaring towers of the Cathedral of St. Bavon, the Belfry, and St. Nicholas Church guided me to the heart of the Flemish city (page 815).

Just opposite the Town Hall, I drove into the courtyard of Belgium's oldest hotel, the Cour St. Georges. In fact, it was 300 years old when the Emperor Charles V himself used it in the 16th century. Napoleon slept here, much later, of course.

The hostel, early headquarters of the honorable crossbowmen of St. George, took its name from that guild. I attended a meeting of the crossbowmen at their present quarters in another part of the city. All around the walls of their hall hung models of fighting bows cher-

Bruges's Beloved Belfry Has Watched Over Canals and Boats for 700 Years

Bruges began life as a seaport. When, toward the end of the 15th century, the harbor finally became choked with sand, trade shifted to Antwerp. Today boatmen guide visitors along the canals, pointing out patrician palaces, churches, and art galleries that make Bruges a museum city. Medieval Bruges stored its charters of independence in the bell tower.

Kodachromes by Howell Walker (above)

Lofty View of Bruges from the Belfry

Seen from a height of 220 feet above the central square, Bruges assumes the proportions of one of those toy towns found under a Christmas tree.

A grand panorama of the city and surrounding plain of Flanders rewards the visi-

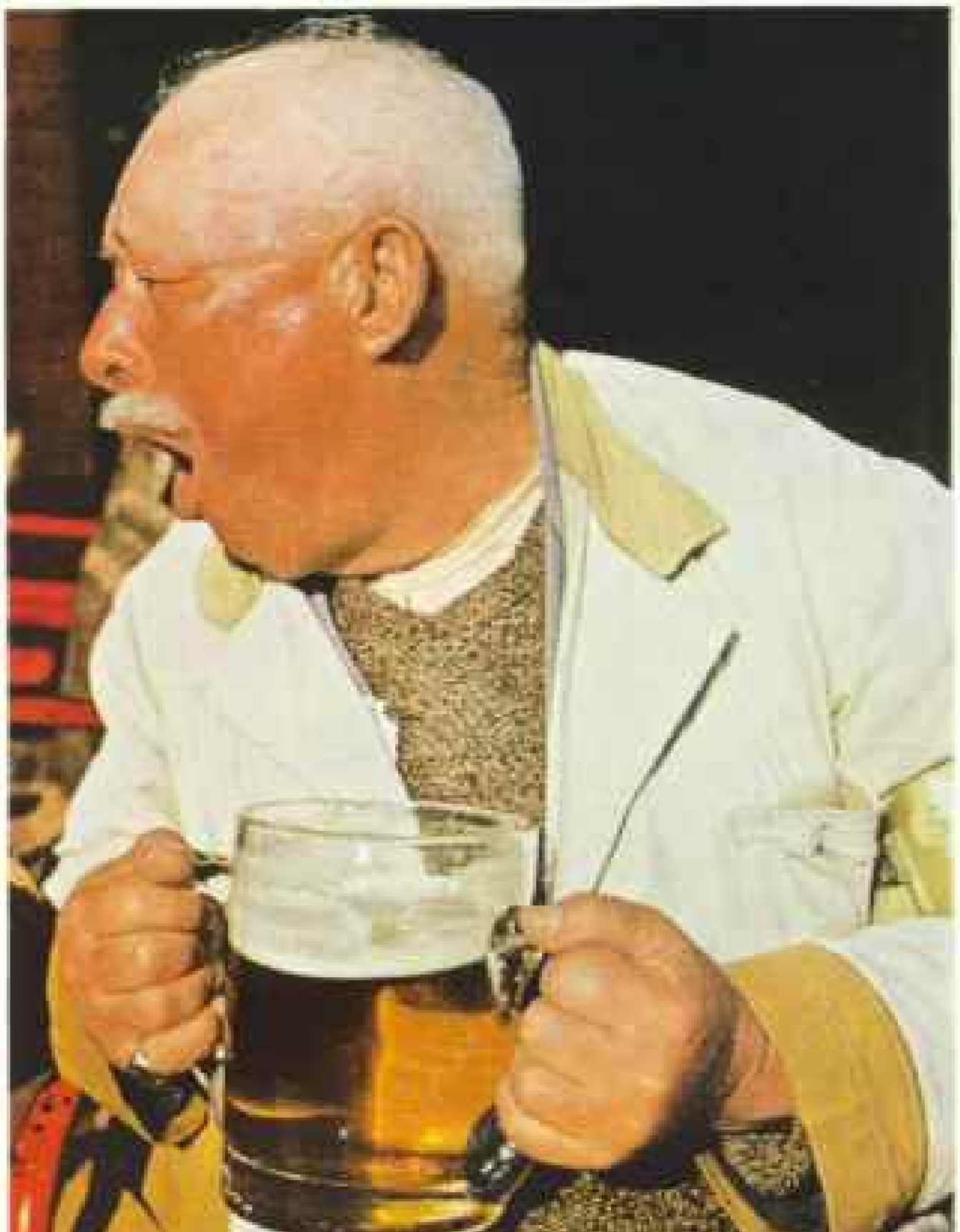
Two mustachioed customers with outsize steins offer generous proof that Belgians like their national beverage, beer. Annual per capita consumption, nearly 150 quarts, exceeds that of any other coun-

Luis Marden, National Geographic Staff © N.G.S.

akes In an Array of Gabled Cafes

tor who climbs the Belfry's 365 stone steps. Once on the ground again, the hungry sightseer has only to cross the square to enjoy some of the most satisfying food and drink in Europe. Belgian cooking leaves little to be desired except a reanimated appetite.

try. These garrulous workmen quench their thirst in Bruges. Two-quart tankards are usually reserved for festive occasions or practical jokes played on unwary visitors.



ished by the guild since the distant 1300's.

Handling the heavy pieces with enviable ease, members engaged in shooting contests. I watched them perforate five-inch-wide targets some 60 feet away. The stakes were generous mugs of frothy Flemish ale.

"Have a shot," said a guildsman, offering me his cocked bow.

Its weight appalled me; I wondered whether I could hold it steady enough to sight. Somehow I did, and to my astonishment—everyone else's, too—the missile hit the target two inches from the bull's-eye. I didn't dare overtax my luck with another shot, but willingly gave the bow to a more practiced marksman.

After the experience, I feel inclined to quibble with the cryptic dictionary definition of a crossbow: "A medieval weapon for discharging quarrels, stones, etc., formed of a bow set crosswise on a stock." Not a word about weight. No mention of the bow's being so stiff it requires a special crank to bend and cock it. Anyway, I now know that a quarrel is a square-headed bolt or arrow.

An old Flemish painting come to life, lay sisters sew together at the Little Beguinage in Ghent. These spinsters and widows earn their livelihood with needlework in a life of prayer.

Centuries of Quiet Seclusion

In Ghent I slept, dreamed, walked, talked—in a word, lived—in the past. Abbeys, castles, canals, quays, guilds, cobbled market squares, churches, and chimes all took me back through the long gray centuries. And in such strongholds of tradition as the Little Beguinage, past and present seemed one.

This is a sort of convent, and yet it's not. The Beguines, or resident sisters, are not strictly nuns; they take no conventual vows; but devote themselves to a religious life. Their domain, surrounded by a high brick wall, constitutes a little city within the city. Spinsters and widows, the women live alone in separate houses after a two-year novitiate in a communal house. They wear white wimples and dark habits with full Flemish skirts down to the ground.

I parked my 1957 station wagon just outside the Beguinage, founded in 1234. At the main entrance I pulled an iron handle that rang a bell. The gate opened, and I stepped into a setting that has changed little in hundreds of years.

(*Continued on page 823*)

Ghent's Turreted Belfry, Its Weather Vane a Dragon, Keeps the City's Time

On Christmas Eve, 1814, Britons and Americans met in this Flemish city and signed the Treaty of Ghent, ending the War of 1812. The clock tower, begun about 1300, contains a 52-bell carillon. St. Nicholas Church, dating from the 13th century, rises just beyond.

Photographs by Bowell Walker, National Geographic Staff © N.G.S.

Begonia Blossoms Pave the Town Square in Festive Lochristi

Since the commercial value of Belgium's begonias comes from the tubers, or underground stems, growers altogether disregarded the flowers until the idea of using them for celebrations took root a dozen years ago.

Lochristi, a small Flemish town near Ghent, stages its begonia festival each summer. Residents pick a million-odd blossoms, fixing them in beds of sand or on wire netting to make artistic patterns; they carry out a general theme that varies from year to year.

Last August the community re-created scenes from the world's favorite fairy stories: Cinderella (page 819), Red Riding Hood, Snow White, Puss in Boots, and others.

Horticulturists in the Ghent area plant some 430 acres to begonias. Annual export of the tubers, mostly to the United States, brings in more than a million dollars.

Seeds start sprouting in hothouses in mid-January. During March and April the seedlings are thinned twice. They are transplanted to fields in the latter half of May. When rain holds off, automatic sprinklers water the thirsty crop. Tubers are dug during the last two weeks of October.

The begonia owes its name to a French amateur botanist, Michel Bégon, an administrator in the West Indies at the time of Louis XIV.

The plant reached England in 1777. Its culture in Belgium began in the middle of the 19th century. Crossbreeding has produced numerous varieties.

Fairy-tale Castle Ablaze with Begonias Blooms for Cinderella

This tableau, one of many at Lochristi's annual begonia festival, assumes the most ambitious dimensions of all. Men, women, and children arrange begonia flowers to represent the final phase of the fairy tale.

The white charger will carry Cinderella and her Prince Charming to his flower-bright castle for their wedding.

Belgium's flag flies over the happy scene.

Enormous toadstool in Lochristi's land of gnomes (opposite, lower) dwarfs a toy farmer and his cow.

Begonia petals become tiles on the kitchen floor that Cinderella is forced to scrub.

Fisherman on Horseback Drags His Net for Shrimp in a Roughening Sea

The last of Belgium's mounted shrimpers (*pêcheurs de crevettes à cheval*) trawl off the North Sea beach at Oostduinkerke. Elsewhere along the coast, notably at Ostend and Zeebrugge, fleets of boats net the crustaceans.

This oilskinned rider and his durable mount plow through a surf pelted by rain. When he goes ashore for the last time, he transfers the catch to saddle baskets and rides home to a whitewashed stone cottage.

Boiled shrimp fresh from the drying rack occupy the fisherman's basket. He shows a small part of the day's catch.

I felt apologetic for the noise of my footfalls in this place of utmost serenity. Through the still September air a leaf drifted lightly to earth; I almost expected to hear it land.

Passing brick dwellings with rose gardens, I skirted the central park. Out of the silence grew a sound of chanting. At first I thought it came from the church standing among tall trees; then I realized it was coming from a communal house.

When the singing ceased, I knocked at the door of this building. It opened just enough for the wimple-framed face of the prioress to appear and ask the purpose of my call. Masoeur Martha Mouton then invited me to step inside.

"What do you wish to write about?" she asked.

"The Beguinage, the sisters, what they do, how they. . . ."

Before I could finish, the chanting started again in an adjacent room. Masoeur Martha looked at me questioningly; I couldn't tell whether she was asking herself or me if we should intrude. Finally she led the way in. The chanting stopped, but the work went on.

I stood gazing at a 17th-century Flemish painting come to life. The gray light of Flanders filtered through wrinkled glass and set in soft relief a dozen Beguines bent over their sewing. They sat close to the windows on hard, straight-backed chairs. Each sister had a work basket beside a simple wooden stool that kept her feet off the uncarpeted floor. No tables, no machines, no chitchat.

Needlework Supports the Beguinage

The Beguines mend clothes, knit and darn socks, make sheets, bedspreads, table cloths, and do fancy embroidery. What they earn must maintain them and the Beguinage; no outside church or order aids them.

My visit over, I walked toward the gate with Masoeur Martha. She said goodbye, and then added, "Our work, unlike yours, keeps us always in the same place. But we are content here."

Ghent, a city of art, owes much to the brothers Hubert and Jan van Eyck. Their joint talents produced the immense polyptych, "Adoration of the Lamb," considered the noblest creation of the Flemish School they founded.

Depicting hosts of Biblical characters, the 12 panels of this finely finished work cover the entire wall of a chapel in St. Bavon Cathedral. Every inch of the painting reveals unremitting devotion to detail, even down to the individual hairs on Adam's wrist. Color, light, shadow, reflection, line, expression—all combine to produce a realism so tangible that you feel you could reach out and pluck a flower among the blades of grass or finger an exquisitely embroidered robe.

Flanders Spins Cotton for the World

Another Fleming who paid close attention to details started the city's cotton industry. In 1800 Liévin Bauwens, an enterprising burgher, journeyed from Ghent to England. At that time Britain controlled the European cotton market; hand-labor countries could not compete with her mechanical production. England, of course, jealously guarded the plans and patents for her machines. But Bauwens managed somehow to return to Ghent with parts and enough technical knowledge to set up a spinning machine. Today Belgium ranks among the largest exporters of cotton thread.

Knowing that tobacco thrives in Flanders, I would not have been surprised to find cotton growing here, too. It doesn't, though. Belgium imports the raw material from the Americas, Africa, and Asia. Much comes from the southern United States. One morning on the Ghent waterfront I watched a ship unloading thousands of bales of Texas cotton.

What Flanders does grow and in profusion is flowers. In the Ghent area begonias alone cover 430 acres. The largest tracts are at Lochristi, about four miles from the city. These fields lie flat as carpets striped with yellow, red, white, and orange; each good year they produce from 30 to 33 million flowering tubers. Indeed, the begonia is to Belgium as the tulip is to the Netherlands.

To Belgian growers the commercial value of begonias comes not from the flowers but from tubers, or underground stems. The bulk of the crop is exported to foreign countries, mostly to the United States. Only in recent

Windbreaks Crowd Umbrellas off the Beach at Ostend

Only an occasional beach umbrella appears in this August view. During that holiday month last year the sun rarely shone on this popular Belgian resort or on any other part of the country. Distant casino replaces one destroyed during World War II.

Fishermen's Sons Parade with Nets and Model Boats in a Solemn Blessing of the Sea

Heist, like other fishing communities on the Belgian coast, holds the ceremony yearly to pay homage to the source of its livelihood. While this procession passes along the esplanade, the fishing fleet assembles offshore. A priest at the waterfront altar will consecrate the North Sea, the ships, and the mariners. This pious custom goes back to the 15th century.

years have growers found a use for the blossoms they formerly threw away.

Just what happens to them I discovered at Lochristi's annual Begonia Festival (pages 816-19). The flowers transformed the town's main street into a multihued fairyland. In the various arrangements, all done with begonias, familiar characters like Cinderella and Puss in Boots blossomed right out of childhood storybooks.

Although Ghent lies 25 miles from the coast, the textile trade, plus traffic in copper, steel, oil, leather, and timber, makes it the nation's second largest shipping center. First comes Antwerp, one of the world's leading seaports, which lies even farther inland—55 miles up the Schelde (page 808). The river links Antwerp with all the main shipping lanes, while an extensive network of overland communications connects it with the most highly industrialized regions of Europe.*

Fate and a River Favor Antwerp

In effect, what fate took away from Bruges, she gave to Antwerp. A proverb says, "Antwerp owes the Schelde to God and everything else to the Schelde."

I devoted an entire day to the harbor area; yet even this was not enough to see all of its 13,200 acres. In the morning I drove with a port official around a crowded waterfront that appeared to have no end. We looked at 32 miles of quays threaded with 500 miles of railways; docks, locks, drawbridges, barge basins, and dry docks; cranes and grain elevators on the piers, cranes and grain elevators afloat; silos, warehouses, massive oil tanks, timber sheds, cold-storage chambers; ships from more nations than one could name without a flag book handy; and men—by reputation the best harbor workers in the world.

In the afternoon I boarded a boat to weave among traffic in the maze of the port's waterways. It was somewhat like driving into a strange big city at the rush hour. Canal barges queued up bumper to bumper; freighters rubbed gunwales; tankers wallowed in the wash of liners. I watched ships arriving, unloading, loading, resting, departing; ships with tugs on leashes; ships with tugs nuzzling them like hungry young puppies; ships that smelled of other lands.

"Why," I asked, "does one see so many foreign vessels in your dry docks?"

"Because we work night and day," the official said. "There are ports that do not."

Antwerp is the nation's second city after Brussels, yet it has the genial character of a much smaller town. By any standard, it is an influential center of trade and culture.

Culturally Antwerp is, above all, the city of Peter Paul Rubens. Yet, even earlier than this prolific 17th-century painter, Antwerp could claim Christophe Plantin, the master printer who declared that "no other town in the world could offer me more facilities for carrying on the trade I intended to begin."

One Bible in Five Tongues

Plantin died in 1589 and was buried in the Antwerp Cathedral. The epitaph on his tombstone justly calls him "prince of printers."

In 34 years he published some 1,500 different works, a phenomenal achievement for that time. These included editions of classical authors, Hebrew Bibles, liturgical pieces, illustrated anatomical dissertations, handbooks on botany, music books, atlases, and the first dictionary of the Dutch language.

In his printing house and home, now a museum, I saw two of the oldest known presses (Plantin operated 22 at one time); traced the art of printing and bookmaking from Gutenberg's day (about 1450); and marveled at leather-bound treasures that make the place a bibliophile's paradise.

Of all Plantin's typographic enterprises, the one that impressed me most was his five-language Bible. This colossal undertaking took four years and ran to eight volumes, with texts and translations in Aramaic (the tongue of Jesus), Hebrew, Syriac, Greek, and Latin. Detailed appendices to the work expanded on grammar, vocabularies, even studies of ancient measures, costumes, and habits. Plantin lived up to his motto, "Work and Perseverance," to produce this masterpiece, still considered the most important ever executed by one printer in the Netherlands.

Village Shared by Two Nations

Why say "Netherlands" when Antwerp belongs to Belgium? Well, in the strictly literal sense, the term applies to all the Low Countries, not just to old Holland. However, I do know of a village that belongs partly to Belgium but lies wholly within the borders of the present-day Netherlands.

To reach Baarle Hertog, I had to pass first

* See "Paris to Antwerp with the Water Gypsies," by David S. Boyer, National Geographic Magazine, October, 1955.

Harvesters Gather Grapes at Christmas

Some 34,000 hothouses at Hoeilaart, 5 miles southeast of Brussels, turn the community into a city of glass. Constantly kept at a temperature of 70° F., the shelters allow growers to produce fruit for winter dinner or summer picnic.

Belgian grapes, mainly table varieties, are exported to England and as far afield as the Belgian Congo.

These men in wooden shoes pick the Colman variety. Pipes carry heat into the greenhouse.

Flemish girl picks tobacco east of Ieper (Ypres), a World War I battlefield. Local farmers devote some 2,600 acres to the crop.

Autochrome (above) and Kodachrome by Bassett Walker, National Geographic Staff © N.G.S.

through Belgian then through Netherlands customs barriers. I found nationals of both countries living in the village, each with their own town hall, church, shops, and homes. Though I could not sort out the two peoples, I learned to tell the nationalities of the houses by their number plates. A Belgian dwelling shows black figures on a white field, while Dutch has white on dark blue.

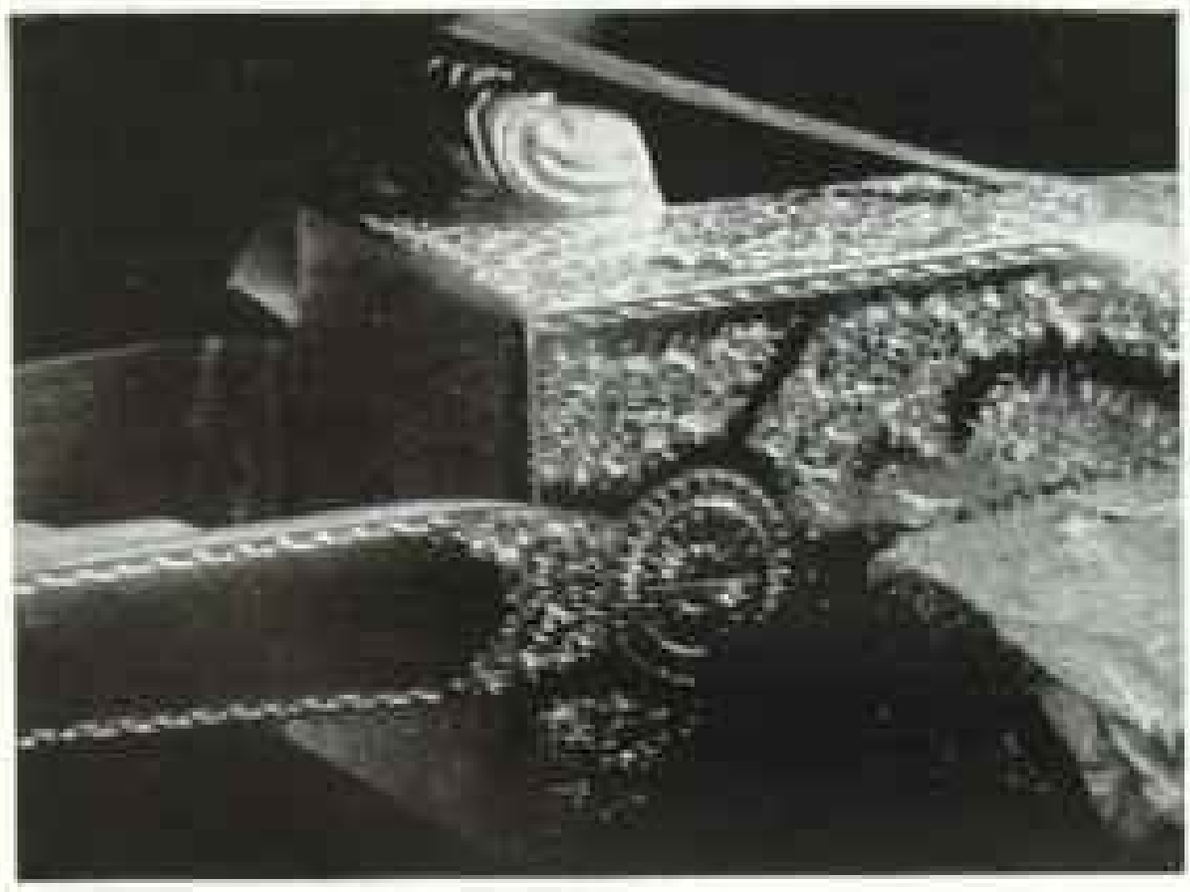
There are two currencies and, inevitably, two tax collectors. Each colony has its police force, which arrests only its own nationals. Fortunately, neither of the two fire brigades waits to see whether a Dutch or Belgian house is burning. The village has no clear-cut dividing line; rather, it consists of bits of Belgium surrounded by Dutch territory.

This odd situation arose hundreds of years ago, when Baarle Hertog straddled the border between what was then North and South Netherlands. After Belgium won independence, the town found itself a full mile inside Holland, yet still shared by the two nations.

The enclave played a dramatic role during World War I, when Germany occupied Belgium but respected Dutch neutrality. Safe behind the Dutch frontier, the Belgians in Baarle Hertog operated a radio transmitter that proved invaluable for Allied espionage.

Back in Belgium, I headed toward the northeast corner. This region, known as Campine, at first appeared to me barren and utterly useless. It was a land of sand and solitude —melancholy, bleak, weird—of brush, stunted pines, juniper shrubs, swamps, reeds, weeds, and winds. How could anyone eke out an existence in such country?

The answer lies deep beneath the surface: black gold—lodes of it. Campine contains extensive coal beds. To the once-desolate area the mineral brought fresh life as increasing numbers of workers and their families arrived. New mines opened up; man-made mountains



A Gunsmith of Liège Assembles a Double-barreled Work of Art

Emerging as a center of firearms manufacture in the 15th century, Liège quickly won a reputation for quality workmanship and inspired design. Royal decrees, one as early as 1687, required that each new gun be tested. Today only flawless weapons receive the city's official hallmark.

Hand engraving, fashioned with chisel and hammer, embellishes this unfinished shotgun breech. Such craftsmanship distinguished two fine guns presented by the citizens of Liège to the World War II U. S. Generals Courtney H. Hodges and George S. Patton.

and industrial chimneys rose; towns grew up around them.

The Albert Canal adds to the region's prosperity. Linking Antwerp and Liège, the waterway passes through the working heart of Campine. Its advantages are obvious today; more significantly, the canal encourages further exploitation of Campine's coal reservoir, the exhaustion of which lies entirely beyond our time.

I followed the Albert Canal into Liège and witnessed another instance of what coal and water can do for a community. I had arrived in the Pittsburgh of Belgium. Here, along the banks of the Meuse River, I saw immense steel mills, glass works, gun factories, chemical plants, a university, and a helicopter port.

Cookies big as platters leave youngsters speechless. A specialty of the town of Dinant, the cakes are a simple mixture of flour and honey.

Local industry was among the first on the Continent to use the Bessemer process for steel. It built the first European locomotive. How odd to stand here in the smoky atmosphere amid discordant factory noises and know that Liège also gave birth to such a sensitive musician as César Franck.

Five centuries of gunmaking at Liège have enabled its Museum of Arms to exhibit more than 8,300 pieces in one of the most comprehensive collections of firearms in the world. The amazing array, which ranged from Stone Age weapons through the primitive arquebus to the World War II heavy machine gun, held me captive for half a day.

Last of Liège's Puppet Sculptors

The city has played with more than firepower. At one time 30 marionette theaters entertained Liège with puppets of kingly size and character. Charlemagne, Roland, Napoleon, and, of course, the smaller and most beloved Tchantchès still draw crowds. In the Walloon country Tchantchès stands for what both Punch and John Bull mean to England or Tijl Uilenspiegel to Flanders.

Regrettably, many of the theaters have disappeared today, but I met Denis Bisscheroux, who for the past 50 years has earned a living by carving marionettes entirely out of wood. A friend took me along a narrow, hidden street to this artist's house, built in 1502. Bisscheroux worked in a little upstairs room cluttered with hardwood logs and 200 different tools. We watched him chiseling with exquisite precision the head of a 16th-century French nobleman. We were seeing the last of Liège's old-school puppet sculptors.

Through the hills southeast of Liège I drove to a mineral-springs resort named Spa, the original spa of Europe. Its waters have attracted visitors from all over the world since the 16th century. I drank a glassful straight from a spring; then I walked about the wide, quiet streets.

Tablets on a bubbling fountain listed the names of Spa's distinguished visitors. Among them I noted Margaret of Navarre, Montaigne, Descartes, Peter the Great, Charles Fox, Casanova, William Pitt, Napoleon III, the Duke of Wellington, and James Fenimore Cooper. Belgium's first four kings were on the list; so were Thackeray, Disraeli, Victor Hugo, Foch, Herbert Hoover, and Raymond Poincaré.

I continued south into the Ardennes, a hilly forest region of rivers, rocks, and romantic ruins. In this part of Belgium I came to few towns and only occasionally passed farms in the valleys or on the wind-swept plateaus. Here Charlemagne and his barons hunted among stands of oak and beech; today men still shoot deer, wild boar, and smaller game, or cast for trout in the singing streams.

Four Sons of Aymon Ride a Giant Steed in Ath

Every summer the town of Ath holds a festival based on a religious procession first staged 600 years ago.

A fixture of the parade is a monstrous horse called Bayard. Legend says Bayard carried the princely sons of Aymon to safety from the wrath of Charlemagne.

Bayard the Horse, 23 feet high, weighs almost three-quarters of a ton. A dozen men concealed beneath his caparison propel the float and its youthful passengers.

Three large escutcheons represent the arms of Ath (front), a 15th-century chatelain of the town, and the brotherhood of Saint Marguerite, a patroness of gunners.

Mrs. Goliath waltzes down Ath's main street to celebrate her marriage to Mr. Goliath. Her costume hides a man supporting the 13-foot 255-pound frame. Through a peephole in the skirt he finds his way.

All Kodachromes by Bonnell Walker, National Geographic Staff © N.G.S.

A Bronze Lion Broods Over the Field Where Napoleon Met His Waterloo

It rained in Flanders on the night of June 17, 1815, as Europe slept in the terror of its most persistent nightmare—Napoleon. Escaped from Elba, the one-time master of the Continent had gathered an army and now stood ready to fight a climactic battle against Anglo-Dutch forces under Britain's Duke of Wellington. Early the next morning Napoleon surveyed the battlefield near Waterloo village and ordered delay until the mud dried enough to maneuver artillery.

While Napoleon waited, Prussian troops of Wellington's ally, Von Blücher, slogged through to the Iron Duke's aid, arriving as the battle raged in the afternoon. Napoleon was defeated; Waterloo marked the end of the first French Empire.

In the 1830's the Low Countries built the 148-foot hill (right) to mark the spot where the Prince of Orange fell wounded. The lion was cast by a Liège foundry in 1826. The rotunda houses a series of paintings showing decisive actions in the battle.

Gus Foscin and (left) Russell Walker, National Geographic staff

Curving around a tight bend in the Ourthe River, I entered La Roche en Ardenne (page 836). Mist swathed the ghostly ruins of a feudal castle looming above the town. I put up at an inviting inn and sat down to talk with proprietor Edmond Binet. He was also chef, mayor, and associate of the local tourist office.

In a tourist circular that Monsieur Binet handed me, I read of a beautiful lady phantom who haunted the town's castle.

"What's this all about?" I asked.

"You will see," he said.

After dinner the mayor accompanied me to the ruined fortress. The evening was stormy, the castle properly dank and gloomy. Then a spotlight came on, lighting an eerie figure on the stairway. I was suitably impressed—until the "ghost" removed its headdress to reveal, alas, not a beautiful lady but a bald-headed man.

I could only conclude that it's a phantom's prerogative to change face.

Like La Roche, Bastogne took a dreadful pounding in the last war. The enemy surrounded the town during the winter of 1944, isolating a U. S. detachment under Maj. Gen. Anthony C. McAuliffe. When the Germans called on him to surrender, the general replied with one short, sharp word—"Nuts!"—and went on fighting.

Though the enemy pushed west around Bastogne, the U. S. hold on that strategic

road center proved a serious thorn in the side of the Germans, diverting needed troops. Eventually, forces under Gen. George S. Patton relieved the beleaguered garrison.

Today Bastogne stands rebuilt around a market square gratefully named Place MacAuliffe. Here a bust of the general before one of his tanks occupies a place of honor. Facing the square, the Nuts Museum houses mementos of the heroic resistance. And on a hill outside the town a huge, star-shaped monument commemorates United States soldiers who fell in the Ardennes.

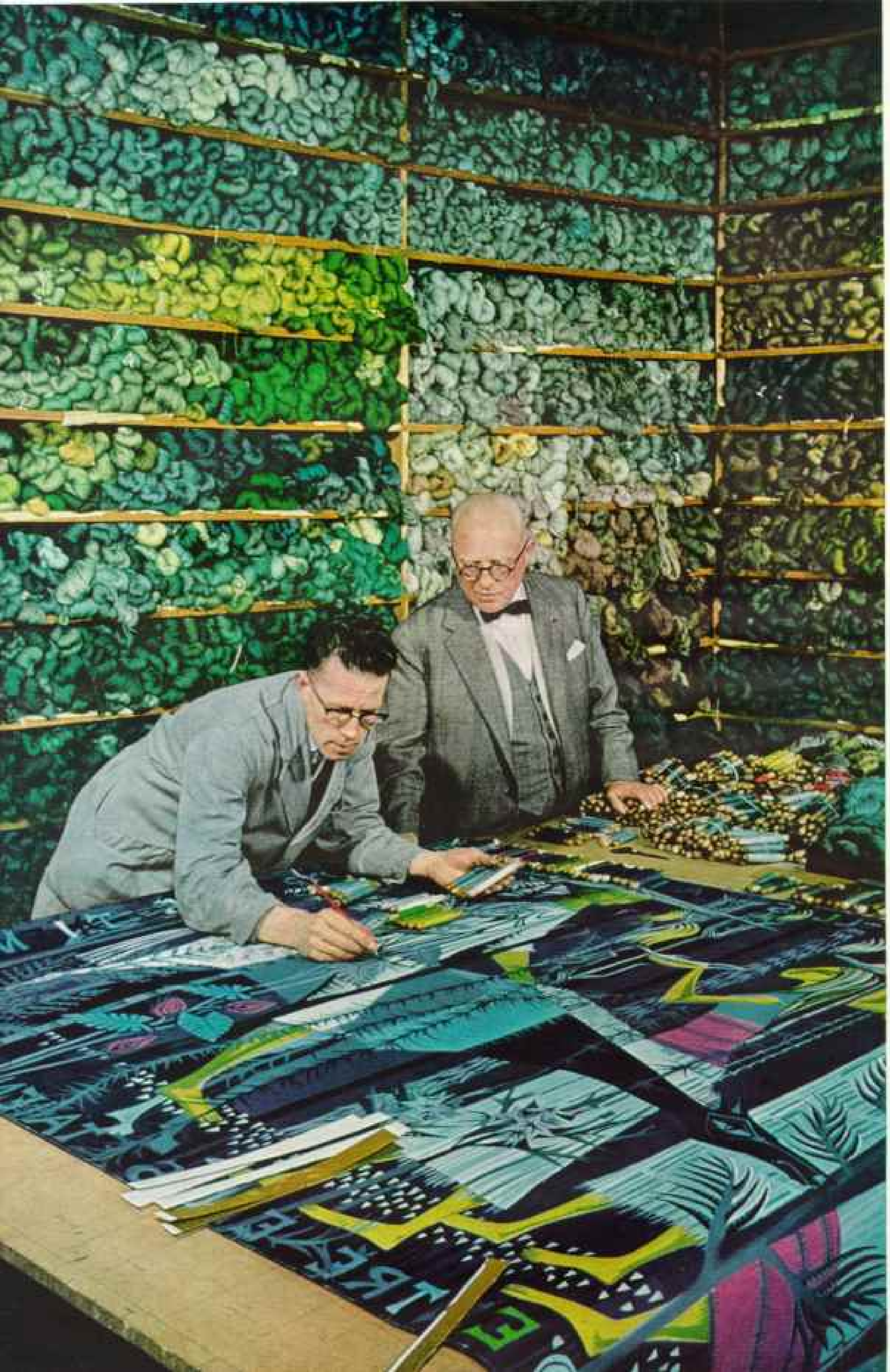
Tobacco Leaves Decorate Houses

In the southeast corner of Belgium I entered the valley of the Semois River, which all but ties a knot at Bouillon. This town, lying at the bottom of an earthen bowl, was born of a fortified castle perched on the rim. How long the fort has stood, no one could tell precisely. Godfrey of Bouillon sold it to the Church in 1095 before he set out on the First Crusade.

From here I stayed with the Semois until it flowed across the French frontier. The river wound through wooded ravines, refreshingly green valleys with scattered hamlets, and tobacco plantations. Though it was a Sunday, I found men and women working in the fields. They explained that the wet weather of the preceding weeks forced them to take advantage of this sunny Sabbath to gather the crop.

All through the Semois Valley I passed sheds filled with drying tobacco. The leaves decorated the stone houses on farms; in villages they hung under the eaves of slate-slab roofs. Roadside stands displayed boxes of cigars which, along with the delectable landscape, identify the region.

With regret I left this valley, only to enter another as pleasant. The Meuse River led me to Dinant, a little town largely renowned for copper art and fancy cakes. If it chose to do



anything so brash, the quiet commune could also blow its own horn as the birthplace of Adolphe Sax, inventor of the saxophone.

Dinant's setting, as strategic as it is picturesque, makes the town memorable. It straddles the Meuse. A sheer rock cliff crowned with a citadel guards the right bank. Beside the escarpment an onion-shaped church tower rises above gaily painted houses. Buildings on either shore cast reflections among passing boats and barges.

Bakers' Town Recalls a Mighty Horse

Although both world wars dealt the town brutal blows, true to Belgian character it has always snapped back. I found townspeople happily hammering out copperware and baking cakes. The copper work started here long enough ago for Dinant to give its name to the industry called *dinanderie*.

As to the origin of the cakes, I could not say. I visited a bakery founded in 1774 by an ancestor of the present owner, who still shapes a mixture of flour and honey in wooden hand-carved molds as old as his family business. The molds turn the cakes into fishes, ships, fruits, flowers, birds, animals, towns, and people (page 829).

About a mile upstream from Dinant I saw a pinnacle that appeared to have split away from the cliff on the river's right bank. This 115-foot-high needle of stone known as Bayard's Rock took its name from a legendary horse that is supposed to have rent the wall asunder.

The story goes that Bayard, ridden by the four brothers Aymon, was fleeing the wrath of Charlemagne. The boys had behaved badly in the Emperor's castle. In fact, one of them had killed the great man's own nephew in an argument over a chess game.

Imperial forces tracked down the fugitive Aymons and chased them and their mount Bayard onto a high cliff above the Meuse River. There was only one thing for Bayard to do: with a tremendous spring he leaped into the air, carrying his riders safely across the river. Such was the force of his leap that the rock wall cracked and split behind him.

The legend captured all Belgium's imagination. For centuries towns throughout the country have featured Bayard and the Aymon quartet in folklore festivals. I was to see the four sons ride again at Ath (page 830).

My time in Belgium was running out. I had to move with regrettable haste along perhaps the loveliest stretch of the Meuse. At the confluence of this river and the Sambre, I came to Namur, another strategic stronghold with a hilltop citadel.

The Meuse bent east and I went west, hating to leave the clean peace of the enchanting valley. Ahead loomed smoky forests of factory chimneys and mountains of slag in Charleroi and Mons, both districts engaged in mining coal and making steel.

Beyond these industrial regions, I regained quiet countryside and stopped at the Chateau of Beloeil, popularly called the "Belgian Versailles." The Prince and Princess Eugène de Ligne, whose forebears have lived here uninterruptedly for the last six centuries, showed me around their castle and grounds. Like the De Lignes themselves, their fief combined elegance, hospitality, and simplicity.

I continued on to Tournai, one of Belgium's oldest towns; cut through flax fields feeding the linen mills of Kortrijk; wheeled around to refight the Battle of Waterloo (page 832), then returned to Brussels.

Capital Wears Flowers for Guests

On a final walk to the Grand'Place I paused before a printed appeal by the Mayor of Brussels to his fellow citizens. I translated from the French:

"Belgium has invited the world in 1958. To the millions of visitors expected at the Exposition, our city will offer its customary hospitality, its traditional cordiality.

"From now on, think of dressing up your houses. Decorate windows, balconies, façades with flowers. You will thus add a cheerful, colorful note to the charms of Brussels. . . .

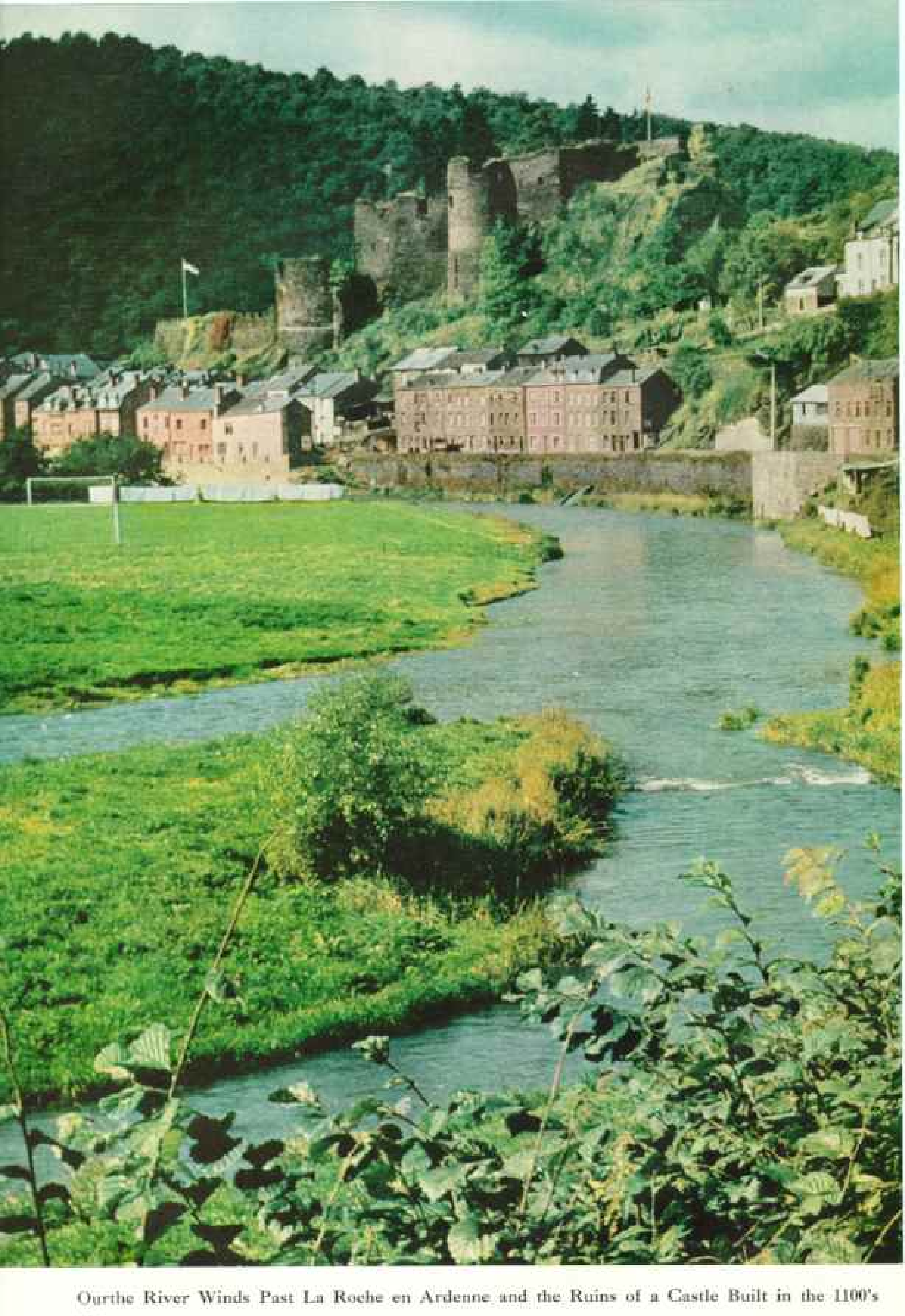
"The city itself will share in your gesture, embellishing its squares, gardens, and terraces.

"Thanks to all those who will answer this appeal."

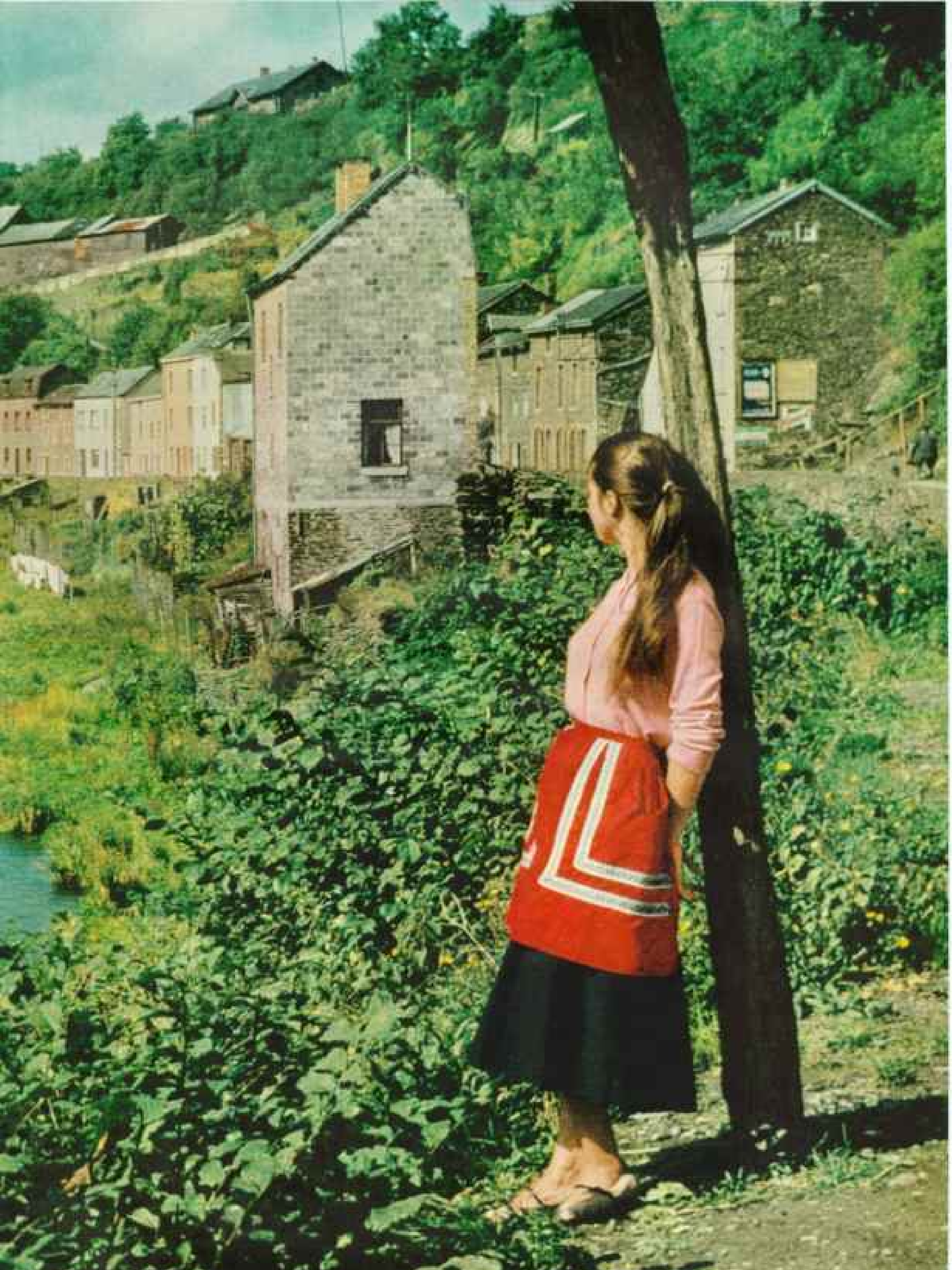
In that friendly spirit, Belgium today welcomes the world.

An Artist's Vision Takes Shape: the Design for a Hand-loomed Tapestry

Wools and silks of some 50,000 different shades go into the products of the De Wit tapestry factory in Mechelen. Gaspard de Wit (right), director of the family enterprise, personally designs the painted cartoons, or patterns. Here he supervises the most critical phase, the selection of wools. An associate numbers the hues in the painting as a guide to the weavers; since they work from the back of the tapestry, the pattern shows in reverse.



Ourthe River Winds Past La Roche en Ardenne and the Ruins of a Castle Built in the 1100's



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Marie-Thérèse Binet Gazes at the Rebuilt Town, Where Only Four Homes Survived World War II

The High World of the Rain Forest

In the Trinidad Jungle, Naturalist and Artist Work Together to Portray a Teeming Animal Kingdom Men Seldom See

By William Beebe, Sc.D.

Director Emeritus, Department of Tropical Research, New York Zoological Society

Illustrations from Paintings by Guy Neale

THE FIRST impression of a South American primitive tropical jungle or rain forest is its resemblance to a cathedral. There are vast heights, pillars, oblique shafts of light, buttresses, and aisles. Incense and silence enhance the illusion.

There are many kinds of woods and forests, but there is nothing else like the true primitive jungle. Next to the depths of the sea, the summit of a tropical rain forest is the most difficult place to reach to study the living beings that inhabit it. One has great depth, the other towering height; both have distinct stratification of life.

A World of Eat or Be Eaten

In their leafy canopy high above the ground, the inhabitants find food and mates. The vegetarians feed upon leaves, buds, nectar, bark, flowers, fruit, and wood. The remainder devour one another and strive to avoid their enemies. But all, from the smallest insect to the largest monkey, have a common foe—gravity.

The smaller the organism the less the danger from gravity. If a howling monkey loses its grip, the result may be a broken bone or death. But many beetles, on being threatened, fold their legs, let go, and bounce harmlessly.

Imagine that the jungle's trees and other vegetation have, by some miraculous means, become transparent. We see a whole world of life suspended in mid-air.

In the heart of the mighty transparent tree trunks, beetle grubs feed and live and perhaps listen for the approach of woodpeckers with deadly beaks. In the sunlight among the now-invisible upper branches flit hundreds of birds—gorgeous hummingbirds, toucans, macaws, and tanagers.

Others hop about on the ground or through the vanished underbrush. Small creatures swarm where the leaf mold and jungle debris had been. I once counted more than 500 in four square feet and doubtless missed as many more. Climbing up the trunks are tree creepers, woodpeckers, squirrels, snakes, anteaters, porcupines, and giant weasels.

Two groups of creatures, bats and sloths, defy gravity in a peculiar way, by hanging upside down. Bats cluster together like some strange fruit, launching themselves at night into the air on their membranous wings. Sloths may spend a month feeding on the leaves of a single tree. So nearly immovable are the curved claws that a sloth will continue to hang suspended for a long time after death.

There seem to be defects in the transparency of our jungle vegetation: patches of opaque bark and knotholes, flowers and fruit, twigs and leaves. These actually are animals—lizards and moths with patterns of lichens and bark; stick insects, mantids like flowers, parakeets and butterflies like leaves. Mimicry and protective coloration play intricate parts in the lives of tree animals.

The eight paintings on the following pages show this coloration and other aspects of jungle life. They were executed by the English artist Guy Neale under my direction at the New York Zoological Society's field station at Simla, in the Arima Valley, Trinidad.

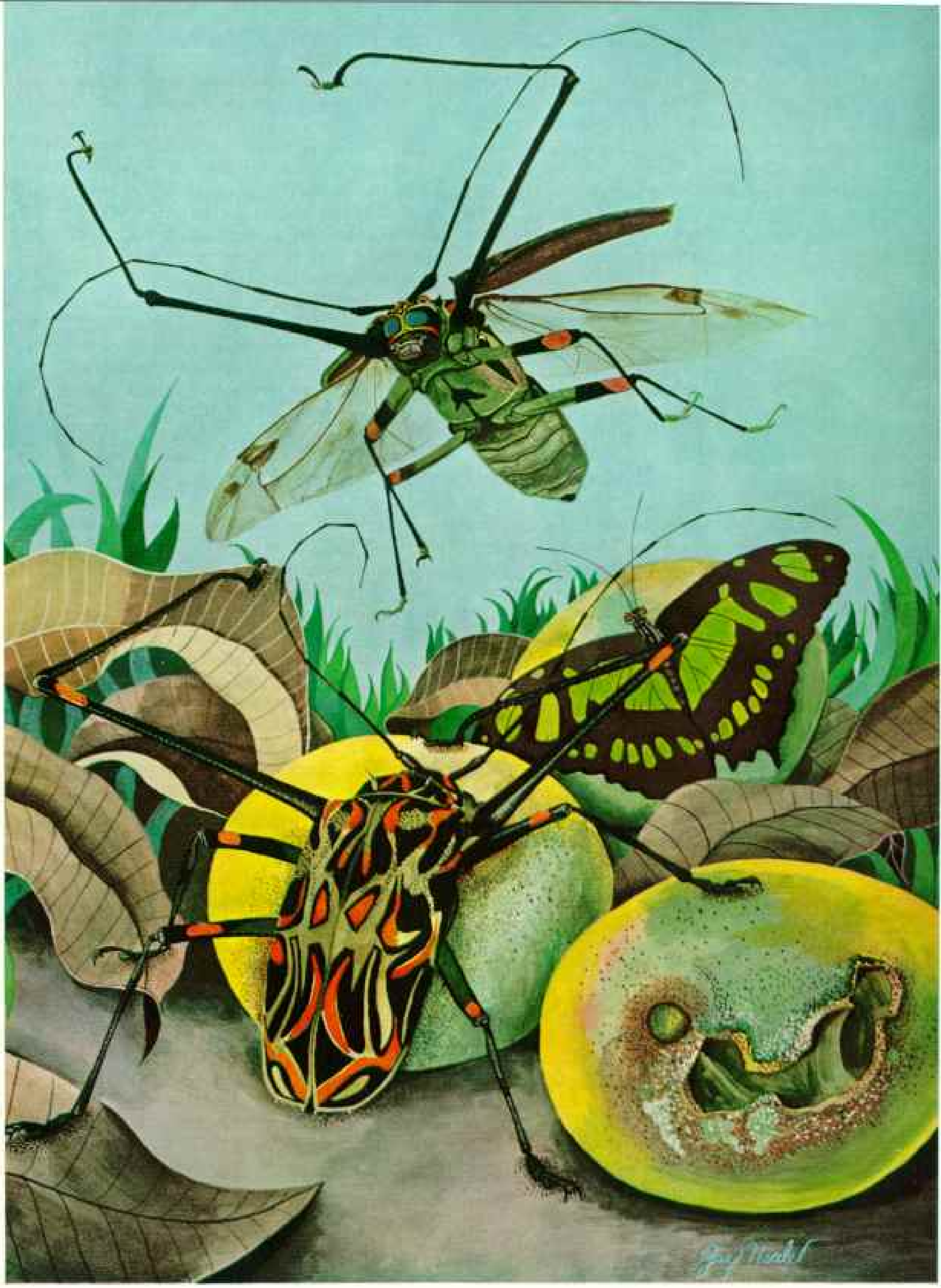
Artist Paints a Jungle Banquet

Mr. Neale's first painting (opposite) shows three bright-hued insects at a grapefruit feast.

Swayed by the wind, our fruit bumped against the rough bark of a branch until the skin was deeply bruised. A giant oriole enlarged the abrasion and fed on the succulent juice. Then a gale blew the grapefruit to the ground on the edge of the jungle.

Now began a new life-in-death. Molds and fungi brought color and odor. Bacteria thrived in the juices. Now the dead fruit offered nothing but fermentation and decay; yet beautiful creatures came to the repast.

The checkered green, jungle-leaf, or malachite butterfly (*Victorina steneles*), as it is variously called, is a frequent visitor to the incredible meal. Its leaf-green spots and splashes on black wings enable it, among the



Long-armed harlequin beetles and a jungle-leaf butterfly imbibe the liquor of overripe grapefruit on the edge of a Trinidad rain forest. Artist Neale's vivid paintings depict the swarming tropical domain, a twilight world that resists man's prying eye.

lights and shadows of the forest, to blend uncannily with sun-splashed leaves.

Volatile emanations from the decaying fruit summon splendid tropical beetles, one almost three inches long. This is a long-armed harlequin beetle (*Acrocinus longimanus*). Its great wing covers have all the beauty of a rich oriental rug. On a background of olive ocher are great splashes and arabesques of jasper red, framed in black.

With a loud, insistent roaring hum, another harlequin beetle appears, flying through the jungle, legs spread wide, wing cases aloft, and membranous wings a pale blur. When it alights it begins a special song, a series of rapid, zizzing squeaks. In making the sound its head trembles like a doddering old man.

Enormous eyes are wrapped around the front of the head, forming a sheet of facets. The thorax bears a colored cartouche of graceful design. Slender antennae are nearly three times the length of the whole insect, but the most striking members are the forelegs. Upper and lower portions are enormously lengthened, the femur and the tibia each equaling the entire length of the insect.

Yet when the beetle flexes its legs, the distant foot can clean the eyes and head as deftly as though the limbs were of normal length. No use is known for these exaggerated legs, but they are a decided liability when a beetle tipsy on fermented citrus juice takes a walk.

Insects with Hobgoblin Faces

FROM the opposite page stare eight bizarre faces, chosen from many score which have peered out as we walked through the jungle. To give each its proper body would test the knowledge of the best naturalist.

Looking at just a part of an animal instead of the whole is rather like taking a single phrase or sentence out of context: the result may be surprising.

This is particularly true when we look a common fly, a grasshopper, or a spider in the face without seeing the rest of its body. It may, in fact, be almost unrecognizable.

Line-up of a Weird Rogues' Gallery

Let us consider these faces, starting in the upper row and proceeding from left to right.

No. 1 is most difficult to place, for it is as yet unnamed—and it defies description. It is certainly a tropical May fly. It is probably short lived, like its relatives, possibly emerging from the larval skin, molting once again, flying, mating, laying its eggs, and dying between dusk and dawn of a single night.

No. 2 requires a side view to identify it as a membracid, a tree hopper (pages 850-51). From in front it appears to be a double-decked helicopter. Viewing it laterally, we realize the value of the elongated horny trident which arches over the soft body. The whole insect is protected from above by this armored scaffolding.

The artist has given face No. 3 enough body to show without doubt that it belongs to a caterpillar. The head is very like a Halloween pumpkin face, reddish buff with false black eyes and nose. The adult is unknown, but it may well be a species of hesperiid.

Face No. 4 resembles a miniature horse with four eyes. It is the face of a tropical ant lion called ascalaphid, from the Greek word meaning owl, because of the nocturnal habits of some of the species. The head is covered with a strangely un-insectlike coat of hair, both around and between the eyes, and the eyes themselves are divided by a deep groove which seems to double them. The larvae lie in ambush to seize and devour unwary ants.

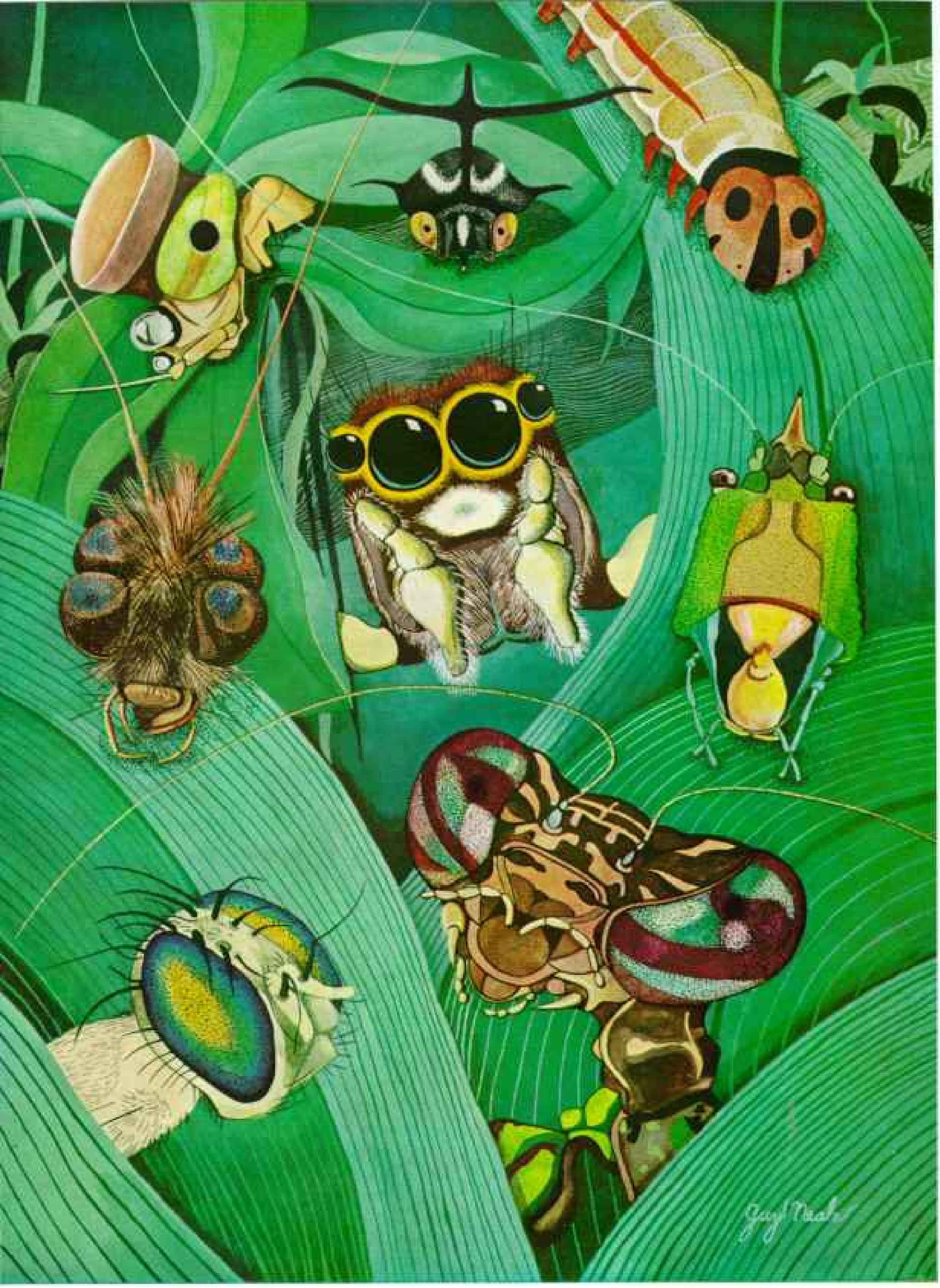
Face No. 5, with its quartet of glaring headlight eyes, can be nothing but a jumping spider. Four remaining eyes are hidden but are doubtless focused on the surrounding leaves, which hide the next creature to fall prey to this little tiger of the jungle.

No. 6 is a terrifying animal of human expression, with small, fearful eyes peering over jade-green jowls ending in a pair of slender turquoise jaws. No less strange are the habits of this grasshopper, for it is carnivorous, a thing as unexpected as a cow leaping upon, killing, and devouring a hen.

Eye Colors Fade in Death

No. 7 is a fly—a tropical jungle fly, with enormous iridescent eyes and a scanty head covering of coarse, spinelike hairs. A few minutes after death all color fades from the eyes, but in life they show a variegated pattern as beautiful as a butterfly's scales. These are so characteristic that they could well be used for reliable classification.

Last but not least we have No. 8, unquestionably a praying mantis, with head turned, its gaze directed straight at us, each eye a fabulous color scroll of changing brown, green, maroon, pink, and blue.



Bizarre insect faces, a gallery of science-fiction monsters, peer from lush folds of green. Only the creeping caterpillar proves easily recognizable. Author Beebe identifies these Halloween visages on the opposite page.

Ghostly Butterflies Perch on an Immortelle Tree

THE GORGEOUS scarlet-flowering bois immortelle (*Erythrina micropteryx*) is one of Trinidad's most abundant trees as well as its showiest. At first glance it would seem to have some of the hallmarks of a weed; it is often seen as a wild plant growing in cultivated fields, a plant out of place.

This species of immortelle was imported from Peru many years ago, but unlike the majority of such introductions it has found a place for itself as both a useful and an esthetic addition to the Trinidad flora. As we fly over the island, great areas of these blossoming trees come into view. Each tract marks the outline of a cacao plantation, for which the majestic trees provide necessary shade. They well deserve the local name *madre de cacao*.

Spiny Armor Discourages Monkeys

The niche that immortelles have won for themselves is an interesting one. The color of the blossoms and their lack of odor combine to make them lonely at night, for moths or other nocturnal insects are more attracted to lighter-hued, scented flowers.

Through the years a full-grown tree may reach a height of 80 to 90 feet, with a trunk armed with serried spines. Such an array is an effective barrier to monkeys and other arboreal creatures. This insulation against predators is a boon to the caciques, or giant orioles, that live in colonies and fasten their pendulous nests to the tips of lofty branches.

With consummate but instinctive skill the orioles attach their finely woven five-foot nests in safety, out of the reach of all but winged enemies. With most of these latter they can cope by sheer weight of numbers and fighting ability. Less successful is their resistance to the parasitic giant cowbirds, which haunt the tree and seize every opportunity to lay an egg in the caciques' nests.

Hummingbirds appear with the first bloom and remain until new green leaves replace the flowers. These visitors, together with passing butterflies, make a scene of superb color.

The background is the tropical blue sky; then comes the coral and scarlet of the solid mass of bloom, unshaded by a single green leaf. The hummingbirds dart back and forth like iridescent bits of molten meteors. They vary from the hermits, with long, flowing tail feathers, to the diminutive tufted coquettes, less than three inches over-all and wearing Elizabethan ruffs of cinnamon and emerald on the sides of their heads.

Butterflies of endless shapes and colors add to the chromatic pattern. Their visits to the trees are brief, however, for the long flower tubes leading to the nectaries are gauged for the tongues of hummingbirds rather than those of butterflies.

Color is present in almost every part of our terrestrial globe, and in the animal world may be fraught with life and death, playing a vital role as warning or protection. But there are two vast areas on the earth which are comparatively colorless—the ocean and the air. A host of oceanic creatures have taken advantage of this clarity and have themselves become transparent.

Certain snails, worms, crustaceans, jellyfish, and fish have evolved a freedom from color and opacity. Many fish are revealed only by their silvery iridescence, the food they have swallowed, their faint shadows, or an unaccountable swirl in the water. There is no need for the scientist to dissect such creatures; every organ and tissue is ready for direct study.

What of the transparent sea of air in which we live and move and breathe? What a marvelous thing would be a transparent bird or bat, or even a translucent eagle. But the air is too thin to support heavy bodies without substantial lifting limbs. Only by sturdy wings can animals attain flight through the air, temporarily conquering gravity.

Insects with Transparent Wings

Insects alone have evolved wings so large and bodies so small that transparency is possible. Several families of butterflies have acquired transparency by a modification of the color-bearing scales. In some these are reduced in size or in numbers, in others they are changed to fine hairs or are actually set on edge like open slats of a Venetian blind. Or the scales may become transparent themselves or be so loosely attached that they soon fall off, to reveal the clear membrane beneath.

Such a variety of adaptations only increases our wonder and bewilderment at the intricacy of nature, whether in the colorful immortelles and hummingbirds, or in the glasslike transparency of jellyfish and butterflies.

The wings of these casual butterfly visitors to our immortelle tree are transparent because the scales are reduced to minute hairs. Their full name is the "transparent one of the forest," or, as the scientist would put it, *Ithomia drymo pellucida*.

Butterflies with windowpane wings flutter among blossoms of the flaming immortelle. A bug in kaleidoscope dress crawls warily up the spiny branch. The tree's riotous bloom is springtime glory; summer's green leaves shade many Trinidad plantations.

Sleeping Butterflies Hang by Their Feet

MANKIND, hummingbirds, and butterflies are diurnal, light-loving creatures. All spend the hours of the day concerned with the affairs of their lives, and all relax in sleep at night.

In addition, all three classes are given to migration. In man it may be on a wholesale plan, as when the Goths swept southward through Europe and overwhelmed Rome. In the hummingbird it may be on the scale of a grand tour, annually from Alaska to Mexico, a round trip of several thousand miles. This is the more astonishing in a bird whose weight is scarcely that of a penny.

Butterflies Migrate in Dense Clouds

The migration of butterflies, in dramatic appearance, excels that of birds, for it takes place in the bright light of day and may number millions of individuals. The best known butterfly migrant is perhaps the monarch.*

I have heard of a place favored by the fluttering hosts where to kill a monarch butterfly is to be threatened with fine and imprisonment. This, I regret to say, is not stimulated by entomological feeling but by the danger of losing remunerative tourist visits.

Once, while riding with a party along a mountain trail in northern Burma, we entered an enormous cloud of golden butterflies, which alighted on our clothing, horses, and ourselves. I captured a few specimens for identification; my Burmese companions gently picked off the insects or carefully brushed them away, for they believed these butterflies to be the wandering spirits of men who are asleep.

A mass migration of butterflies is usually come upon suddenly, without warning. A few scattered golden yellows drift by, a skein of a dozen fly past, then abruptly the surrounding air is filled with them. For hours or for days the butterflies pass, in an uncountable fluttering swarm.

A narrow-winged black butterfly with slashes of scarlet across the forewings may be the first to catch the eye or enter the net of a newcomer to the Tropics. Further acquaintance reveals that it is a *Heliconius*, either *melpomene* or *erato*.† This tells us that 200 years ago the mind of Linnaeus, the naturalist, turned to Greek mythology as he looked at the nameless butterflies before him. He thought of the muses of tragedy and of lyric poetry, and their home on Mount Helicon.

This butterfly seems to have little fear of man or of other possible dangers. Seldom rising higher than 20 feet above the ground, *Heliconius* flits through the open forest without ever brushing a wing against the mesh of vines, tendrils, and leaves.

I watched one as it fluttered at sunset one day along a trail, sometimes almost brushing against me. It forged ahead and after a few yards I found it resting in a small spot of sunlight. Then a cloud obscured the light, and the butterfly flew to a cluster of leaves, where it began a curious pushing and butting with both body and wings.

Suddenly, instead of one, there were four butterflies, three of the pendant leaves having changed into insects. *Heliconius* had led me, on its daily migration, to the sleeping place of its fellows. Search revealed eight more, and before long two newcomers came up the trail.

As the dusk increased, more and more came, until I counted 49. Soon the fluttering ceased. I carefully picked one sleeper from its twig, and the legs let go without resistance. I put it back, and the feet again supported the insect. It had not awakened.

Another I carried away a few yards and blew upon it with no result. It slept quietly. Then I shook and jarred it, and at once the body curved around, two tufts of hairs appeared, and the air was filled with the odor of witch hazel. To a human this is a pleasant, clean odor, but it must be a potent defense against many enemies.

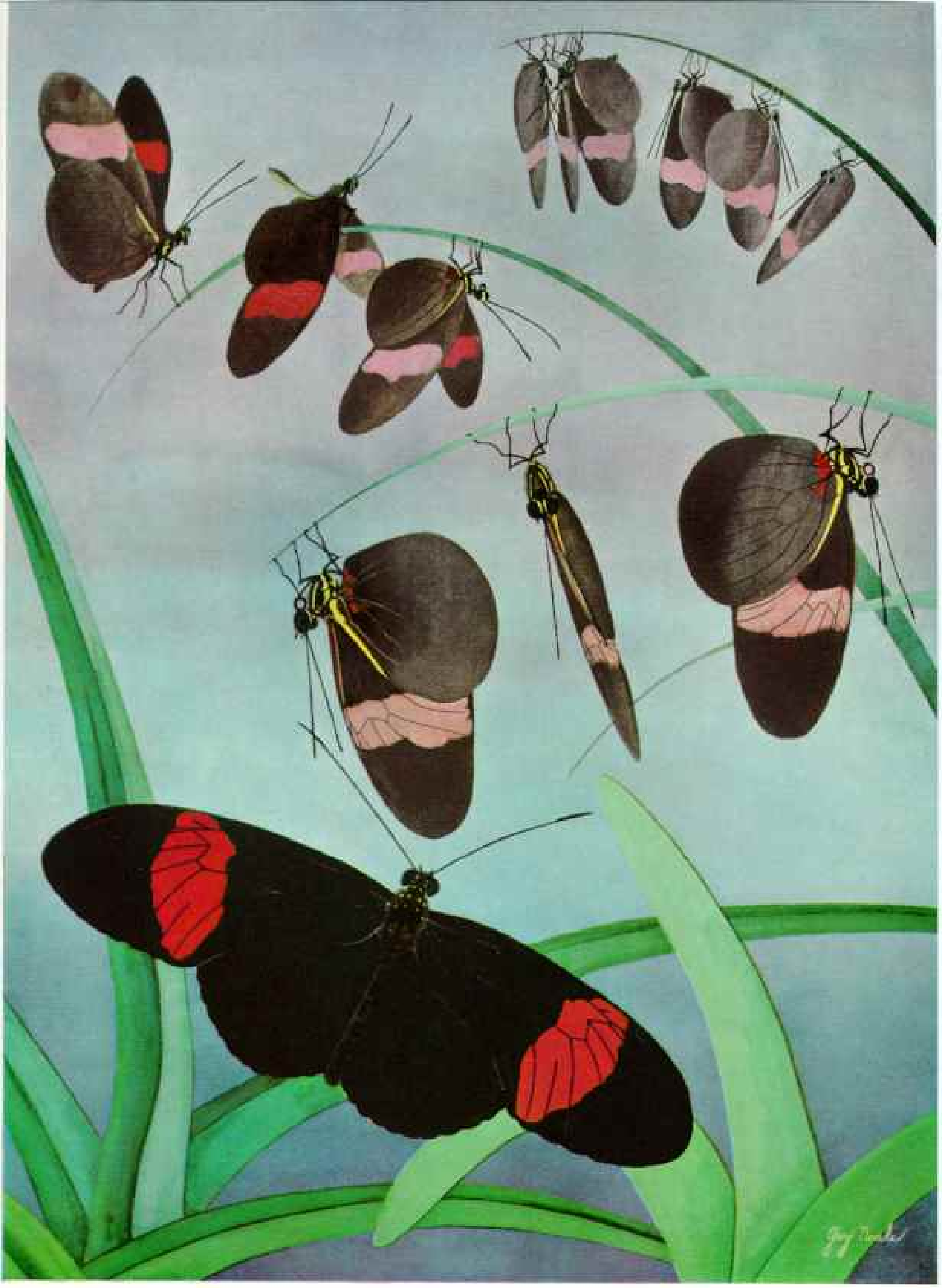
Wanderers Return to the Same Twig

What guides the butterfly to its sleeping place? It seems probable that locality sense plays the dominant part, but it is equally certain that odor is important. If we watch a particular butterfly, say one with a distinctive tear in its wing, we may find that it alights on the same twig and even the same part of the twig on successive evenings. It is not uncommon to see an incoming melpomene or erato waken and drive away one of its fellows and take its place on the perch.

We have never witnessed the inception of a sleeping colony, but we have observed the ending. As time goes on the members become more bedraggled and worn, and finally the last insect fails to return. Then the dormitory may lie empty until a new colony takes over the following year.

* See "Butterfly Travelers," by C. B. Williams, NATIONAL GEOGRAPHIC MAGAZINE, May, 1937.

† See "Keeping House for Tropical Butterflies," by Jocelyn Crane, NATIONAL GEOGRAPHIC MAGAZINE, August, 1957.



Like pendant blossoms, sleeping erato butterflies hang upside down from slender leaves. Night after night they may lodge their feather-light bodies on the same dormitory perches. Bright red slashes atop the wings show pale pink on undersides.

Photograph by M. Woodbridge Williams, National Geographic Staff

Jungle Watching, Dr. Beebe Squats East Indian Fashion at Streamside

Here the author demonstrates a number of his time-tested rules for observing wildlife (opposite page). He ventures alone into the rain forest; wears drab clothing; opens his mouth slightly while listening for faint sounds; and holds the glasses close to his nose.

Marco Polo of Nature's Realm, Dr. Beebe Faces a Friend

Scientist, explorer, writer—these are the labels worn by Dr. William Beebe. Since postgraduate work at Columbia University in 1899, he has roamed the far places of the earth, delving into the mysteries of nature and sharing his knowledge with the world. An early idol and field-trip mentor was Theodore Roosevelt. From T. R. young Beebe learned that the three most valuable words in a scientist's vocabulary are "I don't know."

Beginning in 1930, he fired the world's imagination with a series of descents into ocean depths in the bathysphere, a steel ball lowered from a barge. In 1934, in a dive sponsored by the National Geographic Society, Beebe and Otis Barton reached a record depth of 3,028 feet in Bermuda waters. Four of Beebe's articles describing strange undersea creatures have appeared in the NATIONAL GEOGRAPHIC MAGAZINE.

Dr. Beebe, who retired in 1952 as Director of Tropical Research for the New York Zoological Society, spends half of each year at his New York home and half at the Zoological Society's field station in the Arima Valley of Trinidad. There he continues his studies of jungle creatures, such as this friendly lizard perching on a stick.

The Author Lists 12 Rules for Observing Wild Birds and Animals in the Forest

An explorer in the deep sea must provide himself with breathable air and a metal shell to withstand the terrific pressure. For a successful study of forest wildlife the human intruder must be cloaked in silence, be as motionless as possible as well as mute. With eyes, ears, and nostrils he must be ready to register and record everything that can be detected by his imperfect senses. Two items of equipment are a pair of binoculars (my choice is 7 x 50) and a good squeaker, or bird call, judiciously used. Here are a dozen rules for jungle watching:

1. Move only when the wind blows and moves the leaves.

2. When a wild creature is near, keep eyes partly closed. Animals do not like to be stared at.

3. Hold hands high so that any movement is down, as leaves fall.

4. When listening to faint sounds, keep mouth slightly open (as lovers of music do in the top gallery of the opera).

5. Drab clothes are best, but a scarlet or blue shirt will do no harm if one keeps still. It is movement, not color, which frightens wildlife.

6. If sand flies or mosquitoes are bad, do not be ashamed to use a repellent. A dozen mosquitoes biting at once may disturb the toughest observer.

7. When approaching a singing bird, take a step during each song; many birds will not notice.

8. Learn to squat East Indian fashion. It allows two slight shifts which alternately ease all muscles, and keeps you clear of wet surfaces and *bête rouge* (red bug).

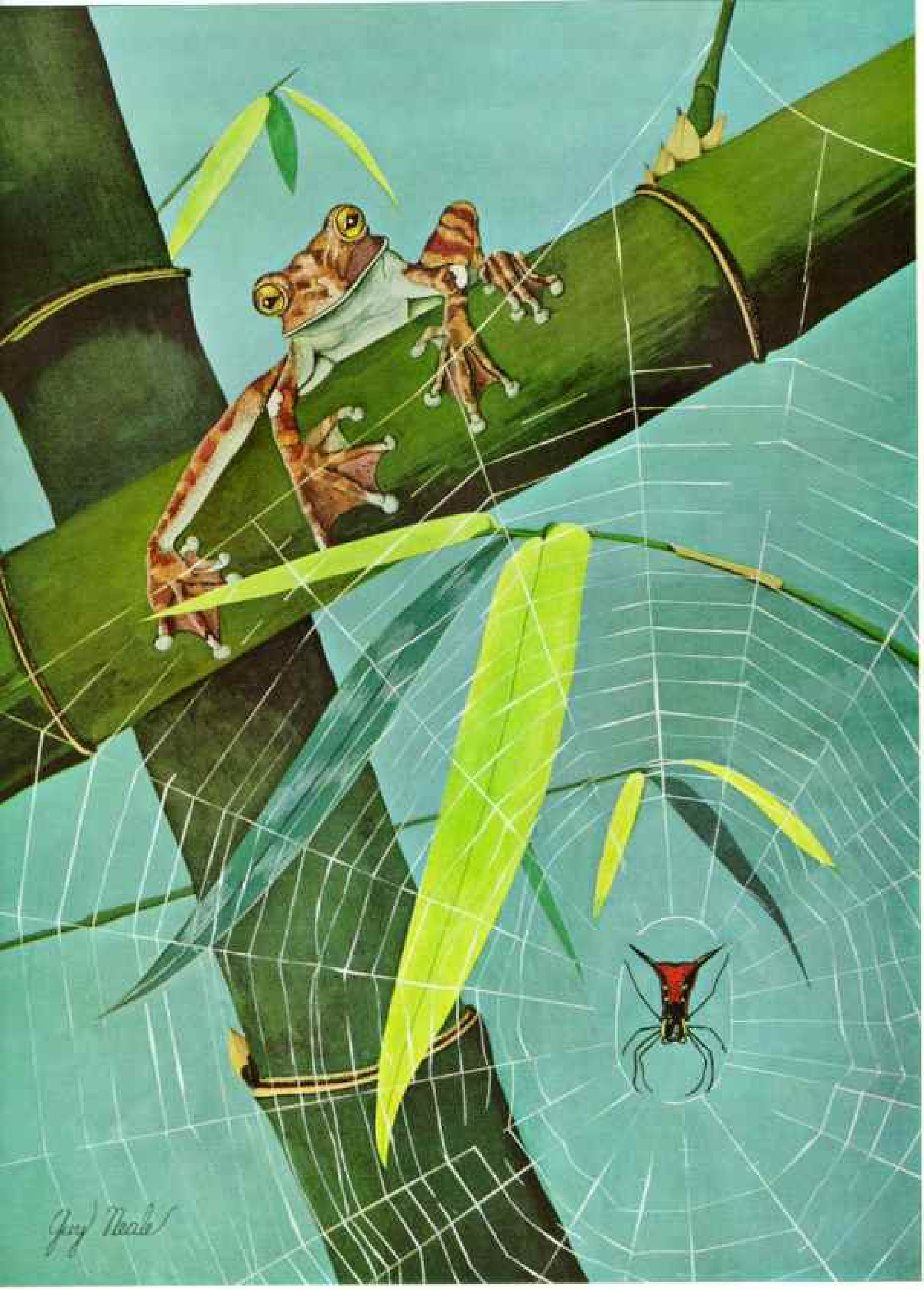
9. When squatting, hold glasses close to nose, so they can be shifted to eyes with a minimum of motion.

10. Don't trust your eyes or memory when you can check and recheck.

11. A sudden yell or gunshot frightens wild birds for a few seconds, but the effects of a cough or a sneeze will last much longer.

12. A low monotone in speaking is less disturbing than a hissing whisper.

In jungle work one person is a necessity, two are a crowd. The only use for three or four persons is to have them walk ahead in single file, and for you yourself suddenly to stop and squat motionless, and have the others go on. Animals cannot count, and you may escape notice by some of the hundreds of watching eyes.



Moonlight encounter between giant tree frog and thorn spider is peaceful: the thornlike spines of the smaller creature make it unpalatable. The tree frog, a master of camouflage, can alternate coats of red-brown and olive-buff.

Frog and Spider Meet in a Bamboo Clump

A GIANT tree frog and a thorn spider meet in a bamboo grove in moonlight. It is an accidental and a peaceful encounter. The spider desires nothing more than a fly or moth entangled in its web; the frog is deterred from eating the spider by the hard, projecting spines for which it is named.

These two easily enter this slippery world of polished bamboo, the frog by means of large clinging feet, the spider swinging from a maze of aerial silken cables that it draws from its own hidden reservoirs. They can move about at will, the frog by leaping, the spider by walking or swaying at the end of its homemade thread.

The great frog has a voice audible a quarter of a mile away. The spider, voiceless, is forever mute, whether it is spinning, capturing its prey, or guarding its batch of eggs.

Frogs and Humans Closely Related

As vertebrates, humans and frogs are blood brothers under the skin. When the skeletons of a man and a frog are placed side by side, the stories of the "Frog Footman" and "Mister Toad" are not such fairy tales as they may appear. Both frogs and ourselves start life immersed in fluid, and both develop several gills—in the tadpole to function, in the frog to be superseded by lungs. Likewise in ourselves gills shift into other structures, such as lower jaw, ear bones, and tongue.

The giant frog's world is fraught with dangers, and this creature seems to be unusually handicapped, for it has few defensive weapons. In the face of attack it can only retreat by strong leaps, or hope to avoid notice by continued immobility. Here it has the advantage of alternate color patterns that blend into the jungle background.

Its great staring eyes are as efficient as they are decorative. When wide open, they reveal a golden iris surrounding a diamond-shaped pupil. When the eyelid rises and covers the eye, it proves to be a delicate tracery of silver veins, so transparent that the eye can still see.

Our tree frog is well named *Hyla maxima*, for its total length may be as much as ten inches. It spends the day crouching flat on a leaf over the water. At dusk it awakens and begins to search for food. It swallows such diverse creatures as millepedes, small frogs, lizards, young mice, roaches, and moths. However, it learns to discriminate and never takes a bitter-tasting insect twice.

With the advent of the rains the great frog clears its throat and joins with its fellows in a nightly chorus, a summons to the females. The utterance is a deep, reverberating bass rumble, short and sonorous, at intervals of about a second.*

The sound has a primitive quality, and so it should, for the voice of amphibians was first raised in the carboniferous period, 250,000,000 years ago, as attested by the finding of fossils with ear sockets. This must have been the first vertebrate voice to arise on the prehistoric air.

A frog, developing in a brief month or two from the tadpole stage, roughly relives the evolution of its ancestors throughout millions of years. From a fishlike creature with gills, fins, and primitive sense organs, it spans the ages before our eyes, changing from an aquatic vegetarian into a reptilelike carnivore possessed of a voice, four legs, and lungs. If tadpoles and frogs were exceedingly rare creatures, they would be eulogized as the most remarkable of living missing links.

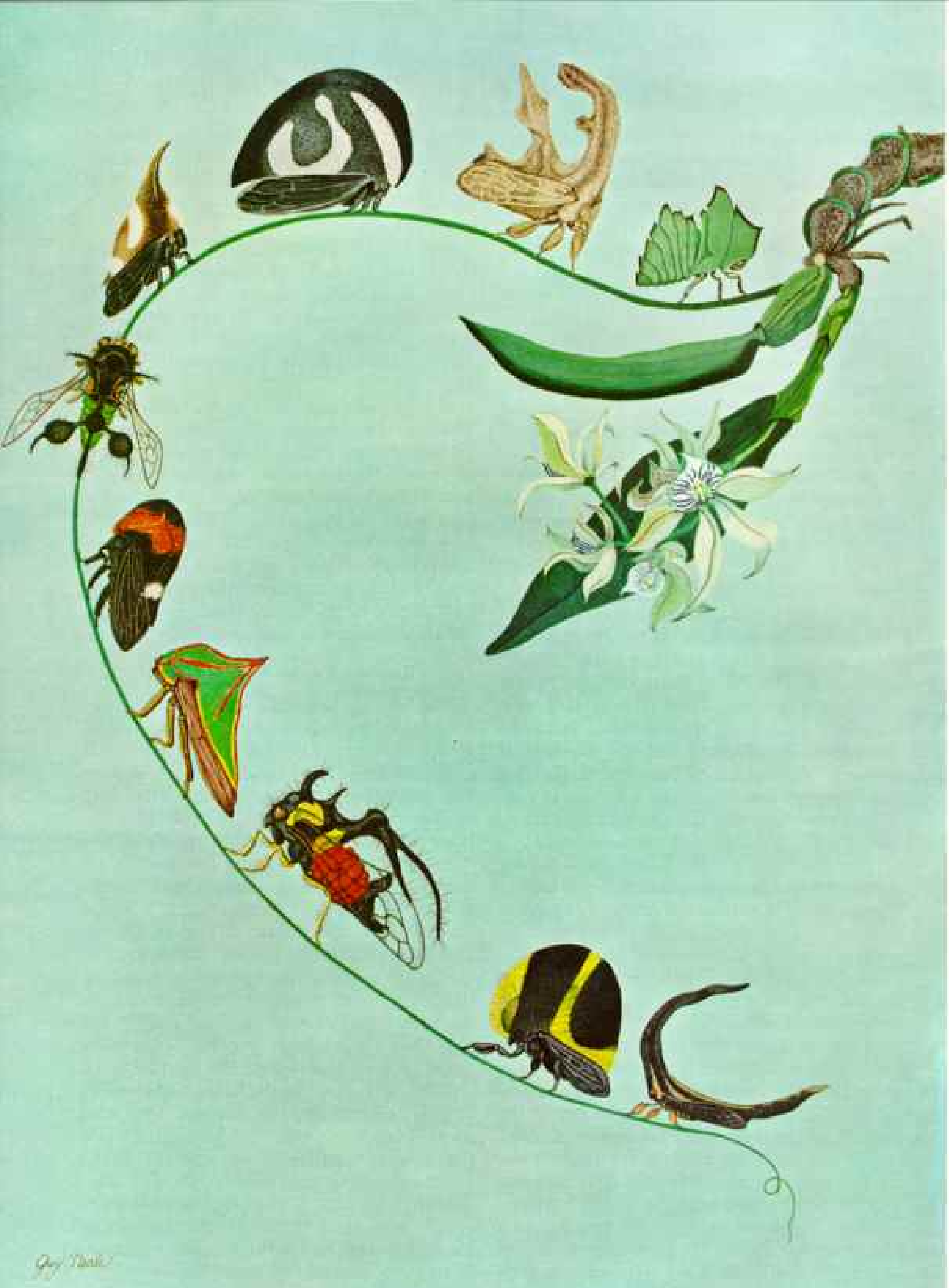
Bamboo Raises Voice in Wind

The bamboo forest has a voice of its own, a mysterious, unpredictable sequence of sounds. I hope sometime to watch the emotions of a great conductor, seated under a clump of bamboo while the wind force changes from zero to 12—calm to storm. He will never be bored by repetition or lack of variety.

Before the leaves record the gentlest of breezes there comes a sound like a distant cricket beginning its song, only it is not a cricket, and not distant. The breeze increases, and from the far side of the bamboo clump one hears a telegraph key with audible dots and dashes in some unknown code. As the wind comes in gusts, a sound exactly like the roll of a woodpecker rings out, followed by the howl and whine of wind in a ship's rigging.

Thunder is never in the bamboo repertoire; that is reserved for the awesome roar of a great jungle tree's fall. But intermittent rifle fire gives a startling accompaniment to the catastrophe of burning bamboo, when on occasion it is set afire to provide space for more economic plants. As the air and moisture in the multitude of hollow bamboo joints becomes heated, the engendered steam bursts its cells in the giant pipes of grass and explodes. The dying bamboo discharges its own funeral volley.

* See "Voices of the Night," by Arthur A. Allen, NATIONAL GEOGRAPHIC MAGAZINE, April, 1950.



Tree hoppers, parading up a wild-orchid stem, display an amazing variety of camouflage and protective armor. These tiny sapsuckers "look like nothing but themselves," says Dr. Beebe, but their shields suggest sails, thorns, leaves, and crescents.

Membracids Wear Fantastic Armor

MEMBRACID is the name of a group of strange little bugs otherwise known as tree hoppers. More than 2,500 kinds share the earth with us, inhabiting every continent. So whether you are Chinese, French, Brazilian, or American, you may find a tree hopper in your own back yard.

These insects represent an explosive type of evolution. Like a shower of sparks from an exploding skyrocket, certain organisms, evolving along a slender family tree, suddenly burst into a galaxy of living forms. Examples are orchids, birds of paradise, hummingbirds, and horned scarab beetles as well as our tree hoppers. Each is represented by many living species, amazingly varied in looks.

Jungle Shelters Widest Variety

In the lights and shadows of the South American jungle this variation in form of tree hoppers reaches its maximum. Witness this strange procession walking up the stem of an orchid.

From birth to death the chief occupation of a tree hopper is sapsucking. With its proboscis it punctures stem, bud, or leaf and drinks the life fluid of weed, shrub, or tree. Depending on the supply, it may spend hours or even days without moving.

After an unrecorded courtship and a brief mating, the tree hopper deposits its eggs either in long lines or small clusters in oval nests of brown or white wax. In the Tropics the female membracid often remains sitting upon her eggs until they are hatched.

From the eggs emerge nymphs, or young membracids, wholly unlike their parents. They are soft bodied, often covered with a white mealy substance and decorated with black spines. At once they sink their little sap wells and soon begin to give off drops of honeydew. Then come thirsty ants, that drink the free lunch of secondhand sap.

The ants apparently do not herd these waxy cows, but when in danger defend themselves, and indirectly their insect fonts, savagely and with great vigor. In some cases the attending ants erect byres or tunnels of vegetable dust and fibers over the immature membracids.

Five times within a month the young bugs molt and change their skins, losing their baby spines and doubling and redoubling in size. At the fifth shift, bumps and lumps may develop until they resemble the outline of Santa Claus's sack of gifts.

Membracid eggs look like small seeds; membracid nymphs more or less resemble other nymphs. But the full-grown creature, the tree hopper that clambers out of the nymph's fifth skin, looks like nothing but itself.

A selection of a score of membracids may suggest, in armature and ornamentation, the following objects: crescent, keel, bell, arc, bean, heart, lens, sickle, pear, helmet, shield, oar, beak, hook, ball, initial, and handle. One tree hopper suspends three spheres in conventional pawnbroker style, another carries the initials "EL" as if on a float.

Seen in their natural haunts and postures, some of these insects are almost indistinguishable from stipules, buds, thorns, leaves, galls, and fungi. Others mimic wasps and ants.

These spines, humps, balls, and crescents are only buffers and masks sheltering the real soft-bodied, defenseless tree hoppers beneath. As odd as the outgrowths themselves is their method of attachment. They may extend far beyond the body of the insect, or stand erect, flat and conspicuous as a billboard; yet all arise from a single small body segment. This is the prothorax, directly behind the head, and from this alone spring all the fantastic structures.

Spines Discourage Predators

The average spider, lizard, or bird seeking a succulent bit of food would be discouraged by the hard, spiny exterior. But sometimes an enemy approaches closer, looking for a chink in the armor. At the first suspicion of danger the tree hopper deserts sap well and nest, and walks along the stem. Or it may scuttle around to the opposite side. If the threat continues, the insect leaps into the air. This is of the nature of an automatic or mechanical take-off, for at the height of the hop four membranous wings appear from somewhere and lift the insect with incredible speed.

This feat is no more or less wonderful than for a heavy truck to spread diminutive wings and go whirring off into the blue. Every tree hopper has, in addition, a built-in homing ability which somehow enables it to find its way back to well or eggs.

No. 1 in the procession painted by Guy Neale is a good mimic of a leaf-carrying ant; Nos. 4 and 7 are almost indistinguishable from vegetable thorns. Nos. 5 and 8, viewed from above, are reasonable ants. The remainder of the procession provides substance for wildest speculation.

Mouth agape, a green lizard advances on two praying mantises. One freezes on a flower while the other, a dried-leaf mantis, gives a sudden show of outspread forelegs and performs a frantic jig. She unfurls filigree fans above purple-pink bands.

A Lizard, a Mantis, and a Dance of Intimidation

A GREEN LIZARD encounters two praying mantises on the edge of a tropical jungle. We can think of these merely as a reptile and two insects, or we can look more closely and consider their structure, make-up, and attitude: the upper mantis in motionless pose, the lizard threatening attack, and the second insect displaying desperation.

The green lizard is much more than his name implies. Even his color is deceiving; a hand lens resolves his mosaic of scales into varying tints and shades of green. In a color book we find them listed under such enchanting names as night, calliste, cossack, peacock, emerald, oil, viridian, parrot, and turquoise. Yet before our eyes the greens may fade and the lizard turn to dull brown. These changing colors and patterns have given the animal his name: *Polychrus marmoratus*, the many-colored marbled lizard.

Creatures Accept Man's Friendship

One remarkable trait is common to both lizard and mantis—their adaptability to close association with men. Given a week of feeding and handling, *Polychrus* will accept humans as friendly providers. He will cling contentedly and be carried around for hours on one's clothing. Held close to a window, he will systematically clear it of flies.

There are more than 2,000 species of mantids in the world, and every single insect is an individualist.* From their near relatives —roaches, crickets, grasshoppers, and stick insects—they differ as an intelligent sheep dog differs from the witless sheep.

At man's approach a cockroach will rush headlong to the nearest crack; a grasshopper flees as fast and as far as six legs and four wings will take him. Stick insects neither welcome nor rebuff fraternization. They remain immobile, as if their whole desire in life is to be mistaken for something botanical and dead, a twig among twigs.

The mantis, by contrast, is one of the select body of wild creatures which appear to be waiting for man to tame and even domesticate them. Others of this class are mallard ducks, red junglefowl, and rock doves.

Our favorite mantis is the dried leaf (*Acanthops falcata*). When found in the jungle she is usually hanging from a dead twig, a shriveled leaf among others, the frills and veins on her brown wings helping her play the part as she trembles in the breeze.

Often we bring her to the laboratory, delighting in her instant, ridiculous tameness. We feed her small insects, watch her lay a string bean of an egg case, and observe her lively progeny emerge. We are never bored while she makes half-hour toilets, cleaning every spine and polishing her eyes.

Mantids are almost unique among members of the order Orthoptera in being meat eaters. All their armature and senses are fashioned for stalking prey. What happens if the fierce assailant becomes the threatened, the aggressor put in fear for her life?

We faced her one day with a tame *Polychrus* lizard. Slowly he crept up a twig toward the mantis. With her retreat cut off, she unflinchingly faced the advancing monster. Finally he reached what was to her the deadline, and she changed like Cinderella at the touch of the wand. In a desperate dance of life and death, the drab brown leaf became something utterly different, colorful and vibrant.

Her head and all the forepart of her body shot upright; her forelegs spread wide and graceful as a pair of slender arms. With the same movement were displayed all the serried lines of sharp spines. Her dried-leaf wings were folded close together and to one side, discarded props. In their place two other wings unfurled like a pair of fans, brilliantly patterned in golden yellow and black.

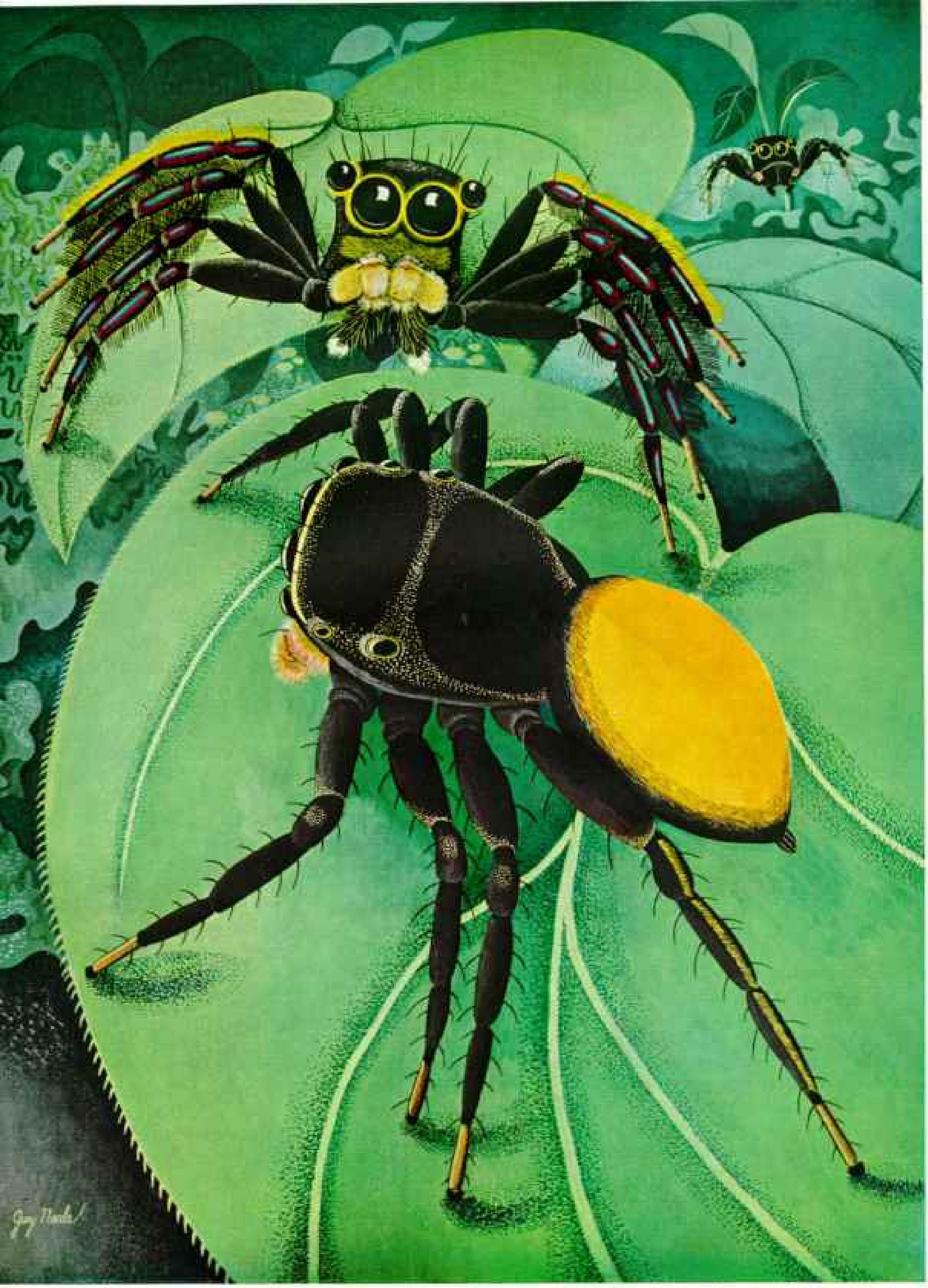
Then, as the mantis balanced on her toes like a ballet dancer, came the climax. Her body flashed up and sideways, free of the wings and flaunting broad, shining bands of flowing Tyrian purple shading into pale pink. She sidled back and forth before us, waving her forelegs, flicking her body, quivering her elegant wings.

Mantis Becomes a Leaf Again

For some moments the full display was maintained. The lizard, startled, halted and gave the mantis a split second for escape. She folded her arms and wings, dropped toward the ground, and again became a swaying leaf hanging upside down from a twig.

We once put a mantis to the extreme test by facing her with one of our pet monkeys. Even as he slowly reached out his hand to grasp her, she burst into her transformation performance, whereupon the monkey not only withdrew his hand and arm, but crept away down the limb.

* See "Praying Mantis," 15 photographs with full legends, by John G. Pitkin, NATIONAL GEOGRAPHIC MAGAZINE, May, 1950.



Jumping spider, a fifth of an inch long, can leap a prodigious 40 times its own length. Huge headlamps are flanked by six lesser eyes. This battle of bluff pits two yellowface males, vying for a female who watches calmly from the sidelines.

Jumping Spiders Dance and Roll Their Eyes

IF YOU WERE a small insect, a very small one like a jungle fly, and you saw a pair of moonlike jade-green or jet-black eyes peering at you over the edge of a leaf, they would probably be the last things you would ever see. For the eyes would very likely belong to a jumping spider, and the ensuing leap would span, for the fly, the instant between life and death.

A scientist once looked into his microscope at a similar pair of limpid green eyes and saw a strange thing happen. The pair of moons began going into eclipse—a black crescent crept slowly across the face of each, until only two black circles were visible. Then one eclipse began to reverse, to roll slowly back until there was one green, one black eye.

On another day the scientist discovered that these retinal motions of the spider's eyes played a noticeable part in its special courtship. This jumping spider, *Lyssomanes*, truly "makes eyes" at his prospective mate.

Aristocrats of the Spider World

Jumping spiders in many ways may be considered the aristocrats of spiderdom, approached only by their relatives the wolf spiders. The dominant measure of superiority is eyesight. Wolf spiders have clear vision probably to a distance of several inches, but usually need a momentary touch to make certain of their prey. To a highly developed jumping spider the visual world extends to a radius of one foot, and a moving object is distinguishable at a still greater distance. This, combined with a leap at least 40 times its own length, makes a jumping spider a dangerous enemy and a successful competitor.

The yellow-faced jumping spider, *Corythalia*, is an excellent example of its family. Guy Neale here vividly depicts two males and a female.

The two enormous anterior eyes reveal much of the habits and life of the spider itself. The fact that they are directed forward indicates that their owner is a pursuer and not pursued. The brilliant coloring of yellow and black tells of a diurnal life in sunlight and shade, and its confinement to the male hints of possible elaborate courtship and male rivalry.

We seek in vain among jumping spiders for complex webs and funnels, and come to the conclusion that these active hunters are not slaves of the silk. The dominant functions of the small silk glands are to provide egg shelters and to ensure an ever-ready rope or drag. This lifeline can be made to order, attached, and paid out so rapidly that it can break a fall, as well as make certain a safe return to an overhead branch or boulder.

Yellowface's six lesser eyes are little more than indicators of movement at short range. They are arranged around three sides of a rectangle, so that they make up in scope what they lack in definition. It seems probable that when a suspicious movement is detected, by a twist of the headless and neckless torso the large anterior eyes are brought to bear, somewhat like a stiff-necked man shifting from eyes to binoculars.

To be of special concern, the vague movement must resolve into a source of danger, food, a rival yellowface, or a prospective mate. In the case of the first, escape is by slithering down the silken life line, or by instant, swift eight-legged flight. If there comes into focus a luscious insect of appropriate size, our yellowface may gather his legs together and, with unerring aim, leap the intervening space and alight upon his prey.

Sooner or later he encounters another yellow-faced male, and both spiders are moved to display. When they are confined in artificially narrow quarters, the ensuing encounter may result in temporary disablement from the venom of a bite. But meetings under natural conditions are always bluff, not battle.

Each tries to make himself appear as large and tall as possible, standing on tiptoe, at the same time spreading all his legs fanwise. This posture is held for some time and permits the simultaneous display of all the yellow ornamentation—face, palpi, eye rings, and a decorative golden fringe along the fourth pair of legs. In these masculine encounters, color, pattern, and pose outweigh touch or odor.

Courtship Begins with Dance

The female of this species has a black face, with almost no trace of yellow. But she is slightly larger than the male, and the mere sight of her has the power to throw our yellowface into a frenzy of courtship. The opening overture is a dance, a series of rapid, side-to-side jiggles, so swift they blur a motion picture film at normal speed. This continues at irregular intervals as the excited spider advances in short, zigzag spurts toward the female.

The painting shows two male yellowfaces engaged in their bluffing battle. A female watches the combatants from a distance.

My Neighbors Hold to Mountain Ways

Blue Ridge People of North Carolina "Stick to Their Fancy" in Preserving a Life Their Pioneer Forebears Knew

By Malcolm Ross

With Photographs by Flip Schulke

I BUILT a cabin in the Blue Ridge as a summer foil to subtropical Florida, where my family happily basks the rest of the year. We are northern-born, and our craving for changes in the seasons must be inbred.

In Yancey County, North Carolina, we first felled oaks and sourwoods to expose a view of the 6,000-footers—Celo Knob, Cattail Peak, Black Brothers, Mount Mitchell—that march in successively deeper shades of blue to the far horizon. Then we set our cabin on a rock ledge above a lonely waterfall.

O Pioneers, we thought, boldly opening up virgin territory! But then, under deep humus, we recovered the shaped stones of a chimney hearth that had warmed a mountain cabin right here a hundred years before we arrived.

And slowly it dawned on us. We were merely the latest ripple in a stream of lowlanders who throughout American history have fled from the hot tidewater flats across the Piedmont to the cool Blue Ridge beyond. Our trail to mountain serenity had first been rutted by the wooden oxcarts of Revolutionary War veterans seeking their grants of wilderness land; next it was smoothed for the coach wheels of ante bellum Carolinians, and at last macadamed for our rubber tires.

Our ready-cut chimney rock was just the first of many such discoveries. A relic of

Bill Blevins told me his fields were in "bitsy pieces . . . laid out like a crazy quilt from here to yander and back to the sourwood stump."

masonry halfway up our falls identified a reservoir which once had served all early Burnsville. And below the falls, where we scouted for a good spot for a swimming hole, we uncovered another set of chimney stones, quarried and hewn by someone who long ago had loved this site.

"Best hound I ever had got hisself killed by a b'ar right above you," we heard next from a passer-by. "Oh, yes," another said, "I recall when that place of yourn had a sawmill."

Bear and grouse hunting in the fall; blueberry picking in July; jeeps hauling mica from a mine up top; young girls from a summer camp astride decorous plugs on the same mountain trail. We, who thought we were pioneering, soon came to see instead how the past and the present merge in these highlands. The beauty of the hills has been shared again and again. Yet it has lost no freshness for its present custodians or for random visitors. What's more, the true pioneering stock survives here, in word and deed and spirit.

For us, the sense of merging into the Blue Ridge community began with our need for flagstone. We wanted it to cover the red clay around our cabin's foundations. In the Blue Ridge the grapevine is the accepted medium of discovering who can supply what.

"Hit stood, that cabin, for a hundred y'ars on Billy Gibbs's land over the hogback."

That's how I first heard about Bill Blevins, part-time farmer, occasional Baptist preacher, and wholly laird of a 75-acre wedge of green fields wrested by his hand out of the slopes of 6,326-foot Celo Knob. No flagstone hereabouts, I was informed, could match the black-gneiss slabs quarried by Bill Blevins where Roaring Spout Falls tumble 150 feet from the escarpment at the top of his hollow.

A Lifetime to "Cl'ar a Holler"

From the porch of his cabin below the falls he sauntered to meet me, a ramrod figure, his blue eyes friendly under a slouch hat, hand extended. Two hours of porch gossip later, I left with a bag of fresh-dug potatoes, a jar of preserved cherries, and a quoted price of $6 for three tons of flagging which he at 76 had split and toted from the falls.

"Fifty-five y'ars I spent cl'arin' this holler," he told me proudly.

"I bought the home piece when I married, then more bitsy pieces. They was laid out like a crazy quilt from here to yander and back to the sourwood stump, but I finally got holt of all the pieces to make up the quilt. Hit was rough cl'arin'. The folks who first held the land had girdled the big trees and left 'em standing dead or fallen dead, 'n with

all them y'ars of grape and brier twining 'em. I reared sons and they pitched in. Hit took my working lifetime and some of theirs."

I had passed and greeted his sons' families on my climb to the cabin. One small, weathered gray house, I noticed, stood shuttered within a fenced enclosure. A bearing apple tree, a clipped lawn, and neat rows of flowers and vegetables spelled living; yet the house was closed and silent. I asked Bill Blevins about that.

"I moved up here after my wife died," he said. "I keep the old place as hit was when she were living. Hit stood, that cabin, for a hundred y'ars on Billy Gibbs's land over the hogback. Under that sheathing is the old Gibbs cabin, poplar logs two and a half foot wide. Hit were wastin' empty, and I asked Billy Gibbs to price hit. 'Eighteen dollars,' he said. 'Billy,' I said, 'you've made yourself a bargain.' But I had. We toted hit over the hogback log by log, set 'em up and sheathed 'em, and hit'll stand come another hundred y'ars."

A Mountain Man Wins a Livelihood

A patch of fields and woods seems an unlikely source of hard cash in trade with the outside world. Yet Bill Blevins has sold wild ginger root to eastern herb companies and ginseng root for export to China; also the pelts of bear, deer, squirrel, skunk; rock for school buildings; the perennial staple, tobacco; and the work of his hands in building chimneys and in carpentering.

Skilled hands and sharp eyes are the tools of survival in the mountains. But the economy of the Blue Ridge is based most solidly on the land and its minerals.

Phil Ray, descendant of 18th-century Tommy Ray who first settled in the region, told me how his grandfather found one of the richest mica deposits in North Carolina.

"Grandpa came across Indian stone tools under the roots of a big storm-felled pine. That meant mica. There are a lot of old diggings and spoil heaps in the mountains. Trees grow on them that were saplings when the first white people came. Grandpa's Indians could only scratch the surface with their tomahawks, but they kindly pointed out to him a vein which still yields mica more than 200 feet down."

Scientists of Grandpa Ray's time linked the Blue Ridge diggings with mica ornaments buried in the graves of Mississippi mound builders. The shining sheets of mica—ruby, rum, green, or olive, splitting miraculously to the gossamer thinness of a bee's wing—

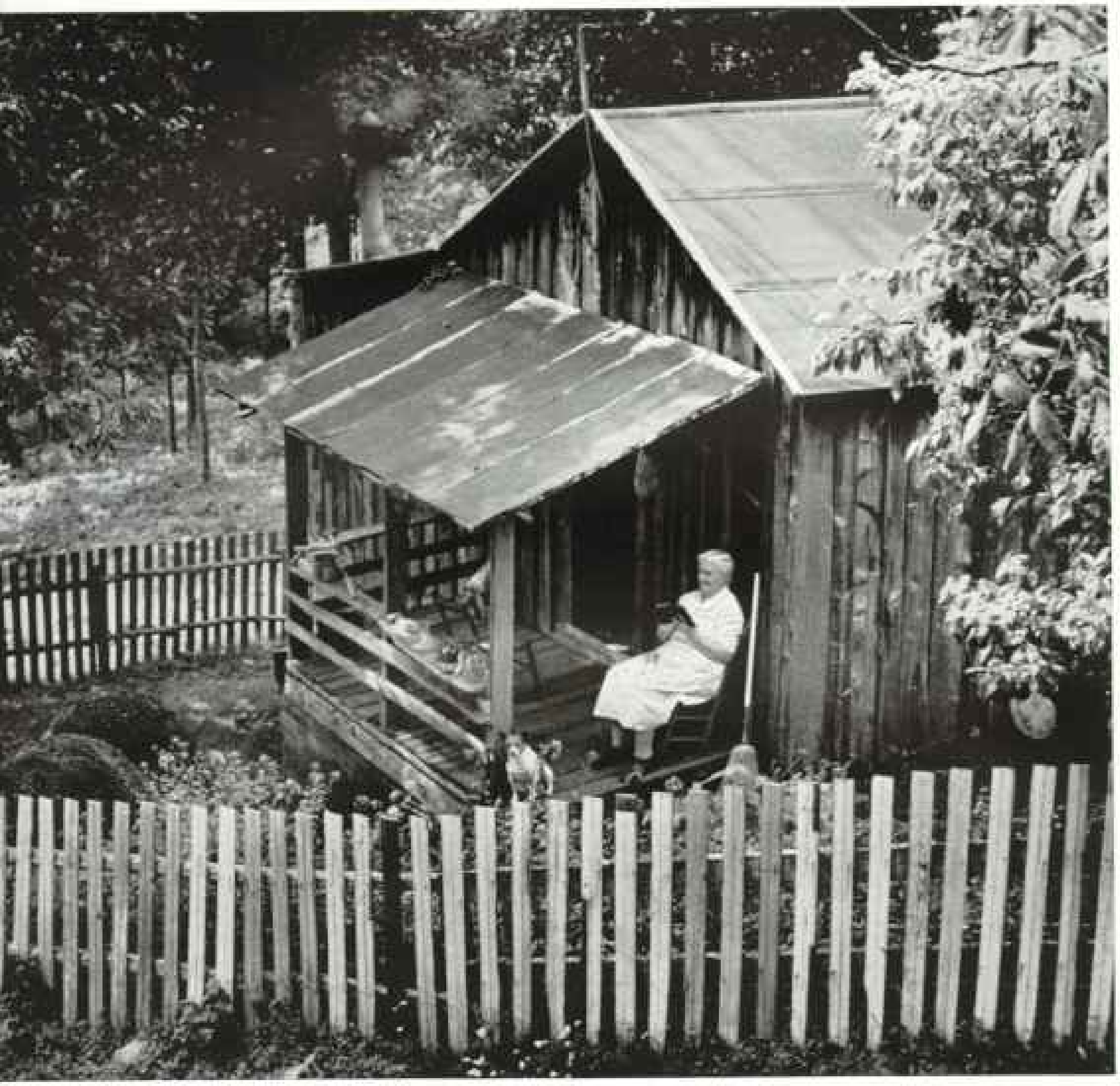
Halfway up the stiff climb we paused

were held so sacred that Indians traveled hundreds of wilderness miles to dig them.

My boys and I followed their trail up to the Ray mines on Bowlens Pyramid, not as mica miners but as amateur jewel hunters. Halfway up the stiff climb we paused to drink from the Widow Banks's spring and to pass "Howdy" with her.

"Why," asked one of the boys, "do people live so high up?"

A good question to consider while straining up a rocky trail to a cabin on a mountainside, occupied by a lady past her climbing years. I have asked it myself and received several answers. The quiet. The being out of sight of another's chimney smoke. The air. The clear water. The mountains to look at.



to drink from the Widow Banks's spring and to pass "Howdy" with her.

But Phil Ray explained to us that the first settlers found the valley trees too big to fell for quick farming, and so built their cabins far up in the high hollows where untouched black soil bred prodigious first-season crops. Habit and the high-up peace kept them there.

Highlanders Came to the Blue Ridge

Historians have a related answer. Many Blue Ridge people descend from Scottish highlanders and from the Scotch-Irish who emigrated from their old-country lands in the 18th century, and memories of the long treks for independent lands are still alive.

After pausing at the Widow Banks's spring, I climbed after the boys and found them dangling over the edge of an abandoned mine shaft. We borrowed a double-jack from a near-by working mine, cracked big rocks into little ones, and found a handful of hexagonal aquamarine crystals, but no garnets, amethysts, or topazes. Yet all these gems the Ray mine has given up to initiates such as Roby Buchanan, self-taught jewel cutter and "rockhound" extraordinary, whose hunting grounds are the abandoned diggings and waste piles up a hundred hollows.*

We visited Roby Buchanan, my wife and I, at his home at Hawk over in Mitchell County, and stretched out on his lawn to listen to tales of jewel hunting.

* See "'Rockhounds' Uncover Earth's Mineral Beauty," by George S. Switzer, NATIONAL GEOGRAPHIC MAGAZINE, November, 1951.

Nolichucky River

North Toe River

Big Rock Creek

Red Hill

MITCHELL COUNTY

YANCEY COUNTY

Bakersville

Clinchfield Railroad

Cane River

"We set our cabin on a rock ledge above a lonely waterfall."

Day Book

"When a man's got printer's blood he's anyhow gone."

Lusk Edwards's Print Shop

Old Mine Fork Rd.

Author's Cabin

Kona

Home of Monroe Thomas

Parkway Playhouse

BOONE FORGE

Yancey Railroad

33 miles to Asheville

Burnsville

Little Crabtree Creek

Jim Hutchins's House

Deneen Mill

Bear Wallow Road

Mica House

Micaville

YANCEY

Banks Creek

Ray Mine

Widow Banks's Spring

Bowlens Pyramid

Feldspar Mill

Bowditch

Johnny Hutchins, Gunsmith

Gunsmith Johnny Hutchins lives far up Banks Creek.

COUNTY

Celo Knob

Celo

Bill Blevins's Farm

Pensacola

Floyd Wheeler's House

Roaring Spout Falls

Ed Whetstine's Place

Cattail Creek

South Toe River

Cattail Peak

"Old 99" pushed through folks' front yards and parted the bushes from Burnsville to Kona.

Black Brothers

Buckeyecreek Gap

16 miles to Marion

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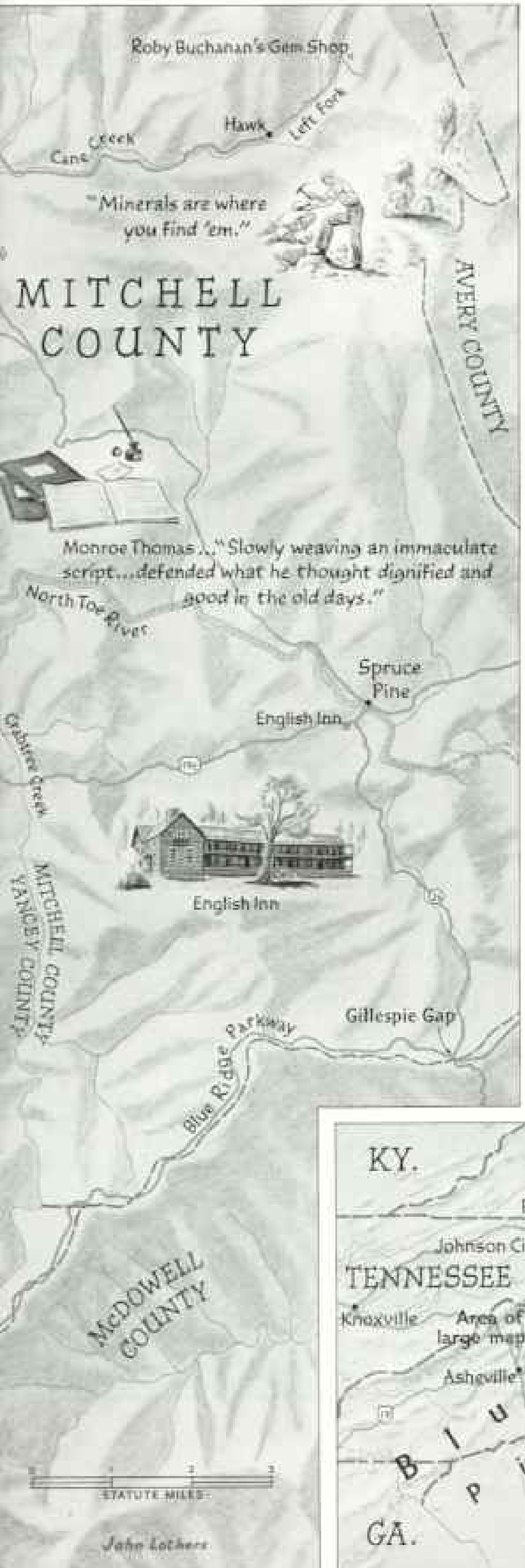
Mount Mitchell

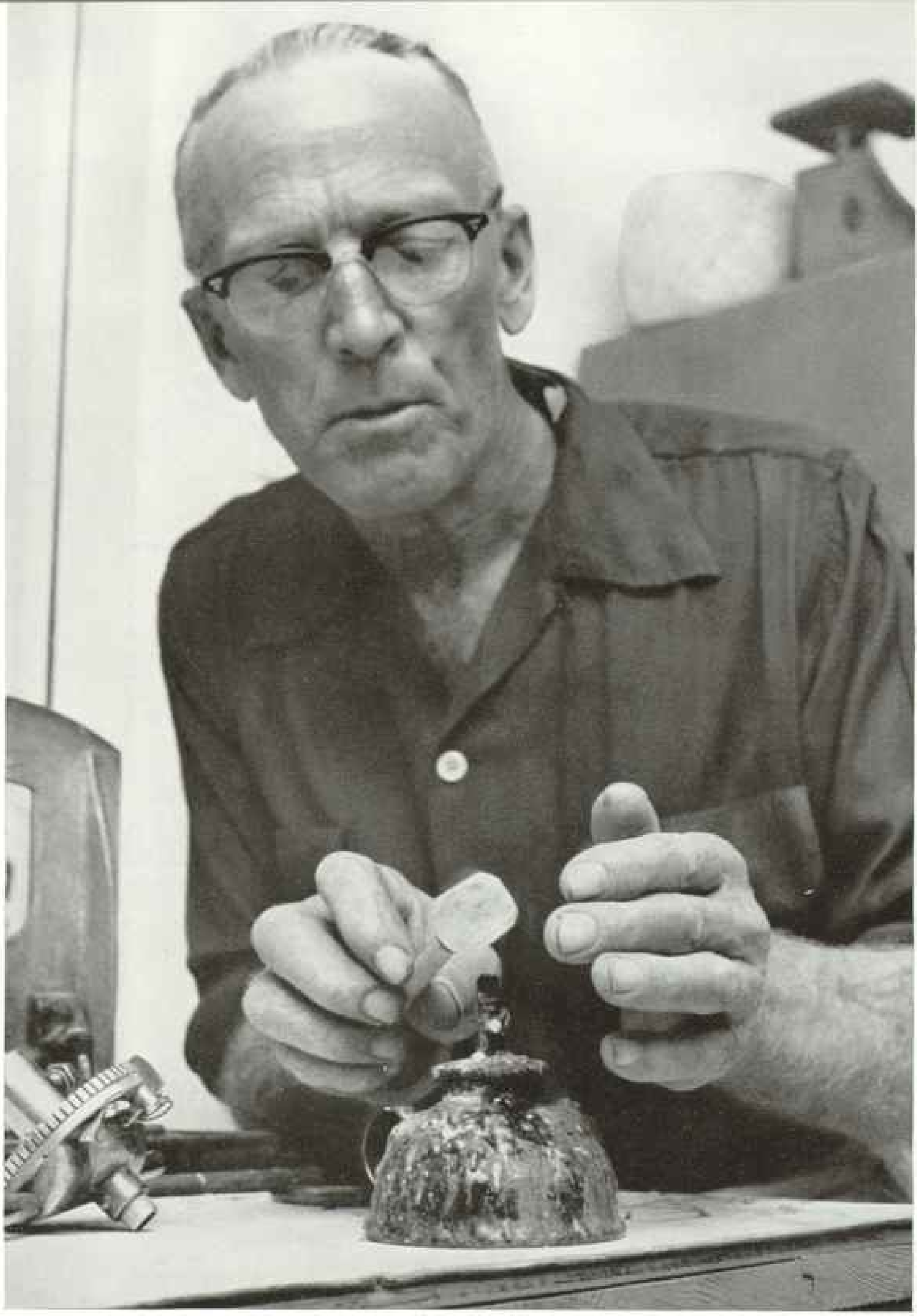


A North Carolina Pioneer in Weathered Bronze Surveys the Blue Ridge

At the peaceful county seat of Burnsville in the heart of North Carolina's mountain country, author Ross often passes this tarnished statue of Capt. Otway Burns, a veteran of the War of 1812.

Summering there each year, the author savors the joys of an unhurried, serene way of life.

Up shady hollows and along high-up ridges that seem to plead, "Leave me be," he has come to know an individualistic people who share with him their treasured mountain ways and handed-down skills.



...Roby Buchanan, self-taught jewel cutter and "rockhound" extraordinary, whose hunting grounds are the abandoned diggings and waste piles up a hundred hollows.

"Minerals are where you find 'em. For 30 years I hunted the bresh for a rumored cache of kyanite, when all along it was as near to the Blue Ridge Parkway as that bean patch yonder."

"What's kyanite good for?" I asked.

"Spark plugs, for one thing. Back in Model T days the spark-plug companies thought they had to have kyanite in big crystals, and hauled them out eight miles by mule train. Then they found there were whole mountains of kyanite splinters which would do the same job.

"Those tourists wouldn't have spark plugs to nudge 'em along the highway without our minerals," Roby reflected. "Kaolin clay is the spark plug body. Kyanite is infusible, and when it's ground up in the clay it saves the plug from exploding from the heat. Feldspar gives the outside finish. All dug from our hills.

Mica Mine Sold Too Soon

"There's my gran'pappy's mica mine yonder." He pointed to a great scar on the nearest mountain. His grandfather, he said, sold the mine for $500 in 1865. Since then $1,500,000 worth of mica has been taken from it.

"My pappy worked 55 years for wages under that hill," said Roby. "Five men have been killed in it. I found my first gem stones there. Come on down to the shop and I'll show you what I do with 'em."

The shop on a creek in the valley had been his father's gristmill. Young Roby found it dull minding the mill on days when a small head of water took half an hour to grind a bushel of corn. He rigged a gear to the line shaft and made smaller and smaller gears until he had the speed for a diamond saw, a silicon-carbide wheel to grind rough shapes, and another wheel for the facets. It took years of tinkering before the gristmill changed its product from corn meal to jewels.

In time, word passed that up Left Fork near Hawk one could get aquamarines, amethysts, sapphires, and emeralds fit for a bride —and that Roby made them out of mine tailings. The cutter of the Jonker Diamond once visited Roby for three days, the heir of the Dutch diamond-cutting tradition coming to see a self-taught Tarheel. A pin of Roby's, gold set with semiprecious gems, recently sold in a cityside store for four times what his grandfather was paid for his mica mine.

Whence comes this mineral wealth?

It took upwards of a billion years to deposit, deform, uplift, and erode the Pre-Cambrian rocks that form these hills. Under the stress and heat the foundation changed. Now below the soft, wooded contours lies a plum pudding of sedimentary deposits pierced by igneous dikes, warped around gneiss and granite, shot through with crystals of quartz and garnet, and moldy with the long disintegration of feldspar into soft kaolin.

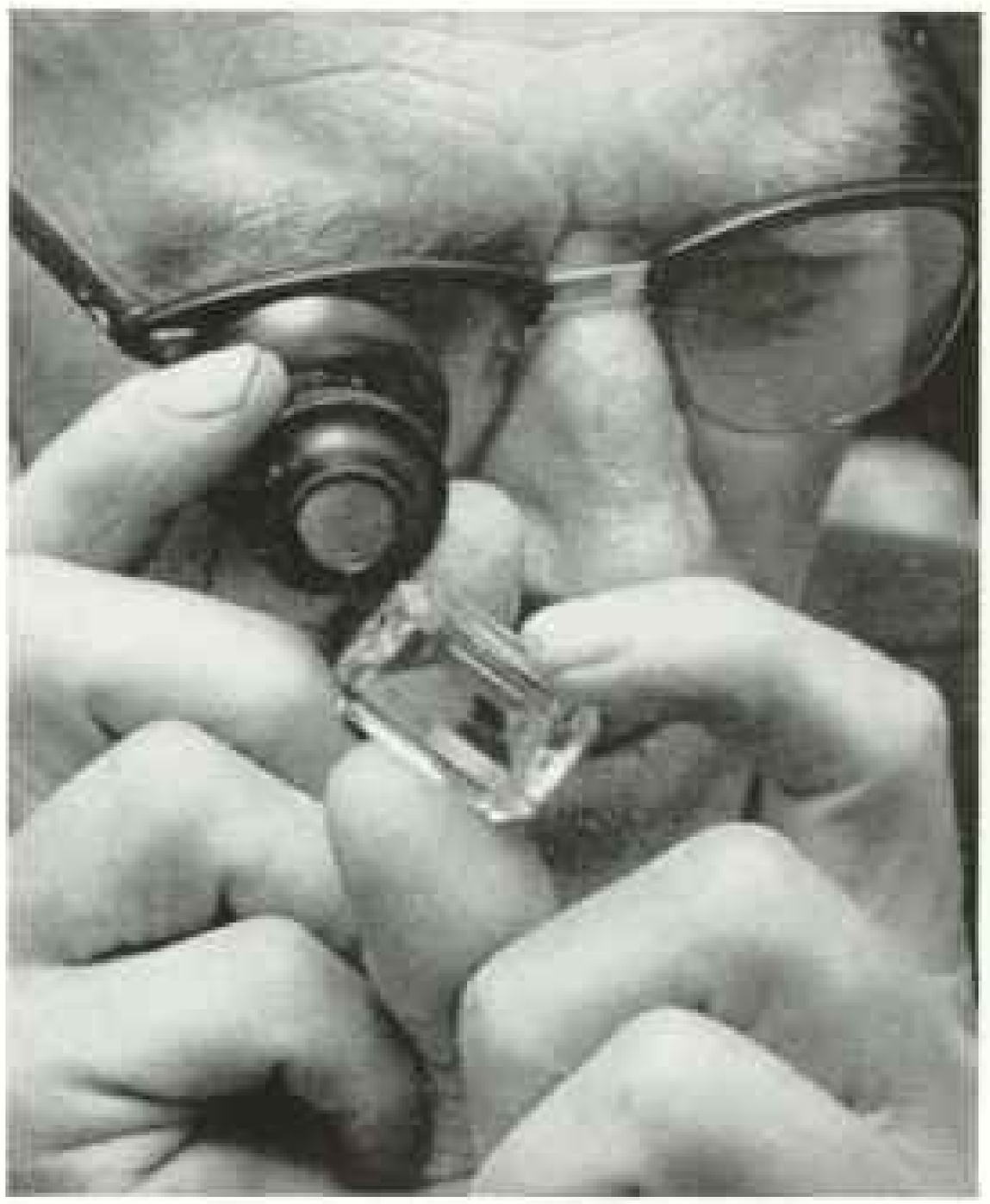
Sharp Knives Split Glassy Sheets

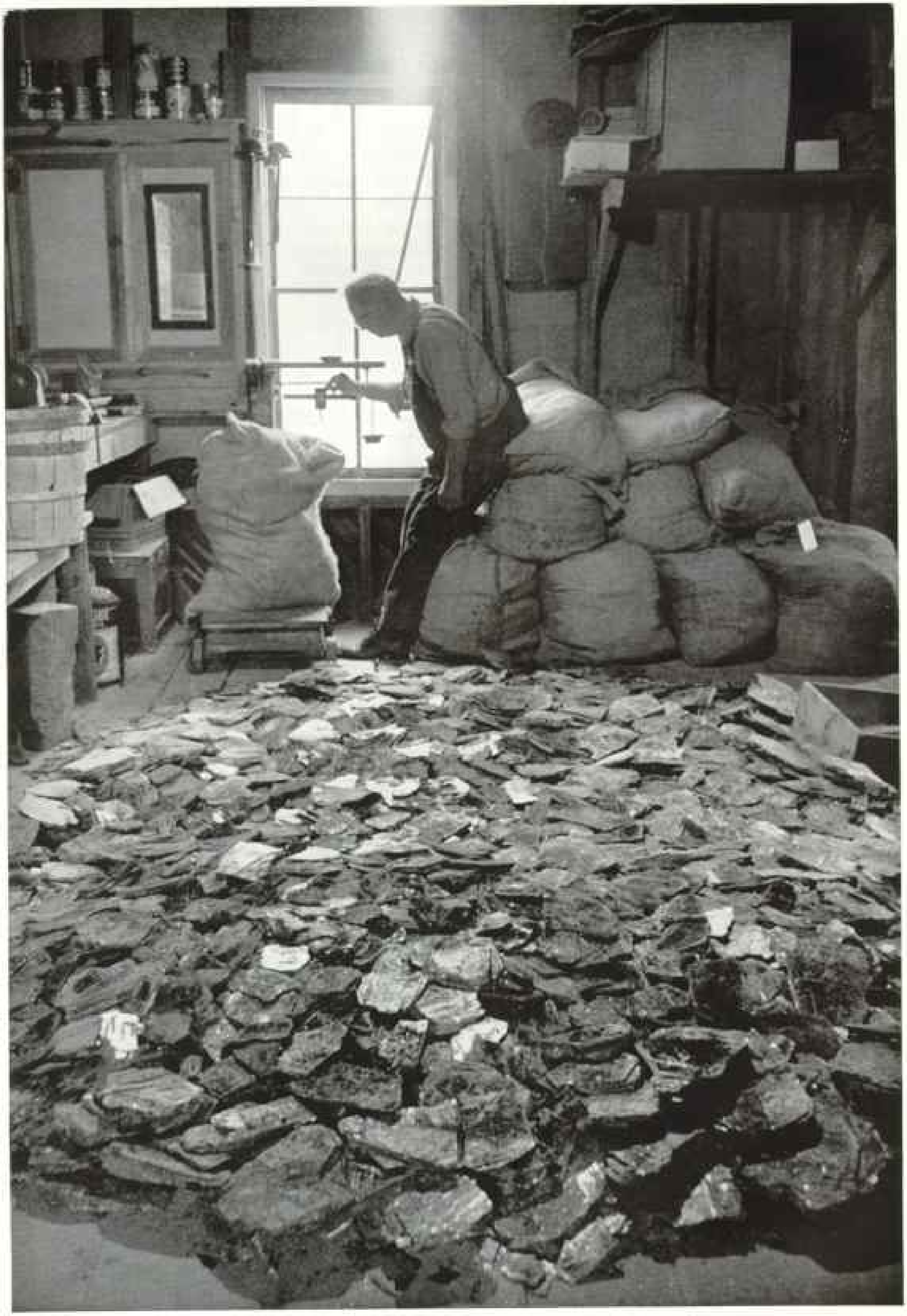
Mica and feldspar are the commercial plums in this pudding. Hardly a farm lacks outcroppings. We have a feldspar vein below our falls. Small pocket or payload? Who knows until you try? But there is a limit to the patience of amateur hammers against resisting surfaces. Our family decided to find out where the mica ends up, and so we visited the Mica House in Micaville.

Here Tate Hoover honed the linoleum knives with which four deft-handed ladies split and shaped the mica "books" into sheets and leaves for jet plane spark plugs and top-secret electronic gadgets. In the latter, no other electrical insulator serves as well as mica.

We followed the road out of Micaville to where the washings from the mill of W. F.

Word passed that up Left Fork near Hawk one could get aquamarines . . . fit for a bride.





864 *...the Mica House in Micaville...where the mica ends up.*

Deneen, Sr., help change the South Toe from a trout stream into something too soupy for a catfish. But the sparkle remains in the fine wet-ground mica, and will come to life in the gloss of wallpaper, paint, and the inside coating of your automobile tires. Mica mixed into "heavy muds" seals fissures at the oil-well drillhead, curbs gas leakage, and tames gushers.

Daniel Boone Runs a Smithy

Blue Ridge people have infinite ties of interest and friendship with one another. When we came to know one of them, we heard about others we must meet. A mica miner talked about W. F. Deneen, Sr.; he in turn told us about Daniel Boone.

The Deneen summer home is the English Inn, in Spruce Pine. Its first log unit dates from 1765. It was a tavern when the Tennessee boys from beyond the Nolichucky paused briefly there on their way to fight at Kings Mountain. It remained an inn for circuit-riding lawyers and other horseback wayfarers until Mr. Deneen bought and restored it.

"Daniel Boone made all the ironwork," he said. The reference was not to the great Wilderness Road scout, although the first Daniel did blacksmithing and knew the Gillespie Gap route. His descendant Daniel VI hammered out the English Inn balconies and hinges. We stalked him through his father, Kelse Boone, who taught Daniel his trade.

Kelse's smithy in Burnsville smells as it should, of coal smoke and hot iron. It has upended nail kegs on which friends sit in talk of politics and bass fishing. Kelse, at 76, will make you a horseshoe or a hamburger grill. His great-uncles—Ed, Sol, Mac, and Crum Boone—were all blacksmiths, and so back to Daniel the first, whose smithing was probably confined to lethal weapons.

Kelse showed me a yellowed newspaper clipping which traced the American Boone lineage to its origin in Exeter, England, and further back through English earls to the Sire de Bohn—1066 and all that. Kelse Boone

Kelse Boone's smithy in Burnsville smells as it should, of coal smoke and hot iron. It has upended nail kegs on which friends sit in talk of politics and bass fishing.

. . . a 290-pound reproduction of a Pacific-type locomotive . . . rigged on compressed air to please endless small-fry visitors.

went to school in a log cabin "three months each fall off 'n on for 10 years." In appearance he does not favor an English earl. But he is full of laughter and has a one-eyed dog ("Lost the other to an ol' cat") which licks his sooty arm affectionately.

Daniel Boone at eight pumped the bellows for Kelse. He learned his trade well enough to be chosen to make reproductions of the wrought-iron work hammered out by early smiths in Williamsburg, Virginia. The morning I called, he was beating a piece of iron into a part for a Ford tractor. Half the customers of Boone Forge come in overalls for tool repairs; half come in summer dresses for andirons, H and L hinges, latches, and ornamental railings for big houses in far-distant States.

"I take some pride in the Williamsburg work," he said. "I couldn't do like the original smith who made a fine taper on a finial to please his ownself, hammering away until the line suited his fancy. To reproduce that line from a drawing or a rusted relic, you have to please the architect. That means calipers and more hammering to feather it down than that smith did 300 years back. But they never refused any of my work at Williamsburg."

Model Railroad Runs on Air

We climbed to the smithy loft where Daniel Boone during five years of work at night built a 290-pound reproduction of a Pacific-type locomotive. It can run on a wood-fired burner, but he has it rigged on compressed air to please endless small-fry visitors impatient for it to get going. The whistle makes a fine screech. In an interval between screeches, Daniel Boone said:

"This is peaceful compared to Lusk Edwards's whistle."

"Another locomotive fan?"

"Printer."

We followed directions up Old Mine Fork Road to what must be the only printing plant in the United States powered by a steam engine retired from an earlier career in a wood-

shop. The rambling barn of a print shop was locked. Lusk Edwards was on his front porch reading a National Geographic while a grandson circled him on a squeaky tricycle.

"Been reading the Magazine for 20 years," he said, appraising me from under bushy eyebrows. From a hesitant start he opened up memories which would have pleased that earlier printer-pamphleteer, Benjamin Franklin of Philadelphia.

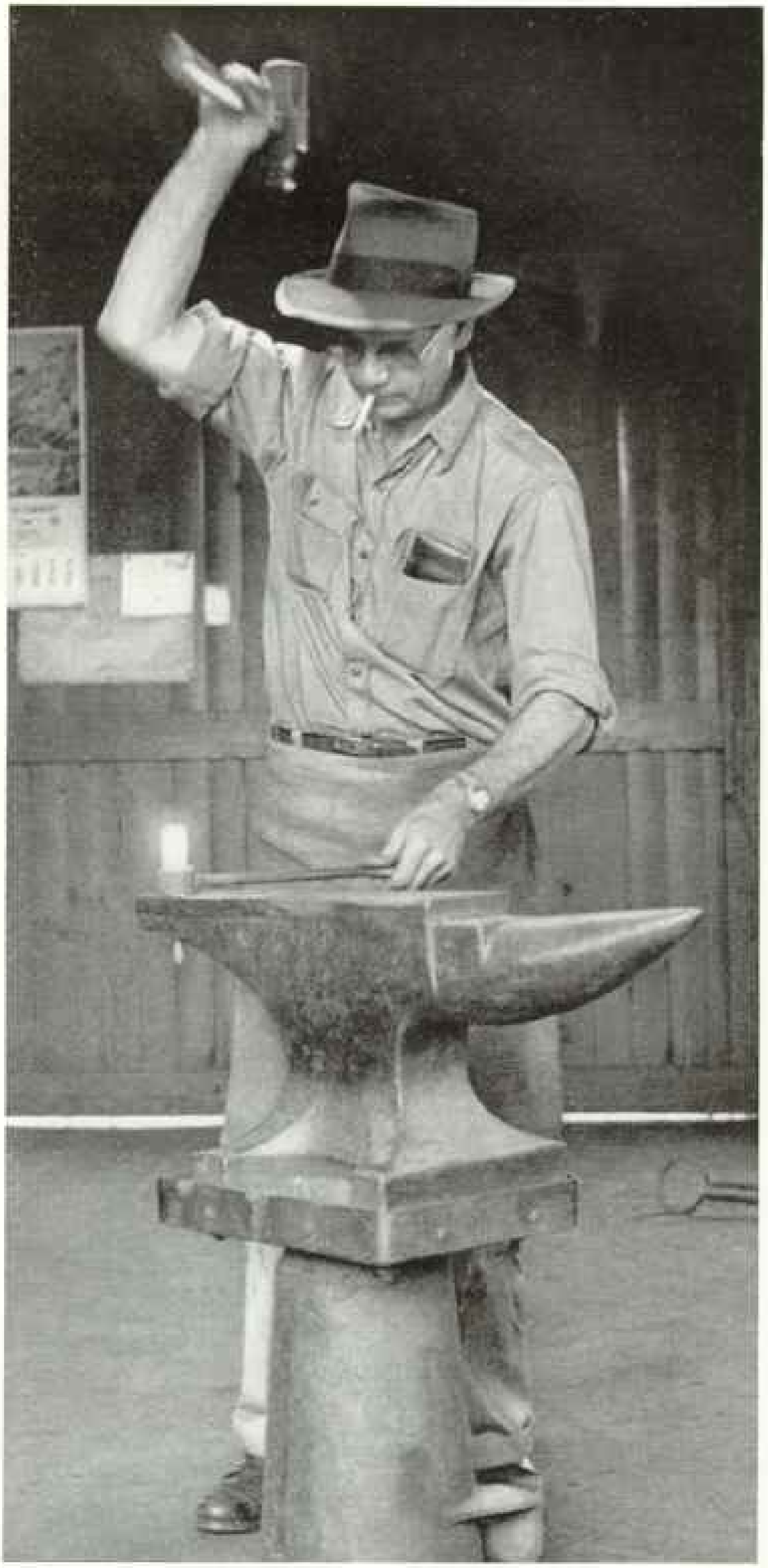
A Printer Sticks to His Fancy

"My father said he was sure I'd fail if I be a printer. He'd 400 acres of land and it well timbered. I could plow and sow corn to suit him, but there was too many farmers—10 people to feed one family—and when a man's got printer's blood he's anyhow gone. I stuck to my fancy."

Lusk Edwards carved his first type out of wood. His ink he made by boiling dogwood bark and copper crystals. His first boughten press was an old Army job used by General Grant's headquarters to print field orders.

"I never left the soil—sort of like that old Greek who had to keep in touch with it.

"But I never quit printing either, since I was a boy 60, 70 years back. In the 1890's I distilled oil of pennyroyal. It brought 75 cents a pint in Burnsville, money for books and rubber type. My first paper was the *Echo*. I wore bad clothes and studied. Told my wife to take over the cow and chickens and run the farm



Daniel Boone: "I couldn't do like the original smith who made a fine taper on a finial to please his ownself, hammering away until the line suited his fancy."

to suit herself. She doesn't know to this day how I once dropped and broke a press worth a hundred and fifty dollars while letting her kids run barefoot."

A Pumpkin for a Paper

The list of Edwards's papers from 1900 on—*Echo*, *Blue Ridge Rocket*, *Vim*, *Edwards Broadcasts*, *Appalachian Log*—mark the periods when there was money enough to indulge in publishing.

Lusk built up his job printing by mailing out cut-rate price lists for legal blanks to justices of the peace all over North Carolina. The 50-cent orders piled in. One J. P. sticks by him after 40 years. But his widest, and rather mischievous, grin he reserves for tales of how he bartered printing for anything anybody would swap.

"I put an offer in the *Rocket* one time of a year's free subscription to the person bringing in the largest pumpkin. We had pie in our ears that fall. It gave me a further idea. In those days a postmaster had to have so much in mailings every quarter or he'd get docked. None of them was makin' it. Take Day Book over in the next valley—that town got named from the postmaster saying: 'I'll have to look in my daybook,' to check whether someone had gotten a letter in the last few months since his previous trip to town.

"That daybook was scant on entries; so I dickered with the postmaster to mail me 2,000 fliers free so's he could get up toward his quarterly mark. Those fliers offered printing in exchange for hats, shoes, underwear, carpenter tools, seedling plants, or whatever a body wanting printing had of value."

"Did it work?" I asked.

"My, yes. First thing, I got me a splendid hat. Man charged me $2 in printing. A $2 hat was a hat in those days. There'd come socks, shoes, and pants, and if they didn't fit my family I'd sell 'em to a neighbor. We even traded printing with a nursery fellow for sweet potato and cabbage seedlings."

Lusk Edwards: "I never failed to get a tooth out—if they could stand it."

Mountain Dentistry

I had heard that Lusk Edwards dabbled in dentistry. He confirmed it with happy enthusiasm.

"Been a tooth-dentist for 30 years. I'd been boasting so much I'd print it out for whatsoever that I couldn't turn down a set of dental tools. You know

"When a man's got printer's blood he's anyhow gone."

how you have to run a child all over, catch it, and yank out a tooth with a string. Well, here was just the ticket—an up-to-date nickelplate forceps and little round things you stick in to see where to get a good holt. Our children needed a lot of tooth-pullin'. Grown-ups found out about it, and I hated seeing neighbors go through misery and sufferin' when I could do it so easy and for nuthin'. I never failed to get a tooth out—if they could stand it. Used a lot of camphor, asafetida, and whisky; according to taste."

"Still do it?" I asked.

"Pulled a feller's tooth 10 days ago. Let's go see the print shop."

This is a split-level structure to end all such. At dirt floor level is a forge, a 1921 Overland (retired), and the steam engine.

"I fire her up to 80 pounds pressure, start the Campbell press, and can get a run of 500 copies before it drops to 40 pounds. Then I run back and stoke her up again."

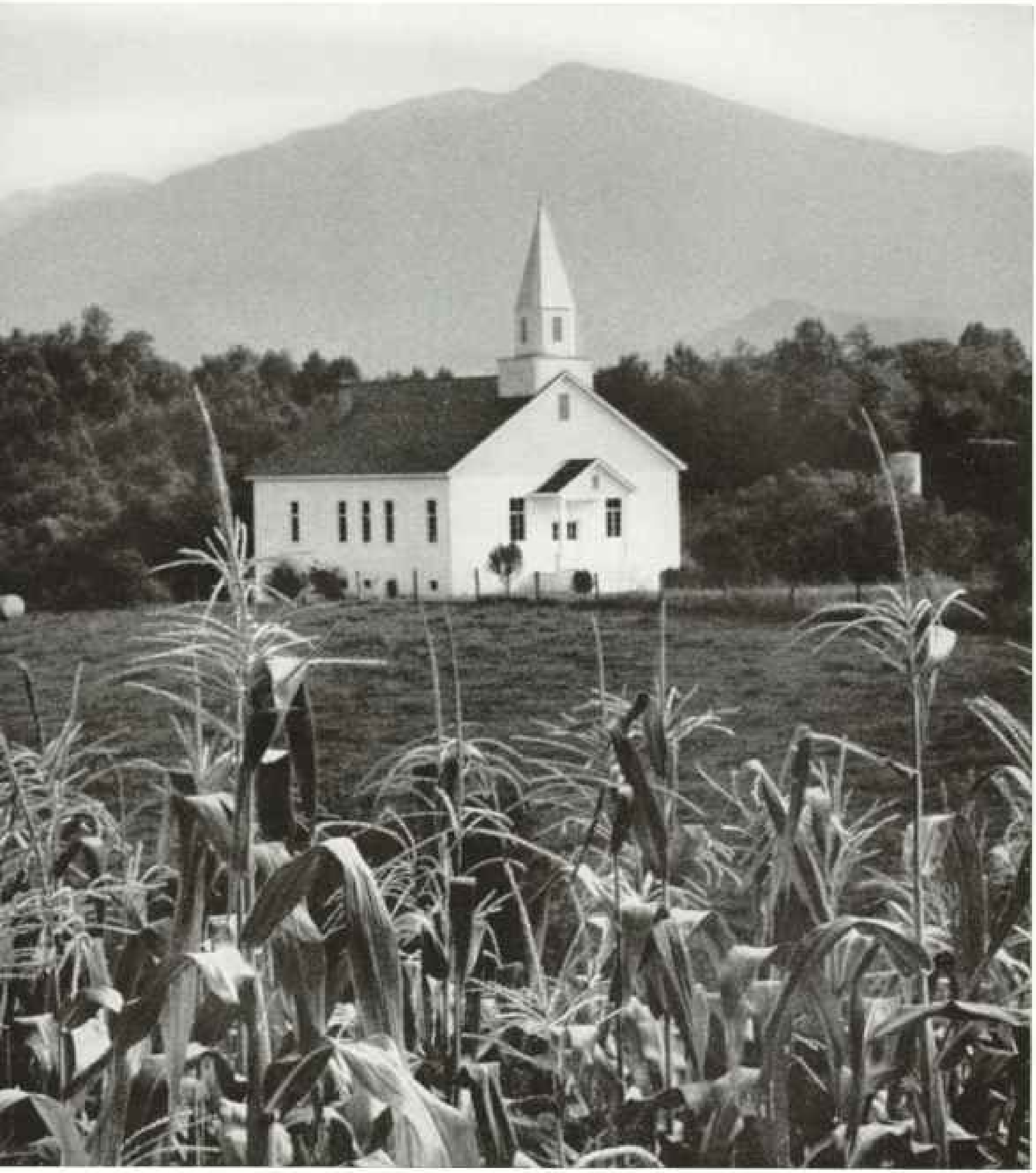
His outsize whistle Lusk installed mainly, I suspect, because he likes its sound. It also calls his helpers to work and lets neighbors know when his gristmill is in operation.

Railroader Floyd Wheeler: "I like a steam whistle. Hain't like that penny poop on a diesel."

Life centered in the small community.

A maze of wheels, belts, shafts, and levers gears the steam engine to presses of considerable antiquity. Lusk took a long heave on a belt to start a small press for the job of turning out some Yancey County tax blanks.

"Do all their work," he said. "Sometimes some salesman feller tries to sell the county a printing job, but I just go up there to the courthouse and cuss 'em out."



deeply individualistic, wielding a great moral and spiritual power over its people.

The arrival of two men to buy a calf shifted our interest from printing to farming. We followed Lusk over neat upland acres to a second steam engine with an equally outsize whistle. Below was a fine log barn, but Lusk Edwards the week before had laid foundations for a new one. He would fell trees from his woodlot, stoke up the engine to saw his lumber, and build that new barn. This, I think, was not so much for the need of hay storage as for the need in Lusk Edwards at 78 to find an outlet for his energies.

Whistle talk took me next to Floyd Wheeler, who for 39 years yanked the cord at every road crossing on the 13-mile Yancey Railroad.

"You could hear hit from Burnsville to Kona. Hit used to make the women sob and wring their hands."

Mrs. Wheeler, porch-rocking with us at their house by Cattail Creek, smiled wryly.

"Speak up loud," she requested. "Floyd's right deaf from that old whistle."

I had had my first glimpse of Floyd Wheeler two years earlier while I was driving along the Micaville road. There was a whistle blast around the bend, an antiquated locomotive parting the bushes, and a blue denim arm waving from the cab. It had to be Floyd. His was the only hand on the railroad's one and only throttle.

Youngster on the Black Mountain Line

"When did you start railroading?" I asked.

"In 1913 they run the Black Mountain line in from Burnsville and I went to work firing. I 'lowed I could run the engine, but the feller said: 'Son, you ain't old enough to even get a job on a railroad.' I was hardly 18 then."

Mrs. Wheeler went indoors to fetch two faded photographs, a young Floyd Wheeler in 1917 khaki, and a grease-monkey Floyd Wheeler on a big locomotive in France during World War I. He explained:

"I was the youngest engineer in the Railway Transportation Corps, and the biggest fool. You know what a fool is? A young fella! I hadn't been three weeks in France when my train got sidetracked right back of the front. I could hear 'em fightin'. Sounded like Christmas to me, so I went over the top of a hill and walked smack into the Army.

"They was a-tearin' the trees to pieces. Twigs 'n bark was fallin'. I stepped behind a big tree and felt like I was stickin' out on both sides. I remembered I had business on the near side of that hill. Johnson, my fireman, asked me how I liked the front. 'Buddy,' I said, 'they're trimmin' the bresh back there —with bullets.'"

To tease her husband, Mrs. Wheeler next produced a *Yancey Record* clipping which in sarcastic vein reported the death of a bear by falling out of a tree. This tragedy had occurred out of season and with her husband in attendance.

"Shucks," Floyd said, "b'ars don't naturally die from falls, but this one were overweight from killin' hogs—and maybe an extra mite of lead."

Aside from the Case of the Overweight Bear,

Floyd Wheeler was rated the first bear hunter of Yancey County. Then, on a winter run in 1955, he lost his right eye when a snow-bent apple branch whipped inside his cab. He hunts no more.

"Old 99" Boasted a Man's Whistle

Floyd returned from France for 37 more years on the Yancey County run. By 1926 the virgin timber was gone, the lumber spur made into a highway, passenger traffic abandoned. Floyd now pushed "Old 99"—built in 1905—through folks' front yards five miles from Burnsville to Micaville, two miles up the spur to the feldspar mill at Bowditch, and back with the filled cars shoving Old 99 in the tender on the downgrade run to Kona.

"How did you pass the time?" I asked.

"Hit passes good on a steam engine. You jes sit 'n listen to the cough of the stack. I like a steam whistle. Hain't like that penny poop on a diesel."

It was the diesel, however, that gave us our ride on the Yancey Railroad, renamed in April, 1955, when the Clinchfield Railroad

"A couple of big wheels from the State Utilities Commission egged us amateurs into saving the road. We all took a share.... Nowadays a directors' meeting is a neighborly get-together."

sold its Black Mountain line for $22,000 to a group of Burnsville citizens. Bill Banks, youngest railroad president in the United States, explained to me how a going line came to be knocked down for one-thirtieth the amount of its bonded indebtedness.

"The Clinchfield had gotten permission from Washington to abandon the Black Mountain," Bill told me. "Why not? The best break they had in years was a small deficit in 1953. Their chief engineer made a classic report: 'This railroad is run down in every respect.' But to Yancey County, loss of the line would have meant half a million dollars a year in lost wages, closed mines and mills.

Everybody Owns This Railroad

"Then a couple of big wheels from the State Utilities Commission—Ed McMahan and Parks Lowe—egged us amateurs into saving the road. Washington reopened the case. We raised $70,400 by peddling common stock around town. We all took a share: schoolteachers, millowners, widows. We held a regular meeting at the Men's Club, and bought in the road for less than junk value. Our new diesel alone cost us twice what we paid for 13 miles of roadbed. Nowadays a directors' meeting is a neighborly get-together."

Bill Banks is 33. For all I know he may be the only American railroad president who sports a crew haircut and receives no salary. No Yancey Railroad official gets one. Paul Young, its secretary-treasurer, does get paid, but that's because he is also full-time station-master and shipping clerk. Bill Banks is a lumberman, as were his father and his grandfather and so on back to the first Scotch-Irish Banks who felled the first trees for a Banks cabin hereabouts.

"They outtalked me at the Men's Club," says Bill in excuse for his railroad presidency. But since accepting it, he has traversed the United States studying railroad operation. Last year the Yancey showed a profit, which went back into new ballast and oak ties.

For this the Ross family was very happy as we stood for a long day along the rail of the diesel watching the curves of the old roadbed come at us. Dogs outraced us in barnyards. Fluttering grasshoppers took turns in pacing us. We nearly got a chicken to add

to the cold fried variety in our lunch basket.

We brushed corn just coming into tassel, skirted tobacco patches, waved at towheads, lost a race to a truck on the road above us. We wound down Little Crabtree Creek to Micaville, thence up the spur to where the Bowditch mill stands snowy white with spar dust against the green slopes of Celo.

Blue Ridge Spar Makes Kitchen China

Buck Bradshaw's diesel shunted boxcars to the loading platform while we invaded the mill's misty interior. On belt conveyors from above came feldspar chunks, a truck-ride away from near-by mines. "Crunch" went metal jaws on the chunks, and spewed the pieces into revolving cylinders.

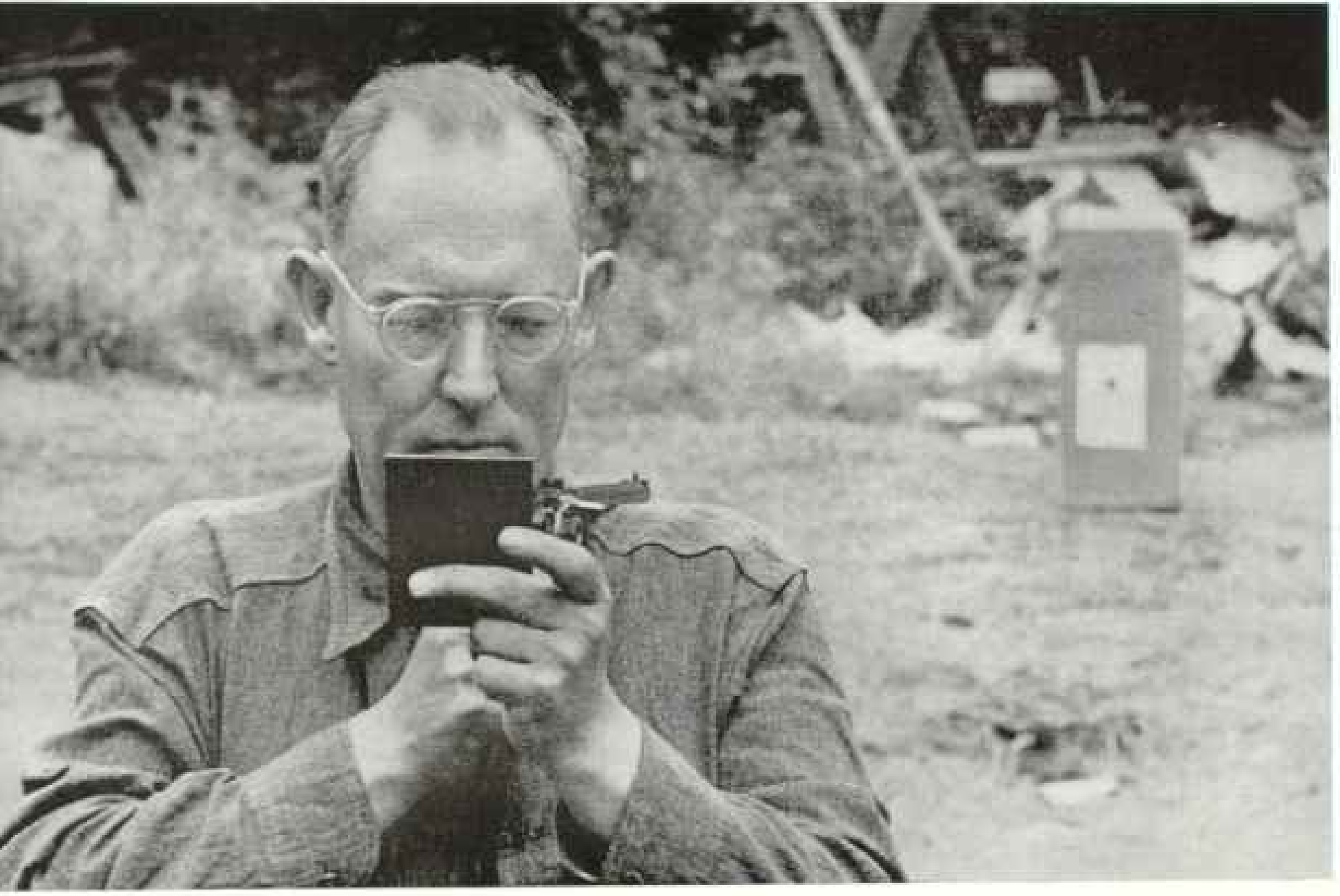
Here the spar meets two tough customers. In with the spar are pebbles imported from French seacoasts. The cylinder walls are lined with blocks of Belgian agate. Mixing it up with these two brings the feldspar out as a drifting white powder ready for manufacture into the sort of glassware or china that fills the kitchen shelves of America.

Western North Carolina is the foremost United States source of feldspar. When Buck Bradshaw hooked up eight carloads behind his diesel and brought it swinging around the curves that follow the South Toe River to Kona, he was helping to supply a necessity and also justifying the faith of the Men's Club at Burnsville.

On the return stop at Micaville, Floyd Wheeler climbed aboard. Buck Bradshaw's quiet passion for his diesel is as deep as Floyd's huffing and puffing enthusiasm for the ghost of Old 99, now retired. I knew he would taunt Buck. At the first mild toot of the diesel whistle, Floyd held up his little finger, indicating comparative whistle sizes. Buck grinned and shifted his quid. They were both railroaders.

The lives of people cross and crisscross in the mountains. An old miner at Kelse Boone's smithy showed me gems Roby Buchanan cut for him. Kelse wrought the picks to grade the railroad in 1910. Daniel Boone repairs Lusk Edwards's presses. Lusk thinks his whistle makes more noise than Floyd Wheeler's. Floyd's bear-hunting guns know the skilled touch of John C. Hutchins.

We brushed corn just coming into tassel, skirted tobacco patches, waved at towheads...



Gunsmith Johnny Hutchins hit the thumbtack.

Johnny lives far up Banks Creek in a cabin built during the administration of Thomas Jefferson. A trumpet vine is taking over the mellowed wood. Within is a private arsenal of rifles and pistols of delicate precision. Johnny Hutchins designed and made them, using native wood for stocks and old Ford springs, saw blades, or anything at hand for the metal parts. He showed me one, saying, "I reckon this is the world's smallest derringer."

Egged into it, I took turns firing a target pistol over my shoulder while sighting in a mirror held in the other hand. I hit the carton. Johnny Hutchins hit the thumbtack.

On a Hutchins pistol, which in off-hand shooting puts three straight within a dime's circle at 20 feet, John puts his butterfly proof mark. Each fall the hunters come to have their guns tuned.

"They like pistols for bear. The laurel's so thick you can't shoot until 50 feet. It takes the silkiest trigger pull possible. You don't pull and you don't squeeze. You just touch it and she's gone. It's like tuning a banjo."

"I reckon this is the world's smallest derringer."

School Builder from Bear Wallow

Gunsmith Johnny Hutchins is cousin to Jim Hutchins, philosopher. This quiet scholar in overalls completed in his lifetime the traditional American cycle from one-room log

schoolhouse to consolidated high school. As a boy his schooling was under the adage: "If they ain't no lashin' they ain't no larnin'." When he retired as Yancey School Superintendent in 1941, he had built five stone high schools. Old-fashioned and modern education merged in Jim Hutchins.

"Yancey, Mitchell, and Avery Counties used to be called 'the Lost Provinces,'" he told me, "and rightly so. Our roads were a kind of stew. It took two days by wagon from Asheville. Few outsiders risked it. Trade was by barter. There were no industries—just mountain living. We were very poor then. Matter of fact, I still am."

Jim Hutchins's mild blue eyes peered with amusement over his glasses. We were sitting on his lawn above the road where the tourists go by. Down it a piece was the quaint sign: "Bear Wallow Road."

"We lived on Bear Wallow. Mornings I'd push aside the fox-grape vines to see the fresh prints in the mud. Those days, folk were still girdling trees to clear a patch for corn. There were no matches. We'd borrow a live coal between boards from a neighbor. We had good times—possum hunting by torchlight, chestnut roasts. The blight had not yet killed the chestnuts. Springtimes, their blooms turned the mountains into cumulus clouds."

Jim Hutchins in 1906 left home for Wake Forest College. He arranged with the mail carrier to bring an extra horse along with him. Buck Creek was in flood. He made the opposite bank "with my pony submerged to the saddle and me hugging his neck. I was Wake Forest's greenest and wettest freshman."

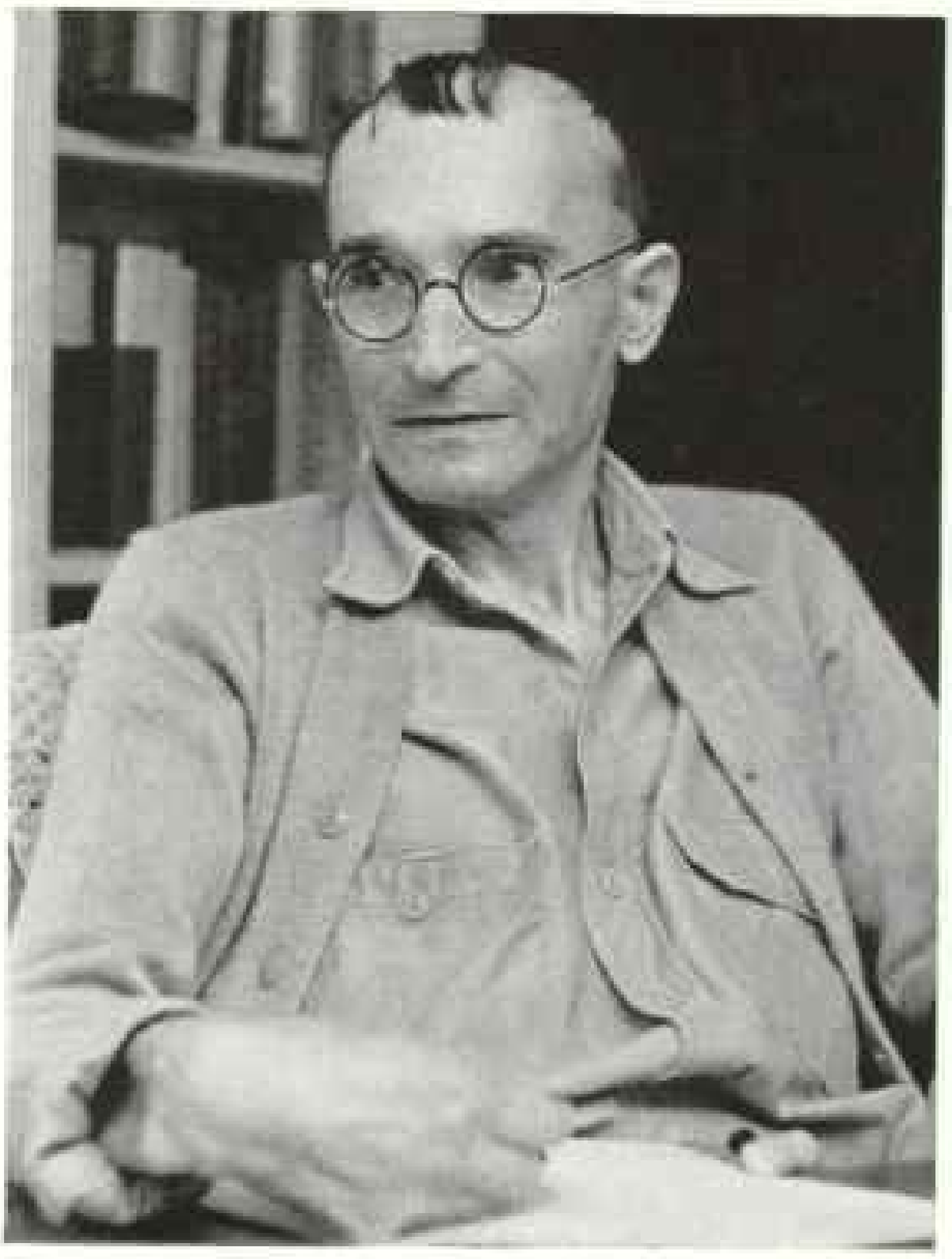
Backwoodsmen Appraise Shakespeare

Jim Hutchins loaned me a handwritten manuscript: "Public Education in the Mountains," by Monroe Thomas. The clear and careful script, I learned later, was written by hands cruelly twisted by an affliction which cut short Monroe Thomas's teaching career and kept him prisoner in his cabin for 20 years.

My wife and I called at Kona on this back-

Jim Hutchins, quiet scholar in overalls: His schooling was under the adage, "If they ain't no lashin' they ain't no larnin'."

Monroe Thomas, lonely crusader: "The old homecrafts are like hunted animals, creeping deeper and deeper into the hinterlands."



Ed Whetstine: "You can't find another timber than white oak to rive down fine. Hit makes nice baskets and lasty ones too."

woods saint, for so we came to hold him. He was at his writing board, busy at his lonely crusade to bring teachers back into mutual intimacy with students and their families. His mother sat over crocheting as delicate as her son's handwriting.

I had learned from Jim Hutchins that he and Monroe Thomas swapped frequent letters containing their views on Milton and Shakespeare, original poems, and disquisitions on the relative merits of log cabin and modern consolidated-school education. Against the latter Monroe Thomas launched his philippics in the gentlest of voices:

"Our schools have lost touch with our people. The consolidated schools are beehives of industry, pouring an imposing number of subjects through their pupils' ears, but our children have their heads and hearts turned away from the land where they will have to live and work and build their homes. They know nothing about their land and heritage. They cannot name the wild flowers and plants, much less make use of them."

He showed me poems about the woods he could no longer visit. One phrase of his stuck:

"The old homecrafts are like hunted animals, creeping deeper and deeper into the hinterlands."

He harked back to the old mountain life of handmade bull-tongue plow and wooden-tooth harrow, "when a man was not a man until he could swing a cradle scythe, and there was no soil erosion." Life centered in the small community, deeply individualistic, wielding a great moral and spiritual power over its people.

World Turned Out to Be a Whopper

Then the railroad invaded the North Toe Valley, bringing cash sales instead of barter, stripping the timber, imposing the turmoil of the outside. Monroe told me of an old lady who said after her first railroad trip:

"Well, well . . . effen the world's as big back t'other way from where I come as hit is thisaway, hit sure is a whopper!"

Monroe Thomas knew that the world really is a whopper and cannot be kept from cabin doors. But he felt that teachers could bring

back homespun moral values by entering pupils' homes and learning family needs and aspirations.

"That was the bond which helped our fathers get more education, grade for grade. Modern schools have swapped footpaths for buses, ponds in the branch for shower baths, grapevine swings for indoor gyms, dunce stools for I.Q. ratings. I'm proud of the schools Jim Hutchins built. But I want them to be an arm of the people."

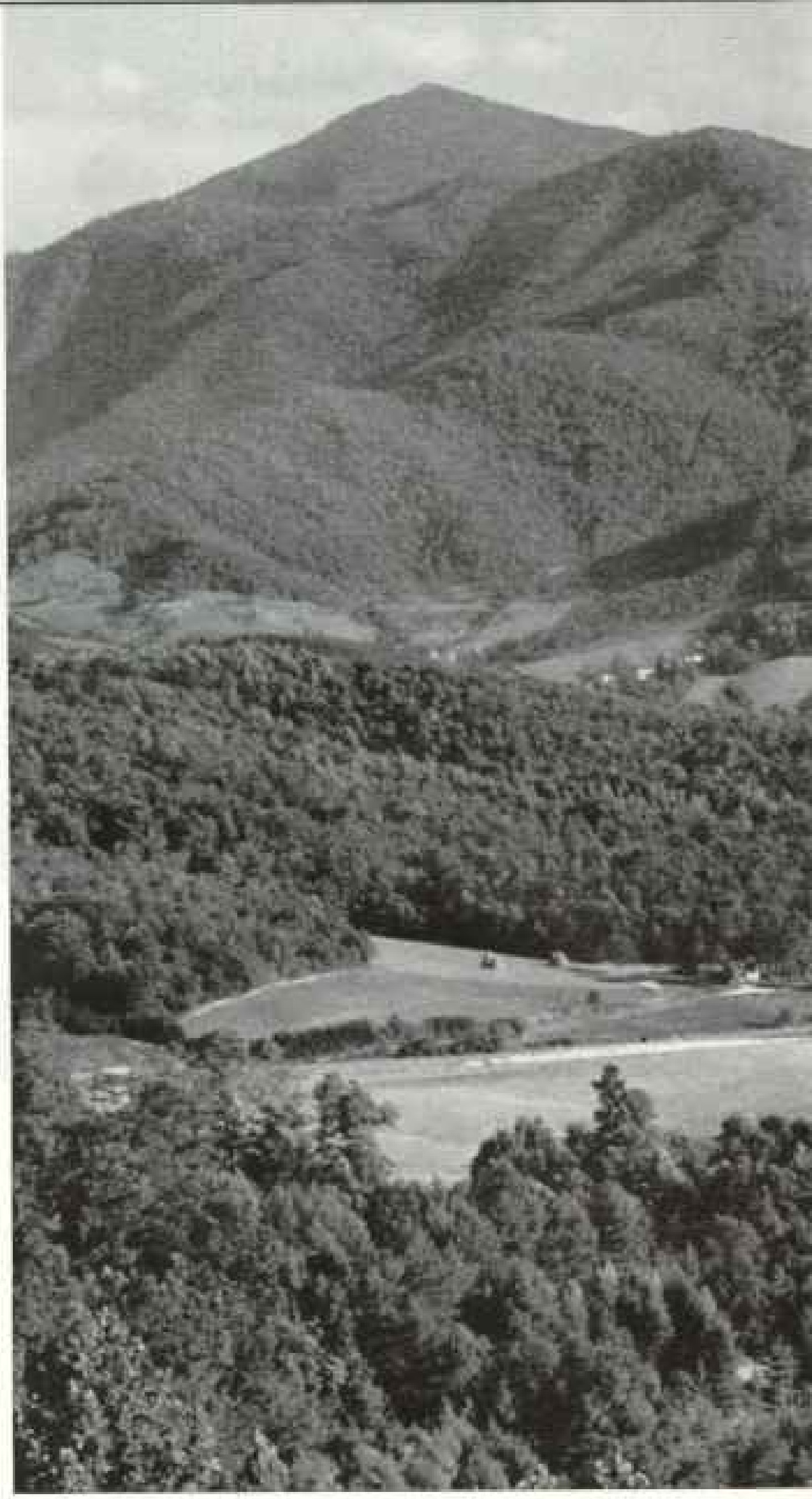
Backwoods Poet Recorded His People's Heritage

Not many months after I wrote these notes on him, the frail body of Monroe Thomas lost the battle it had waged for 40 of his 56 years. Now that his friend's voice was stilled, Jim Hutchins loaned me upwards of 50 letters and manuscripts sent him over the years by Monroe Thomas. They reveal a passion to preserve the integrity of the old mountain life. For 20 years—slowly weaving an immaculate script with his left hand after his right became useless—he had defended what he thought dignified and good in the old days and deplored aspects of modern impacts on his mountains. He left in Jim Hutchins's hands a sort of monument to what Blue Ridge people were and are.

His mother, Maggie Silver Thomas of the skilled crocheting hands, is a great-granddaughter of the Revolutionary War veteran who first settled the North Toe River Valley. Still standing is the family's log house, for seven generations "never bought, sold, mortgaged, rented, insured, or vacant."

Monroe's first paternal ancestor in the mountains was one Joe Thomas—born Tomas in Spain—who arrived in the valley from Florida in 1810. They kept their Iberian features, the Carolina Thomases—delicate, enduring bodies, dark features, irascible tempers, and warm hearts. Joe lived to 114.

His grandfather—"Water" Aaron to tell him from a cousin "Roarin'" Aaron—weighed 110 pounds, wore a women's size 5 shoe, and fought four years for the Confederacy. When he was 90 years old he was caught in a mine rockfall. The doctor assured him he was not badly injured.

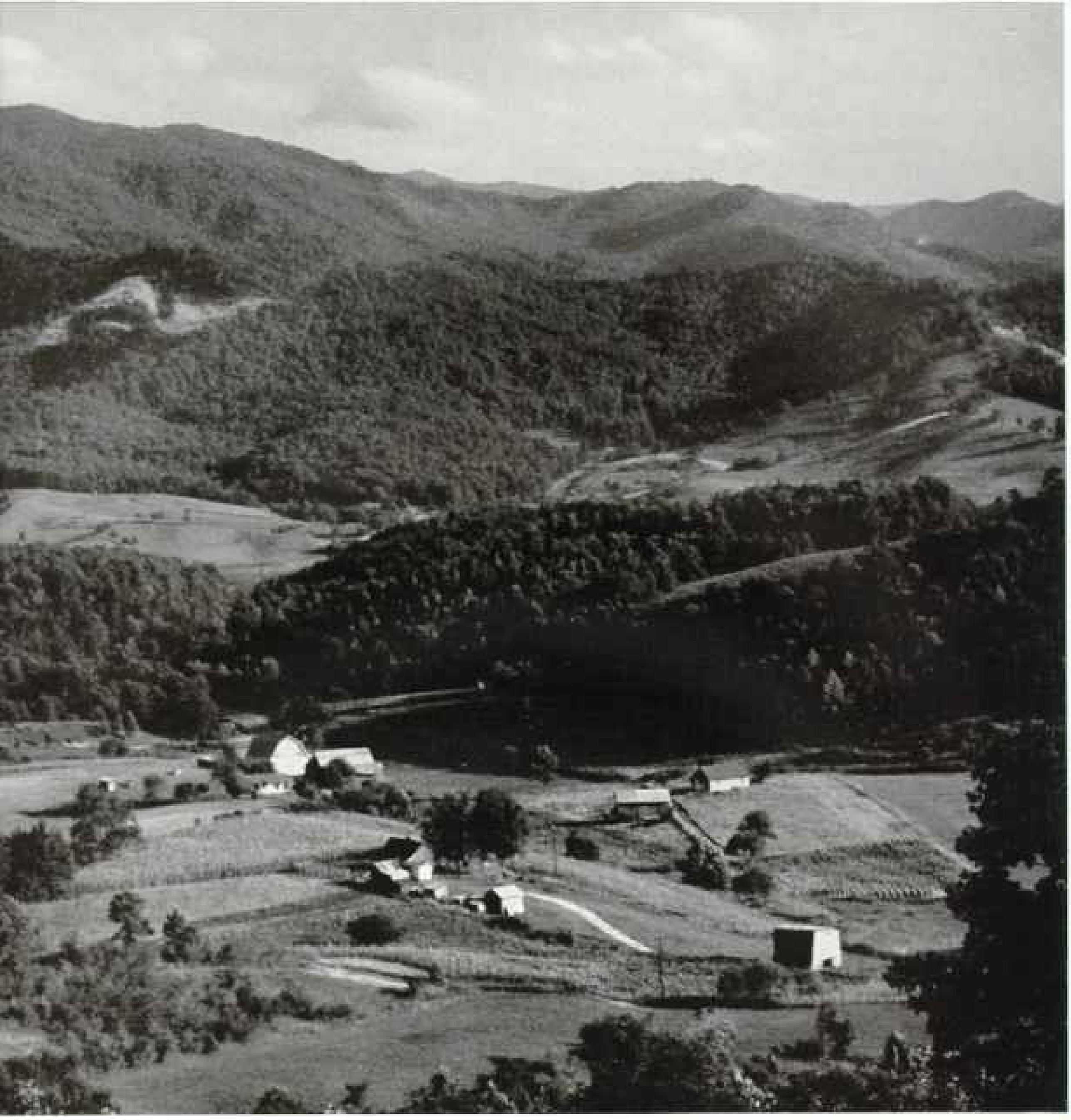


The quiet ... the being out of sight

"Psssss-st!" Water Aaron hissed in his beard. "Hit'll take me 20 years to git over this."

By his reckoning, he never recovered, for he died in 1924 at 104, six years short of the 20-year recuperation period.

Longevity was denied Monroe Thomas by a boyhood attack of typhoid fever followed by a degenerative bone disease. Total incapacity eventually kept him a cabin shut-in, tended night and day by two brothers who had foregone matrimony to care for him. He lived—totally—in his thoughts and writings of mountain ways, mountain virtues, and lapses from the old code. To improve his



of another's chimney smoke . . . the mountains to look at . . . the high-up peace . . .

style and his breadth of thought, he read Emerson, the *Atlantic Monthly*, *Harpers*, and the National Geographic.

But cool, sweet streams run unheeded by the outside world. His writings never found print outside of mountain weeklies. Yet, unnoticed by him from his cabin window, the old way of life was beginning to creep back from the deep hinterland in which he feared it was being lost. This is evidenced in good care of the soil and the forests, revivals of square dancing and song fests, gradual salvage of homecraft skills.

The iron shaped on the anvil and the splitting of the white oak sapling on the shaving horse will persist up the hollows while the oldsters last. Some of the younguns are apprentices. Most towheaded grandchildren retain love of the land and its customs, absorbed from grandfathers who dug out the stumps and brier and planted the seedling cherry which now shades the yard and fills the shelves with jars of ruddy fruit.

One local development in the return to handicrafts comes from an unexpected source. In Burnsville, summer classes in handicrafts and art and a drama workshop are being conducted by the University of Miami. Teachers

in the mountain schools are learning basketry, jewel cutting, and pottery, and are sculpturing native soapstone. In turn they take these skills to pupils whose grandfathers knew them but whose fathers forgot.

Clayton Charles, head of the university's art department, took me on a trip to recruit the Whetstines as basket-weaving teachers. Ed Whetstine stepped a few paces from his cabin and deftly stripped bark from a young hickory. This was for caning a chair bottom. He returned to sit astride his shaving horse, an oaken monster contrived as a vise to hold oak splits while he rives them with a drawing knife to make basket ribs. No factory-made tools here. The blade was a sharpened automobile spring, the handles corncobs.

"White Oak Makes Lasty Baskets"

"You can't find another timber than white oak to rive down fine," he said. "Hit makes nice baskets and lasty ones too."

"Lasty? The only way to get shet of those baskets," Nancy Whetstine added, "is to burn 'em. We used to carry taters and berries in 'em when I was a girl. Grandfather made 'em to barter things for. He'd get for a basket as much shucked corn as hit would hold. Ed, you going before those folks in Burnsville in those pants? Where's your t'otherns?"

"These are my t'otherns. T'otherns were tore so bad I can't wear 'em."

We transported Whetstines, drawing knives, hickory strips, and half-finished baskets to Burnsville, where a mixed class of schoolteachers and college students hung on every movement of the basketmakers' hands.

Next day I joined another group off to collect soapstone. The passion to carve the soft, lustrous stone had spread to drama students. They whittled on it during rehearsals and while waiting in the wings to come on stage. On the collecting trip the leading lady of *As You Like It* heaved stone from the quarry along with Yancey County teachers.

How the ultramodern campus of the University of Miami extended itself from Coral Gables, Florida, to Yancey County is another tale of cooperation originating in the Burnsville Men's Club. Burnsville turned over to the university a school building converted into a theater, a dormitory, workshops, and, more important, its enthusiasm. Burnsville people solicit advertising for the theater programs, sell tickets, fill the Parkway Playhouse out front, and work backstage.

On the town square is a bronze statue of Capt. Otway Burns, who commanded a privateer in the War of 1812. He once remarked on a trip through the recently opened wilderness that "this would make a beautiful site for a town." It did, and today Burnsville boys squat on their hams around his statue, talking about whatever mountain boys talk about—girls, maybe.

During court week tourist Cadillacs and jeeps red with country clay maneuver for parking space. Baggy overalls and student blue jeans idle past the courthouse. Along the railing are old-timers come to town to attend trial, transact a little business, or just plain gossip. They make a frieze of leathery faces, with crinkled eyes peering happily under hatbrims, such as you will find only in American backwoods communities. Human streams still are merging in the Blue Ridge.

Monroe Thomas . . . slowly weaving an immaculate script with his left hand . . .

Contentment

I've found the world a very pleasant place.
By day the sun has lent me heat and light,
Kind nature's brought me food for strength and grace,
And moon and stars have fed my soul by night.
My neighbors have not looked on me for wings,
Nor wished me in that hotter nether clime;
And I've not looked on them for rotten things,
Nor moaned that I was born out of my time.

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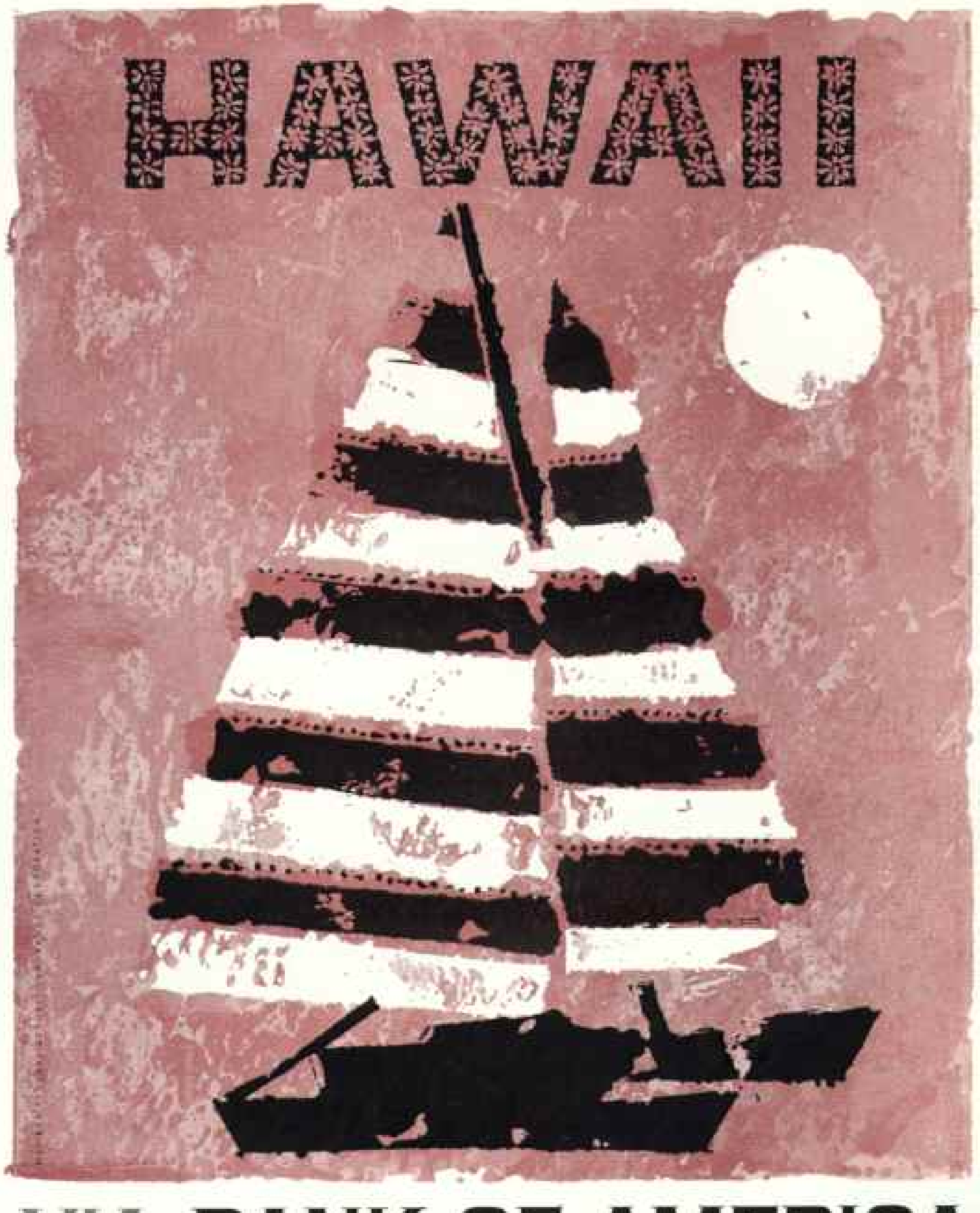

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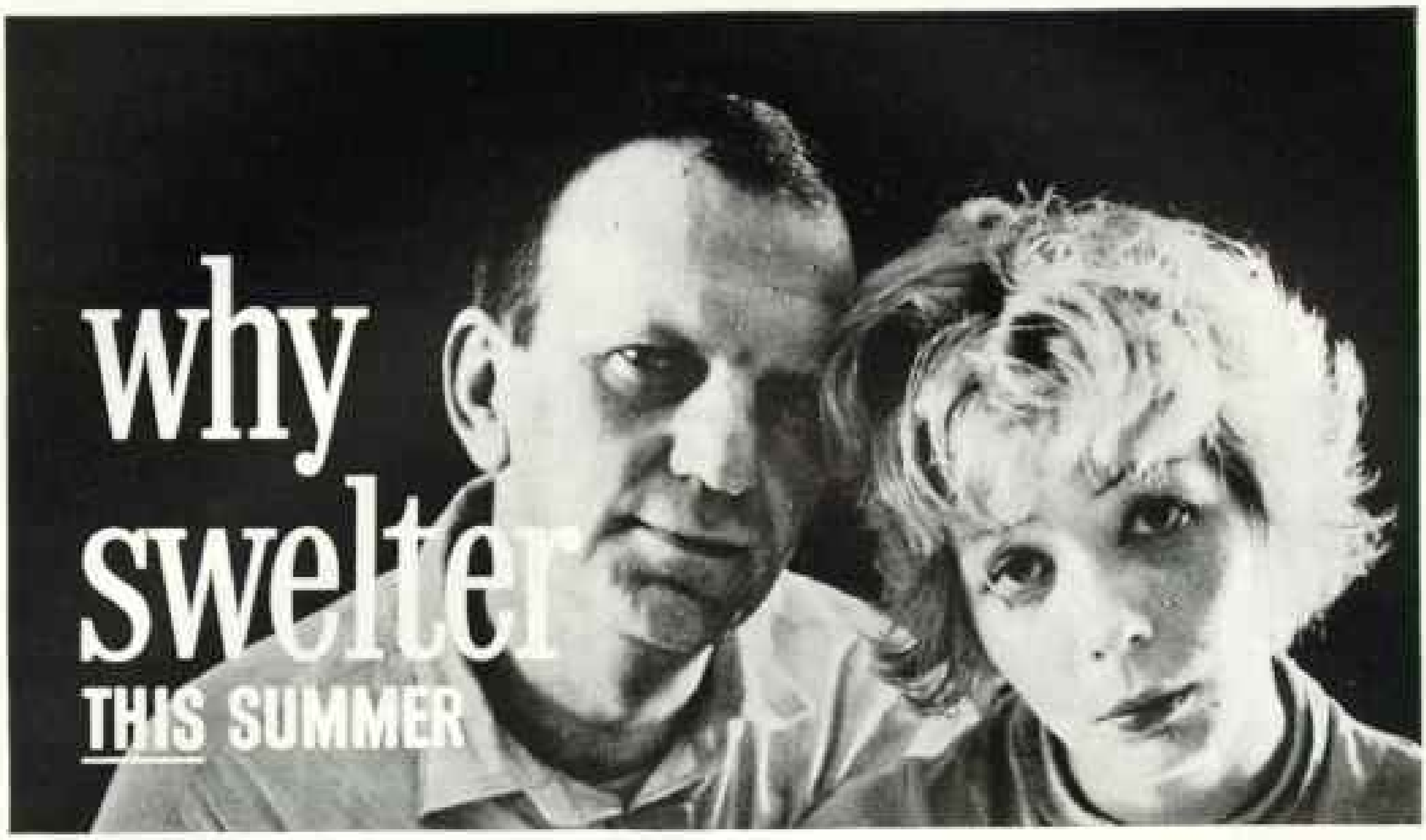

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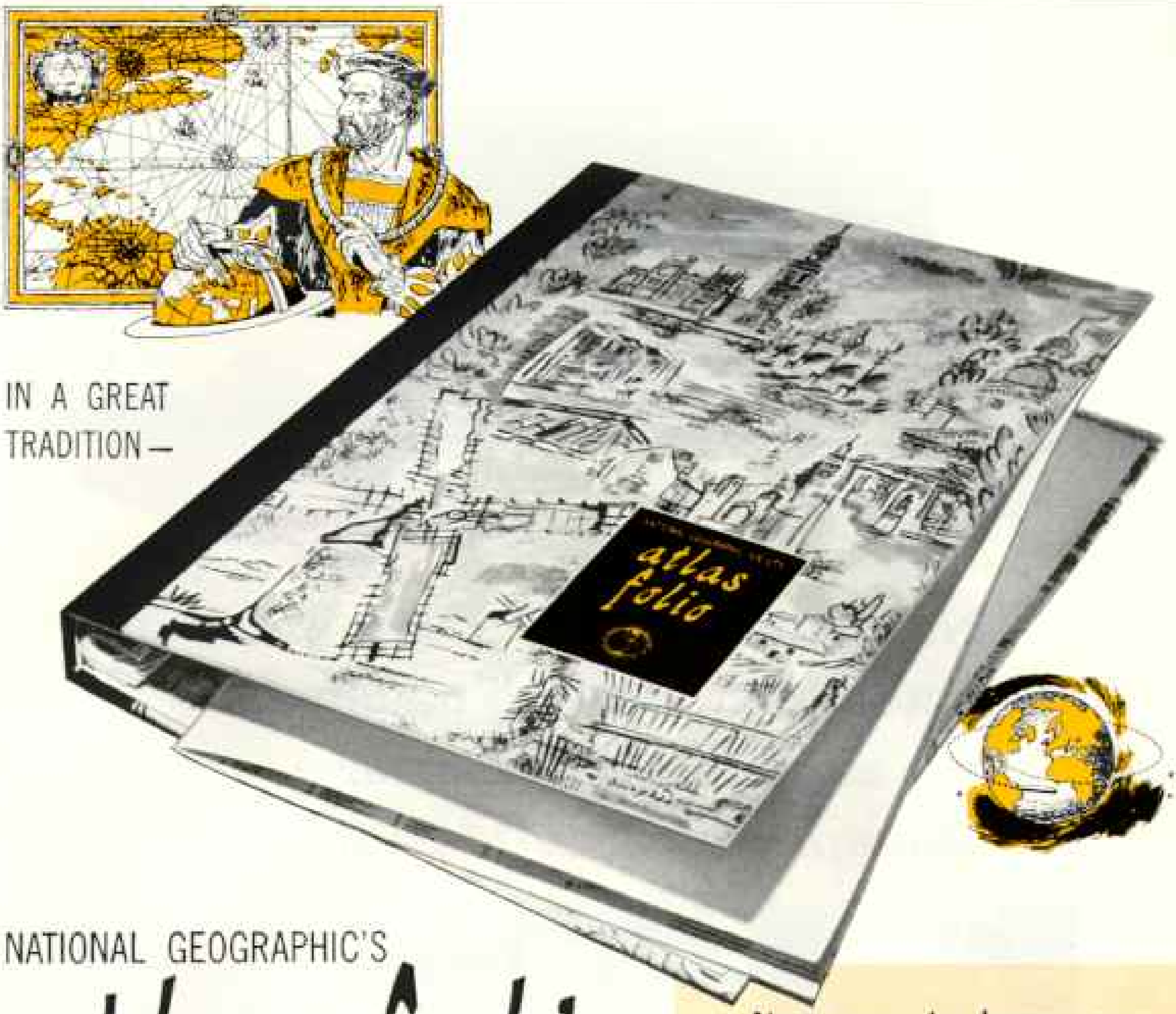

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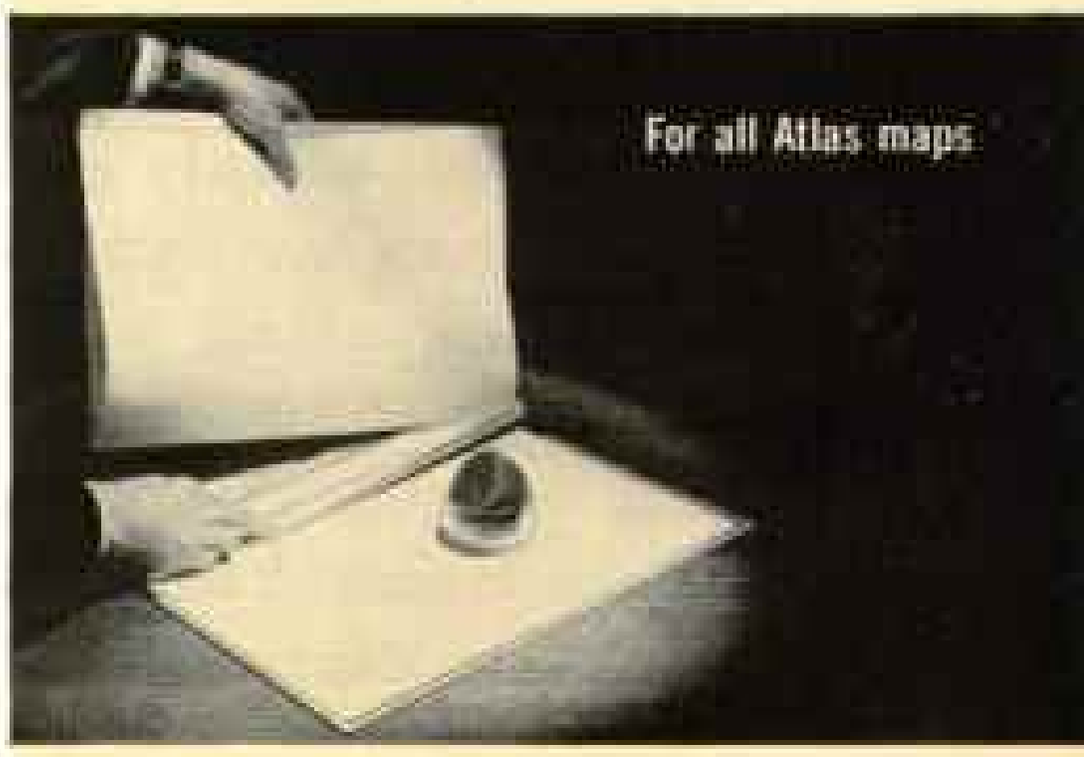

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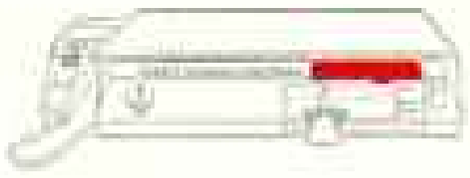
THE NEW **DICTAPHONE**  **TIME-MASTER**

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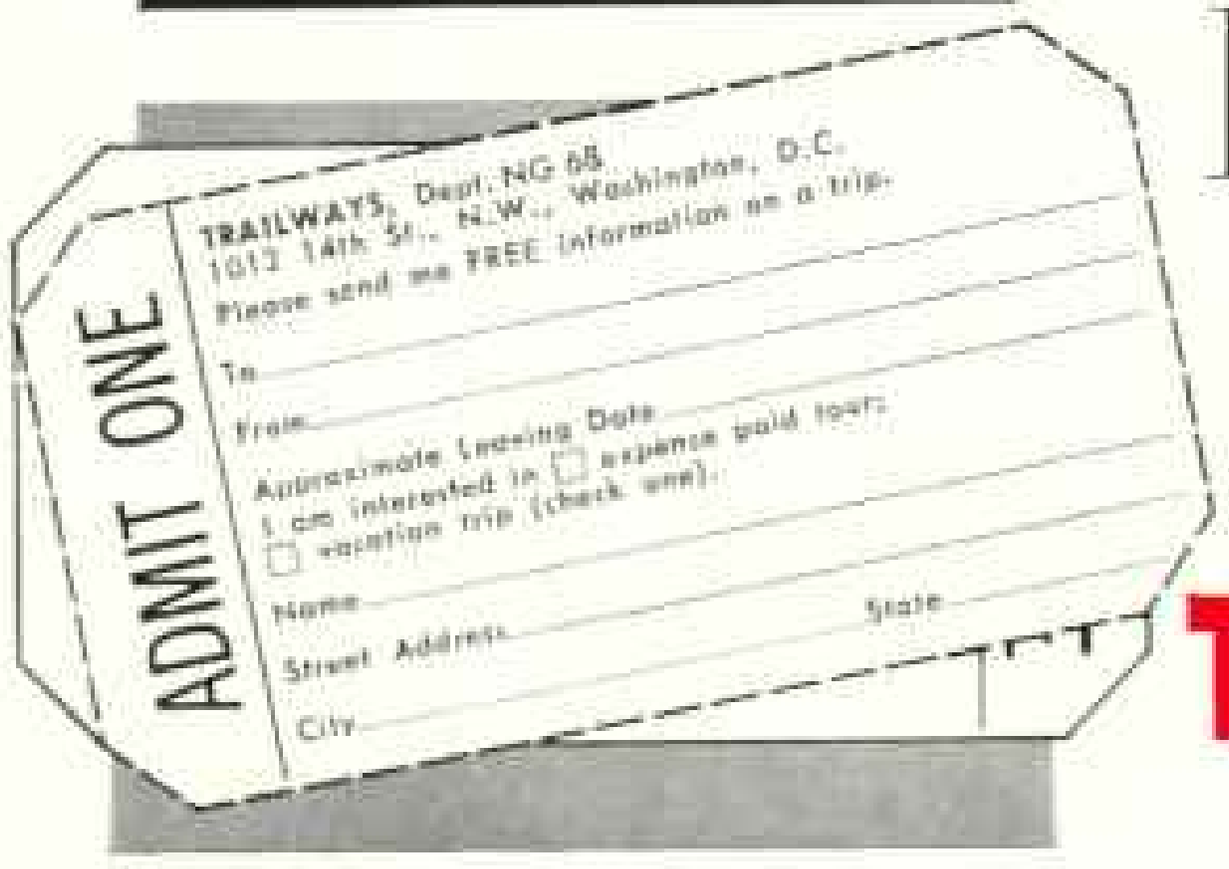

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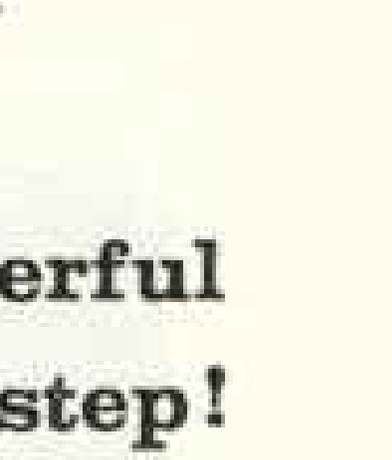

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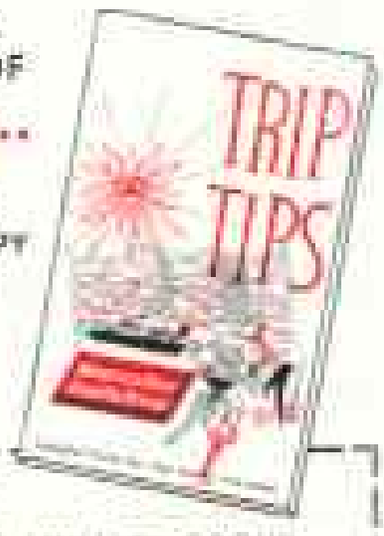

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Gentlemen: For peace of mind while on my trip please send me, without obligation, a copy of "TRIP TIPS."

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America's most dramatic mountains — Grand Teton National Park, Wyo.

Give us men to match these mountains!

Most *big* mountains start with *little* mountains at their feet. But Nature wasted no time building foothills here. She put all her energy into the Grand Tetons themselves and there they are, thrusting up from the plain and strutting off against the sky. Born of earthquake and ice, they are the most spectacular peaks in the chain that forms our continental backbone.

You can read about the Tetons in books: how John Colter discovered them in 1807, how the mountain men rendezvoused at Jackson Hole to swap tall tales, how conservationists made them into a great National Park.

Now, see for yourself. Tramp the miles of wilderness trails. Wet a hook in the snow-fed lakes that mirrored Indian campfires. Or, as the mountain men liked to do, lazy around a spell for your soul's quiet peace.

A poet wrote of the West: *"Bring me men to match my mountains!"* America has always answered that call, for there's a challenge in this restless, adventurous nation that breeds great men . . . *men who dare to stand up against the sky itself!*

* * *

FREE TOUR INFORMATION If you would like to visit Grand Teton National Park, or drive anywhere in the U.S.A., let us help plan your trip. Write: Tour Bureau, Sinclair Oil Corporation, 600 Fifth Avenue, New York 20, N. Y.— Also ask for our colorful National Parks Map.

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you'll just love North Carolina!

Your high road vacation in Western North Carolina takes you to the peaks of the Blue Ridge and Great Smoky Mountains, where flame azalea and the majestic rhododendron make spring and summer colorful travel seasons.

Or, taking the low roads, you follow moss-arched highways through the historic Old South of Eastern North Carolina to sandy beaches. Your souvenir may be a pirate piece of eight, a real conch shell, or big fish from the Gulf Stream.

Bring the whole family for Variety Vacationland fun in North Carolina.

NORTH CAROLINA

COMING EVENTS: Singing on the Mountain June 22 Grandfather; "Unto These Hills" opening June 24 Cherokee; "The Lost Colony" opening June 28 Manteo; "Horn In the West" opening June 28 Boone; Flat Rock Playhouse late June through August.

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"AMIGO" IS the Spanish word for friend. You hear it often in San Diego . . . for this oldest of California cities represents a captivating mixture of Mexican and American culture.

San Diego's fortunate location on the international border, where California and Mexico meet, makes it an unique city. There is the bustling California playground, with famous restaurants, theaters, concerts, parks, beaches, fabulous fishing. Step across the border and you're in Mexico with all the gaiety and charm of matadors, caballeros and beautiful señoritas.

Write for illustrated folder. San Diego Convention and Tourist Bureau, Dept. G-6, San Diego 1, California.

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Man most likely to succeed
...*in getting over a stomach ulcer*

"Yes," said the doctor, "you have a stomach ulcer. If you want to get over it, you must slow down and quit worrying."

"Sounds easy, but how?" the patient asked.

"You've got to work at it. About your worries—don't bottle them up. Talk them over with someone you trust. When problems seem insurmountable, leave them awhile—spend a few hours with a book or putter around your garden.

"Tackle your big problems one at a time or let some of them wait until tomorrow.

"After some rest and sleep, you will view your troubles next day more calmly and clearly."

And so this man, convinced that tension and strain are his worst enemies, is getting over his ulcer.

About one-half million Americans have ulcers. Moreover, ulcers take the lives of nearly 10,000 Americans every year.

Many factors contribute to ulcers—too much heavy, rich, spicy food, irregular meals and sleep. But emotional stress seems to be the chief culprit.

When an ulcer is discovered early and treated promptly, however, most patients can relieve their symptoms by diet, acid-neutralizing medicines, and emotional discipline.

Although relief of symptoms is usually easy to achieve, ulcers tend to recur and patients who have had one need periodic medical supervision.

If unchecked, an ulcer may undermine general health by upsetting digestive processes . . . or it may penetrate the wall of the affected organ and require immediate surgery. Fortunately, operations for these complications are successful in most cases.

The patient who follows his doctor's advice about diet, medication and a normal daily routine stands an excellent chance of overcoming his ulcer and living a normal life in good health.

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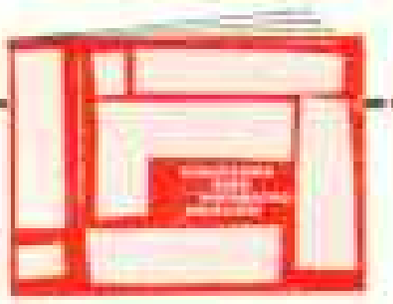

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Please mail me a free copy of your booklet "*Emotions and Physical Health*," 6-58-N.

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☆ NEW DIAMOND JUBILEE TIRE ☆

This new Double Eagle culminates 60 years of continuous research and development. It is *the finest tire men can make or money can buy.*

Beneath the road-gripping tread is incredible strength . . . strength that provides far more safety.

This you can credit to Goodyear's exclusive 3-T process which triple-tempers the Double Eagle's Nylon Cord under precisely controlled Tension, Temperature and Time.

A revolutionary pre-shaping technique prepares this custom-crafted tire for greatly increased mileage.

To this you can add the comfort that comes with soothing quietness —the security you sense from increased traction and non-skid protection—the satisfaction of better all-around high speed performance.

Marked by the *blue circle of safety,* this superlative tire can be equipped with Goodyear's new Captive-Air Steel-Cord Safety Shield for new freedom from worry over blowouts, punctures, or roadside tire changes.

See this remarkable Double Eagle at your nearby Goodyear dealer's. Goodyear, Akron 16, Ohio.

The world's finest tire . . . by miles!

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IN WYOMING, TOO...GOOD TASTE ADDS ENJOYMENT TO THE PAUSE

Yes... people everywhere have made Coca-Cola the best-loved sparkling drink in all the world. ● In more than 100 countries... over 58 million times each day... someone enjoys the specially different taste of Coke, the always welcome lift of Coke, the sense of right enjoyment that belongs to Coke alone. ● *Have a Coke*... so good in taste, in such good taste—anytime, everywhere.

Hopi dancers at Grand Canyon—and the new Kodak Medallion 8 Movie Camera, Turret *f*/1.9

New Kodak Medallion Turret Camera takes 3 kinds of movie shots—all so easily!

Gets wide-angle, standard, and telephoto views
...magazine-loads in just 3 seconds!

Save the action *best* with the new, 29-ounce Kodak Medallion 8 Turret Camera. It comes lens-equipped for regular shots, wide-angle views for greater scope, telephoto shots that bring subjects closer.

This is Kodak's easiest-to-use turret camera. Drop in an 8mm Kodachrome Film magazine and snap the cover shut—a 3-second operation! Set the Ektanon *f*/1.9 Lens and start shooting—even slow-motion movies and single-frame exposures.

Ask your photo dealer to demonstrate the new Kodak Medallion 8 Turret Camera. Only $159.50, as little as $15.95 down. No extra lenses to buy. See the Medallion 8 single-lens model, too—$106.50.

Cine-Kodak Showtime 8 Projector *(right).* Matchmate for your Medallion 8 Camera. Shows 8mm movies up to 5 feet wide—brilliantly! Reverse action, "stills." Cool, quiet. $123.50, or $12.50 down. *(All prices are list, include Federal Tax, and are subject to change without notice.)*

See Kodak's TV shows—"The Ed Sullivan Show" and "The Adventures of Ozzie and Harriet."

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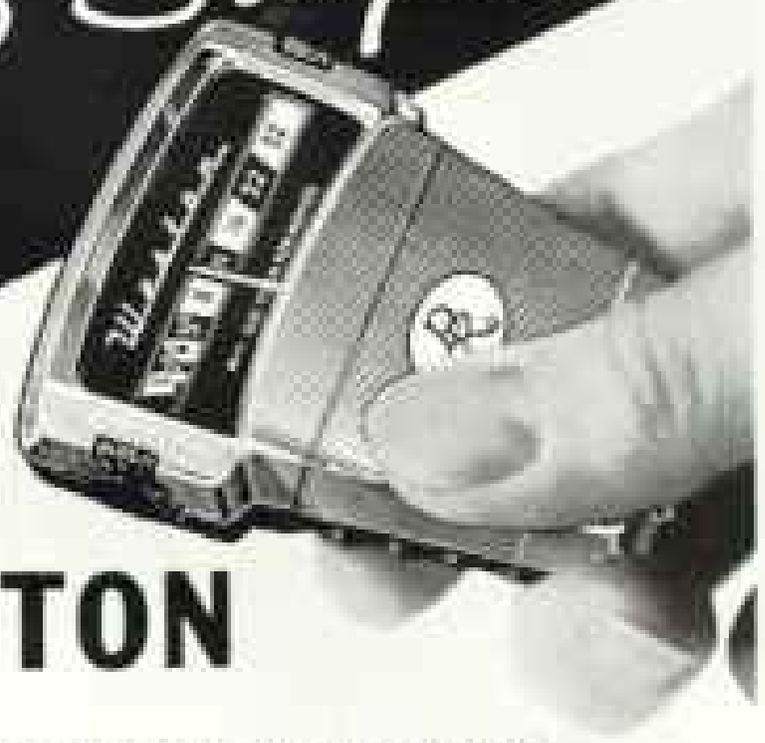

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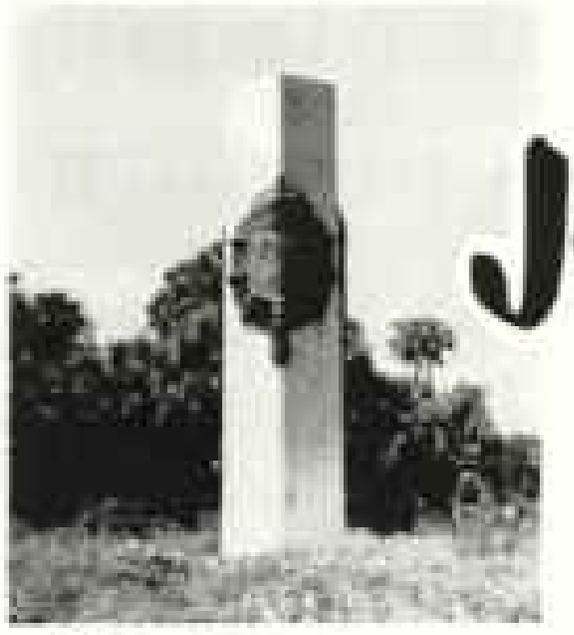
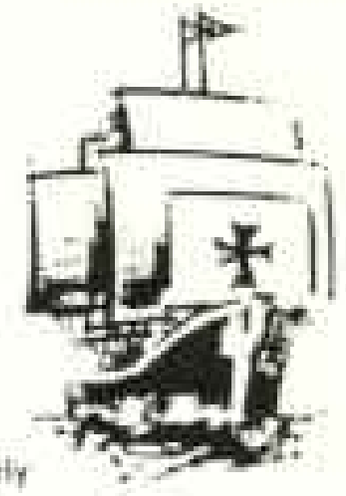
EXPOSURE METER

You'll be thrilled at the very first pictures or color shots you make with this new compact, direct-reading exposure meter. Every picture, *without exception*, will be crisp and color true . . . your movies will have a professional touch. So easy to use, too, with any camera or film. Just point it, and instantly read correct lens setting for perfect exposure. It's the simplest, quickest-to-use meter available. Low cost. See it at camera stores now.

city of pleasant memories



Jacksonville **FLORIDA**



The famous Ribault Monument.

To those interested in America's early history a visit to Jacksonville and its surrounding area is a "must" for this part of America was old long before the coming of the Pilgrims. Among the many historical sights to be seen and places to be visited is a monument erected by the French Huguenot, Jean Ribault near Jacksonville on May 1, 1562.

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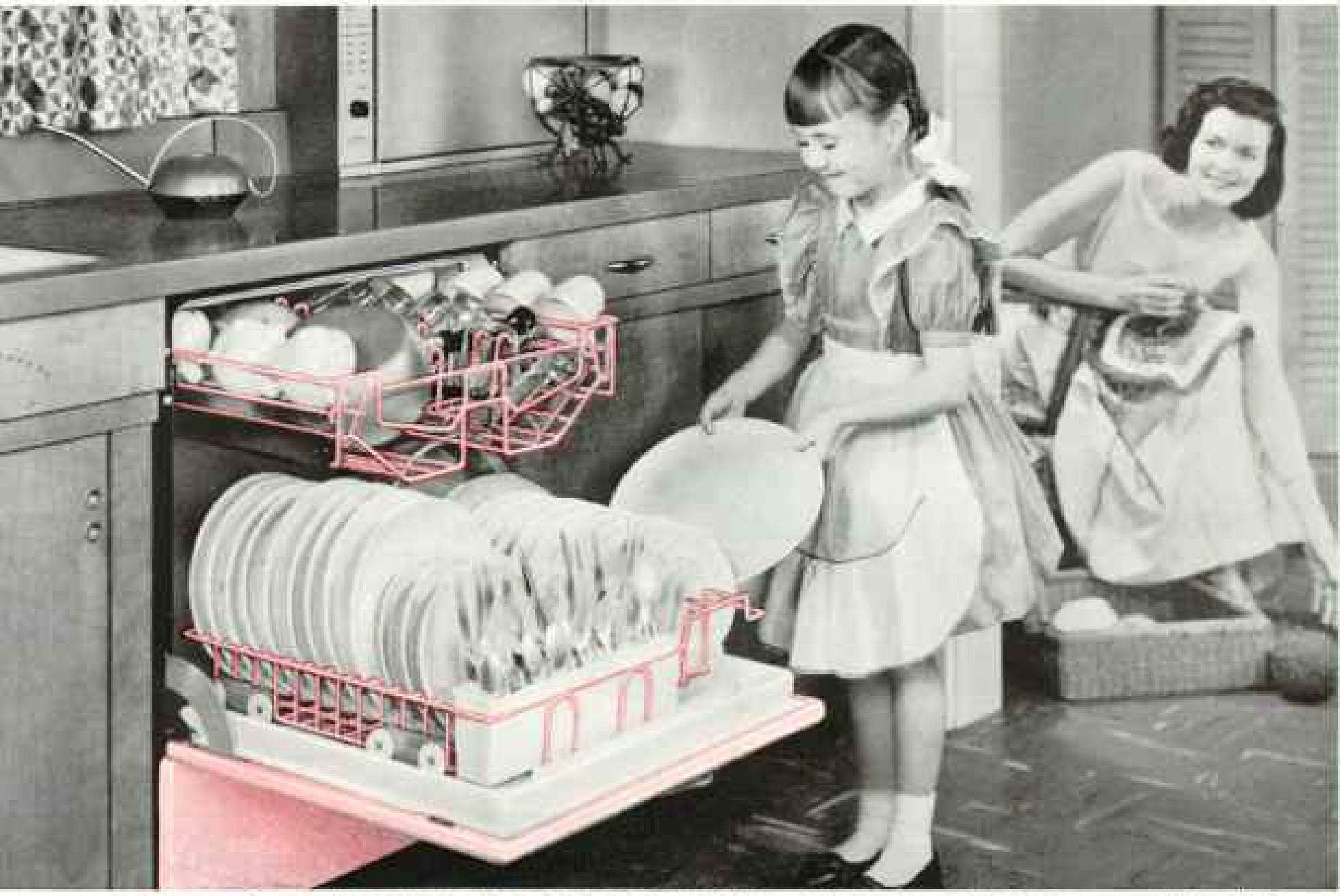
New Frigidaire Dishwashers load easily, hold more, do all dishes sparkle-clean!



Free-standing, under-counter, mobile, and sink combination models in kitchen-matched colors. Model SW-102

Washes and dries up to 48% more than other comparable models checked

—every dish is double-scrubbed and triple-rinsed!

Loading the new *Sheer Look—PLUS* Frigidaire Dishwasher is literally child's play. Open the full-width door, and spacious racks glide to you to put every dish at your fingertips. And talk about capacity! The compact Frigidaire Dishwasher holds 12 place-settings* (132 pieces) *plus* 15 extra pieces. No other competitive models checked held even the 12 place-settings. For illustrated facts on 1958 Frigidaire Dishwashers, call your Frigidaire dealer or kitchen specialist or write Frigidaire Division, General Motors Corporation, Dayton 1, Ohio.

No Wonder Dishes Sparkle, Spots Disappear!

Sparkle-Clean Washing Action! Frigidaire Turbo-Spray Tube spins safely between the loading racks, soaking every surface with thousands of hot wash-and-rinse sprays. Even dried-on egg vanishes. Scientifically designed racks expose every piece of more than 12* place-settings to full contact with water. A special "Spots-Away" wetting agent is automatically injected into the final rinse to make everything rinse brighter and dry faster.

Speed Clean-Up Time!

The perfect team-mate for your new dishwasher—quieter, faster Frigidaire Food Waste Disposer—now safer than ever. Quickly shreds and flushes away leftovers of all kinds. Ends garbage problems.

Sheer Look Style Fits Any Decor!

Like all of America's most beautiful appliance family, Frigidaire Dishwashers build-in, blend-in beautifully. Choose from the complete line of Frigidaire Sheer Look kitchen and laundry appliances in matched colors and finishes for any kitchen decor.

GM

'58 FRIGIDAIRE DISHWASHERS

*National Electrical Manufacturers Association Standards.

FRIGIDAIRE Division, General Motors Corporation, Dayton 1, Ohio

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To experience a French Line sailing is to really understand the full meaning of "*Bon Voyage!*"

You are caught up in the gay French spirit of fun. You wave to your friends on the pier, hear the deep voice of the ship speak out, watch the great bow swing downstream. You're under way!

That evening, at dinner, you learn why French cuisine is world famed. And ahead are days of sparkling entertainment and serene deck-chair relaxation. You reach Europe refreshed and ready for the sights to come. Consult your Authorized French Line Travel Agent.

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610 FIFTH AVE., NEW YORK 20, N. Y.

HERE IS THE NEW ARGUS C-44

...its ability goes far beyond its price

The talented new Argus C-44 with f:2.8 Cintagon lens and new turret viewfinder attached. Surrounding it are its accessory 100mm Telephoto and 35mm Wide-angle lenses.

The new Argus C-44 is indeed an astonishing camera — it fairly bristles with features you look hopefully for in other cameras costing hundreds of dollars more.

For example . . . It is the only camera at or near its price that offers you the versatility of interchangeable lenses on a lightning-fast bayonet-type mount. It brings you the convenience of a quick-computing, lens-coupled rangefinder-viewfinder . . . the precision of an f:2.8 Cintagon lens and 1/300 shutter.

That is not all. This new C-44 for 1958 is equipped with a split-second thumb lever film advance that lets you take pictures as fast as you can flick your thumb and trip the shutter.

Would you like more? The remarkable C-44 even goes so far as to give you a rapid film rewind crank that fits down into the frame, pops up when you're ready to use it, lets you reload your camera in a twinkling. *All* these features are built-in, and all are included in the price.

And there is an exciting new accessory: a variable-power turret viewfinder (shown on camera). This instrument shows you the full-size picture which each accessory lens takes. Cost: $24.95.

It all adds up to this one last thought: you ought to get your hands on the talented new Argus C-44—soon. The price is $99.95.

C-44 ACCESSORIES:

100mm Telephoto Lens: $59.50. 35mm Wide-angle Lens: $56.50. 50mm f:1.9 Cintagon Lens: $89.50. L-44 Clip-on Exposure Meter: $17.50 with case. Flash: $8.25. Case: $12.50.

argus

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Why buy three policies when you can get Hartford's 1-Policy Package?

Once you had to pay three premiums. For the only way you could get broad insurance protection was to buy *separate* policies.

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It's different now. Hartford's "1-Policy Package" combines the fire, theft, liability and other insurance you need for your home. Gives you—*in ONE policy*—all the vital protection shown in the panel at the right.

You can see how much more *convenient* this is. Just one policy to keep track of. Just one to pay for. And, if you want, installments arranged to fit your budget.

Another important consideration: Hartford's "1-Policy Package" may be easier on your pocketbook than the policies you have. For it can save you as much as 20% of what you would have to pay for separate policies giving you the same broad and dependable protection.

What about your present policies? You don't have to wait for them to expire. Your Hartford Fire Group Agent can arrange to give you credit for policies now in force. So you can begin enjoying the advantages of a modern Hartford home protection policy any time you choose.

So don't delay. Whether you own your home or whether you rent, you owe it to yourself to find out about Hartford's "1-Policy Package" *before you pay another premium!* Mail the coupon. Get the full story. Then decide.

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ALL THIS DEPENDABLE PROTECTION!

Our 1-Policy Package insures you against . . .

Fire	Liability
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. . . and other hazards, too, at home and away from home —all subject to policy conditions.

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No matter where you go, LEICA M-3 is the symbol of the finest in photography. Compactness, precision design and traditionally superior optics are some of the reasons. But the LEICA M-3 also has automatic controls and other features that combine precision with an unbelievable ease of operation, bringing it a world-wide reputation as the "world's most advanced camera." Whether you're going abroad or just doing things at home, the LEICA M-3 is your choice—if you must have the finest.

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Leica **M-3**

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With this scope you can see everything as above but with greater power plus will split finer stars. Mirror has twice the light gathering power. Mirror guaranteed to give theoretical limit of resolution. Rack and pinion focusing, hardwood tripod, real equatorial mounting—only one adjustment follows stars! Aluminum finder 8-power finder telescope. 2 standard size eyepieces and mounted Barlow lens give you powers of 18X, 90X, 120X, and 270X. Free handbook and Chart. Shipping weight 25 lbs.

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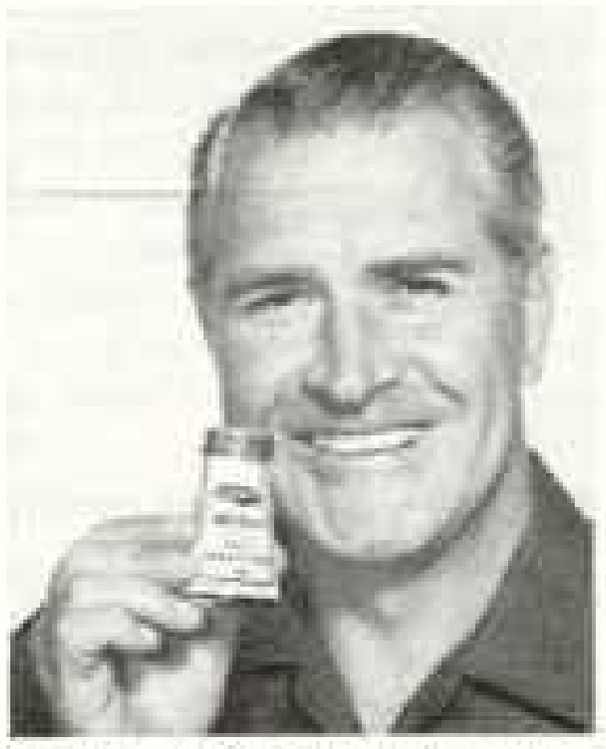
EDMUND SCIENTIFIC CO., Barrington, New Jersey

On a SALT-FREE Diet?



Start enjoying meals again by seasoning your food with Adolph's, the best-tasting salt substitute made. Adolph's looks and sprinkles like salt—retains its flavor in all cooking, baking and canning. Adolph's contains Mono-Potassium Glutamate, which accents the true flavor of all foods—makes them taste their natural best. Ask for Adolph's Salt Substitute at your grocer's.

ADOLPH'S LOW-SODIUM MEAT TENDERIZERS are the only meat tenderizers available for salt-free diets. Ask your grocer or write Adolph's Ltd., Burbank, California.

Adolph's

SALT SUBSTITUTE

YOUR HOST MEETS YOU AT EVERY STOP ON THIS FRIENDLY TOUR OF SOUTH AMERICA

You are driven from the airport to your hotel . . . accompanied on sightseeing by someone who knows local lore and speaks English . . . guided to fascinating shops and eating places. A "host tour" also features the best hotels and superior rooms with private bath.

Day by day, you appreciate the extra attentions that make this way the most popular way to see South America. Let's see what you can do in 3 weeks:

1st day—Board a DC-7B after a New York lunch, fly non-stop to a Caracas dinner. Your Venezuelan "host" will take you to the luxurious Hotel Tamanaco. Your room with bath will await you.

2nd day in Caracas. Morning tour of the city. Afternoon beside the hotel pool. At nightfall, you'll take the famous 20-minute drive over the 6-million-dollars-a-mile superspeedway to the airport and board a DC-7B for Rio.

3rd day—You'll arrive in Rio de Janeiro in daylight to get the priceless view. You'll be escorted to your hotel on Copacabana Beach and have the day to explore, bathe, shop.

4th day—Rio from Sugar Loaf will climax a sightseeing drive to museums, markets.

5th day—Rio from Corcovado after a drive through suburbs, and Tijuca Forest. Standing at the foot of the impressive statue of Christ, you'll look down on Sugar Loaf, and the harbor. One of the great experiences unique to South America!

6th day—Rio with time to visit landmarks, bathe and shop; or take a side trip to Petropolis and Terezopolis, if you like.

7th day—São Paulo, city of modernistic skyscrapers, an hour's flight from Rio. You'll be expected at the Jaragua Hotel. On an afternoon drive, your host will point out the city sights.

8th day—A day to visit local churches, or drive to Santos, world's largest coffee shipping port.

9th day—Montevideo! You'll arrive in Uruguay in the early evening, and stay at the splendid Victoria Plaza Hotel.

10th day—You'll drive around Montevideo—to the top of the hill that named it—to beaches, and out into the country to see gauchos.

11th day—You're sure to want to shop because nutria coats that would cost $1,000 or more here are less than $400 there. At nightfall, you'll take an hour's flight across the river to Buenos Aires, and the famous Plaza Hotel.

12th day—Buenos Aires, one of the most beloved cities in the world! You'll drive to government buildings, race tracks, adjacent parks, art galleries, and to the world's largest opera house.

13th & 14th days—On your own in this friendly city of the 50¢ filet mignon. Your host will name the best eating places. And your hotel is just around the corner from Avenida Florida where alligator articles sell for a song.

15th day—Santiago, Chile, after another experience that only South America can offer . . . the 30-minute flight over snow-covered Andes. You'll never tire of telling about it. You'll probably talk of nothing else on your drive to the Carrera Hotel, one of the world's finest.

16th day—If you're not up already, band music will waken you next morning as the Changing of the Guards takes place in the plaza in front of your hotel. Then you'll be driven to see government buildings and palatial homes.

17th day—You'll see more of Santiago; or have time for a trip by train to Valparaiso and Viña del Mar, "Riviera of the Pacific."

18th day—Lima, after a stop at La Paz, Bolivia, highest airport in the world. You'll see many moods of the Andes . . . ranging from snow-covered volcanos to sun-baked plateaus which Indians used as gigantic drawing boards to chart the sun and leave ancient calendars. Then, in early evening, the Gran Hotel Bolivar!

19th day—Lima and suburbs. You'll drive narrow streets overhung with wooden balconies . . . wide, beautiful plazas framed in 400-year-old architecture; and through suburbs where palatial homes are set in tropical gardens.

20th day—Lima and historic ruins on the Pan American Highway. A 4-hour motor drive will take you to museums and along the Pacific to Pachacamac, where civilization flourished 2000 to 4000 years ago.

21st day—Lima with time to shop for silver before the evening plane for home over the routes of Panagra, Pan Am and National. Your plane stops at Panama at midnight and you may decide to prolong your trip to stop off there. Otherwise, you arrive in Miami in early morning, in New York before noon of the 22nd day.

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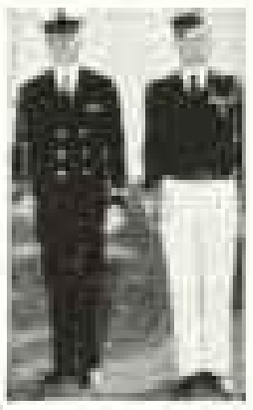

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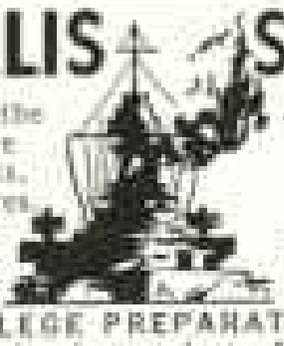

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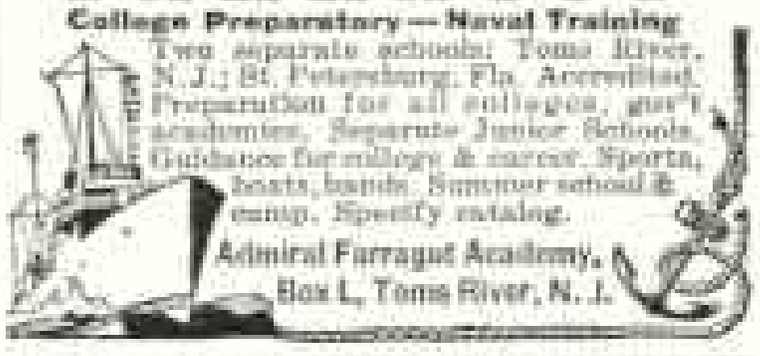

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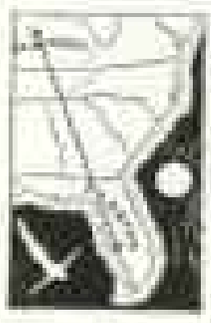

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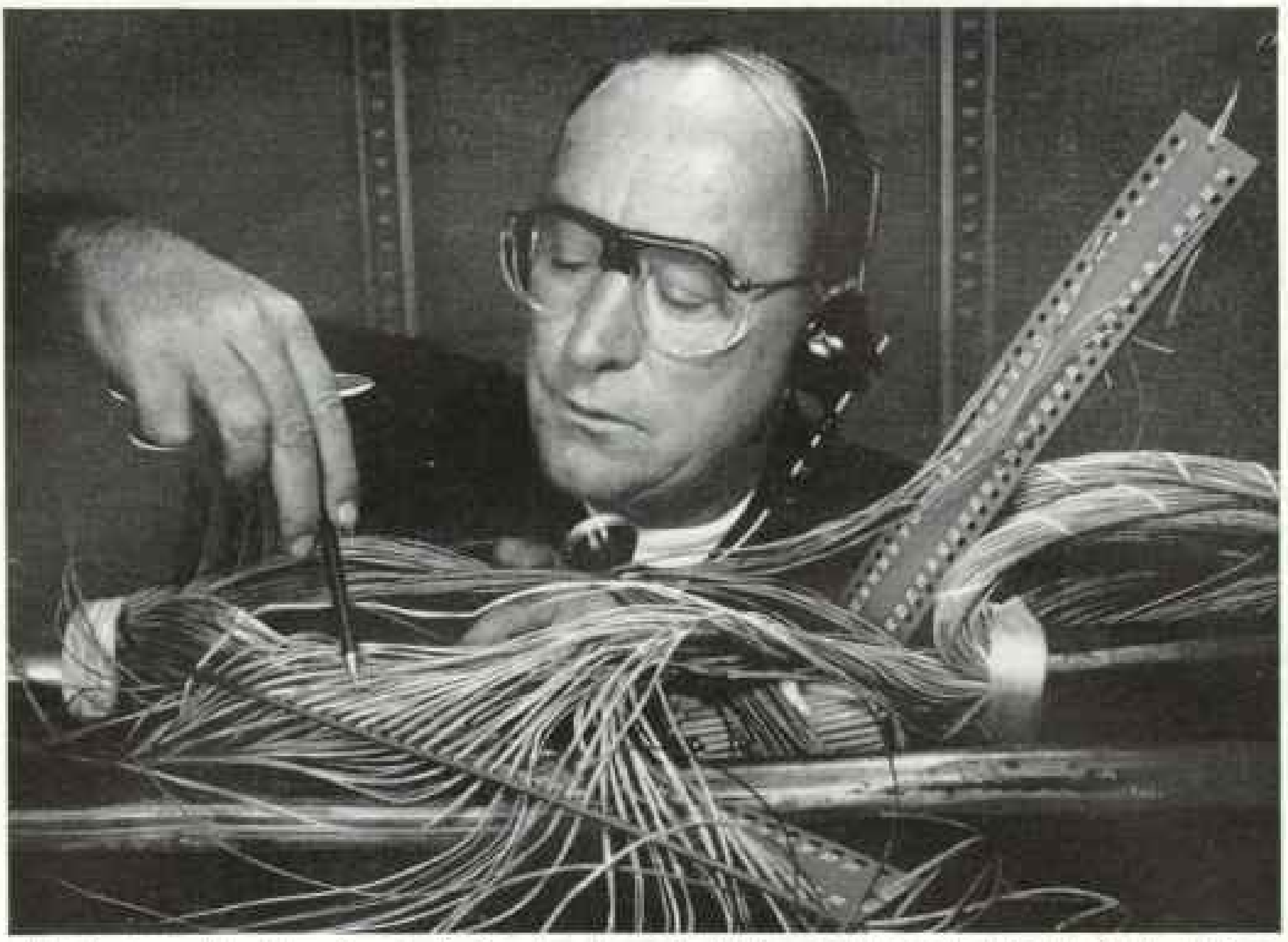

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