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America's Wilderness: How Much Can We Save?

THE MEN who built our nation looked on the wilderness they encountered as a repository of raw materials, land, and wealth. Colonists, pioneers, loggers, miners, railroaders, and captains of industry drew from it to fashion the wealthiest and most powerful nation on earth.

But by so doing, they almost destroyed the very thing that had nurtured us. Whole forests were felled to build cities and undergird railroads, marshes were drained, swift-running rivers were silenced by dams.

Today lonely beaches where spoonbills once nested sprout condominiums. The desert night blazes with the garish neon of cities. On western hills and northern lakes, the cries of coyotes and loons give way to the snort of road-building and industrial machines.

Fortunately we Americans have come to a new awareness of the value of wilderness to our spiritual and physical well-being. And with passage of the Wilderness Act in 1964, we began to preserve much of what remains.

A few years ago I flew to a remote lake hidden in the folds of Alaska's forested mountains. Living in a small cabin, chopping my own firewood, relishing the pure air and the silence of wilderness nights, I felt the awakening of senses dulled by urban living. How much civilization has given us, I mused, but how much we have lost!

John Muir had it right: "Climb the mountains and get their good tidings. Nature's peace will flow into you as sunshine flows into trees." *

Muir's was not the only voice crying for the wilderness. Over the decades Henry David Thoreau, Aldo Leopold, and others recognized the problem.

But the idea of wilderness as a spiritual resource is only the newest of many demands made upon the public domain—by miners, timber sellers, cattlemen, sportsmen, campers.

Often these interests all claim the same piece of the pie. The wilderness program has generated heated controversy. Somewhere a balance must be struck.

In 1925 Leopold saw the value we would in time place on wilderness: "Our tendency is not to call things resources until the supply runs short. When the end of the supply is in sight, we *discover* that the thing is valuable. The next resource . . . is the wilderness."

Just a year earlier the Forest Service set aside the first national wilderness, 750,000 acres in Gila National Forest in New Mexico. Thereafter other areas would be designated, but the actions lacked the protection of law.

Not until 1964 did Congress pass the Wilderness Act: "to secure for the American people of present and future generations the benefits of an enduring resource of wilderness."

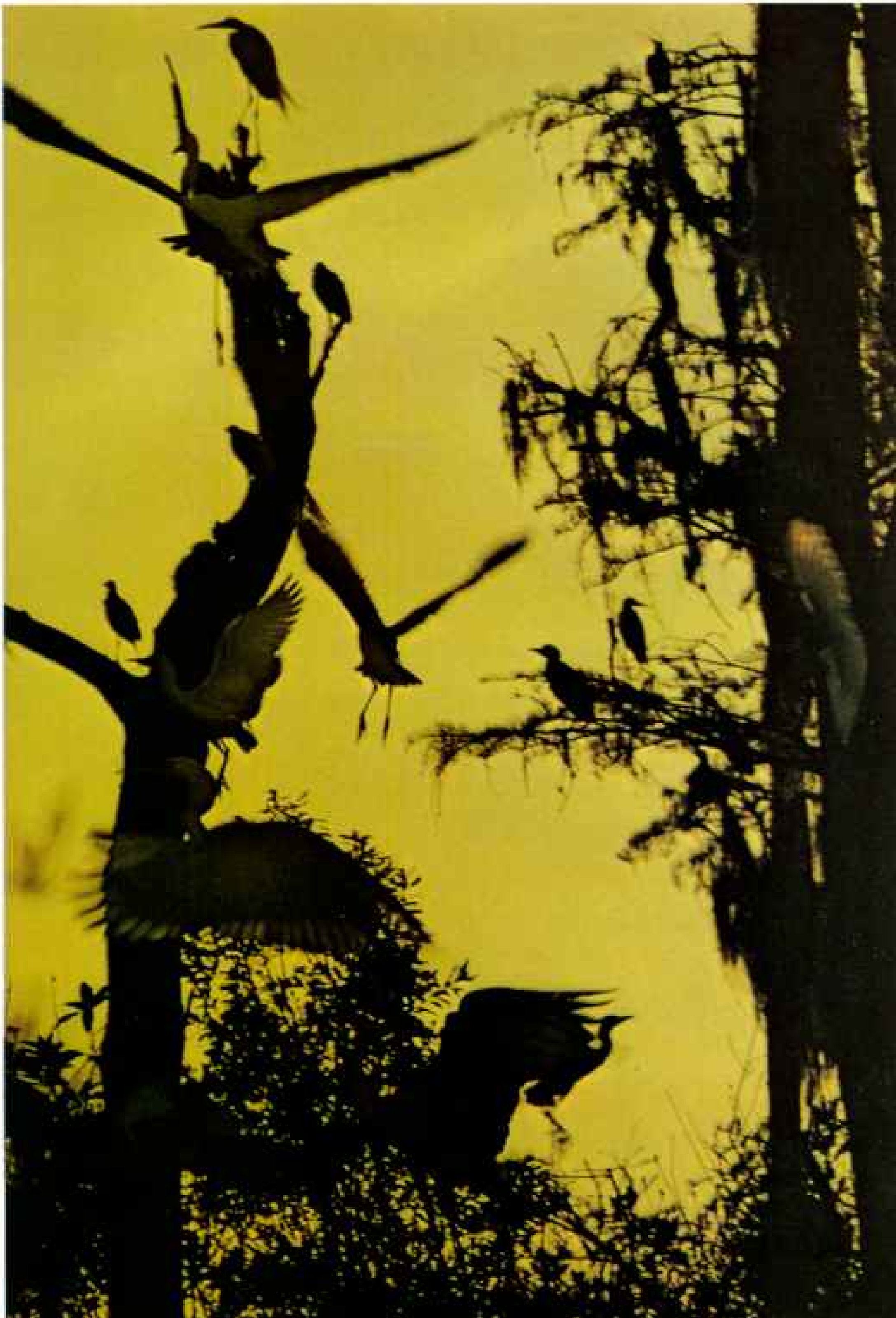
Today the Federal Government has set aside more than *(Continued on page 156)*

*For a perceptive appraisal of John Muir's life and work, see the April 1973 NATIONAL GEOGRAPHIC.

Wilderness is sun-crowned Mount Olympus breaking above a batting of clouds in western Washington. Wilderness is "where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain"—thus the Wilderness

DAVID MUENCH

Act of 1964 sets criteria for surveying and protecting the surviving pockets of an undeveloped America. Wilderness is an idea as much as a place, with modern man learning to pass like the shadow of a cloud across what he did not make and cannot improve.



Frieze of egrets emblazons a brassy sky over Okefenokee Swamp. Already a wildlife refuge, the huge peat bog contains an extensive area proposed as wilderness. A

FARRELL BRENAN

bargain for taxpayers, preservation of wild lands requires no new agencies, bureaus, or personnel, the essence of wilderness being the absence of human tinkering.

11 million acres in 91 wilderness areas. These lie scattered from sea to sea (map, pages 158-9) and range in size from Pelican Island Wilderness in Florida, a scant six acres, to the Selway-Bitterroot, sprawling over 1,240,618 acres of the Rockies in Montana and Idaho.

In contrast to parks, wilderness areas are roadless and resortless. You enter on foot, on a horse, or in a boat. The going is rugged, but the rewards are beauty, balm, and solitude.

The 1964 act provided for the system to grow. Acreage will more than double with the inclusion of areas already well along in the designation process. State governments also are saving roadless and natural areas.*

Years may pass before the last decision is made on preserving wilderness areas. The Forest Service, National Park Service, and other agencies involved are moving with caution before making recommendations that would lock up vast acreages indefinitely.

Other interests—timbermen, miners, stockmen, developers of resorts and ski lodges—protest the lockout from coveted lands.

THE FOREST SERVICE, trying to please many masters, has maintained a purist line on wilderness expansion. There are significant differences, it argues, between the aspen-bordered meadows and lodgepole forests of the Rockies and the second- and third-growth hardwood forests of the Appalachians. Wilderness advocates have pursued a maximum-acre philosophy—put

*Unspoiled stretches of mountain, desert, swamp, and forest are portrayed in the Society's new 344-page book, *Wilderness U.S.A.* Copies may be ordered at $9.95 each, including postage, from Dept. 1006, National Geographic Society, Washington, D. C. 20036.

In foaming fury, Maine's Allagash River tumbles over tiers of rocks, here foreshortened by a telephoto lens. A canoeist who portaged his craft and gear around the 35-foot falls continues down the river.

Last year some 10,000 people paddled and poled the Allagash Wilderness Waterway, the first state-administered watercourse to become part of the National Wild and Scenic Rivers System, established by Congress in 1968.

Today the system includes ten rivers, set aside by law for the enjoyment of those who wish to shoot rolling rapids, paddle a quiet stream, or simply dip toes into water that runs fresh, free, and cool.

TARRELL GRIVAN

as much land as possible under protection.

These two views reach a collision point in eastern forests where true wilderness is scarce. The tight constructionists believe that the law bars once-logged forest from consideration. Conservationists argue that nature will return the land to a state resembling the pristine.

This and other issues add complexity to the more than 130 wilderness proposals now before Congress. Many more bills will be introduced in months ahead. The Wilderness Act provides for every citizen to have his say, not only through his Congressmen but also at public meetings organized by the agencies involved. Thus the question of how much wilderness we preserve rests with all of us.

Now I invite you to visit five areas representative of our wilderness heritage. With distinguished naturalist-author François Leydet and outstanding wildlife photographer Farrell Grehan, ride the high and lovely Mazatzal desert, a designated wilderness; penetrate Spanish moss-hung Okefenokee Swamp, a proposed wilderness; fight the white waters of the Allagash River, a wilderness preserved by the State of Maine; and traverse glacier-peaked Olympic National Park, part of which may become wilderness.

Finally, with Assistant Editor Joseph Judge, climb into Wyoming's Wind River Range, an area battled over by wilderness lover, stockman, and timberman alike.

Savor the wildness and the beauty of each. Historian Wallace Stegner once said, "It has never been man's gift to make wildernesses." But perhaps it is our gift to preserve them.

Gilbert M. Grosvenor

Finding and preserving the

LIKE MANY A NATURAL RESOURCE, most of America's wilderness had vanished before warning cries were heeded. Under the Wilderness Act, certain areas have now been set aside and many are under active consideration. Some states and private agencies have taken the initiative in preserving nonfederal wild lands.

● ESTABLISHED WILDERNESS (named on map)

○ PROPOSED WILDERNESS (numbered)
(before Congress as of November 1, 1973)

1. SAN JUAN ISLANDS NWR
2. NORTH CASCADES NP
3. ALPINE LAKES
4. COUGAR LAKES
5. MALHEUR NWR
6. HART MOUNTAIN NAR
7. SISKIYOU
8. SNOW MOUNTAIN
9. GRANITE CHIEF
10. FARALLON NWR
11. EMIGRANT BASIN PA
12. YOSEMITE NP
13. SAN JOAQUIN
14. PINNACLES NM
15. SEQUOIA-KINGS CANYON NP
16. SANTA LUCIA (LOPEZ CANYON)
17. AGUA TIBIA PA
18. CHIRICAHUA NM
19. BLUE RANGE PA
20. GRAND CANYON COMPLEX
21. BRYCE CANYON NP
22. CEDAR BREAKS NM
23. CAPITOL REEF NP
24. ARCHES NP
25. HIGH UINTAS PA
26. LONE PEAK
27. UPPER SELWAY
28. MISSION MOUNTAINS PA
29. JEWEL BASIN
30. SPANISH PEAKS PA
31. YELLOWSTONE NP
32. GRAND TETON NP
33. GLACIER PA
34. LARAMIE PEAK
35. MT. ZIRKEL WSA
36. FLAT TOPS PA
37. INDIAN PEAKS
38. GORE RANGE-EAGLES NEST PA
39. COLORADO NM
40. BLACK CANYON OF THE GUNNISON NM
41. SAN JUAN PA AND UPPER RIO GRANDE PA
42. GREAT SAND DUNES NM
43. BANDELIER NM
44. SANDIA MOUNTAIN
45. MANZANO MOUNTAIN
46. BOSQUE DEL APACHE NWR
47. APACHE KID
48. BLACK RANGE PA
49. GUADALUPE MOUNTAINS NP
50. CARLSBAD CAVERNS NP
51. BADLANDS NM
52. THEODORE ROOSEVELT NMP
53. LOSTWOOD NWR
54. CHASE LAKE NWR
55. BIG SLOUGH WSA
56. KISATCHIE HILLS WSA
57. SALINE BAYOU WSA
58. CHAMBERS FERRY WSA
59. CANEY CREEK
60. DRY CREEK WSA
61. BELLE STAR CAVE WSA
62. RICHLAND CREEK WSA
63. UPPER BUFFALO
64. GLADES (HERCULES)
65. IRISH (WHITE'S CREEK)
66. ROCK PILE MOUNTAIN WSA
67. BELL MOUNTAIN WSA
68. LA RUE-PINE HILLS WSA
69. WHISKER LAKE WSA
70. BLACK JACK SPRINGS WSA
71. ROUND LAKE WSA
72. RAINBOW LAKE
FLYNN LAKE WSA
73. STURGEON RIVER WSA
74. ISLE ROYALE NP
75. ROCK RIVER CANYON WSA
76. BIG ISLAND LAKES
77. WEST SISTER ISLAND NWR
78. CLEAR FORK WSA (ARCHERS FORK)
79. PIONEER WEAPONS HUNTING AREA (CAVE RUN)
80. NEBO RIDGE WSA
81. LUSK CREEK WSA
82. BEAVER CREEK
YELLOW CLIFF WSA
83. CUMBERLAND GAP NHP
84. BIG FROG WSA
85. OCHUTTA
86. SIPSEY
87. BRETON NWR
88. BRADWELL BAY
MUD SWAMP-NEW RIVER WSA
89. ST. MARKS NWR
90. CHASSAHOWITZKA NWR
91. FLORIDA KEYS NWR
92. ALEXANDER SPRINGS WSA
93. OKEFENOKEE NWR
94. WOLF ISLAND NWR
95. BLACKBEARD ISLAND NWR
96. ELLICOTT'S ROCK
97. SHINING ROCK ADDITION WSA
98. JOYCE KILMER-SLICKROCK
SNOWBIRD CREEK WSA
CHEOAH BALD WSA
99. CRAGGY MOUNTAIN WSA
100. GEE CREEK
101. MOUNTAIN LAKE WSA
PETERS MOUNTAIN WSA
MILL CREEK WSA
102. CRANBERRY
103. LAUREL FORK
RAMSEY'S DRAFT WSA
104. JAMES RIVER FACE
105. SHENANDOAH NP
106. DOLLY SODS
107. OTTER CREEK WSA
108. HICKORY CREEK WSA
109. TRACY RIDGE WSA
110. LYE BROOK
111. BRISTOL CLIFFS
112. PRESIDENTIAL RANGE
WILD RIVER WSA
CARR MOUNTAIN WSA
113. CARIBOU-SPECKLED MOUNTAIN WSA
114. KILKENNY WSA
115. MOOSEHORN NWR ADDITION
116. BRIGANTINE NWR
117. POCOSIN WSA
118. CAPE ROMAIN NWR
WAMBAW SWAMP WSA
119. CHAMISSO NWR
120. ZEMBEK NW. RANGE
121. SIMEONOF NWR
122. HALEAKALA NP

ABBREVIATIONS
NAR ... NATIONAL ANTELOPE REFUGE
NHP ... NATIONAL HISTORICAL PARK
NM ... NATIONAL MONUMENT
NMP ... NATIONAL MEMORIAL PARK
NP ... NATIONAL PARK
NWR ... NATIONAL WILDLIFE REFUGE
PA ... PRIMITIVE AREA
WSA ... WILDERNESS STUDY AREA

wild country

Screech owl, that's who!
Exercising squatter's rights to his cactus apartment, this robin-size fledgling will hunt for his living in Arizona's desert wilderness. From spiny basin to ponderosa uplands, the 205,000-acre Mazatzal rockscape shelters a diverse populace well adapted to hardscrabble survival.

Desert condominiums, giant saguaro cactuses house more than owls. Gila woodpeckers and gilded flickers excavate them; then successions of other birds, bats, rodents, and insects move in. Man's works lie mostly in ruins—fragments of Indian settlements, silent shacks of prospectors, yawning mines mortgaged to sweat and silence.

PHOTOGRAPHS BY
FARRELL GREHAN

MR. GREHAN'S PICTURES ILLUSTRATE THIS AND THE NEXT THREE SEGMENTS OF THE WILDERNESS ARTICLE, EXCEPT FOR PAGES 178-9 AND 184.

The Mazatzal's Harsh but Lovely Land Between

"MOVE, YOU SON OF A GUN, before rigor mortis sets in!" I jumped guiltily, startled out of my semicoma. It took me a split second to realize that Larry Lincoln's blast was directed not at me but at his horse. The dapple gray had sidled into the paloverde tree to which it was tethered and showed no disposition to be saddled.

Frankly I sympathized with the animal. On this, the last day of a six-day trip into Arizona's Mazatzal Wilderness, I felt no keener to break camp and saddle up than my guide's horse appeared anxious to be mounted. It had been a rugged ride over very rough terrain. A glance at pioneer names on maps of the region tells you how rough: Bloody Basin, Hardscrabble Mesa, Suicide Ridge, Deadman Creek, Dead Cow Canyon, Lousy Gulch, Poison Canyon, Hells Hole.

Mazatzal itself (pronounced Ma-ta-ZEL), is a Paiute Indian term; they point between spread fingers and say "*mazatzal,*" meaning the "empty place between."

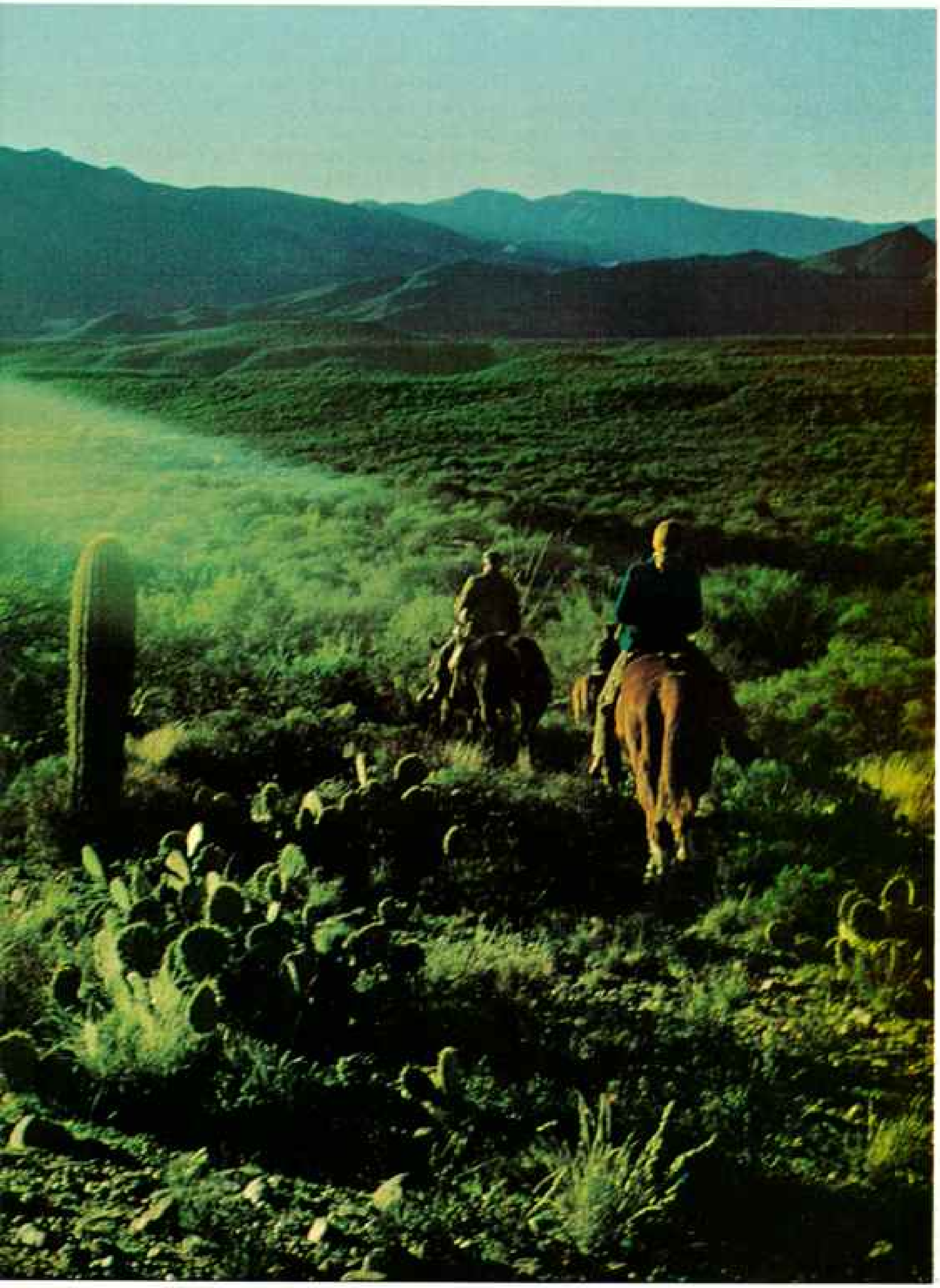
Empty and big—205,000 acres that slope upward and eastward from the Verde River to the ponderosa- and fir-clad Mazatzal Mountains, then plunge abruptly to the Tonto Basin.

Larry, a slight, wiry, crew-cut forester with the outdoorsman's permanent tan, had planned to loop across the Verde to the still-snowbound high country and back to the river at Horseshoe Dam. But the loss of a packhorse at the start—it fell off the outfitter's truck, gashing a leg—forced us to shorten our trip.

I awoke in camp the first morning to a mild golden dawn, heard the murmur of the Verde River and the liquid cascading song of a canyon wren, and felt the wilderness beckon from the hills beyond the river.

We urged our snorting, rearing beasts across Sheep Bridge, a long, swaying, rickety suspension span, just wide enough for horse and pack, built 30 years ago by a Basque sheepherder. It would have been a

Riders follow day's westering light toward the mountains of evening. Nearby a young saguaro stands like a ramrod sentinel beside a tumult of prickly pear, while an ocotillo explodes into green, making the most of brief desert rain. East Cedar



Mountain bites into the sky—from which come the occasional slams of sonic booms and pollutants spewed by copper smelters. As historian Roderick Nash has observed, "... it was ultimately civilization that made possible the appreciation of wilderness."

long drop to the swift, muddy waters below.

Heading north, we forded the clear, tumbling waters of Sycamore Creek near its mouth, then started up a rocky trail that climbed the flank of H K Mesa. Big saguaros raised their fluted columns and supplicatory arms on all sides. The whiplike multiple stems of the ocotillo, soon to sport flamelike flower clusters at their tips, swayed gently in the warm breeze.

The green-barked, green-branched paloverdes had several weeks to go before exploding in a mass of yellow blooms, but the thorny mesquites were just beginning to be feathered with delicate acacialike leaves; jumping cholla bristled with evil spines; prickly pear and hedgehog cactuses were starting to bud; in another month their gorgeous waxy flowers would unfold to the sun.

I HAVE A DEEP LOVE of these hardy desert plants; even in midsummer, when they appear sere and gray and spinily defensive, there is a fascination in their special adaptations to the ultimate tests of heat and drought, a certain nobility in their tenacious hold on life. But on this gentle spring day, it was not so much these typical desert species that caught and held the eye; it was rather the unwonted greenness of the slopes and hilltops, and the exuberant outburst of wild flowers of every shape and hue.

Viewed on a torrid July day, the rocky slopes and sandy flats seem incapable of sprouting anything so lovely and delicate as the desert mariposa or sand verbena. And yet you know that in the sunbaked earth lie waiting the seeds of its rebirth. And every spring the miracle recurs, with greater or lesser éclat, depending on the amount of winter rainfall.

The past winter and early spring had been among the wettest on record. And the display of wild flowers was as spectacular as any that old-timers could recall. The trail wound between domes of yellow brittlebush, broad mats of raspberry-red owl clover, masses of blue lupine, wide splashes of golden poppies, apricot-hued desert mallows, and a host of humbler flowers.

We talked little as we rode, marveling, through this wild garden. Now and then a mourning dove cooed from a paloverde. Mostly, the only sounds were the breathing and snorting of the horses as they labored uphill, the creak of the saddles, the scraping of hoof over rock, and the occasional clatter of a stone dislodged from the trail. Near the top of the rise I spotted two mule deer, which took off with springy bounds and disappeared over the skyline.

Deer, black bear, javelina, and mountain lion are hunted in the Mazatzal—the lion inexcusably, in my opinion. It takes no skill or courage to gun down a cat your dogs have treed. And lions are so few that even in Arizona's wilds the species' long-term survival is far from secure.

The top of H K Mesa was a long, level expanse of thick emerald-green grasses, sprinkled with wild flowers and with well-spaced small trees that gave it a parklike appearance. My palomino had been impatient at having to trail the packhorses, and I now gave him free rein. He broke into an easy canter, slaloming between the trees and shrubs; we surprised a jackrabbit, hunkered down in the shade of a bush, and he took off at high speed in a bouncing, zigzag flight.

Our route dropped off H K Mesa, down a slope where the poppies, lupine, mallow, and owl clover were absolutely startling in their intermingled profusion, up a steep, badly eroded switchback trail, over a ridge of red sandstone, and down an equally precipitous descent to the confluence of two creeks and the remains of an old cattle or sheep camp.

AT DAYBREAK a thick rime of frost covered my sleeping bag, and the grass sparkled with ice crystals in the sun's first rays. After breakfast Larry and I rode toward Cypress Butte and Cedar Basin, a long, hard zigzag climb up a rough trail that led us, after a short walk, to an abandoned mine shaft blasted out of the rock.

While admiring the enterprise and doggedness of the men who had dug this hole in so inaccessible a spot, I deplored the provision in the Wilderness Act that allows continued prospecting and mining in certain wilderness

"**Beep-beep—zap!**" Unlike his cartoon counterpart, the real roadrunner is more hunter than hunted. He sprints across the desert floor in pursuit of a meal, making quick hash of mice, lizards, young quail, and even rattlesnakes. Treating man as a curiosity, he has been known to race stagecoaches and cars for the sport of it.

areas. This particular mine was abandoned, but elsewhere in the Mazatzal—and in other wildernesses—exploration goes on.

Less damaging than mining would be, but conflicting nevertheless with the definition of wilderness, grazing is permitted in the Mazatzal under Forest Service control. It accounts for the miles of fences, the corrals, stock tanks, and developed springs. It affects also the natural succession of vegetation. Still, man was present here long before the first domestic cow or sheep appeared on the scene.

On the crown of a steep conical hill, we found a low wall of flat reddish stones, pierced by a few windows, or peepholes. The foundations showed that the area had once been divided into rooms. The site commanded an entire view of the surrounding country, with parts of Horseshoe Reservoir shimmering far to the west, and the snowy 7,500-foot summits of the Mazatzals sparkling to the east.

I later learned from Dr. Alfred E. Dittert, Jr., of Arizona State University, that the Mazatzal abounds with the crumbling structures of ancient Indians who may have been here as early as 2500 B.C. The ruin in which Larry and I stood was probably a winter habitation built 900 years ago by a pottery-making people sometimes referred to as the Sinagua. The house was not impressive. Still, it was haunting to reflect that so many centuries ago men and women had lived and perhaps died right here, in this wilderness where few modern men cared to tread.

THE NEXT THREE DAYS' RIDE up to Mountain Spring, at nearly 5,000 feet barely touched by April, and back to the lowland of poppies and lupine was a grueling one. Climbing a ridge, dropping down the other side, crossing a boulder-filled wash, another steep climb, another abrupt descent, across a stream, packhorses slipping and stumbling—up, down, up, muscles screaming: Are there *no* flat places?

On the way down we followed Deadman Creek for two or three miles, crossing and recrossing the racing stream in which the horses sank to their bellies. Uprooted cottonwoods marooned on streamside boulders testified to the violence of summer's flash floods.

We scrambled from the stream bed at last and climbed to a level bench above its right bank, cut by tributary washes that we must detour or cross. By one of these we made camp, tieing the horses to paloverdes with plenty of good grass within their reach. It was a warm evening, and the west-facing hillside shone golden in the setting sun.

AS NIGHT CAME ON, the moon took over the task of lighting the desert. It was only in its first quarter, but in that clean, dry air it shone brightly until it set behind a hill about midnight. I sat up for a long time in my sleeping bag, drinking in the quiet and serenity of the Mazatzal: the soft, sweet-scented breeze that spoke of spring blossoms and spring grass, the sheen of paloverde and mesquite silvered by the moonlight, the occasional stamp of a horse's hoof, the clear, slow, quiet, endless calling back and forth of two birds of the night, a doleful, haunting sound.

Would I ever, I wondered, visit the Mazatzal again? Quite possibly not, but that was not what mattered. Despite the hardship, I felt happy that I had been here, but that too was secondary.

What really did matter to me, what gladdened my heart on this last night in the freedom of the desert, was the knowledge that the nation had resolved that this harsh yet lovely land should remain free and wild. And I thought of what conservationist author Wallace Stegner had written of another desert region, in Utah to the north:

"It is a lovely and terrible wilderness . . . harshly and beautifully colored, broken and worn until its bones are exposed, its great sky without a smudge or taint from Technocracy, and in hidden corners and pockets under its cliffs the sudden poetry of springs. Save a piece of country like that intact, and it does not matter . . . that only a few people . . . will go into it. That is precisely its value . . . those who haven't the strength or youth to go into it and live with it . . . can simply contemplate the *idea*, take pleasure in the fact that such a timeless and uncontrolled part of earth is still there."

FRANÇOIS LEYDET

Tempering the desert's severity, spring casts a profusion of gold poppies and blue lupines under a saguaro's fluted arms. Only rarely, when rain and favorable temperatures occur in the right sequence, will the desert allow such a flowering. With summer, Mazatzal's gorge and mesa, wash and butte revert to the austere beauty of a thirsting land.

Okefenokee, the Magical Swamp

THERE IS SOMETHING wonderfully elemental, marvelously primeval about bog, marsh, or swamp. The waters, the muck, the rushes and cattails fairly teem with life from the lowest forms on up the scale of evolution. Indeed it was in swamps, was it not, that life first emerged from the sea to colonize the land? And thus it was with an atavistic feeling of coming home that I stepped into Clay Purvis's canoe at the northern entrance to Okefenokee Swamp on a cold, clear December morning.

Clay, a quick-moving, slightly built naturalist-guide for Okefenokee Swamp Park, has spent a good part of his 22 years exploring the inner recesses of Okefenokee.

Like a vast saucer of tea, Okefenokee spills its dark waters across 680 square miles of southeast Georgia and northern Florida. Here Spanish moss-draped cypress, open-marsh "prairies," and piny islands offer refuge to wildlife and serenity to man.

Pillowed on a brother-to-be, a heron chick rests from life's first struggle in Okefenokee, a republic of animal citizenry. White men settled the swamp's margins in the late 1700's, but Seminoles held the interior until the U. S. Army banished them to Florida in 1838. By the 1890's man was still "conquering" nature, but a scheme to drain the swamp by canal collapsed after its promoter, Capt. Harry Jackson of Atlanta, realized he had grossly underestimated the task. Thus the abortive project

became "Jackson's folly." Heavily logged until 1926, Okefenokee repaired itself—and continues to do so. Even its periodic fires, during times of drought, help keep open its lakes and cane-grass prairies by burning off dried muck and brush.

Our destination, the swamp's western entrance at Stephen C. Foster State Park, was only 18 miles away as the ibis flies, but more than that by winding boat trail.

At first the trail was fairly wide—it was the run followed by the park motorboat tours. But soon we turned off the main trail, into a narrow watercourse crowded on either side by hurrah bushes bewhiskered with old-man's-beard, a vine with silky gray seed plumes. High above our heads soared the great cypresses, bare of needles at this time of year but draped with long gray tendrils of Spanish moss. A barred owl hooted to our left.

Like flagstones in a garden path, broad lily pads paved the boat trail, harbingers of the coming glory of spring and summer, when millions of white and yellow water lilies, yellow-spiked neverwets, and white clusters of floating hearts would transfigure the dark surface of the water.

DURING AN HOUR OR SO of leisurely paddling, we passed into Okefenokee National Wildlife Refuge, which includes 377,500 acres of the 435,000-acre swamp. Soon we emerged from the cypress, gum, and bay forest into Sapling Prairie, one of many expanses of open marsh, where the maiden cane swayed like Kansas wheat in the wind.

Even among the trees I had found the ambient light bright and welcoming, but now in the open it was almost dazzling. Wherever we looked, birds were on the move. Swallows by the dozen swooped gracefully to pick insects off the water; mallards streaked low over the lily pads in straight, purposeful-looking flights. Most spectacular of all were the great wading birds: flocks of white ibis or the even larger wood ibis winging from one cypress stand to another; common egrets and great blue herons; and the huge gray sandhill cranes, which often stood motionless among the canes watching us approach, then took off with loud, guttural cries.

Most of the way our trail was an easily distinguishable, narrow channel cut through the lilies, but there were spots where any of two or three apparent paths seemed equally appropriate. Contributing to the confusion is the unpredictable emergence of new "batteries"—islands of peat that have become detached from the swamp bottom. They have the appearance of dry land, but try to walk across one! Although it may hold your weight, the whole raft wobbles and sways like

a giant waterbed. Hence the name Okefenokee, from two Indian words meaning "trembling earth."

It is no stagnant mire. The earth moves, the air moves, even the water moves, with a barely perceptible southward current. Once the Atlantic covered most of Florida and southeastern Georgia. When the land rose and the ocean receded, a sandbar impounded salt water in the shallow depression that was to become Okefenokee. Over millenniums rains sweetened the waters, aquatic plants invaded and prospered, and decaying vegetation became peat, which today covers the entire floor of the swamp.

Stained tea color by the tannic acid in the peat and trees—but, in my experience, perfectly pleasant and healthful to drink—the swamp water drifts lazily toward two outlets: the small St. Marys River, which drains into the Atlantic, and the larger Suwannee River, immortalized by Stephen Foster, which flows southwest to the Gulf of Mexico.

"As soon as they hear that Okefenokee is connected to the gulf," Clay said with his characteristic wry smile, "the tourists want to know where all the sharks are!"

ABOUT NOON we reached the Red Trail —one of several canoe trails that form a 96-mile network. Maintained by the National Wildlife Refuge, these runs are unobtrusively marked with mileage signs.

There were many advantages, I found myself thinking, to this canoe mode of travel: the silence of our progress, the sense of belonging in the swamp rather than intruding—belonging as had the Seminole Indians when they found refuge here more than a century ago—and the good feeling of using muscles too long underemployed. We made good time; it was only early afternoon when, having turned off the Red Trail onto a side trail, we reached our first day's goal, Bird Lake.

A crude roofed platform had been built on the western shore of the small circular pond. With the paucity of dry land in the swamp, such platforms offer practically the only places where one can camp. Although there are about 70 pine-clad islands occupying some 25,000 acres in the swamp, where the mineral soil rises above the waterline, most of them are inaccessible by boat trail.

Clay set up two pup tents, which shielded us from an icy north wind. A gorgeous sunset faded into a lovely quiet night, with

Instinctively alert, this white-tailed deer knows many escape routes in the swamp—though it has few enemies there. But as supermarket meat prices have risen, so have appetites for venison, increasing the danger from poachers.

In an alligator-eat-alligator world, even a hatchling (**facing page**) must hunt from birth. If he survives the appetites of mammals, birds, and his own kind—perhaps his own kin—he could grow into 14 feet and 500 pounds of rapacity. Easy game for those after his valuable hide, the alligator finds relative sanctuary in Okefenokee. Only tall tales have it that you can't drown in the swamp because a gator will swallow you first. He would rather run than attack.

several owls hooting back and forth. "You should hear it here on a spring night," Clay called from his tent. "The toad and frog chorus and the roaring of bull alligators!"

But we slept undisturbed, until awakened by the rising sun and the rolling cries of sandhill cranes, calling in a prairie behind a stand of cypresses across Bird Lake. Just how cold the night had been was evidenced by the thin ice our paddles broke in the trail.

The boat run became narrower than ever; in places brush overhung it completely, so that we were in fact navigating a tunnel. Then we passed through a magnificent stand of virgin cypress, threading between the swollen bases of soaring trunks. Such virgin stands are few. Following the Suwannee Canal project failure of the 1890's, the Hebard Lumber Company acquired title to most of the swamp, and built a railroad on pilings and cribbing deep into its interior, with tramlines branching out to the major timbered areas. Between 1908 and 1926, more than 423 million board feet of lumber, most of it cypress, was removed. Happily, Okefenokee is a good example, as wildlife expert Liston Elkins had told me, "of what nature will do to restore herself and heal herself." The cypress has come back vigorously.

Even in the nation's long-settled East, where man's hand has worked the most change, conservationists urge that more wilderness areas be designated. Given enough time, they point out, the healing power of nature will wipe away the works of man.

WE REJOINED THE RED TRAIL near Dinner Pond, a long, narrow body of water where we stopped for lunch. While munching our sandwiches, we spied a pair of otters sinuously swimming downstream. One proceeded directly on his course; the other, having spotted us, swam to within twenty feet of us. Sleek-bodied and bright-eyed, he looked us over inquisitively for a moment, nostrils and whiskers twitching, then sped off gracefully after his friend.

The Red Trail continues past a section known as the "Graveyard," a desolation of burned stumps and trees left by the great fires of 1954 and 1955. They struck during a drought so severe that the upper layer of the swamp's peaty floor dried out and burned.

Then we heard an alien sound, faint at first but becoming gradually louder—a sour note in the music of the swamp. Soon we met a pair of fishermen in a motorboat, heading for Big Water with hopes of a nice catch of largemouth bass, bluegill, warmouth, bullheads, or chain pickerel. Even if Congress designates the greater part of Okefenokee National Wildlife Refuge an official wilderness area, it is almost certain to allow the use of motorboats (except on certain boat runs reserved exclusively for canoes). This is countenanced by the Wilderness Act, and though the noise and smell of gasoline-powered boats are simply not compatible with a wilderness atmosphere, it is a matter of practicality.

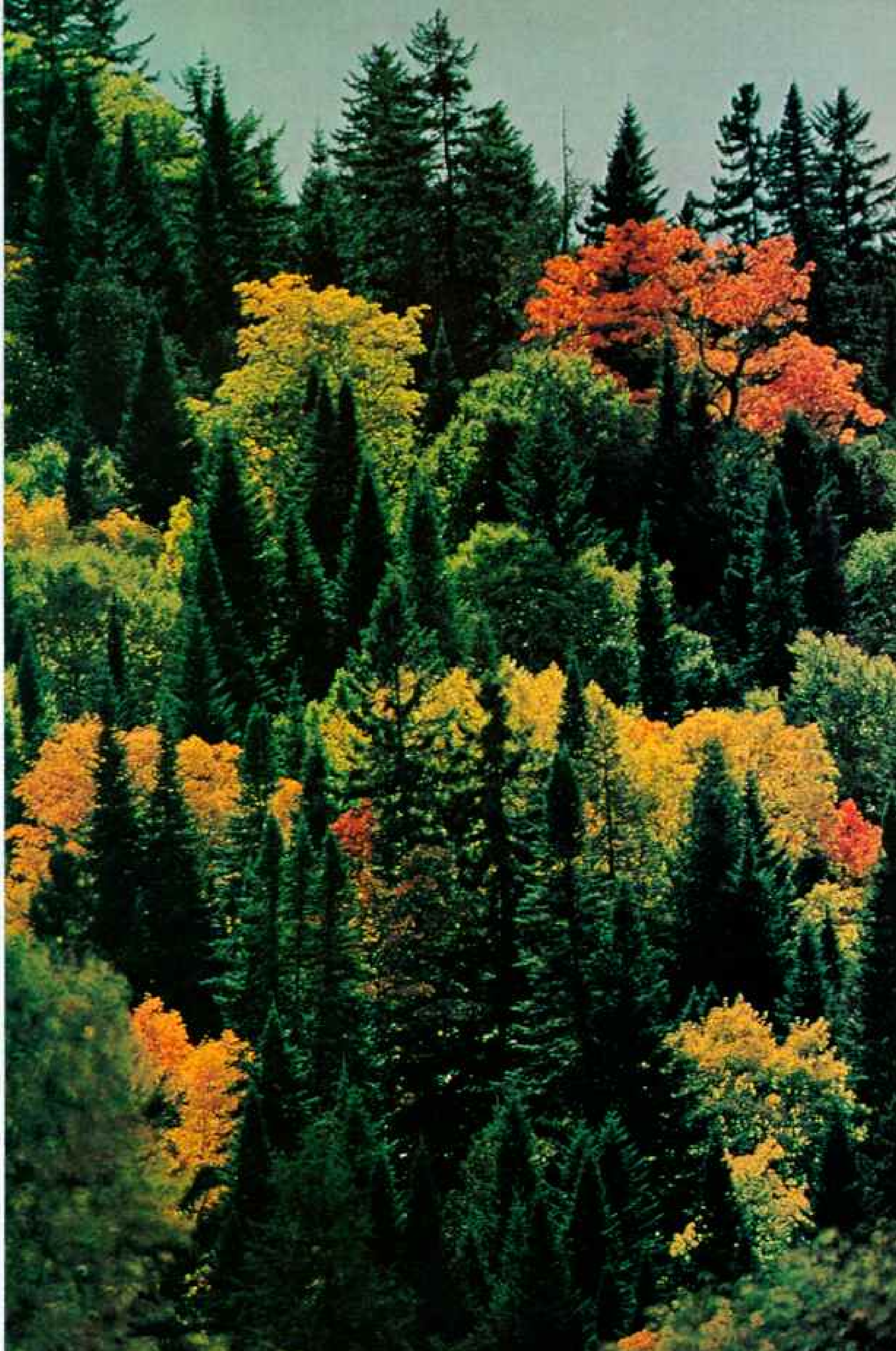
BILLYS ISLAND—one of the larger islands in the swamp with typical upland vegetation of palmetto and slash pine—rang with the cries of youngsters on an outing, which reinforced my realization that our brief wilderness trip was coming to an end. Yet even this was wilderness compared with the early years of this century, when the island was the terminal of the Waycross and Southern logging railroad, and a town of 500 souls sprang up, complete with stores, hotel, and movie house. Only a few piles of bricks, rusted pots and pans, a locomotive boiler, and a Model-A Ford chassis remained of what Liston Elkins claimed to have been "as rough a place as any Western gold-mining town."

Back in Waycross, only a few miles and yet a world away from the magical swamp, I thought of another story Elkins had told me:

"Just a little after World War II, a Greek artist came down here by bus to do some sketching of Okefenokee. He hired a boat, took a chicken lunch with him, and went into the swamp. Within an hour, he was back. 'What happened?' he was asked. 'I don't like it,' he replied. 'Why not?' 'The damned place is beautiful!' 'Well, isn't that what you hoped to see?' 'Certainly not! I thought the place was a swamp!' "

FRANÇOIS LEYDET

Uncommon dazzle of a common egret ornaments a loblolly bay branch in the wetlands refuge. Unlike the ivory-billed woodpecker, last seen in the swamp in 1912, and the threatened Florida sandhill crane, egrets again flourish after a brush with extinction. They were massively slaughtered for plumage to adorn turn-of-the-century hats.



Autumn Flames Along the Allagash

THE NINE MILES we were about to run on this chilly, windy afternoon would be the roughest of our whole 98-mile canoe journey over lake and river from Telos Landing northward to the village of Allagash.

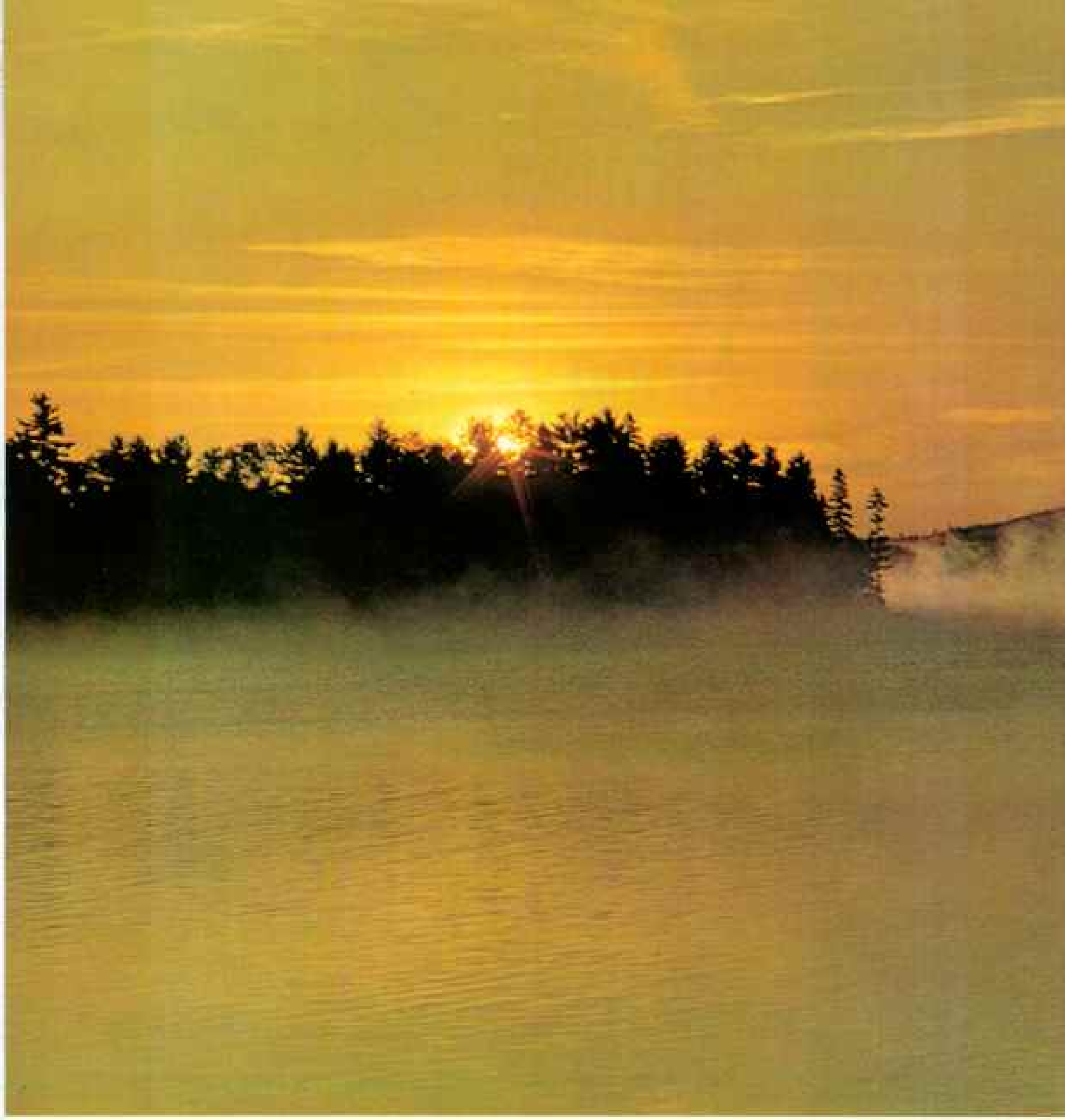
"Here's where the men get separated from the boats," our guide, Maine game warden Leonard Pelletier, had announced with a grin. And yet I was not really worried, even though I had watched that very morning as the battered hulk of a canoe was dumped outside the ranger station.

Just three months prior to this Allagash voyage I had made my ninth Grand Canyon river trip, and had rowed a wooden dory through the canyon's 160-odd rapids without an upset. If I could handle them, I thought, I certainly could handle Chase Rapids even if I hadn't had much experience in a canoe.

From our tie-up among the alders on the bank we could look downstream a short distance. The Allagash here was swift, shallow, rocky, splashy, and loud. But it had none of the booming ferocity of the wild stretches of the Colorado. "Just a long riffle," I called to Mike Long, my stern paddler, as we launched into Chase Rapids.

It did not take long for me to feel thoroughly chastened. Straining at the paddles to keep our bow pointed downstream, wincing at the steel-drum reverberations of our aluminum canoe as it bumped and scraped over barely submerged rocks, we sped down the first half mile with a sense, at least on my part, of growing exhilaration. Then, "Hard right!" I shouted, as a big rock showed through the foam

Brushed by first frost, maples and birches glow among cool green spruce and fir above the Allagash Wilderness Waterway. Gathering waters from lakes and brooks, the Allagash River meanders north by forested banks where life's cadences are the swish of paddles, the whisper of duck wings, the bellow of a moose.



MICHAEL T. LORD (ABOVE); STEVE RAYMER, BOTH NATIONAL GEOGRAPHIC STAFF

Quiet as the morning mist, canoeists steal across Churchill Lake, the northernmost of the bodies of water that comprise the lake segment of the Allagash trip. Thereafter the waterway leads into its faster-flowing river portion, punctuated by three smaller lakes and roaring Allagash Falls. Most canoe trippers drive to Telos Lake to begin their journey, though a few choose to fly (**left**). These fishermen hand rod and bait bucket to the pilot who will fly them to one of two commercial camps on the waterway.

In 1857 Henry David Thoreau with a companion and an Indian guide canoed waterway lakes. Like today's campers, he heard the loon's haunting cry, swatted pesky blackflies, and wrote of evenings when "still I heard the wood-thrush sing, as if no higher civilization could be attained."

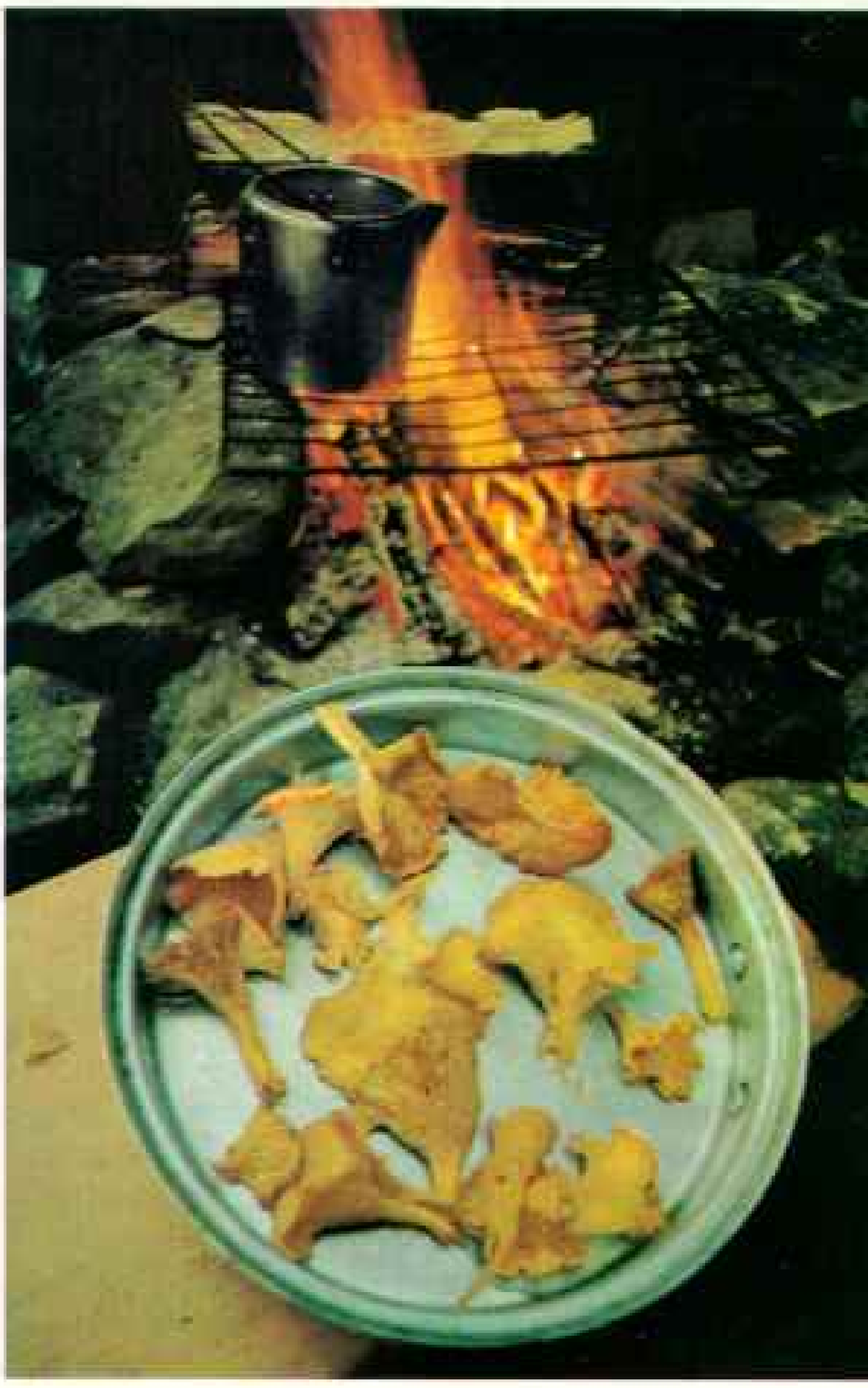
directly in our path. Mike and I simultaneously shifted our weight to starboard, the canoe took a fatal list, water poured in over the gunwale, I slid overboard, followed by Mike, and the canoe slammed broadside against two boulders, where the current held it firmly pinned.

As cold water swirled around our waists and tried to sweep us off our feet, Mike and I heaved against the canoe with all our might, but we could not budge it an inch. What to do now, I wondered after struggling to shore. Abandon the canoe? "Let's go see Herman Cote," Leonard said matter-of-factly.

At the ranger's cabin Leonard explained the situation and asked, "Could you turn off the water?"

"Sure thing," Herman said. He quickly walked past the long sheds that sheltered old logging machinery, and over to Churchill Dam. This is a low wooden structure with six gates that serve to regulate the flow of water from Churchill Lake into the Allagash River proper. It also serves as a crossing for trucks carrying timber felled in the Maine woods just east of the waterway to sawmills in neighboring Canada.

Using a portable motor that emitted a loud, sputtering sound, Herman closed down the two open gates—and the Allagash ceased to



Gourmet treat in wild glade or fine hotel, golden chanterelle mushrooms await the fire (**below**). Everyone labels them delicious, but they closely resemble a poisonous species called jack-o-lantern. Cobbling a tree, pholiota mushrooms (**left**) are edible but trigger stomach upsets in some people.

flow. Just like Moses crossing the Red Sea, I thought. We found our canoe lying on the bare riverbed, bailed it out, and carried it to the bank. Presently, Herman having reopened the gates, the river began to rise, and in a matter of a few minutes we were once again on our way down the Allagash Wilderness Waterway, one of the few state-controlled wilderness areas in the country.

OUR TRIP HAD STARTED at Telos Landing—a much-trampled, unprepossessing roadhead, campground, and gravelly boat-launching area. We did not tarry there, but loaded our canoes as fast as we could and pushed off onto Telos Lake in the teeth of a fresh, clean-smelling mid-September wind. The summer throngs were gone, and with them the powerboats that churn the waters of Telos and Chamberlain Lakes at the height of the season. Civilization intruded briefly at the thoroughfare between Telos and Chamberlain Lakes in the form of a bridge, parking lot, trailer, and cabin. A short distance below we pulled in to camp under lofty evergreens on the east shore of Chamberlain Lake.

As darkness shrouded the signs of human impact, it was easy for me, lying back in my sleeping bag, to imagine that these North

Woods were as virginal as in the days when only bands of coastal Indians penetrated them in the winter to fish and to hunt. The wind, sweet with the smell of evergreen needles, sighed through the tops of the spruces and firs; from the lake, shimmering in the moonlight, drifted the startling calls of loons: peals of hysterical-sounding "laughter" or ringing, long-drawn-out *ha-oo-oo*'s.

AS WE PADDLED OUT onto Chamberlain Lake next morning, a brisk northwest wind whipped its 12-mile-long surface into 18-inch-high whitecaps. This did not seem to impede Leonard, with half a century's canoeing experience behind him. His barrel-chested torso in the stern of the canoe propelled the craft with rhythmical, seemingly effortless strokes along a course as straight as a sheldrake's flight.

Low clouds raced overhead and veiled the long swell of Mount Katahdin to the southeast. With some relief, we put in to shore in the late morning at Nugent's camp, a group of rustic but comfortable cabins, one of two commercial hunting and fishing camps still operating on the waterway.

Asthmatic but still vigorous at some three-score years and ten, Al Nugent sat by the fire in his living room and told of having come to the lake in 1936. "Hauled everything in fifteen miles by team to Telos—stoves, tools, groceries—then built a raft and towed it all to this spot. I built a lean-to first, for hunters and fishermen, then this log cabin in 1937."

Before we left, Nugent showed us motion pictures of Chamberlain Lake in winter, frozen solid, a snowy landing field for dozens of ski-equipped small planes bringing hunters and ice fishermen. The nearby woods trails seemed full of snowmobiles. The snowmobiles growling through the woods and over the lake were hard to reconcile with the image of a wilderness waterway (or iceway).

"Actually, they're more of a problem in farm areas than here," waterway Superintendent Leigh Hoar, Jr., noted as we talked a few days later at his headquarters on Umsaskis Lake. "They break fences and crush seedling trees. Only ten years ago I saw my first snowmobile; now there are 60,000 in Maine alone."

Gathering clouds brought rain in the night but had moved on by dawn. The wind was rougher than ever, and we had traveled a bare two miles, hugging the shoreline, when Leonard motioned us to land. We would go no farther today, and each of us set about killing the afternoon in his own fashion. I followed a path, imprinted by the hooves of a large moose, back into the woods, past a padlocked hunters' cabin and an adjacent garbage dump to a broad open area, its ground strewn with logging slash.

For the 1½ million dollars raised through a bond issue and matched by federal funds, the citizens of Maine obtained 56,000 acres, including more than 30,000 acres of lake, river, and stream. The waterway's shores are masked by a narrow fringe of forest—a "restricted zone" from 400 to 800 feet wide—within which logging is prohibited. An outer buffer zone extends one mile from the high-water mark, within which selective logging is permitted but no clear-cutting.

Visually, the forest screen is effective enough. On a glorious clear, still dawn, a flight of eight ducks streamed overhead against the pink-tinged sky; the farther shore's dark serrated skyline was clearly mirrored in the violet-hued water of the lake; the scene seemed absolutely pristine.

We reached Lock Dam at lunchtime, where a young couple from Providence caught up with us as we were portaging around it. The Rhode Islanders glowed with health and vigor and the joy of immersing themselves in the cleanness of nature.

"We had a visitor last night," the girl laughed. "A beautiful raccoon really ransacked our camp. He was so frustrated that we hadn't left food out that he made off with a roll of toilet paper!"

MIKE AND I were some distance ahead of the others as we entered Eagle Lake. A kingfisher clattered noisily by. A great blue heron took off with a squawk and flapped away into the distance on slow-motion wings. A pair of loons watched us approach and suddenly dived, reappearing half a minute later and fifty yards away. There was utter stillness and peace; the atmosphere of wilderness was strong on this golden afternoon as we paddled soundlessly, watching the marshy shores for the dark figure of a moose or a bear. None appeared, but it did not really matter; we knew they were somewhere about, back there among the trees, the spruce and the maple—the latter beginning to blaze with fall color after two or three frosty nights.

It was hard to imagine that these lovely

lakes—Eagle, Churchill, Umsaskis, Round Pond—had once been the scene of massive log drives. And yet, hidden among the trees just back from Eagle's shore, resting on tracks that now lead from nowhere to nowhere, stood two black steam locomotives of the Eagle Lake and West Branch Railroad, which less than fifty years ago had hauled 80,000 cords of pulpwood annually 15 miles to Umbazooksus Lake.

It was also hard at times to realize that these were still working woodlands. I was savoring the silence one morning at our camp on Churchill Lake, throwing bread crumbs to the Canada jays and watching the early mist slowly lift from the water. But just then, as if in derision, a chain saw started to buzz in the woods to our right.

And it was hard to picture, with so few people about, that nearly 10,000 visitors would use the waterway during the year. "We've had up to 90 people in one campsite," Leigh Hoar told me. "And the numbers climb every year. We're going to have to keep the lid on use, keep strict control over access, and perhaps require reservations."

BETWEEN LONG LAKE and Round Pond (after the embarrassment at Chase Rapids) the Allagash River wound for nine or ten leisurely miles through a magnificent forest of spruce and fir, whose dense, lofty phalanxes pressed in close on either side. Allagash Falls, farther downriver, may be more dramatic, but this to me was the scenic climax of the trip. There was a majesty to this forest, and a brooding, secret air. We floated quietly down this narrow aisle, moved to silence, and thus surprised a deer as we rounded a bend. With graceful leaps it bounded

Eyeball to eyeball with a yearling moose, a canoeist backpaddles for a better look, disturbing the animal's browsing but not its composure. For nearly twenty minutes, man and moose shared the calm of the river. Then the moose finished a lunch of tender aquatic plants and ambled across the stream and into the woods.

Gnawing at the calm of the wilderness, a lumberjack's chain saw bites into an eastern hemlock. Another man strips a fallen tree of its branches. The shovel-snouted skidder will drag the logs to a road where giant trucks will bear them to sawmills.

To preserve the wilderness character of the Allagash Waterway, logging or construction of any kind is prohibited within a zone 400 to 800 feet from the high-water mark. Beyond that, and up to one mile from the waterway, the State of Maine permits selective harvesting of timber. On occasion a canoeist might find his afternoon reverie interrupted by the snarling whine of a saw or the thunder of a logging truck crossing a bridge.

Licking her chops, a red fox (**right**) leaves a campsite and a meal of chicken spread provided her by campers. Accustomed to such handouts, the normally wary animal came to within 15 feet of her benefactors. Conservationists discourage feedings, especially of foxes, which are prime carriers of rabies.

"Best kindlin' in these woods," says a veteran Maine guide of the shell of a fallen paperbark birch tree (**below**). Penobscot Indians once used birch bark for canoes that skimmed Allagash waterways.

The tree's decaying hulk harbors ferns and the glossy-leaved bunchberry, a low-growing plant whose white springtime blooms reveal it as close kin of the dogwood.

Frosted leaves of a ground-hugging raspberry show above its bed of moss (**right**). A short growing season limits size of the plant, an arctic species.

across the shallow river and vanished into the trees, its white flag high.

Although we were tired when we reached camp at Round Pond—we had paddled nearly two dozen miles from Umsaskis Lake—we were buoyed by the day's journey. We had steak for supper, and biscuits, and potatoes "in the bark," as Leonard termed baked potatoes. We even had chanterelle mushrooms, picked in the woods (page 181).

Our merriment was cut short by the start of a steady rain, and we quickly turned in. Next morning I crawled out into a dank, gloomy world and walked into the woods, noting little piles of toilet paper, scattered cans, and other trash. Leigh Hoar's tiny crew

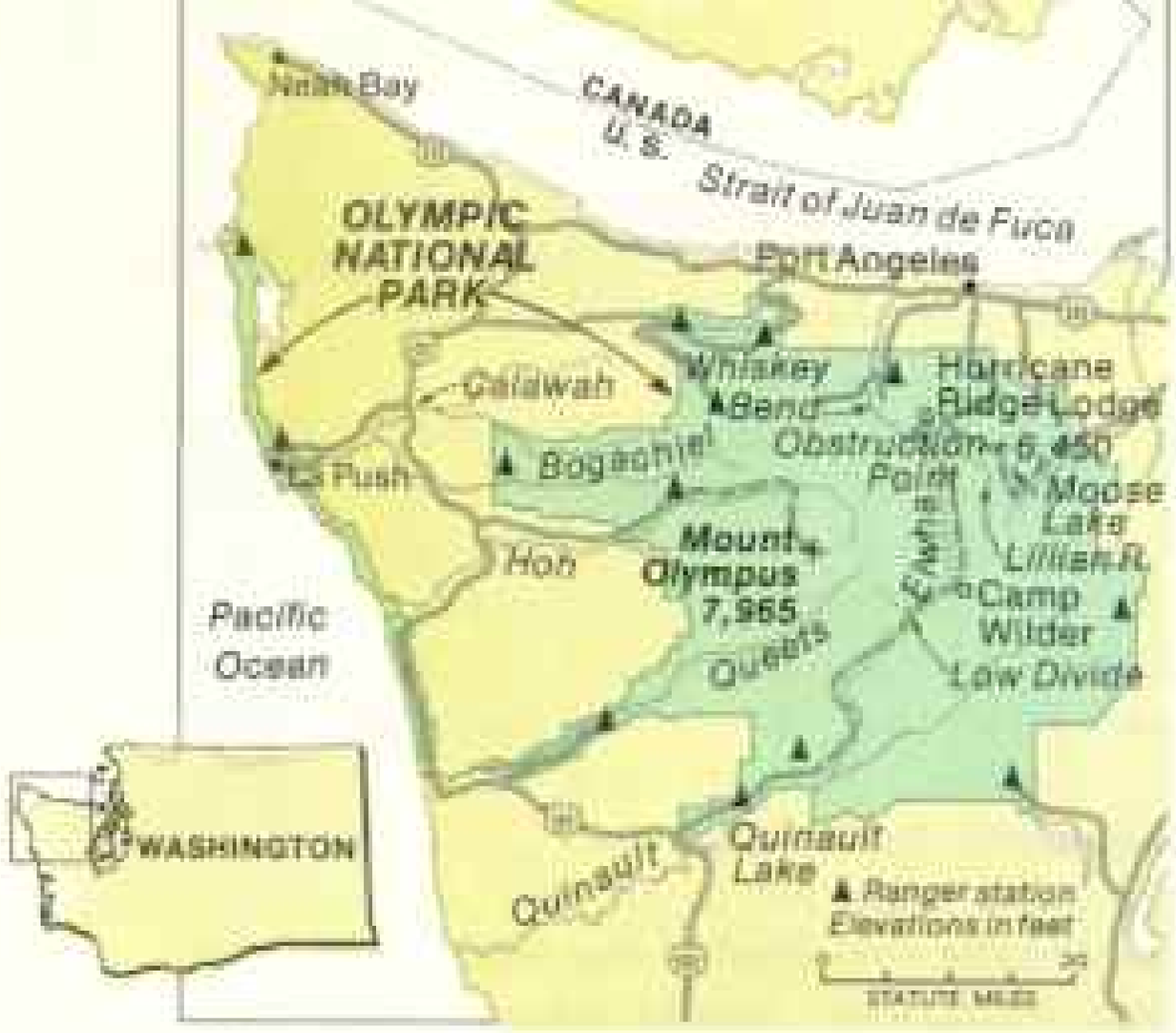
do a heroic job of cleaning up litter, but this looked like a camp they had missed. I helped get rid of as much as I could. Farther back in a swale, the ground grew sodden, boggy, a tangle of rotting logs, mantled with moss and sprouting luxuriant colonies of toadstools.

The place reminded me of Thoreau's description of a bog in these woods: "It was a mossy swamp, which it required the long legs of a moose to traverse. . . . It was ready to echo the growl of a bear, the howl of a wolf, or the scream of a panther; but when you get fairly into the middle of one of these grim forests, you are surprised to find that the larger inhabitants are not at home commonly, but have left only a puny red squirrel to bark at you. Generally speaking, a howling wilderness does not howl: it is the imagination of the traveller that does the howling."

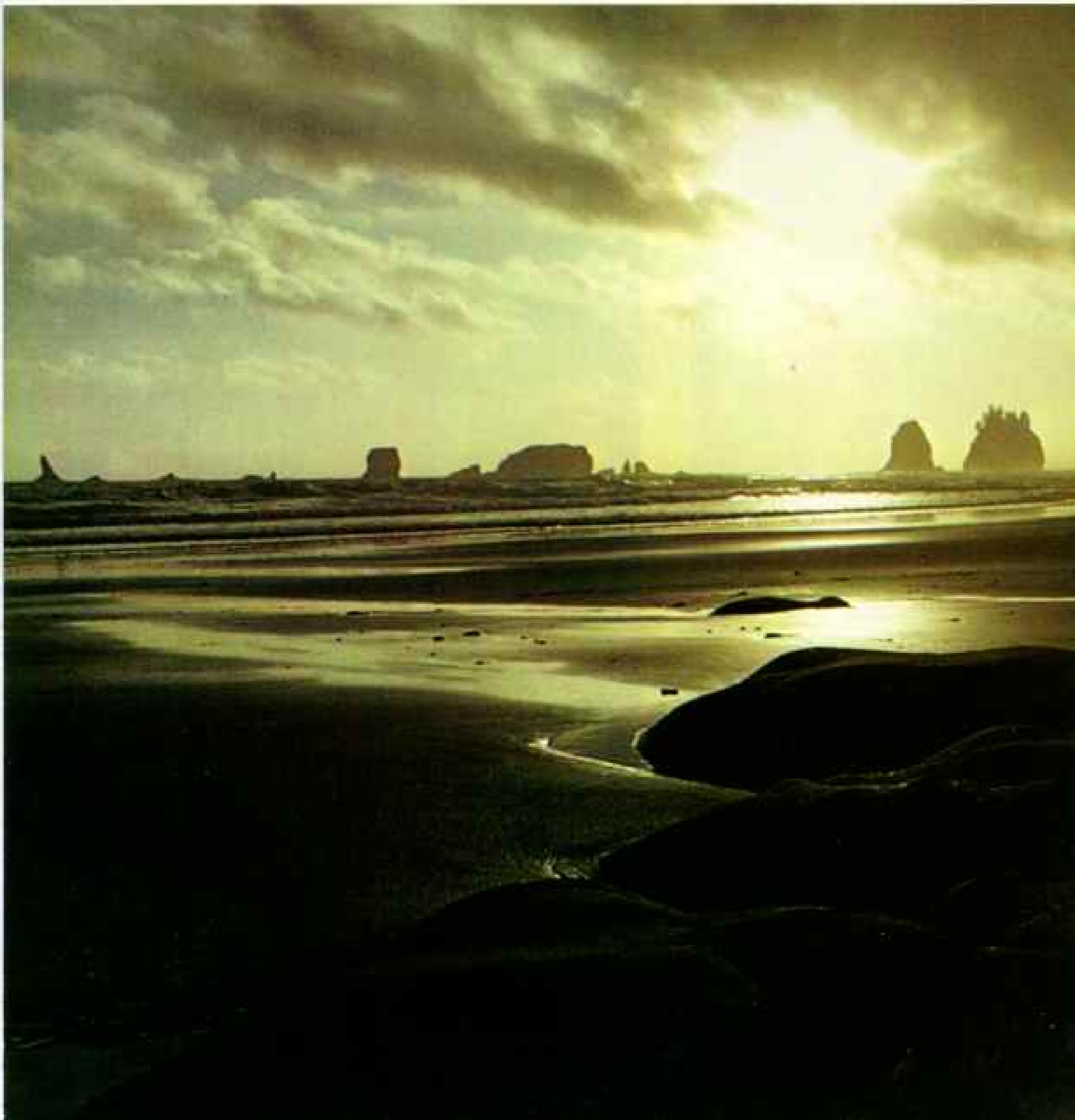
IT WAS A CREATURE more exciting than a "puny red squirrel" that ventured into our camp just as I returned from my exploration. It was a beautiful red fox, a young female, with a glorious bush of a tail, creamy undersides, dark legs, and a lovely alert face.

This fox, I realized, must have grown accustomed to humans. And then something else occurred to me. In her own way she symbolized the character of the Allagash Wilderness Waterway: lovely, vibrant, half tame and half wild.

FRANÇOIS LEYDET



The Olympics: Northwest Majesty



I COULD HEAR THE SURF, taste the salt, smell the pungency of seaweed and iodine even before we broke out of huckleberry thickets to stand on the edge of the bluff overlooking the Pacific. We scrambled down the steep bank and stepped out onto a long, wide strand, utterly deserted except for sandpipers that ran along the water's edge and gulls that wheeled screaming overhead.

Roger Allin, Superintendent of Olympic National Park in northwestern Washington, looked around him with an almost fierce joy. "If you have never believed in a Creator before," he said to me, "just look around you now!" And indeed this wilderness beach seemed to have been freshly minted by the hand of God.

We hiked to the south, along five and a half miles of that spume-sprayed shore. Most of the way we crunched over gravel, boulder-hopped, or teetered along driftwood logs that had washed up in huge rafts. At one point we had to hurry around a headland to avoid being trapped by the incoming tide—a predicament that has cost

Forever riding at anchor, a flotilla of sea stacks—ghosts of former headlands sawed apart by the surf—stands guard where the green thumb of Washington (**opposite**) juts into the Pacific.

more than one hiker his life. I felt the swelling of that tide, like the breathing of some huge animal; I felt its power, its potential menace, even on a calm day like this.

As we rested, watching the waves crash against the offshore stacks, Roger said: "Wilderness is not just a matter of geography. It is also a state of mind. It's the realization that you are entirely dependent on your own resources, that if you do something stupid or have an accident, there won't be a rescue party there to pick you up in a few hours. In a real wilderness your smallest actions take on a heightened significance. You not only feel differently, you learn to think differently."

By that token, I ventured, there was not much real wilderness left in this country. "Perhaps not, at least outside Alaska," he replied. "When an area is as heavily visited as this Olympic National Park, some of the pure freedoms of the wilderness are lost. That's inevitable. Still, most of this park is as close to wilderness as we've got. I hope we can keep it that way."

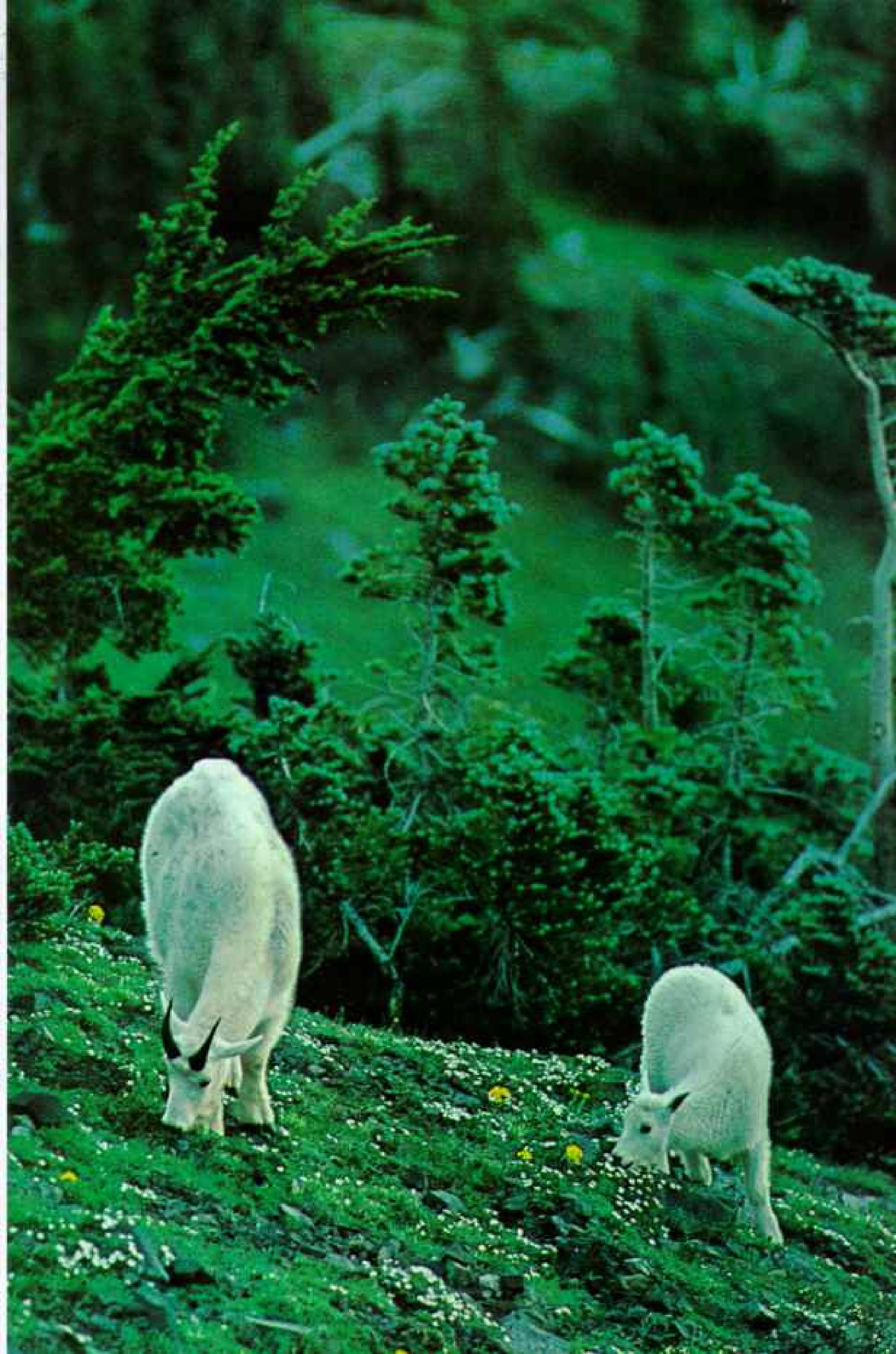
HERE IN THE OLYMPICS, as in other wild places I had visited, the quality of wilderness was inversely proportional to the ease of access. A few days earlier my Land-Rover had been one in a steady procession of cars on the paved road from Port Angeles to Hurricane Ridge, the most visited alpine area on the Olympic Peninsula. Chaletlike Hurricane Ridge Lodge was thronged, and people were scattered all over its vicinity. But on the narrow dirt road to Obstruction Point I had encountered only two or three vehicles.

I had almost reached the end of the road when I spied a movement through the windshield of my Land-Rover. Off to my right, in a meadow brightened by patches of yellow glacier lilies and white avalanche lilies, an animal was running—a fair-size animal, about as big as a large house cat, fat and golden furred with a coat so thick it rippled. An Olympic marmot, I knew right away, although I never had seen one before. He stopped and I approached him on foot. He watched me come, a rather indignant look on his face, his forelegs dangling across his fat tummy. I got to within ten feet of him before he dived into his burrow.

From Obstruction Point I walked south along the Moose Lake-Grand Pass Trail toward a bare, grassy ridge 6,000 feet in elevation. A sharp, high-pitched whistle startled me, echoed by another farther off: marmots warning one another of my approach. Although this was mid-July and the sun shone brilliantly in a deep-blue sky, the wind was sharp and large patches of snow filled the hollows of the slopes.

I reached a point where the ridge crested, and sat down on a flat rock, facing west, beside a small grove of stunted firs. Directly below me a tiny lake sparkled like a star sapphire.

Left high and wet at low tide, starfish and sea anemones cluster in a tide pool. These oases give safe haven to a bounty of life. On the flow of high tide comes a smorgasbord of plankton to keep the food chain intact. The Olympic wilderness begins here, underwater, and ascends through rain forest to glacier-crusted mountains.



Beyond it, thickly wooded ridges plunged down to the valley of the Lillian and Elwha Rivers. And in the far distance, screening the Pacific from view, rose the snowcapped peaks of the Bailey Range and the 7,965-foot crown of Mount Olympus. It was a glorious panorama, innocent of even a jet's contrail to mark the existence of man, and most likely had not changed in some 13,000 years, since the last Ice Age glaciers had retreated.

For the whole two hours that I spent on that ridge, the marmots and I had the place to ourselves. I was too near the roadhead to be in real wilderness, yet the impression of wilderness was strong. Here, where the mode of travel was by foot, I was alone, gazing off into the "high, untrespassed sanctity of space."

IN THE DAYS that followed, as I hiked and packed deeper and deeper into the Olympic forest, flew over it, and searched its ocean shores, I had a growing sense of awe at the grandeur of the country.

Dominating the rugged heart of the peninsula, Mount Olympus rears a white crown girt with glaciers named Humes, Hoh, Jeffers, Hubert, White, and Blue. These deeply crevassed rivers of ice cover more than ten square miles (pages 152-3). The longest of them, Hoh Glacier, stretches for three and a half miles from its cirque high on the mountain to its snout below timberline. As much as 900 feet thick in places, these glaciers—and the sixty-odd smaller ones in the Olympics—are fed by a prodigious snowfall that in some years may total as much as 200 feet.

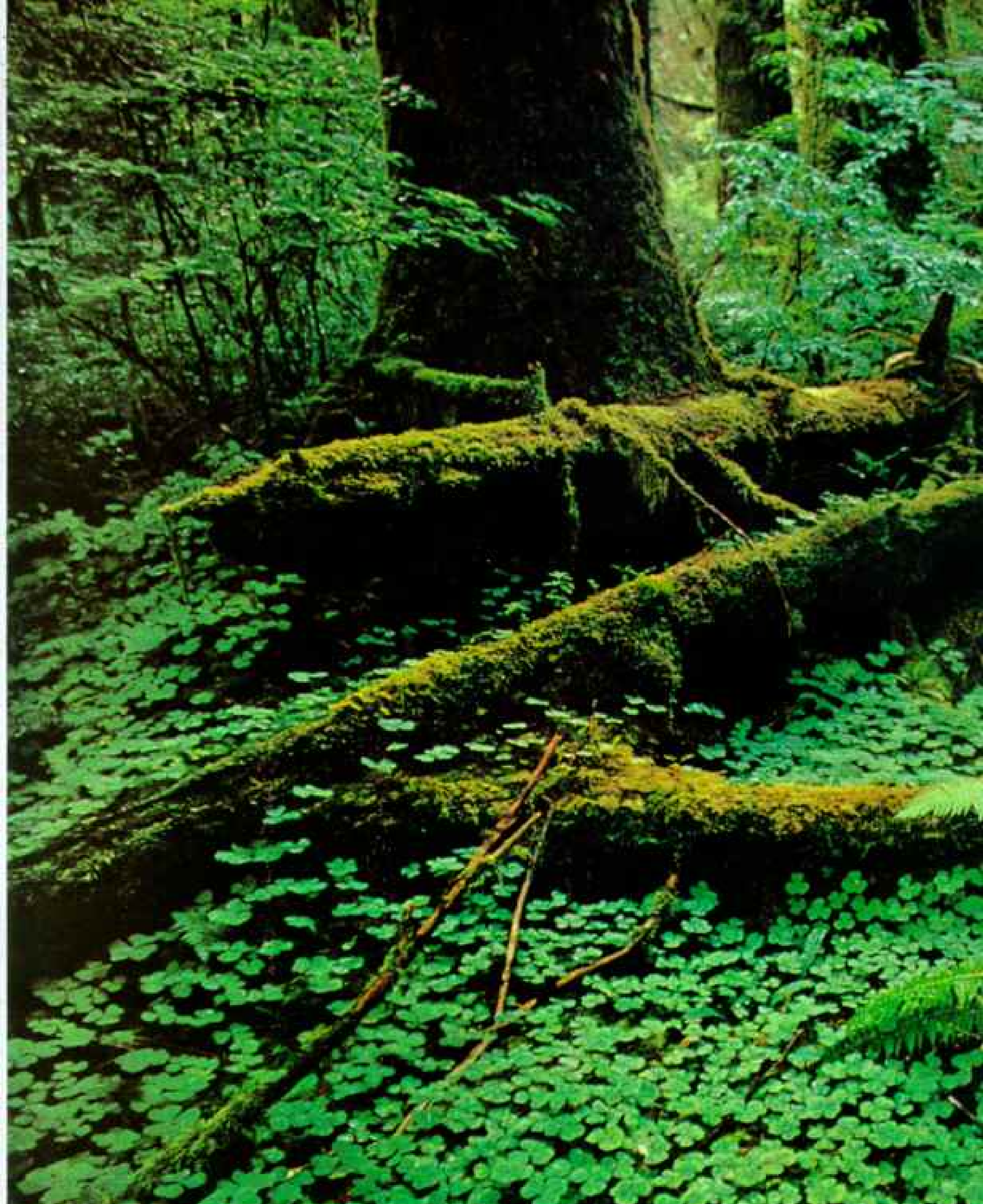
Impressive as they may be today, they are but icicles compared with the massive sheets of ice that four times in the last million years scoured the extreme Northwest and sculptured the land's features into much their present visage. Lobes of the continental ice pushed south down Puget Sound, and west through what is now the Strait of Juan de Fuca. At the same time alpine glaciers inched down the flanks of Mount Olympus and into the present river valleys, carving out classic U-shaped cross sections as contrasted to the V-shaped profile of stream-cut gorges. Today three of the glacier-made valleys, the west-facing Hoh, Queets, and Quinault, are solidly mantled in one of the world's most magnificent forests: the famed Olympic rain forest.

TO REACH THE HOH RIVER TRAIL, I had driven an exasperating 80 miles in a steady, loud procession of heavily laden logging trucks and road-clogging campers and house trailers. I had not walked far, though, before the sounds of civilization faded away, and I found myself enveloped by the stillness of the forest. I continued up the gently climbing trail for some four miles to a place a little beyond Cougar Creek, where I found myself standing at the foot of a truly monstrous tree. Thirteen and a half feet in diameter at breast height, the Sitka spruce soared straight up nearly 200 feet to a snaggle of heavy limbs and a brushy green crown that seemed healthy and vigorous despite the tree's manifest antiquity.

This is a land of giants—the largest known western hemlock, in the Quinault Valley; the largest Douglas fir, in the Queets; the largest red alder, in the Hoh. There in the rain forest unusual straight colonnades of trees caught my eye. When a tree falls, its slowly rotting bole becomes a "nurse log" on which spruce and hemlock seedlings sprout more readily than on the forest floor (following pages); their roots gradually inch around the prostrate trunk to the ground; most of the seedlings die, but a few grow to maturity, standing all in a row on stilted buttresses that hold the shape of the vanished log that gave them their start.

What impressed me as much as the loftiness of the forest roof was the almost overwhelming ambience of vitality. There were streamside flats of red alder, arches of vine maple, groves of big-leaf maple, thickets of purple-berried salal and yellow-fruited salmonberry. It looked to me as if there was not a square foot of bare ground. There were carpets of cloverlike oxalis, mats of moss, gardens of bracken, lady fern, and sword fern. And where the ground floor was occupied, a plant could find room on an upper story. Big shelf-like fungi projected from the trunks of dead trees; the trunks and branches

Nanny and kid browse Olympic highlands amid white phlox and yellow mountain wallflowers framed by fir and hemlock. Agile interlopers, mountain goats were introduced to Olympic National Park in the 1920's and now number some 400. About 93 percent of the park has been proposed for inclusion in the wilderness system.



Choked with green, prime Olympic rain forest along the Hoh, Queets, and Quinault River valleys rises from a lush floor of sword fern and oxalis through midlevels of deciduous trees to the spires of conifers that average 200 feet tall. Nowhere else do more different species of trees grow to such

extreme heights. "It is so lush," commented naturalist-illustrator Roger Tory Peterson, "that it may contain the greatest weight of living matter, per acre, in the world."

Fallen timber may remain for centuries before final decomposition, serving as "nurse logs" on which seedlings can sprout and grow—their root buttresses holding a straddling form long after the nurse logs have rotted away.

As much as 150 inches of rain drench the forest each year, and frequent fogs and clouds create a natural greenhouse, moderating the seasons.

of maples were so shaggy with streamers of club moss that they reminded me of Bactrian camels shedding their winter coats.

Despite this exuberance, the atmosphere of the forest was anything but oppressive. Granted that this was a bright, sunny afternoon, making it difficult to appreciate that twice as many days in the rain forest are cloudy as are clear. Rainfall averages between 130 and 150 inches a year. Granted also that clearings browsed by Olympic elk lightened the density of the undergrowth. Still, even in the most thickly canopied, most shadowy glades there was a marvelous luminescence, an amber-green light that bathed all things in its gentle glow.

The people, too, whom I met on the trail seemed gentled by their surroundings. Or perhaps it was that the raucous did not bother to leave their cars and venture afoot, unprotected by their steel-and-chrome cocoons, into the hushed majesty of the woods.

OF COURSE THIS FOREST has values other than aesthetic, as I realized in the course of a flight over the park. We flew down the Hoh Valley, and as we passed the park's western boundary, the land below seemed to be afflicted with some scrofular ailment: large livid bare patches, further scarred by skid trails, wormlike tractor tracks, and truck roads, blotched the dark complexion of the land. The park is surrounded both by Olympic National Forest lands, one of whose uses is the production of timber, and by private timberlands. Between the main body of the park and the 50-mile-long detached strip that the park owns along the Pacific Coast, the land is a crazy quilt of recently logged tracts, patches of second growth, and stands of virgin forest.

Some days later I set out on a traverse of the park on horseback. Starting from Whiskey Bend, 21-year-old guide Bill Hutton and I rode up the Elwha Valley, over Low Divide, and down the North Fork of the Quinault. Most of the way was through tall forest, except during the climb over 3,600-foot Low Divide, where we skirted lovely small lily-padded Lakes Mary and Margaret, and had open views of high waterfalls and snow-topped summits.

The trail side was brightened by sometimes delicate, sometimes striking blossoms: yellow monkey flowers, Sitka columbines, Columbia lilies, Jeffrey shooting stars.

BIANCA LAVIES

"August 23—Had only few berries to eat all day," logged Herb Crisler when, 44 years ago, he crossed the Olympics with no provisions and only an ice ax and knife for tools. Last summer, at 80, he retraced the steps of that ordeal, backpacking across the peninsula and growing stronger day by day, to the puffing astonishment of younger companions. A pioneer in nature color photography, Crisler spent years shooting the movie footage that was released by Walt Disney as *The Olympic Elk*.

It was a wonderfully peaceful, relaxed ride. We covered 21 miles the first day to Camp Wilder, another 17 the next, to Trapper Camp, and 7 the third. Occasionally Billy, our pack mule, tried to go his own way, but even he gave us little trouble. We met hikers now and then, but most of the way we were alone in the wilderness. I kept thinking that it would be relatively easy to build a road along our route, thus bisecting the park, and that there were some who would applaud such a project.

One local group has been promoting an ambitious program of road and other construction within the park. They advocate paving all approach roads and all roads within the park, building miles of new loop roads inside the park perimeter, studying the feasibility of constructing two aerial tramways (the Park Service is considering one), expanding public accommodations and facilities in the park, and limiting wilderness classification to 500,000 acres at its core.

The National Park Service, on the other hand, is required by the Wilderness Act to study all roadless areas of 5,000 or more contiguous acres and make a report to Congress. In Olympic Park, the Park Service has proposed that 834,890 of the park's 896,599 acres be consecrated as wilderness. Congress will make the final decision.

I, for one, pray that the proposal will be approved. Wilderness is in much shorter supply than recreational lands. Man can easily unmake a wilderness. He cannot make one.

Furthermore, it seems to me that where the national parks are concerned, those who would lace them with roads and otherwise encumber them with facilities geared to mass recreation forget the parks' essential function as stated in the 1916 law that created the National Park Service: "To conserve the scenery and the natural and historic objects and the wild life therein, and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

Unimpaired is the key word, and if it applies to parks, it must surely apply to wilderness. If man is willing to accept some inconvenience, even some discomfort, in order to discover what a Grand Canyon or an Olympics National Park, a Sawtooth or a Mazatzal Wilderness has to offer, he will leave little if any mark of his visit, but it will leave a deep mark on him. If, on the other hand, his idea of communing with nature is to watch its blurred visage through the window of a speeding car, the gift of nature is lost, and nature itself will suffer.

ONE WHO SHARES MY VIEW is Herb Crisler. In Port Angeles I learned that Crisler, at the age of 80, planned to make a 20-day pack trip with a few friends across the Olympic Mountains, retracing as closely as possible the route he followed in 1930, when he made a month-long solo journey, living entirely off the land.

Small, lean, straight-backed, and wiry, Herb looks ageless (opposite). His step is firm and quick; his blue eyes gaze clear, direct, and humorous from a remarkably unlined face framed by flowing gray hair and beard; his voice is gentle but without tremor.

He spoke of his 1930 trip: how he had headed into the Olympic Mountains packing only a hunting knife, an ice ax, a small triangle of waterproof canvas, 75 pounds of photographic equipment, a five-gallon can containing three homing pigeons who were to carry his weekly reports to Seattle; how he had subsisted on avalanche lily bulbs, shriveled huckleberries, little frogs, grouse he knocked down with rocks, and a marmot. After a month, he reached Lake Quinault—20 pounds lighter and a changed man inside.

"One night, starving and freezing high on the slopes of Mount Olympus, I vowed that if I got through alive I would never hunt again. Instead I would become an ambassador for the wild creatures of the Olympics. My camera would show the world what I had seen and come to love."

In the years that followed, Herb was as good as his word. Again and again he trekked into the Olympic wilderness. He came to know intimately the elk, the bear, the cougar, and the lesser creatures of the wilds. It was Herb's film footage that Walt Disney used in his movie, *The Olympic Elk*.

But what if all those proposed roads and tramways were built into that country, I asked? Herb shrugged, uttered a short, derisive laugh, thought a second or two, and answered: "You know, I realized very early that in nature all things are interrelated. Animals, trees, birds, plants, the very pollen blowing through the air—they all help to build what I call the 'web of the wilderness.' All, that is, except modern man. Man is a very poor spider!"

FRANÇOIS LEYDET

Wind River Range: Many-Treasured Splendor

Under a dome of frosted felt, packer Jim Allen (**facing page**) sips the chill off an August morning in the Wind River Range. Summer above timberline comes as a short burst of wild flowers between snowstorms.

Only the fit and skilled can safely traverse this precipitous country just south of Yellowstone with its two million annual visitors. Yet even in these mountains, people-use has soared. NICHOLAS DEMOS III

A SEPTEMBER SNOW SQUALL had whited out vision as our party of four labored the last few yards toward the windswept dome of Union Peak, at 11,491 feet already in winter. On the downward slope toward the south and west, the whirling mist of snow suddenly lifted like a celestial curtain and the landscape fell away through an immensity of clear space and all-enveloping light that stunned our senses.

To the northeast, the volcanic walls of the Absarokas, dark flanks streaked with snow, reared from the Wind River valley. They melded far northward with the distant glory of the Tetons, a shining horizon that swept again toward us, culminating 60 miles west in the singular majesty of Grand Teton.

I felt myself shrinking inside before the scale of the scene—the planetary power that had thrust these mountains upward, the sudden and capricious act of nature that had hurled us from a womb of white into an emotion-shattering splendor of space and rock and wind and vast creation.

That is what people must mean when they talk about a wilderness experience. I was in a place where such things happen—Wyoming's Wind River Range, one of the places where exploring Americans first saw the huge natural magnificence that gave them the idea of West, and West as being different from all other earthly places.

Later on, the wagons out of Council Bluffs and St. Joseph and Independence would follow the easier low route off to the south, along the Sweetwater and over South Pass, where the great trails westward merged. But in the time I have in mind, when Captain Bonneville and the mountain men walked toward the sunset, they were led by the lay of the land up the Wind River, with the long-limbed and deceptively supine mountains on the left, the sharp-toothed Absarokas on the right. At some point, when pioneer pathfinders felt they were going up a blind draw, they scrambled up the Wind River mountains, and again the shape of things would lead them to what we know as Union Pass. There they would stand in high, wide meadow and look astonished at Grand Teton blazing like a beacon before them, with the big Yellowstone country up beyond, and they would know that they were someplace else.

In the valley below, according to local lore, rest the bones of Sacagawea, the Indian woman who aided Lewis and Clark. There

BARREN LAKE IN A BARREN VALLEY *stands nameless above timberline. Such glacier-fed ponds are often too shallow and cold to support fish, but they help sustain game, wildfowl, and an occasional human in search of tranquillity.*

Wind River high country remains as wild as it was in 1842 when Kit Carson and John C. Frémont trekked it on an expedition to scout the way west. LAURA CARPENTER

too, below a butte called Crowheart, an epic battle between Crow and Shoshoni had been fought in the shadow of a red mountain when this was still Indian land.

The Crows called themselves Absarokas, the "bird people," and the French trappers translated that as *gens des corbeaux*—the crow people. Their true home was eastward, in the Bighorn and along Rosebud Creek and the Tongue and Powder Rivers (all marked later in blood), but in the winter they came this way after the game and the shelter of the Wind River valley. A tall and handsome people, the Crows are remembered for being among the best of the buffalo hunters, for having the largest herd of fine horses in the upper Missouri, and for fighting in the bitter Sioux wars of the 1860's and 1870's, on the side of the white man.

IN THE AFTERNOON we stood at the edge of a plunging cliff and looked all the way down into summer where it lingered at blue Simpson Lake and greened a small and gentle valley. Then we crossed the Continental Divide and came down to Granite Lake, set against a mountain wall with high snow scudding from its top, the lodgepole pine forest sighing and creaking in the wind, the world pressing a pristine beauty against our hearts.

John Butruille, District Ranger of the Wind River District of the Shoshone National Forest, led the way toward the lake, followed by Paul Petzoldt, Director of the National Outdoor Leadership School, and by my old friend conservationist Henry Nichol, still stomping down mountains like a boy.

We found a good place, out of the cold

Surmounting themselves as much as the mountain, students in the field with the National Outdoor Leadership School make a final assault under light packs on Wind

wind, but in view of the lake, tied the tents down and built a brisk, welcome fire. Huddling in the cup of warmth, blowing on steaming coffee, we talked about this woodland and others like it in the interior world of Wind River country. Deceitful mountains they are. The long, low silhouette they present to the auto traveler is a charade. Once inside, over the first crests, a beautiful maze of sculptured mountains, near-vertical timberlands, and knife-sharp valleys leads past the brinks of a thousand lakes to rugged alpine heights crowned with ever-white glaciers.

"PEOPLE WHO LIVE around here usually make their living in one of three ways," John said, "and they always have. It's cattle, or timber, or tourists, counting the hunters. Each one depends on this forest. They all have to have a piece of these mountains in order to survive."

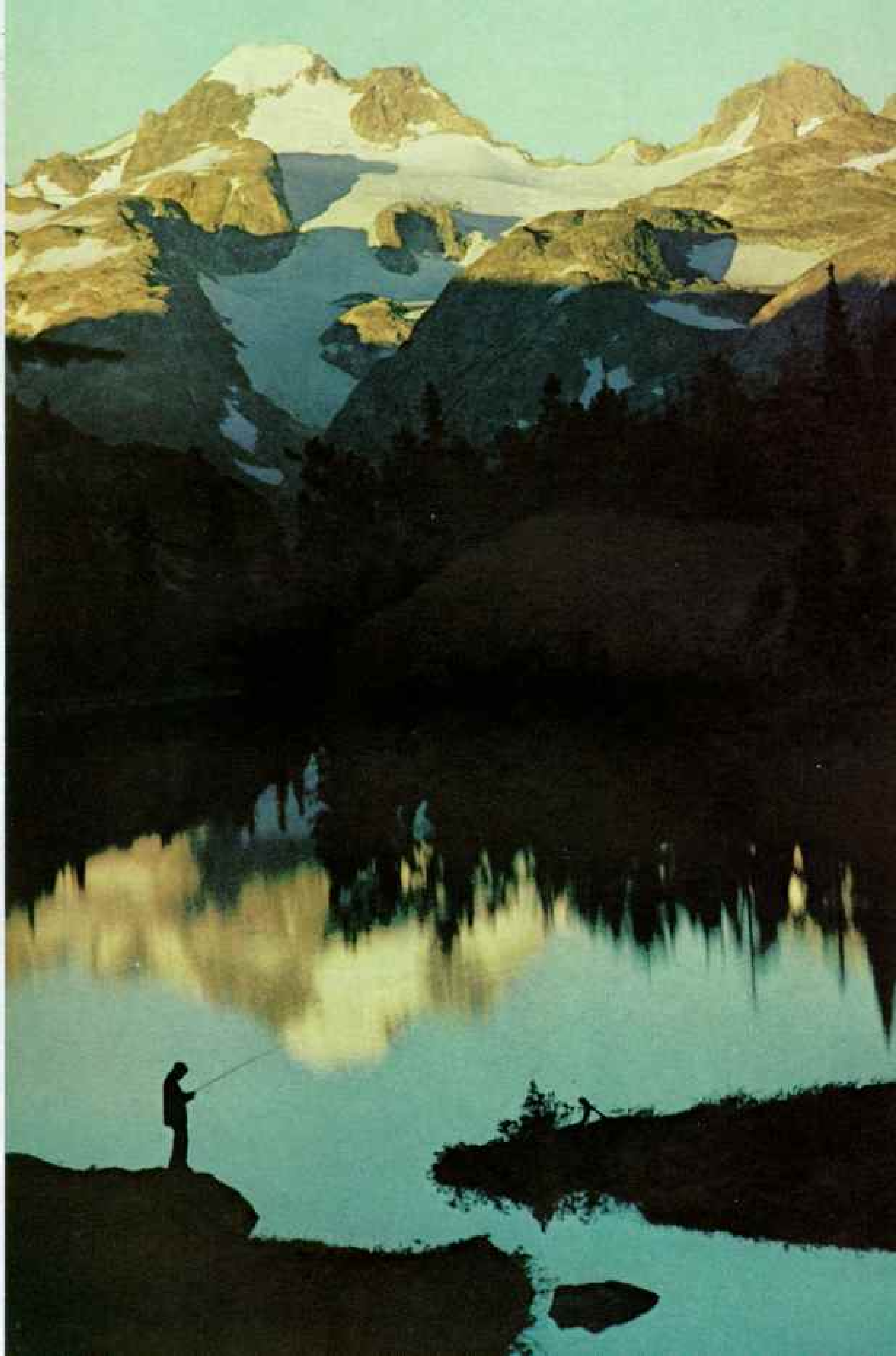
A lot of people have claimed part of the national forest's many treasures, ever since the first white trappers came for beaver, when "settled country" lay east of the Mississippi River.

"Imagine what it was like then," John said. "Deer and elk, mountain lion, rivers of buffalo down below, pronghorn antelope, bighorn, grizzly. . . ."

Shooting down animals is still a popular pastime in the mountains. Supplying the needs of the hunters, packing them in, getting them a trophy is an important business for the valley in autumn, when the area's guides lead parties out to the 13 base camps in search of deer, elk, and bighorn. One of the largest remaining herds of bighorn sheep

River Peak. Learning to live not off the land but with it—and to leave it unscarred—students excavate domed snow caves (**right**), packing in all their food and fuel.

DAVID MUENCH (BOTH PHOTOGRAPHS)



winters on the slopes of Whiskey Mountain, under special management.

Then it was cattle.

"Big herds began coming in before the turn of the century," John told us. "A few local ranchers at that time claimed 70,000 head among them, but almost nobody today believes them. There were enough, though, to deplete the range."

In John's district, 20 owners graze about 6,500 cattle and 2,400 sheep—less than half the number grazed 50 years ago. The whole forest area is divided into allotments for grazing—13 for cattle, comprising 91,000 acres, and 3 for sheep, on 11,000 acres.

"These days," John said, "the trend is to larger herds, and more absentee owners."

And then it was timber.

Millions of people have ridden on parts of the Wind River and not known it. One out of every five ties—five and a half million in all—for the Chicago and North Western Railroad was cut in the mountains over several decades beginning in 1914. That was selective cutting, restricted to 13-inch diameter trees, and the forest lasted. But other timber interests found a good market for boards and studs, and the clear-cutting began.

The Forest Service thought that the lodgepole pine would regenerate if enough seeds were in the slash; besides, the clear-cutting was a way to help fight the parasitic dwarf mistletoe. Also, local sawmills were complaining that not enough trees were being offered by the service. In 1965 some 22 million board feet were sold off, almost all of it in clear-cuts of 40 acres or more.

But the expected reseeding turned out to be a problem. Seedlings, fewer than expected, grew slowly. The almost constant wind, harsh temperatures, and thin soil augured many a bare slope for a long time.

New regulations have followed the protests of conservationists, who are also trying to save the last major Wind River drainage to escape clear-cutting by depositing it in the Washakie Wilderness. The Bridger Wilderness already encloses vast parts of the range.

The Wind River's lack of mineral wealth has spared it from the bane of many another wild region—the miner armed with a shovel. To this day, American mining operates under an 1872 law that lets any man walk onto federal land—with a few exceptions—and stake a claim. For a small expenditure he can secure what amounts to an exclusive property right. Some claims have been converted into housing developments. Though the Forest Service now has judicial weapons to stop such abuse, it still cannot forbid claims in its wilderness areas, nor bar access to them.

WILDERNESS. Now its time has come. Grazing was followed by depleted range. Timber harvesting was followed by clear-cutting. Will wilderness be followed by overuse, by trampling and crowding out the very values that create it?

"We try to teach our students to respect these mountains," Paul Petzoldt said, "to move through them as lightly as shadows, leaving not a single trace of their passage."

Paul's school, like other wilderness-oriented institutions, charges tuition to teach young people how to live in a wilderness. But even this school, of necessity, must use the wilderness to conduct the training.

During the night the snow squalls blew themselves out over the warm valleys, leaving a glinting trace of white on the mountaintops that motorists would remark as they passed up the roads toward Yellowstone—Look, someone would say, snow already.

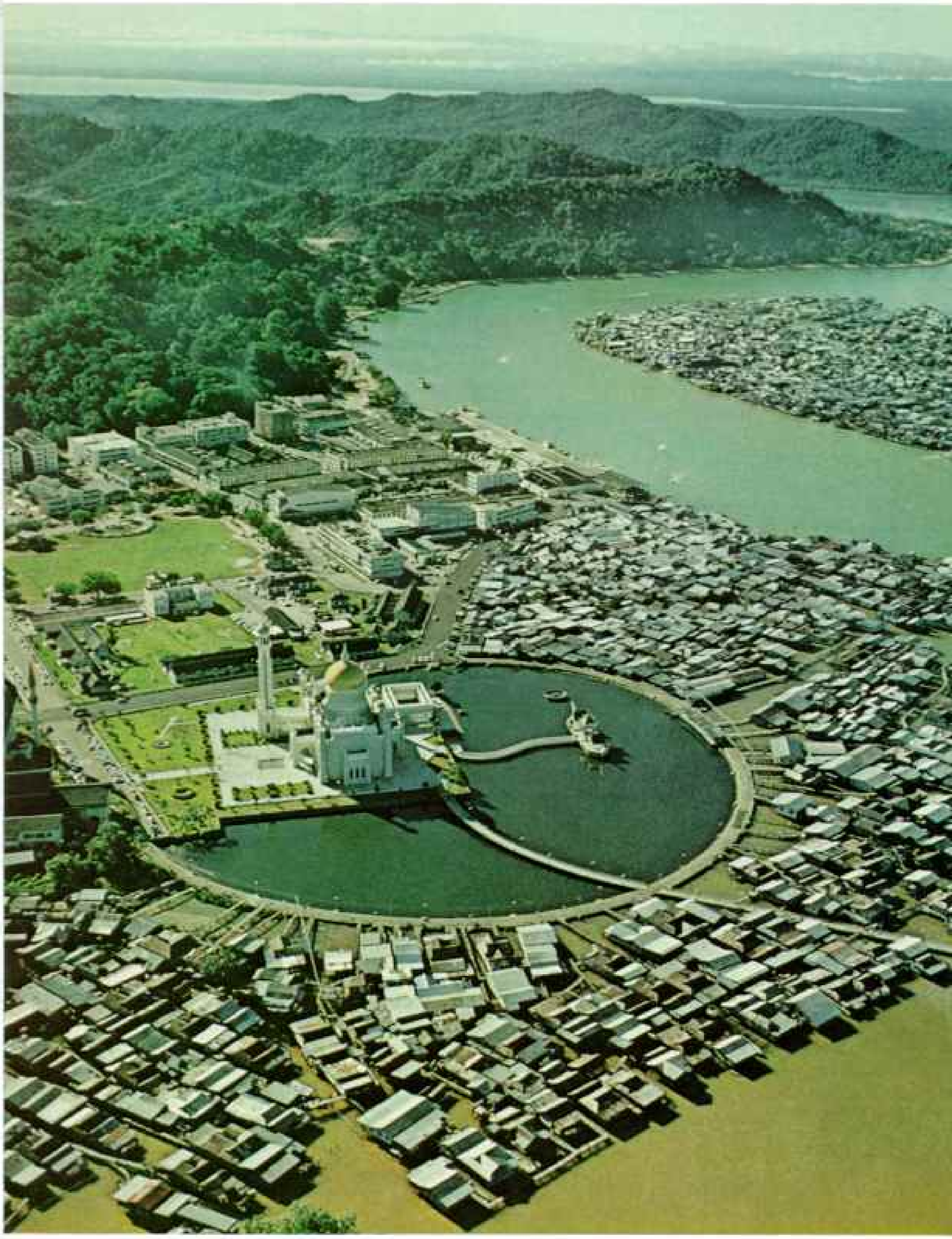
Our small woodland was white, cold, and absolutely still. The night was ignited by high-intensity stars, the sky so encrusted with light that the constellations disappeared, their patterns lost in chaos.

I was up long before dawn, breathing in the pure air and thinking about the mountains. They have known the logger with an ax, the hunter with a rifle, and the cowpoke swinging a rope, all of them here because it was a way to make a living, and a decent one.

But there is a new man here, and in all mountains and valleys and shores, a man with a pack on his back. He has come up out of the city and the suburb, seeking what is perhaps the final treasure of the Wind River —his soul.

JOSEPH JUDGE

Backbone of the world to the Blackfeet, Gannett Peak straddles the Continental Divide, some of its snows melting east, some west. An angler reels his lure through the mirror of Echo Lake. As the contentments of fishing run deeper than merely catching fish, so the wilderness can refresh the mind's eye with vistas of untrod country.



Island of elegance in Brunei's riverfront capital, a gold-domed mosque reigns over both the stilt houses and the modern heart of Bandar Seri Begawan. In this tiny oil-rich nation on the island of Borneo,

Brunei

BORNEO'S ABODE OF PEACE

By JOSEPH JUDGE
ASSISTANT EDITOR

Photographs by
DEAN CONGER
NATIONAL GEOGRAPHIC PHOTOGRAPHER

tribesmen share citizenship with city dwellers who enjoy one of Asia's highest standards of living

"SORRY, SIR, the regiment is standing down today," said the distinctly British voice on the telephone.

"The army is on vacation?" I responded, but this was Brunei and I had been there long enough not to sound incredulous.

"Yes, sir. They should have had Saturday off, like everyone else, but they had to work."

"Suppose a little war breaks out?"

"Rather improbable, don't you think, sir?"

Rather. If there is one place on the planet where dawn is at peace and sunsets are serene, it is Brunei, an oil-rich, Delaware-size sultanate on the island of Borneo, a word that Europeans wrested from "Brunei."

There you can travel up a brown jungle river to the longhouses of the Iban people, who took their last human head—that of a Japanese soldier—only thirty years ago. And, if luck is with you, you can find a band of Punans, stepping with their blowpipes out of a past forgotten by Western man.

There, too, the last lingering echoes of Queen Victoria's age can still be

Honoring a faraway monarch, British High Commissioner Peter Gautrey and Brunei's Sultan Sir Hassanal Bolkiah return a salute at a birthday parade for Queen Elizabeth II. The Sultan's brother, Prince Jefri Bolkiah, in "mod" attire, attends a reception that follows at the High Commissioner's residence (**lower left**).

A power among Malay states in the 16th century, Brunei has diminished in area until today it is a two-pronged enclave surrounded by Sarawak and the sea (**map, right**). Under British protection since 1888, it became a self-governing sultanate in 1959. Great Britain oversees external affairs.

Wading through car-choked streets, Moslems stream to afternoon prayer in the capital (**right**). The state requires Moslem citizens to visit the mosque each Friday.

The abundance of automobiles attests to Brunei's oil-based wealth. The nation's 140,000 inhabitants—mostly Malays—pay no personal income tax, yet enjoy free education, medical care, and old-age pensions.


South China Sea
Labuan Island
Brunei Bay
SABAH (MALAYSIA)
Muara
BRUNEI AND MUARA DISTRICT
Sipitang
BANDAR SERI BEGAWAN
Kampong Ayer
Tutong
Limbang
Bangar
Pasau-Plasau
Labu Bazaar
Lumut
Seria
TUTONG DISTRICT
Kuala Belait
Belait
BELAIT DISTRICT
Miri
Bunut
Sukang
Mellas
Brunei
TEMBURONG DISTRICT
SARAWAK (MALAYSIA)
EAST KALIMANTAN (INDONESIA)
Elevations in feet
THAILAND
CAMBODIA
SOUTH VIET NAM
Saigon
Luzon
PHILIPPINES
Palawan
South China Sea
MALAYSIA
Kuala Lumpur
Borneo
Sumatra
INDONESIA
Indian Ocean
Jakarta
Celebes

heard in expatriate accents that recall how Somerset Maugham played bridge and how the White Rajah of Sarawak stole the Limbang River.

There Sir Hassanal Bolkiah, a Moslem sultan who rules in Arabian Nights splendor, supervises a modern welfare state that is Asia's envy. Most of his 140,000 subjects are Malays; many dwell in stilt houses over the placid waters of the Brunei River. They live a lot more comfortably than did their ancestors when the first Europeans, sailors of Magellan's fleet, found them 450 years ago.

Thanks to rents and royalties from oil production that brings in nearly 26 million U. S. dollars a year, an annual tax harvest of more than 77 million, plus income from well over 250 million invested abroad, great wealth trickles down through Brunei's rigid class system—through royalty, nobility, and aristocracy, until it reaches the many commoners in the form of free education, free medical care, no personal income taxes, and one of the highest per capita incomes in Asia (about $1,400).

Since 80 percent of the state's income comes from the Brunei Shell Petroleum Company Limited, the obvious pun—"Shellfare state"—is heard many times too often. But along with the modern emoluments goes a rigid religious code, with firm guidelines of conduct, firmly enforced.

The astonishing edifice that dominates Brunei's capital—the gold-domed Omar Ali Saifuddin Mosque, one of the largest in Asia—is an apt symbol of the state (pages 206-7).

Invitation to a "Moon Man"

At Brunei's latitude, only five degrees north of the Equator, the sun storms down with the weight and texture of a fine rain. I hoisted my green paper umbrella against the fall of sunlight, and set off past the mosque to the nearby water village, Kampong Ayer, its thousand and more houses strung together with a web of wooden bridges.

It is a pleasant place to walk, and to live, when the tide is in. The medley of sounds makes a soft music—the singsong of girl students in a school, a stringed instrument humming from a small wooden house with artificial parrots dancing in the windows, the laughter of men from a shop, the steady thwack of an adz, the chiming bell of a cake salesman, and the call to prayer issuing from the distant minaret.

"Hey, British," a smiling man called from the porch of his house.

"American," I said.

"Moon man," he laughed. "Come have some tea."

We sat on the porch and watched the sunlight slap on the water, while his wife served tea and two daughters stood and gazed with wide eyes.

"Call me Mohammed," my host said. "The names are very long here." His walls were decorated with several calendars, which gave the year and day in various kinds of reckoning.

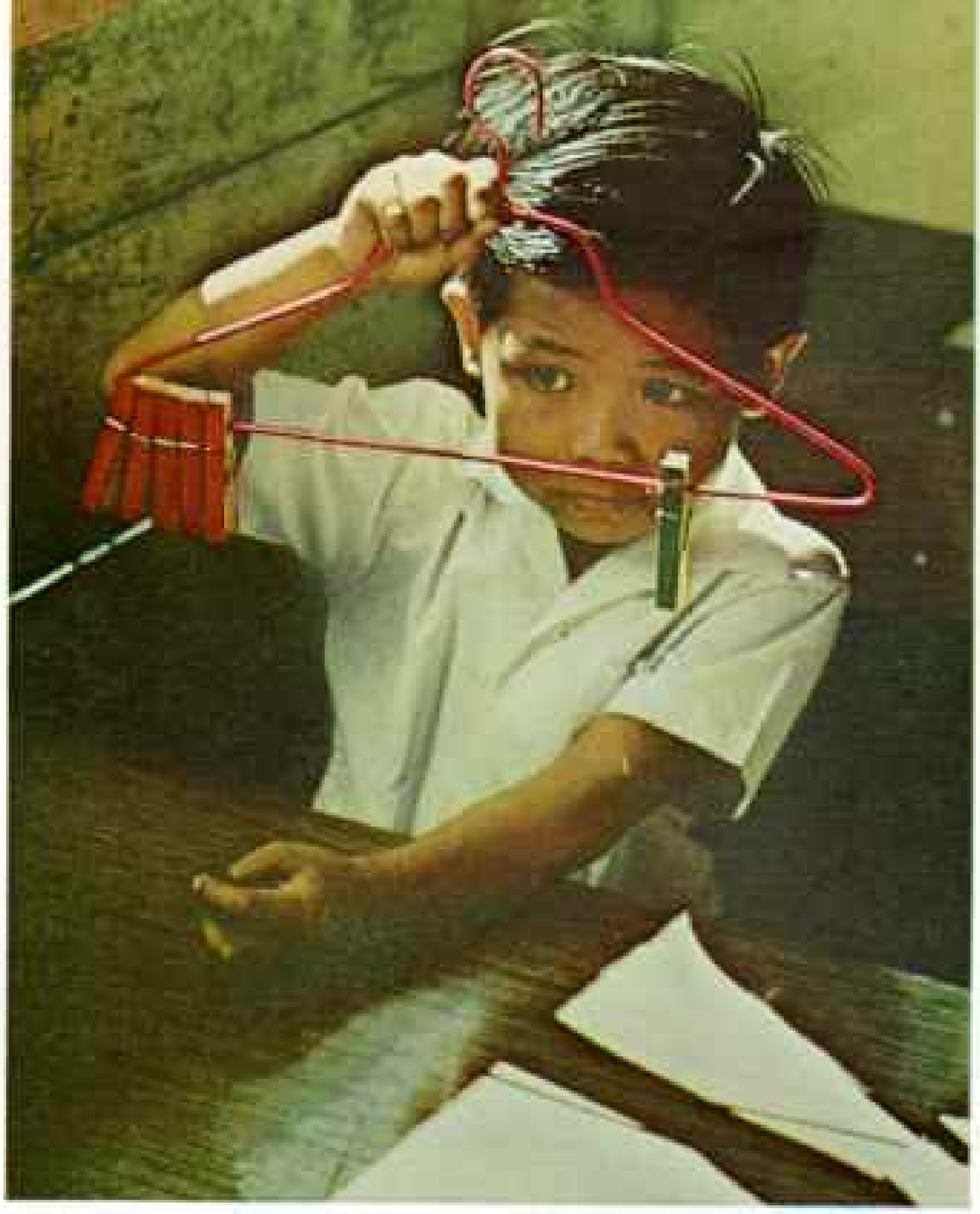
Mohammed indicated the Moslem year, 1393, and the old-style Chinese year, 4671, and the Gregorian year, 1973. I asked him why he kept so many calendars. "Here in the kampong it always seems the same date," he said. "It's hard to keep track.

"The kampong looks like one place," he continued, "but it is actually many villages, each with its headman. In the old days each village had a specialty—some held fishermen, some silversmiths, some carpenters. Now most of us work ashore. Many men take boats to the town wharf and then get in their cars and drive to their jobs. Life is better here, over the water."

I found that at least one of the old crafts is still alive. A pillar of smoke led me across a long bridge and into the yard of a brassmith named Ibrahim, a great, strong, square man who walked about on the black cinders in bare feet. With two helpers, he was casting cannon in the old way, to be sold as expensive souvenirs (pages 222-3). Two log fires with raging orange hearts held clay jars filled with pieces of salvaged brass, taken from ships. When the brass had melted, the men lifted and poured the jars, holding them with smoking wooden paddles. Just at the point when the hair on their arms and legs began to singe, they plunged into the river.

The kampong has felt the impact of modernity. The old pole-and-thatch look has disappeared, in favor of tin roofs and concrete pilings. Honda generators hum here and there, sometimes one for every three houses, and television aerials seek out the signal from neighboring Sabah—Brunei as yet having no television of its own. And, in the evening, the river turns into a loud highway as outboard motors carry commuters homeward.

Still, as the evening light lies low on the glistening water, with a huge backdrop of cumulus clouds, and the kampong begins to



Counting on a bright future, a youngster in a Malay school peers at a counter improvised by his teacher from clothespins and a coat hanger. Illiteracy still exists among tribesmen in the interior, but 90 percent of the nation's children attend either Malay, Chinese, or English elementary schools. Virtually all students qualifying for secondary education receive it; Brunei has more scholarship money for university training than there are takers.

glow with lamplight diffused through a haze of cooking fires, it is a gentle landscape that seems eternal.

How much different is the kampong's modern offspring, the growing city on land. In 1970, old Brunei Town acquired a new name —Bandar Seri Begawan (Bandar meaning "city" in Malay, and Seri Begawan referring to the former ruler). The name commemorates the still-powerful former Sultan, who abdicated his throne in 1967 in favor of his eldest son. A lot of the usual Asia can be found in B.S.B.: the open stalls of Chinese shops, a vociferous and odoriferous fish market, a Friday morning Malay market under a rainbow of umbrellas and tents, where the country people spread glistening vegetables and chickens and all manner of goods.

Memorial Honors Sir Winston

But there are also a score of handsome new buildings, a smashing anthropological museum, far too many automobiles, and one of the largest memorials in the world to Sir Winston Churchill.

"It *is* rather odd," said Gerard de Freitas, a British civil servant, "since Churchill never came here. But the former Sultan met him twice, and admired him."

The large semicircular structure contains both a small Churchill museum and one of the largest aquariums in Southeast Asia.

I never met Churchill, but I feel sure he would have been both puzzled and pleased.

From a ridge overlooking the Brunei River, the land falls downward in uneven terraces, beneath which lie the ruins of Kota Batu—literally, Stone Fort, the ancient site of the palace of the sultans of Brunei (map, page 209). An excavation 20 years ago uncovered Chinese pottery dating to T'ang times, roughly 1,300 years ago.

The people of Brunei were not yet Moslem. In the long centuries between the opening of trade with China, which reached its height around the 13th century, and the arrival of the first Europeans, Brunei, like almost every other Malay state in the widespread archipelago, converted to the faith of Islam.

The new religion may have come with Arab traders riding the monsoon winds across the Indian Ocean. The Malay rulers, who had already borrowed many of the forms of authority from Indian Hindu sources, crowning their kings and nobility with sacred Sanskrit phrases (they still do), found the new faith quite congenial.

Modern Bruneis take increasing pride in

Tapping Brunei's bounty, Malay roustabouts drill for oil near Tutong. Brunei struck it rich in 1929 and today follows Nigeria and Canada among oil producers in the British sphere.

Natural gas also helps fuel the economy. Liquefied in a seaside plant at Lumut (**right**) to facilitate shipping, the gas is piped nearly three miles to tankers moored at the deepwater terminal. A new ship designed for transporting liquid natural gas, the *Gadinia* gobbles 460,000 barrels. All Brunei's production for the next 20 years—five million tons annually—will go to Japan.

their ancient glory, and especially in the chief figure of the past—Sultan Bolkiah, who sometime in the 16th century sailed forth from Brunei Bay on voyages of conquest. He did remarkably well, extending the suzerainty of the Brunei court for more than 1,000 miles, north to Luzon in the Philippines and south toward great Java itself.

The history of the country since then has been the steady dismantling of Bolkiah's empire by European powers, especially the famous Brooke family, the former white rajahs of Sarawak, who consumed Brunei river by river as far as the Limbang, which the present Sultan would like very much to have back.

During this long stretch of time, the Brunei sultanate had penetrated the jungles beyond the river mouths only enough to establish a loose suzerainty over the peoples who had lived there for millenniums, and still do.

Modern Times Come to the Ibans

I went up the brown, jungled Belait River to a place called Melilas. All its citizens were gathered under the common roof of their huge home, an Iban longhouse. I was greeted by the anthem of the Brunei jungle, the brave, rusty trumpeting of fighting cocks.

The Ibans of the *ulu*, or headwaters, have been known by other names, like Sea Dayaks, and always notoriously because of their former custom of headhunting. Under the pressures of Brunei's oil-rich economy, they are being modernized.

The first thing I saw, as I made my way over the spaced boards and branches of the floor, was a small blackened head resting like an eggplant in a wicker basket.

Kanna bin Mudin, the chief of the longhouse, whom everyone called O.K., smiled with pleasure as he held up the trophy.

"Japanese," he said. "Seventy-five were running away from Sarawak. We met them near Sukang." Then, somewhat sadly: "Now they buy natural gas."

The longhouse at Melilas held 118 people living in 15 private quarters, the doors of which opened onto a long common room—something like a village street under roof (following pages)—lighted by outside doorways overlooking a log-and-branch balcony. Children, chickens, and dogs ran loose, but each of the proud roosters, about thirty of them, was tethered beside the door of its owner.

O.K.'s wife spread mats for us. I noticed only a few young men—two sat by a doorway

all day, sharpening parangs, the jungle knives of the Ibans.

"They go downriver to Brunei," said O.K., "where they get good pay, and send the money back. They own cars. Even my son owns a car! I have ridden in it."

As we talked, a typical massive rain came falling in slender white sheets, dappling the brown river, turning back the leaves of the lemon trees.

"Most Ibans live in Sarawak," O.K. went on. "To live here, one must ask permission of the Brunei Government. In Brunei—with few exceptions—only a citizen may own land, and one must have lived here for 20 of the last 25 years and be able to speak Malay to be a citizen. But we have a school here at Melilas, and two teachers, and a radio to call a helicopter for anyone seriously ill."

"*Gulingtangan*" Sounds as It Sounds

In the evening the women brought out slender brass lamps that shed a soft orange kerosene glow up and down the long length of the room. Families gathered in each island of light, talking softly and working easily, mending fishing nets or plaiting baskets.

Then Batu, a striking figure of a man with gray hair and a perfect physique, brought out the musical instrument called *gulingtangan* in Malay and *engkerumong* by the Ibans. A set of bronze gongs sits loosely on ropes stretched on a wooden frame. Batu bonked away while a young girl rose to dance, a slow and even turning of the body accented with wrist and hand motions.

Bing bong, bitter bang boodle, bong bung, batter bong booby . . . gong, gong, cock-a-doodle doodle!

So morning came, with the phalanx of fighting cocks clearing the rust out of their bugles and jarring me from whatever sleep the rooting hogs below had permitted.

I continued downriver, past a sunning crocodile, to Sukang, a settlement of the Dusun people. The headman at Sukang is the *penghulu*, or chief, of the upper Belait River. As such he also controls Ibans and, I was amazed to find, Punans.

I had heard of these peoples, who usually dwell in the interior of Borneo, on far-distant plateaus at the ends of such mighty jungle rivers as the Baram and Rajang, but had had little hope of meeting them in Brunei. Yet here they were at Sukang, brought in from their remote homes by a headman who thought their children should have the benefit of education.

They were living in a government-built longhouse near the bank of the river. When they came down the path to meet me, I saw at once that they had a distinctly different look: their smooth, almost featureless, expressionless faces seemed to me like those of very small children.

We sat and smoked. Kutok, the headman, told me: "Before this time we moved every two or three days, searching for food and hunting, tracking the wild boar and the deer. Once in a while we have to go a long way, to

"Main Street" of an Iban village, the hall of a longhouse at Buau offers a shadowy gathering place. The corridor fronts 26 apartments—an entire settlement under one roof. Iban farmers once were pirates and headhunters as well. Baskets of dusty skulls still decorate many a longhouse. Usually built along the riversides, the dwellings have two-way radios supplied by the government for emergencies.

near Tutong, to get the poison from the bark of the ipoh tree. We make the blowpipes from the billian tree."

One myth I had entertained went by the board when I met the Punans' best hunter, keen-eyed Gepi. He was deaf. Even in the half-lit jungle world, the eye is apparently as important as the ear.

Hunters Move Like Jungle Shadows

The next morning, Luia, who moved like a panther and looked something like one (page 224), and his friend Dua took me into the jungle to hunt monkey. We crossed a shallow swamp and plunged into the jungle along the banks of the Belait. In a moment, the Punan hunters had turned into shadows.

We crept deeper into the forest. It was pleasantly cool and moist, with an occasional hot splash of sunlight.

Luia froze in a stooped posture. Dua held his blowpipe at the ready; it did not waver a fraction of an inch. When he fired the dart, the noise was like the drop of heavy rain on a leaf, perfectly natural among the sounds of the dripping jungle. We heard the dart tearing through the high canopy of leaves, an explosive scattering of birds, then silence. Dua's target, a bird, had winged off at the moment the dart was launched; a few tail feathers floated down.

The scream of a monkey in the deep forest sent Luia off in an instant; he left on hands and knees. As we followed cautiously, we could neither see nor hear the drama of the hunt. Clues came I could not decipher: the crack of a branch, the complaint of an unseen bird, the sudden passage of a frightened little animal.

We waited a very long time before Luia stepped out from behind a tree, shaking his head. He indicated the direction of the chase, and showed us what had happened. He had hit the monkey in the shoulder with his dart, but for some reason the animal did not fall. It stayed lodged in a high tree. Hunters of other kinds would find it, but not the Punans this day.

I was lifted out of the jungle by a helicopter from the Royal Brunei Malay Regiment, a

spit-and-polish military unit trained by British officers seconded to Brunei from their home regiments in England.

It has an impressive array of hardware, including nine helicopters, 1,500 men trained to fight out of them, a patrol boat claimed to be the fastest in Asia, and a hovercraft capable of putting troops on a beach.

It is easy to be somewhat cynical about what amounts to a big army for a little country, but Brunei is wedged between two huge states—Malaysia and Indonesia—where political changes have occurred that have rocked the whole region.

Rebellion Brings British Gurkhas

The country has had its own taste of bloodshed. In the late 1950's Britain, acting on a policy to withdraw from east of Suez and leave democratic institutions established, prevailed upon the present Sultan's father to hold the equivalent of general elections. A firebrand orator sympathetic to Indonesia, Sheik Azahari, led an opposition party that won 35 of the 36 legislative seats in 1962.

Inspired by that success, and fearful that the Sultan would lead Brunei into Malaysia, Azahari declared a rebellion.

Under terms of the 1959 treaty with Britain, the Sultan called for help. A Gurkha battalion appeared on the scene and put down the insurrection after a nasty and bloody and somewhat confused struggle. Apparently impressed by these unexpected fruits of democracy, the Sultan suspended the constitution and declared a state of emergency, which still exists a decade later.

The trend has been toward more, not less, autocracy; the Legislative Council is a showcase of palace appointees, and the will of the Sultan remains the prime moving force in Brunei politics. About 50 of the rebel leaders are still in detention without trial.

Shortly after the rebellion, the call went out for British expatriates to help run the government. Those who answered signed contracts for relatively high wages and looked forward to gathering some kind of nest egg.

But life can be hard, especially for wives searching vainly for places to shop, elite hairdressers, and dinner at some other place than the three or four restaurants in the country. There is a furious amount of entertaining at home and a social life revolving around the Royal Brunei Yacht Club, a charming place, mostly veranda, overlooking the river.

"This used to be Bill Doughty's home, where Somerset Maugham played all that bridge," Chris Beames of The Borneo Company told me one evening as we sat at the club bar. "You've heard the story?"

Here it is: When Brunei and nearby Labuan remained tropical backwaters, poor coastal settlements with dangerous rivers behind them, the statesmen of Whitehall were no doubt somewhat disappointed. Maugham, on the other hand, was delighted. It was a writer's kind of place, and he made his way there.

"When Maugham arrived," Chris told me, "there were only four white men in Brunei." Chris is not old enough to remember, but he is astute enough to have interviewed one of the four before he died a few years ago.

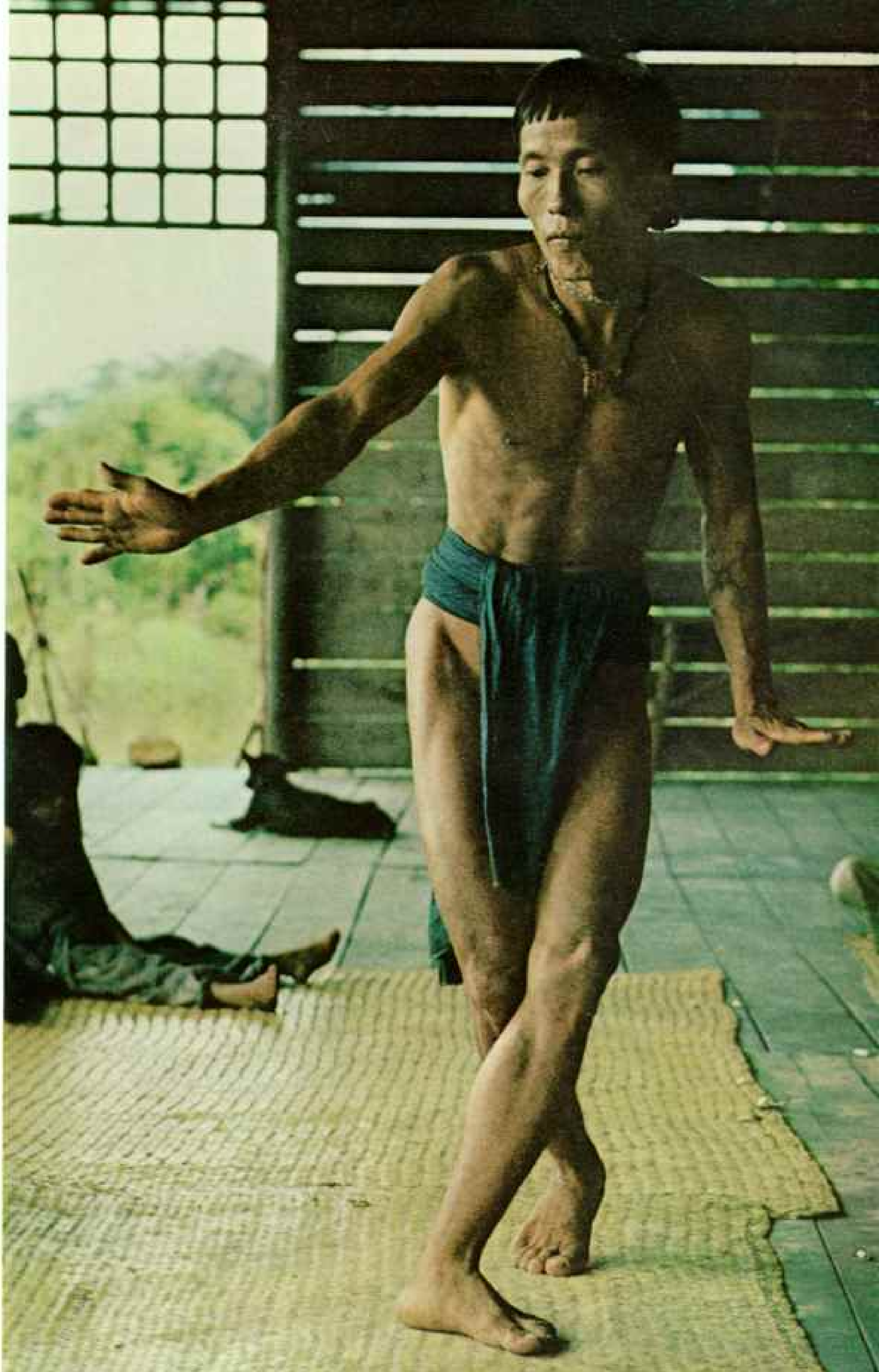
"One of them was the British Resident, Mr. Eric Pretty. Another was a police inspector. The third was Doughty, manager of a small cutch factory, which extracted tannin from tree bark. The fourth player was a postman. They had had a bridge group going until an argument broke out, with the result that one pair had not spoken to the other until Maugham's arrival. He was traveling with his male secretary. And, praise be, they played bridge. Maugham spent his after-dinner time in Brunei playing first one pair and then another, and civility was restored."

Residence Preserves a Vanished Age

Maugham remembered Brunei well, far beyond the confines of his civilizing bridge table. Some of his memorable tales are set in Brunei. One of the places he wrote about has changed not a bit—the residence of the British High Commissioner, on a hill opposite the kampong. Its sweeping veranda and tropical ambience and scampering lizards and memorable vista should be preserved in the British Museum as a vanished way of life.

Not quite vanished. His Excellency Peter Gautrey had me up to a party where Maugham

Stepping to the beat of a guitarlike *sapi*, a Punan man performs a stylized dance. Brunei's nomadic Punans once lived in remote bands. Now, eager for their children to be educated, some have settled in government-built longhouses. But the men still rely on their hunting skills to feed their families.



Screeching at a passerby, a proboscis monkey peers from the jungle treetops along the lower Brunei River, one of the few places in the world where this nearly extinct primate can still be seen.

Surefooted dogs and hunter thread age-old jungle paths. Denied guns by the government, this Iban takes his spear to fell mouse deer or wild pigs. The meat will augment a meal of vegetables, eggs, and rice—the latter the Ibans' main crop, planted, cultivated, and harvested with much ceremony.

Salt-and-pepper topknot crowns a young hornbill (**right**), collected by an Iban as a pet. The birds also provide the tribesmen with food and decorative feathers; one species looms large in the rituals of the few Ibans who still practice an animistic religion.

would have felt at home. We discussed the British interest in Brunei, which seems at first glance to be obvious: oil.

That is only a part of it. What Brunei does with its surplus revenue is also important to Britain. A huge sterling reserve, on the order of 250 million dollars U. S., is held in Britain, a comfortable sum on which to base an understanding.

"1812 Overture"—With a Vengeance

The twelfth birthday of the Royal Brunei Malay Regiment arrived during my stay. It was celebrated with an evening tattoo that concluded with Tchaikovsky's famous "1812 Overture," written to commemorate the burning of Moscow by Napoleon. It contains in its score the famous series of booms from real cannon.

Well, Maj. Tony Hill was placed in charge of the conflagration and assorted effects, and his idea of the demise of Moscow was rather closer to Napoleon's than to Tchaikovsky's. In his talented hands, it became more like World War II.

As the band steamed along the familiar score, two cannon on the parade ground let go with a salvo that obscured the musicians in a pall of smoke and seemed to knock half the spectators off their seats. Followed by a second, third, fourth.

Then the nearby hills broke out in small arms and cannon fire, and from a valley a tremendous burst of flames swept into the sky, reddening the underside of threatening clouds.

"Old Tony's blowing up petrol tins," an officer told me. "Rather good, don't you think?"

By this time the music was totally drowned in smoke and booming mortars. A second

pillar of fire soared skyward, real lightning flashed as if in response, and the Russians led a counterattack to the roar of cannon volleys and the blaze of more fires.

Ka-BOOM! suddenly went the cannon on the parade ground for the fifth and sixth time. The audience disappeared in a dense cloud of smoke, and the band, bravely—one might almost say magnificently—tooting away, recaptured the lead. Then an awesome display of fireworks broke out directly overhead that must have been visible as far away as Saigon. The band finished with a true note, and the sounds of battle died away over the South China Sea.

How pale the concert hall will seem to me now, having heard the burning of Moscow while more or less watching it.

Swimming Monkey Heads for China

In the nipa palm swamps and thickets below B.S.B., we went to hunt—with cameras—the fearless but frivolous proboscis monkey. Fearless it is—swimming rivers, launching itself from treetops. Frivolous, too, because the monkey seldom seems to know, or care, in which direction it is heading. I had heard of one being picked out of the ocean a few days before, contentedly swimming toward China. He bit his rescuer.

Roar of a diesel plow drowns out jungle sounds as a Kadayan tills his garden. Brunei encourages the Kadayan farming tradition by leasing them equipment and helping them obtain fertilizer, chickens, and poultry feed. The crops they raise are welcome in a land that imports more than half its food.

Kadayan farmers produce some of the best rice in Southeast Asia. Theirs is a simple life—planting, fishing in the rivers, and raising water buffalo. Taking a respite from the fields, Kadayan villagers (**right**) linger outside their headman's quarters.

Our monkey-hunting boatman, Haji M. Ahmad, told us that he often came across them in the evening, paddling in small bands across a river some 400 yards wide. Their method of entering the river indicated the conflicting character traits that make of the monkey such an admirable numskull. In order to save as much swimming time as possible, the monkey mounts a tall tree and gets a running start, as it were, by leaping as far out into the water as he can. He hits with tremendous force, almost knocking himself cold before setting out for the distant shore, dazed but determined.

Small wonder he is on the endangered list. He does not much resemble a monkey, but rather a little man with a Bob Hope nose, button eyes constantly full of surprise, and the mouth and chin of a leprechaun (page 218). One of the few places on earth where these monkeys may still be seen is the lower Brunei River, where we cut our engine and coasted the jungled shores, scanning the trees.

There, scanning us, sat a troop of the long-nosed fellows. As we approached, they cascaded off in every direction, flinging themselves straight out into the open sky and coming down with a furious sound of crashing and bashing in the palms below. The racket was awesome.

"You would think they would break something," I remarked, and was saddened to learn later from an expert that broken arms, legs, and ribs are common. Still they leap—the thrill-seekers of monkeydom.

Village Sleeps at River's End

The whole delta country is a wide blue-green mixture of sea and sky. On the way to Temburong District, the sea in the morning was as flat as a plate of glass; at the mouth of the Limbang, the river was a vast lagoon, a mirror held to the brilliant Borneo sky. We crossed over to the Labu, a stream that narrowed and darkened for some miles, until we arrived at a dock and a narrow path leading to the sleepy village of Piasau-Piasau, meaning "coconuts."

The small and scattered farming villages in Temburong are home to the Kadayans. Like Brunei Malays, they are Moslem, speak a slightly different dialect, and are just enough different to suggest a separate origin. Some scholars believe they came from Java, in the time of the great Sultan Bolkiah, who brought them along to Brunei to teach his people how to grow rice.

It is the occupational difference that makes the Kadayan distinct from the Malay, who is seldom a farmer. True sons of the soil, the Kadayans believe in tradition and jealously maintain their own folkways and language. Museum curator P. M. Sharaffuddin passes along a Kadayan saying that speaks volumes about their attitudes: "Even if the child dies, never let custom die."

Good old Coconuts is one place where tradition is not endangered. I had visited the place a few years before and found a young scholar working on his doctorate, Allen R.

Imitations of past glory, brass cannon for the tourist trade recall the weapons that Magellan's men reported guarded the sultan's palace in 1521. In a foundry in the water village of the capital a brass smith prepares molds (**right**) for the miniature guns, which sell for $42 each.

The artistry of Brunei's metalworkers of long ago can be seen in a 200-year-old kettle (**above**) preserved in the Brunei Museum. Brunei also was noted for its ornate silverware and brocade, but brass—particularly in the form of cannon—indicated status and was used as a dowry or to pay a fine.

Maxwell, now of Barnard College in New York. The rice crop was growing, and we walked along a shaded path alongside the fields, and then and there I formed a pleasant and enduring memory of a people of charm and grace. We passed a bent and elderly lady, drifting by on an island of shade cast by her umbrella. Down the path a handsome woman was winnowing rice by tossing it in a shallow plaited basket.

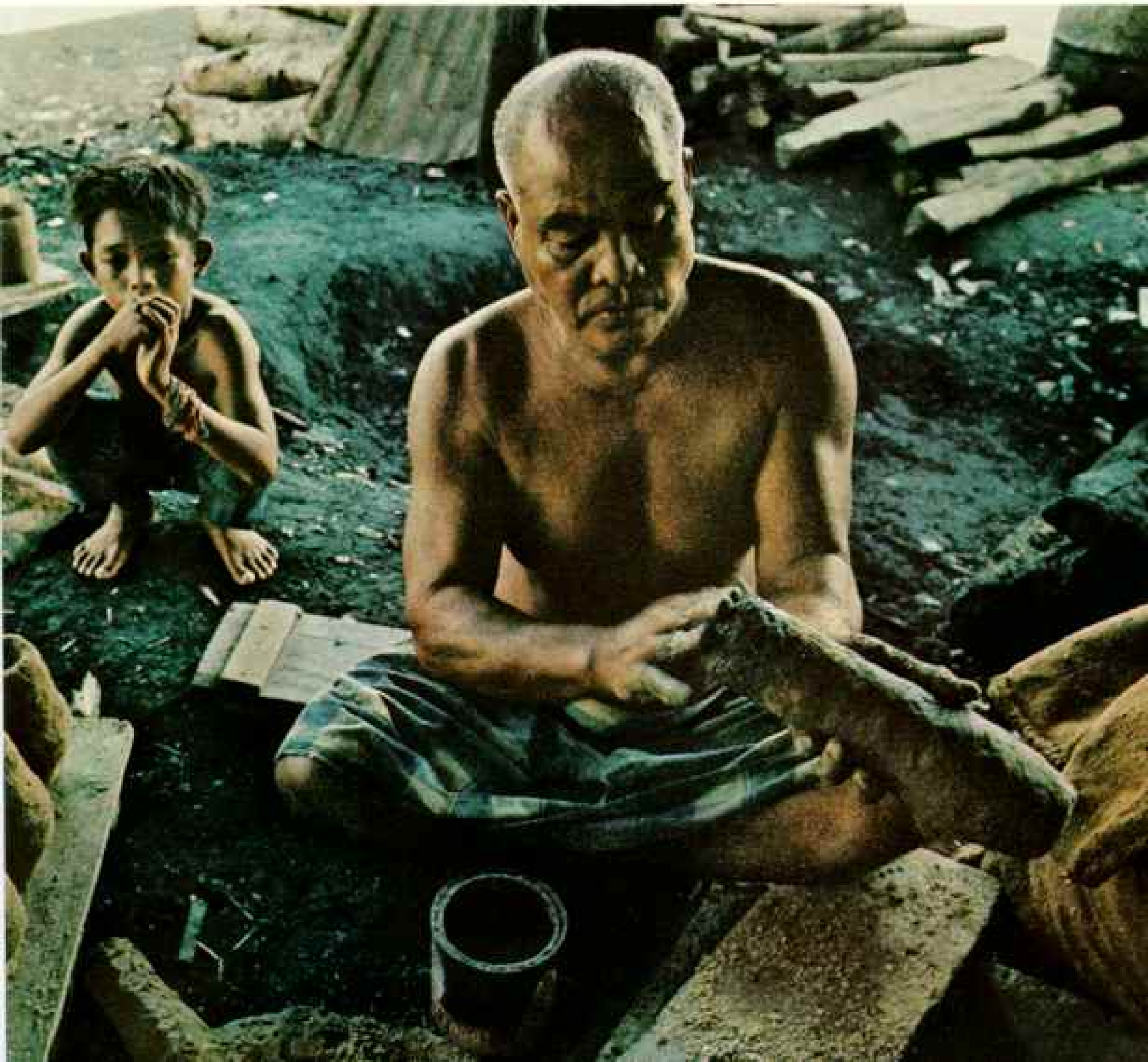
The population in all of Temburong is only a few thousand, Mr. Maxwell told me, but somehow it seemed even less.

The fields were ornamented with elaborate booby traps for birds and other pests—tin cans and palm fronds and bamboo rattles, connected by vines and wires to a control in a small hut. The warning devices are called *telin-ting*, and when the control is pulled they clack and shake and go *telin-ting*. We strolled, then, in a dead calm of hot sunshine, and the Kadayan way of life made its slow, gentle music around us; *telin-ting, telin-ting*.

Fiery Fields Announce a New Season

The time of year was between harvesting and planting; the fields lay fallow, asleep. On a day determined by the headman, Haji Tengah bin Damit, the people of Piasau-Piasau would go out to burn the fields, and towering flames would rise, marking the beginning of another cycle in the endless turn of seasons.

Now it was time for other activity, like clamming. Haji Tengah invited me along. Several women were sitting in a boat chewing betel nut and gossiping. Each carried a basket and the inevitable parang. We turned downstream, cruising through cool spray past the sleeping hamlet of Labu Bazaar, with its neat Chinese store and open green space, and on



down as the river widened into the region of the nipa swamps.

Just as I was thinking that the walls of palm that lined the river were impenetrable, Tengah's boat turned and disappeared into the yellow-green maze. He had found a place just large enough to pull the boat through, by grasping the hard brown trunks of palm and hacking with his parang. Inside was another world—a breathless heat, a febrile violin section of mosquito song, a dank gray odor arising from the squishy mud. Palms bent over and enclosed our passage with a roof of thick fronds overhead. When the wind blew, it made a sound like a heavy rainfall.

Parangs Probe For Muddy Trophies

The women, full of merriment, slid overboard into the black waters, their toes grasping for a hold among slimy roots below.

In a moment, their high-pitched chatter was so modulated by the thick palm atmosphere that they seemed a mile or more away. The clamming method was elementary and efficient. The women probed the thick mud with their parangs; when they heard a dull *thuck*, they reached into the ooze and pulled out a round, blackish clam.

In the course of a suffocating hour or two they had at least a hundred, piling them into the boat from their back-strapped baskets. The clams were heavy and muddy. It was very hard work. When they got back to the village, the men would help eat the catch.

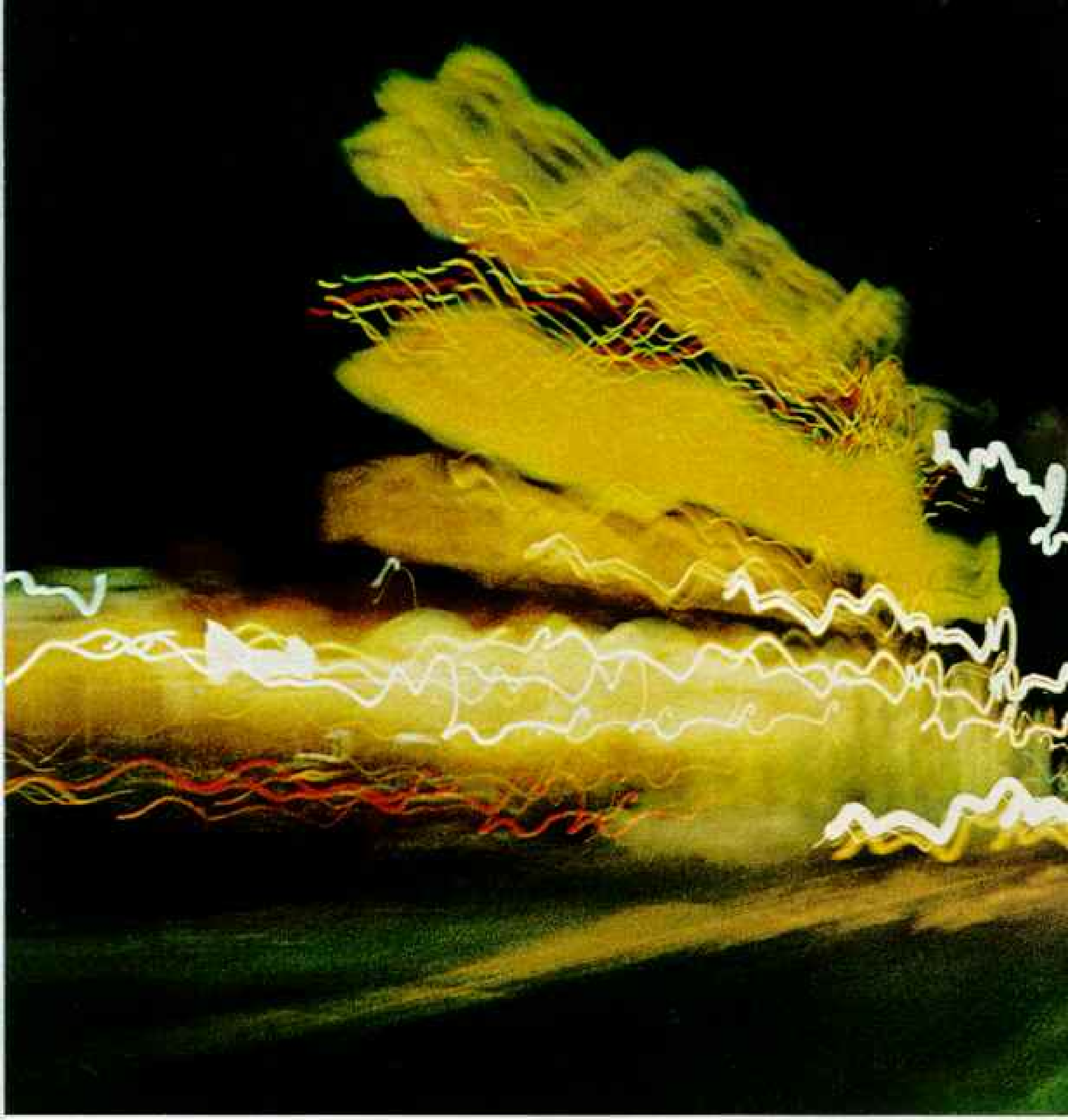
On the morning of the Queen's Birthday, after a night of heavy rain, Bandar Seri Begawan spruced itself up. The Big Field in the middle of the town was set with stands for the nobility and VIP's of Brunei and Britain.

It seemed the whole country had a uniform on—the regiment was there in white jackets, the Gurkhas had come in their skirtlike green pants and black knee socks. Before 7 a.m. the guests began to appear, the European women in wide hats, the men in a panoply of uniform coats, sashes, medals, ribbons, caps.

The sun turned into a blistering fireball by 8:30, the humidity got to the choke point, and a military panoply was spread out on the Big Field. While the Queen of England was presumably sound asleep in her bed some 7,000 miles away, the 6th Queen Elizabeth's Own Gurkha Rifles, the Royal Brunei Malay Regiment (the Sultan's, not hers), the Royal Brunei Police Force, and the Royal Brunei Police Saluting Gun Unit all assembled to fire a crackling good *feu-de-joie*—which sounded like a long string of firecrackers—a booming 21-gun salute, in sections of seven interlarded with strains of "God Save the Queen," and a resounding "Three Cheers for Her Majesty—Hip Hip Hoo-RAY!"

As the sunlight began to rain down, the heat of the day grew burdensome. Peter Gautrey, wearing a white uniform and a pith helmet, gave a final salute, shook hands with the Sultan, and the band retreated slowly, playing—what else?—"Imperial Echoes." □

Crouching for the kill, Punan hunters (**left**) search out wild boar and monkeys with deadly blowpipes. Punans immobilize their prey with handmade iron darts smeared with poison. Wielding more sophisticated weaponry, the Royal Brunei Malay Regiment (**below**) displays its armament, including helicopters and speedy patrol boats. Untroubled by external aggressors, Brunei uses this 1,500-man force to maintain contact with headmen in remote villages and to patrol the border for would-be immigrants seeking to share in the nation's generous welfare provisions.



Trucks Race the Clock From Coast to Coast

ARTICLE AND PHOTOGRAPHS BY JAMES A. SUGAR

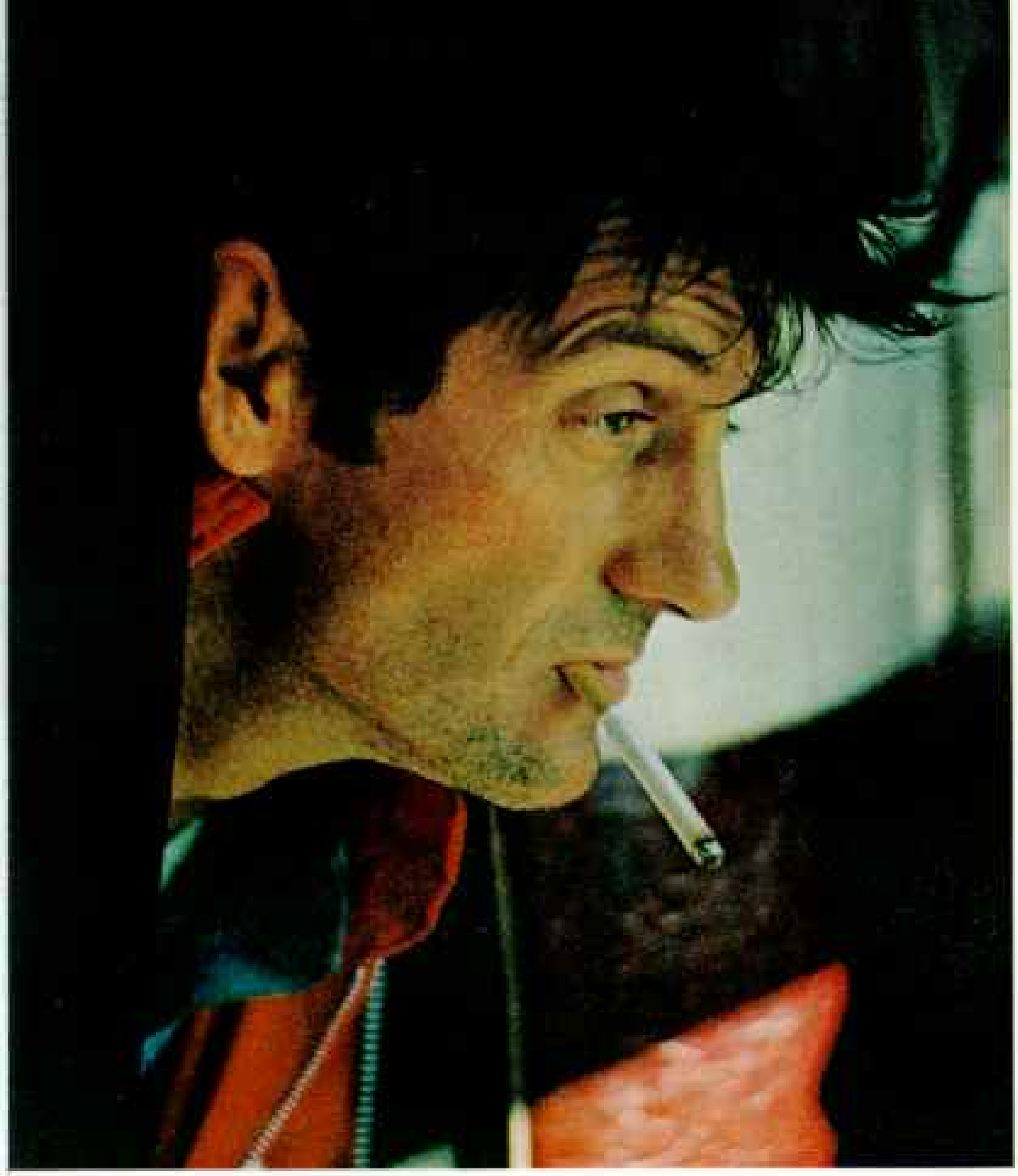
Thundering past Los Angeles streetlights and signs, Crandall Paulson wheels a tractor-trailer north to Watsonville, California, to pick up a load of strawberries. After a transcontinental grind over mountain, desert, and prairie, he and co-driver John Talkington will deliver their cargo to New York City.

THE OPEN ROAD WAS FAR BEHIND. The two men in the truck cab with me had withstood foul weather, bad food, and three and a half endless days of driving to make an on-time 5 a.m. delivery of 17½ tons of ripe strawberries to the Hunts Point Terminal Market in New York City.

With an April dawn still an hour away, the men showed more concern about driving the final two miles in this decaying section of the Bronx than in crossing any of the preceding 3,000 miles from California.

"Roll up your windows and lock your door," driver Crandall Paulson told me. "This is a good place to get hijacked. It's a real jungle."

"It's like I can smell this place—like I can feel it in my bones,



Still groggy with sleep, Talkington stares glassily at the desert the second morning out. The drivers spell each other after five-hour shifts at the wheel. They sleep on a foam mattress in the cab, where insulation reduces the diesel engine's roar to a muted growl.

like rheumatism or arthritis," said John Talkington, the second driver. After a thoughtful look at the chained-up storefronts, he added, "I'd hate to be walking on this street right now. If I did, I'd have a mean dog on a leash in one hand and a .45 automatic in the other."

As the truck stopped at a red light, a shadowy figure emerged from the gloom of a side street and shouted up to Crandall, "Hey, I worked for you before. Why don't you let me help you unload this truck?"

"Sorry, the load's palletized," Crandall responded. "Don't need any help." He turned and said, "That liar, never seen him before."

Soon Crandall eased the 55-foot tractor-trailer inside the gates of the mammoth Terminal Market, crammed with trucks from virtually every state in the continental U. S.

Our truck was but one of nearly a million registered tractor-trailer rigs in the country, or almost 20 million counting all types of trucks on the road. The industry employs some eight million Americans, providing one out of every nine jobs in the nation. Trucks authorized for interstate hauling accounted for 54 percent of all U. S. freight revenues in 1972, valued at nearly 19 billion dollars, compared to a 38½ percent share transported by the railroads, 2½ percent carried by airplanes, and 5 percent by ships and other miscellaneous transportation. In the process, rigs like John and Crandall's traveled more than 43 billion miles, each burning more than 9,100 gallons of precious fuel a year—an average of 4.8 miles a gallon.

Even at 5 a.m. there was no space at Terminal Market's loading platform. We left the rig between rows of parked trucks and waited. Crandall got a space two hours later, but the buyer of the strawberries told

At a favorite truck stop, Paulson pauses for a cup of coffee while Talkington slumbers. This small café, with three booths, six stools, and a hand-cranked phone, offered solace to weary truckers for many years. "Nearly broke my heart when it was torn down recently," Paulson says.

him we couldn't unload. Five other loads of strawberries had just arrived from California three days late, and they had to be sold first to make room in the cooler.

At 2 p.m., market closing time, nine hours after arrival, the drivers were instructed to bring the truck back at 2 a.m., and "This time we'll unload you for sure." Furious, Crandall and John jumped into the truck and drove to a motel in northern New Jersey.

Two-day Wait for a Return Load

Twelve hours later we were back, and by 5 a.m. the truck was unloaded; by six, the drivers had returned to their motel. There, because the delay in unloading caused them to miss a shipment, they would have to wait two days for another load going west.

These landlocked sailors of the asphalt sea begin and end their round-trip journeys across the continent at the Navajo Freight Lines, Inc., truck terminal in east Los Angeles, California. Crandall and John work for John's brother, Gene Talkington, the owner of the truck, who leased this and eight other rigs to Navajo's Protective Service Division. The trailers in this division are equipped with refrigeration units, or "reefers"; hence the name "protective service."

A vice-president of Navajo Freight Lines, Myles Z. Gerson, told me that a long-haul truck driver really works for his pay. A few earn more than $20,000 a year, but to make that, they drive 200,000 miles—as much as most men drive their family car in 15 years.

John Talkington, who has a wife and two boys, said, "Truck drivin' is fine if you're single, but it ain't no good for a married man. You spend two to three months on the road without hardly *(Continued on page 236)*


30


PICO
PICO

Grinding up a switchback, Paulson eyes a steer crossing the road. "When we hit open-range country," he says, "we see lots of them." But the road-wise animals keep clear of the big rigs.

Cruising the Las Vegas Strip on another run, Paulson and Talkington head for one of the desert city's gambling oases. The pair rake in coins from a slot machine (**right**), winning $57 in half an hour. "It was an unusual machine," jokes Paulson. Of an even more memorable visit to Las Vegas, he says, "The money I won playing keno that time helped put my kids through college."

Where snowplows go, trucks are not far behind. Rearview mirror of a Colorado plow shows parts of its bed, raised to drop sand, and a truck negotiating Loveland Pass, where U. S. 6 crests the Rockies. Steep grades, sudden storms, and a summit of 11,992 feet made it a trucker's nightmare until 1973, when traffic on Interstate 70, seen far below, began to flow under the mountain through Eisenhower Tunnel.

Whistling wind, driving snow, and near-zero visibility force truckers to wait awhile before assaulting the pass (**above**). Another driver chains a tire (**below**).

At Loveland, coming down could be more dangerous than going up. "I've seen where 15 trucks in the past three years hit the bottom curve going too fast," says Talkington. "They just went straight off into the timber."

Fast service, strong coffee—some 4,000 cups in an average day—await drivers at an Ohio truck stop (**right**). Though the restaurant also serves four-wheel motorists, there is no waiting for the knights of the tractor-trailers, who eat in sections reserved for them.

Like many roadside havens across the country, this one offers much more than food. A tired trucker can get a shave, shower, and haircut, relax in a comfortable lounge, or browse through a mini-department store carrying stereo tapes, wearing apparel, and souvenirs for the folks back home. A truckers' stop

near Richmond, Virginia, even provides a chapel. Purchasing a pair of Western boots, Talkington (**above**) jokes with a salesgirl at another truck stop.

Author's route with a strawberry express, a three-and-a-half-day countdown to the unloading dock of a New York wholesale market, threads 14 states (**right**). When truckers load in southern California, they head directly east by way of Las Vegas or Albuquerque.

Trucks help move nearly three-quarters of the nation's perishable produce, clothes, radios, and TVs, and almost all its frozen seafood and fresh chicken. For speed and versatility in pickup and delivery, the truck outstrips the freight train, which in turn excels in long-distance transport of coal, ore, grain, and other bulk commodities.

One serious problem—the growing shortage of oil—may alter this pattern in transportation. No one yet knows how severe the shortages may become, or what the full effects of such measures as fuel rationing might be, but no one doubts that the impact will be heavy. Trucks have already been stranded for days at depots that ran dry of fuel. Railroads may take over more of the hauling until new fuels or substitutes for internal-combustion engines are developed.


RESERVED FOR
TRUCKERS


WYOMING
NEVADA
Reno
Sacramento
Las Vegas
ARIZONA
Los Angeles
START
Thursday 11:00 p.m.
Evanston
Salt Lake City
Loveland Pass
11,992
UTAH
COLORADO
Denver
Albuquerque
NEW MEXICO
Topeka
Salina
KANSAS
Kansas City
MISSOURI
St. Louis
ILLINOIS
Indianapolis
IND.
OHIO
Columbus
W. VA.
Wheeling
PA.
New York
N. J.
NEW YORK
FINISH
Monday
5:00 a.m.
Elevations in feet
STATUTE MILES

ever gettin' home. So I quit drivin' regularlike, except for an occasional run to help out."

Crandall is in a different situation. Separated from his wife and, at 47, finished supporting his three grown children, he lives in motels in New Jersey and Los Angeles.

"This is the perfect job for me. I need no home. I just got a motel on each end where I sleep and get my laundry done. Once you get truck drivin' in your system, it's mighty tough to shake," he said. "Ever since I been 21, I just wanted to keep a-goin', keep truckin' down the road."

Crandall would be surprised to know that he was echoing sentiments expressed by Robert Louis Stevenson in *Travels With A Donkey* a century ago: "For my part, I travel not to go anywhere, but to go. I travel for travel's sake. The great affair is to move. . . ."

Crandall moves in a rig that consists of a 1972 Peterbilt cab-over-engine tractor costing $27,500 and a shiny new 44-foot refrigerator trailer costing $17,000. Gene Talkington has purchased all cab-over models because they can haul longer trailers and allow more living space for the drivers than a tractor with the engine up front.

Crandall has 13 gauges to stare at, 16 forward gears to shift, 18 tires costing $150 each to support him, and a 318-horsepower diesel to make the whole thing go. He also has an air conditioner and a bunk behind the seats.

Despite his complex equipment, Crandall explained, "You need just three things to be a real truck driver. A pair of double-clutching, gear-jamming boots, a three-speed hat, and a chain-drive wallet."

Gear-jamming boots are rugged Western-style boots. A three-speed hat is a black military-officer-type hat with a high peak. And a chain-drive wallet is a long black-leather billfold with a metal chain connecting it to the driver's pants. All of these not only function, but also abet the truck-driver mystique.

One Load: 29,952 Pints of Berries

My story of a transcontinental strawberry haul (with a few anecdotes and photographs I gathered on two other truck runs) began with a call from the Navajo dispatcher in Los Angeles one Thursday afternoon: Pick up a load early next morning in Watsonville for delivery by 5 a.m. Monday in New York.

Of the freight charge—$1.05 per 12-pint tray—Gene receives 85 percent as the owner of the truck, and Navajo 15 percent as the contractor. Since the trailer holds 2,496 trays of berries, Gene will make $2,227, out of which he must pay all operating costs, including $250 for fuel and toll, the drivers' motel bills, 7 cents a mile to the first driver, Crandall, and 5 cents a mile to the second, John. That means Gene should clear about $700, Crandall $240, and John $170.

The truck was delayed at the Watsonville packinghouse while three other rigs loaded ahead of us. Finally our trailer was jammed with 29,952 pints of ripe strawberries.

Why Ship by Truck?

Such delays are the rule, not the exception, in this business. "I can't remember a single run where everything went according to plan," one of Gene's drivers told me.

Nevertheless, no other form of freighting can equal the combined speed and flexibility that trucks provide. A truck can go right into a farmer's field to load in his back forty, then span the continent and unload at a precise destination. And the trucking industry's performance in protecting cargo against loss or damage is at least the equal of the railroads' and airfreighters'.

For these reasons—until the current fuel shortage—trucks were hauling three out of every four tons of freight all or part of the way to the nation's markets. They moved 51 percent of our food, including most of the ice cream, frozen desserts, fresh fish, and livestock. They also carried a high percentage of our clothing and pharmaceuticals.

We were ready to roll. Crandall climbed into the driver's seat seven feet above the road, while John ducked into the 7½-foot-long sleeper. I took the copilot's seat. With the care of a man handling fresh eggs, Crandall eased the truck into gear and headed the rig northeast.

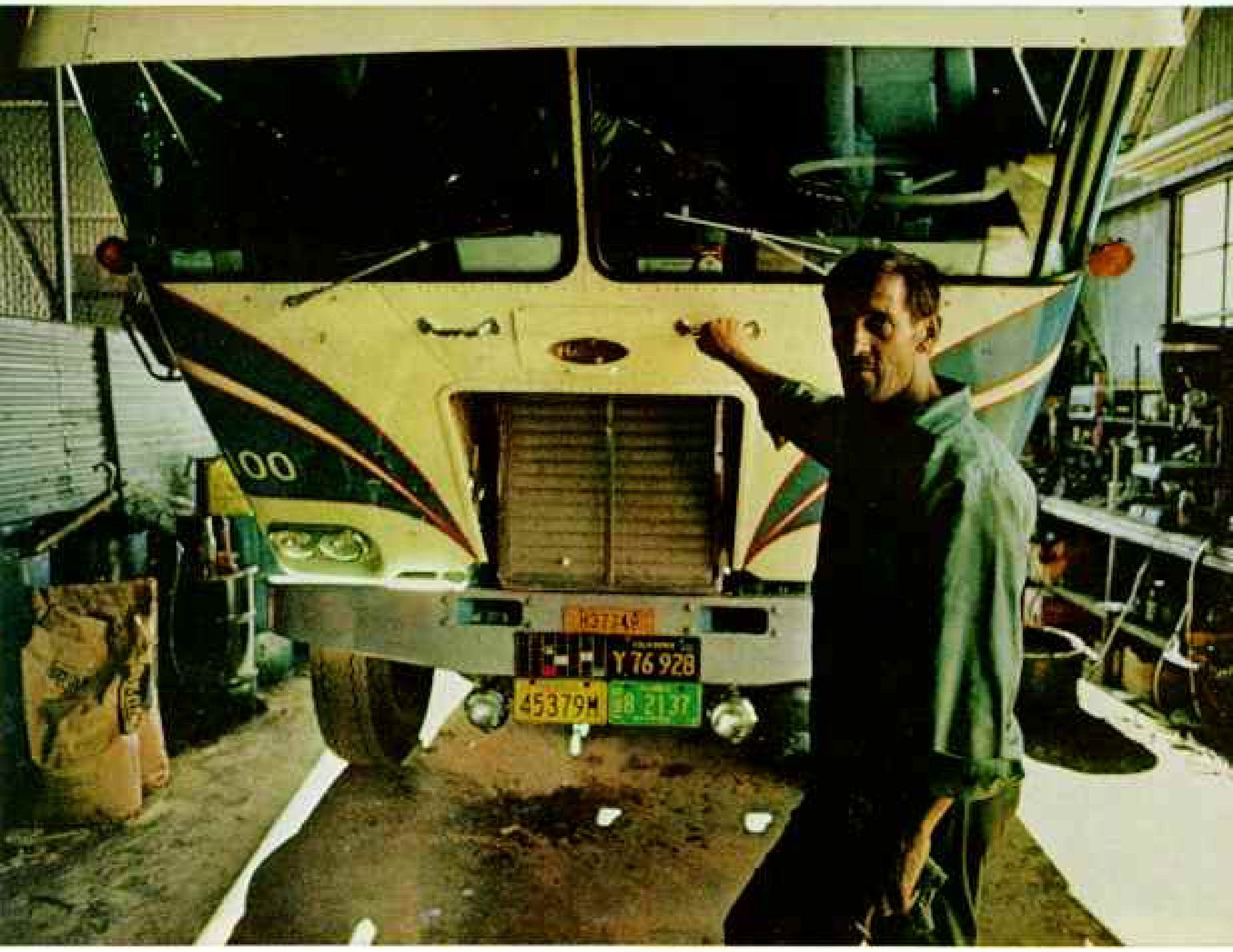
As Crandall settled into the familiar rhythm of driving, John scurried around the sleeper, making up the bunk. He had placed the flowers on Crandall's new patterned sheets facing so that, as John said, "You can see 'em when you fold the sheets back."

"Turn that sheet over," Crandall said. "The flowers are upside down. I'm sure glad I'm not married to you, John."

"Already you're complaining. You don't even like the way I make the bed."

Just a few minutes on the road and already these two friends were battling like fishwives. As John had noted the day before, "Running

Handy with wheel or wrench, Talkington pulls the tractor's aluminum body forward to replace oil and fuel filters and change the ten gallons of engine oil, a routine chore after every two transcontinental trips. "I carry enough tools to overhaul an engine by the side of the road," he says, "and I've done that once or twice."



two guys together for days or weeks is worse than being married. You gotta trust the other guy with your life and get along with him at the same time. A couple months is enough, or you jump down each other's throats."

Within a few hours we were a mile or so from the 7,088-foot Donner Pass near the California-Nevada border. Record snows fell here in the early part of the winter, but now the four-lane, mountain-cresting Interstate Highway was snow free.

We crossed into Nevada at 1 p.m., and just outside Reno stopped at Boomtown, a hybrid truck stop and gambling casino in the style of a 19th-century Wild West saloon. Like most modern truck stops, Boomtown features a separate restaurant for professional truck drivers only, a lounge with color television, showers, a general store, and a truck-servicing and repair facility. In 45 minutes at the gambling casino Crandall lost $10 to the one-armed bandits, and John $4.

The reefer engine had quit, and Crandall discovered it needed a new fan belt. So we stopped in Reno to buy one.

I asked whether the reefer's going out might have harmed the cargo. The shipper of the berries had installed inside the trailer a Ryan Recorder, which records the temperature for each hour. "Won't the recorder show an increase in temperature while the reefer engine was shut down?" I asked.

"Not on a cool day like this," John said. "But in the summertime, them guys at the

Plowing into a Kansas dawn, the drivers keep alert for "black ice," a slippery sheet that glazes the road surface and can turn their 33-ton loaded vehicle into a jackknifing juggernaut. "We call it 'black' from the old days when most of the roads were macadam," says Paulson. "On concrete it looks gray. Even at five to ten miles an hour it can give you trouble."

While Paulson sleeps, Talkington's earphones (**below**) ring to music from an AM-FM stereo receiver. "What kind of music was I listenin' to? Western. I don't listen to nothin' else."

produce market in New York will pull that recorder out, and if it shows a high temperature for four or five hours, why they'll claim a lower freight charge."

So, a trucker once told me, "Some drivers will take the recorder out and throw it in the East River. If the market guy says, 'Where's the recorder?' the driver'll say, 'I don't know —never did see one in there.' "

Leaving Reno at 4 p.m. with a new fan belt, we headed across Nevada. The road was just a tight black band splitting the desert in two. Then, with the headlights tearing a hole in the desert night, Crandall took over from John, and we crossed into western Utah.

Since there was always one driver sleeping in the back, I catnapped by lying on the seat. When I awoke, still dopey from the hypnotic drone of the exhaust stacks, I talked to Crandall about the use of stimulants to stay awake on long hauls.

I recounted what another trucker had said to me: "Sure, I know drivers who take a pill now and then. Running two guys, there's no need, because that's what the second driver is for. But guys that run solo, some of 'em have to take five or six before they even take effect. And they'll keep on 'em, staying up for four, five, six days. Course, I'd rather see a man take a pill instead of runnin' off the road and killin' somebody or killin' hisself. But I've seen some so pilled up they didn't know whether they was a-comin' or a-goin'."

Fortunately, nowadays more and more solo drivers are operating in relays, which helps eliminate the need for stimulants.

"Even so," Crandall said, "it's a tough job. The money worries alone are bad enough."

Crandall has put two children through college, one to earn a master's degree, and a third through technical school. But a lot of the money for their education came from what he had won playing keno in Las Vegas.

In his years as a truck driver, he has seen big changes. "I can remember going back East when there was very little freeway. You would run all those little old country roads down through every little town. Now it's hard to mail a letter. You gotta leave 'em at a truck stop and hope they'll do it for you.

"In the last three years the freeways have improved so much that you save a good 12 hours. Columbus, Ohio, used to be the worst jam—take an hour or two to get through at peak periods; now you bypass it on the Interstate loop in less than half an hour."

This loop is part of the 76-billion-dollar Interstate Highway System* on which accelerated construction began in 1956. For the use of these highways, all classes of trucks paid six billion dollars, or 35 percent of the combined federal and state highway user taxes in 1972. In the course of a year's driving, a five-axle truck like John and Crandall's, carrying a gross weight of 72,000 pounds, pays an average of $3,500 in road-use taxes.

Crandall geared down to enter the parking lot of a huge truck stop in Salt Lake City. Even in the early morning it wasn't easy to find a table for breakfast. The myth that anytime trucks park outside a restaurant means there is good food inside is often just that—a myth. Generally the trucks mean only that the restaurant has a parking lot big enough to accommodate them, that the prices are reasonable, and that the coffee is black.

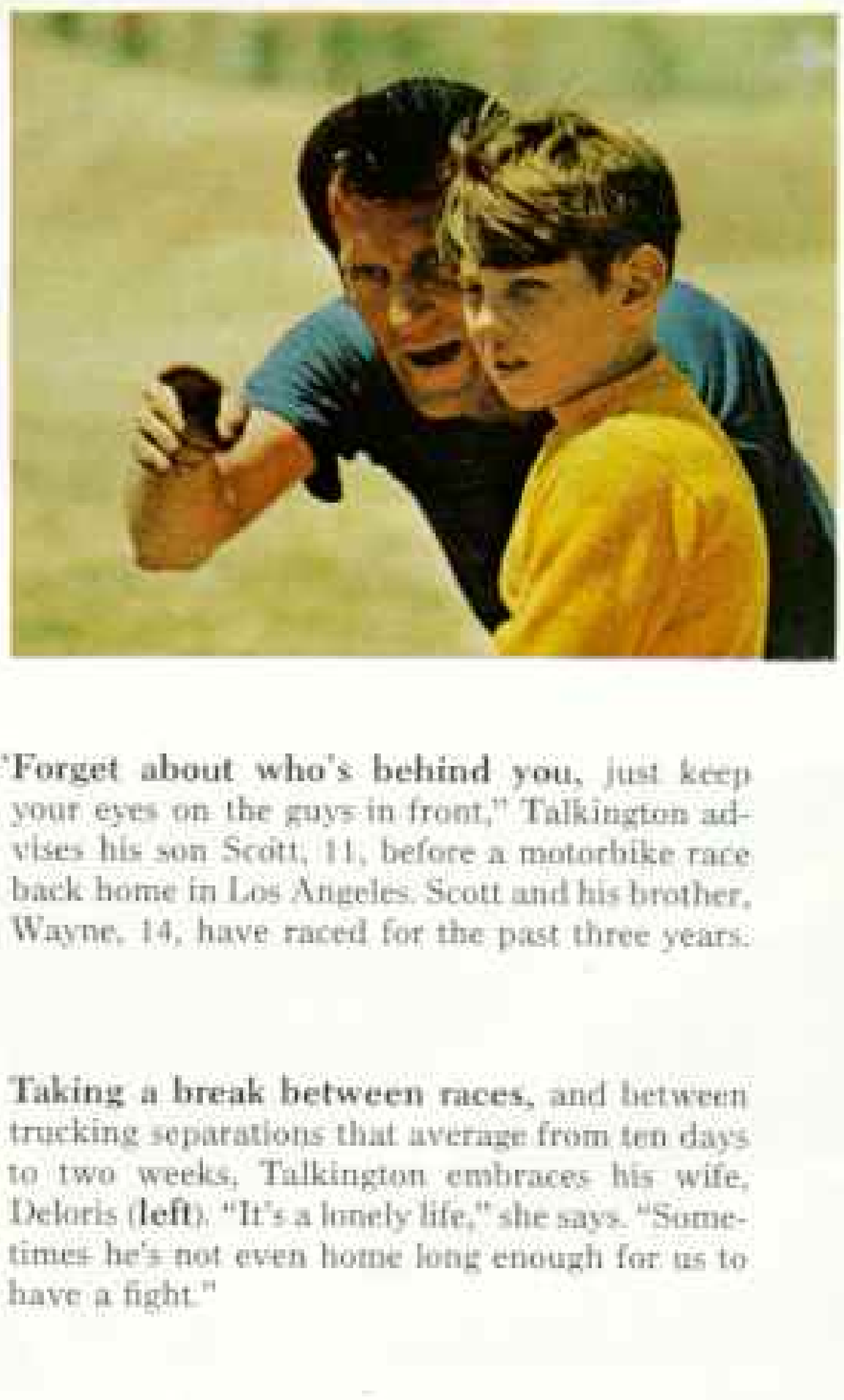
We crossed into southern Wyoming on Interstate 80, surrounded by undulating hills, a huge sky, and occasional white traces from the previous week's snowstorm. The mild day belied the fierce weather that often rages through this region in winter.

The highway official working the scales at the Evanston, Wyoming, port of entry told me he is more lenient about the truck load limit during a snowstorm. A storm can add as much as a ton in snow and ice to the weight of a big rig, and it is not fair to hold a trucker accountable for that.

As the engine strained to make the top of the hill beyond the port, John said: "In some of them ground blizzards, them old roads was better than these new Interstates. These is all open, and the snow will drift up here on the hilltops five, six, ten feet high in places—just drift in right on top of you. On the old roads you could go around the hills."

Outside Denver, John took the wheel, grumbling as we hit Interstate 70. "I hate drivin' this run from the Colorado State Line

*Robert Paul Jordan described the Interstate Highway System in the February 1968 GEOGRAPHIC.



"Forget about who's behind you, just keep your eyes on the guys in front," Talkington advises his son Scott, 11, before a motorbike race back home in Los Angeles. Scott and his brother, Wayne, 14, have raced for the past three years.

Taking a break between races, and between trucking separations that average from ten days to two weeks, Talkington embraces his wife, Deloris (**left**). "It's a lonely life," she says. "Sometimes he's not even home long enough for us to have a fight."

to Topeka more than any other stretch in the U. S. There ain't nothin' out there. No towns or nothin' to go through. Just straight drivin' from one state line to the other. It seems to take forever."

We roared past a trucker working on his broken-down rig, and John said, "If you break down out there on the road, nine times out of ten another trucker will just whoosh!—keep on goin'! You never know if it's some gang fakin' a breakdown to lure you into a trap and hijack your cargo."

We crossed the Kansas-Missouri border at Kansas City, and the Mississippi River at St. Louis. To Crandall, crossing the Mississippi is like entering a foreign country. Born and raised in Montana, he has a definite Western bias and a distrust of anything Eastern. "When you cross the Mississippi, you go into a new world," he said. "People are altogether different—their actions, their ways of livin', everything." Then, while we rolled across the bridge, almost as if to prove his point, a cloud covered the sun. "You see, the sun ain't even shinin' on this side."

Crandall stopped the rig at a sparkling truck stop at Effingham, Illinois. Here, way off the beaten track for tourists, sits a million-dollar monument to the care of trucks and truck drivers. This gleaming two-story building, constructed in a "highway-modern" style, is all glass, brick, and steel, congealed in concrete and bathed in music.

Inside, Crandall and John filled out their logs together while waiting for their food order. The U. S. Department of Transportation requires a driver to log every minute of his trip, showing time, distance, location, and hours on or off as driver. Federal law allows a trucker to drive ten hours following eight hours of rest, but team drivers favor shorter spells at the wheel.

Because these stringent regulations are sometimes unavoidably bent, truckers hate logging. "Keeping one of these here logs will make a liar out of a preacher," John told me.

Dad steadies the bike, while Scott waits for the starter's signal in a race over a corkscrew course at the Indian Dunes dirt track. Scott learned to ride on a three-horsepower machine and now wheels a 75-horsepower motorbike in the weekend races.

The Talkington boys have won five first places in national competition. Nearly 200 other cycling trophies jam the shelves of their parents' and grandparents' recreation rooms.

We drove Illinois, Indiana, Ohio, and West Virginia in ten hours, right up to the posted speed limit of 60 miles an hour. The temperature had topped 90° F. through the Nevada desert; now it was near freezing on a cold and misty Sunday evening. Stopping at Wheeling, West Virginia, for dinner, we all put on winter parkas before leaving the heated truck.

Compared to the days and miles that had preceded it, the 425-mile run from Wheeling to New York was just a Sunday drive. After leaving West Virginia on Interstate 70, we traveled the Pennsylvania Turnpike across all but eastern Pennsylvania, then continued to New Jersey on Interstate 78.

As John bucked the New Jersey Turnpike traffic heading toward New York City, I recalled what Gene Talkington had told me three and a half days and 3,000 miles earlier: "Sometimes just look at the Jersey Turnpike on a Sunday night. Seems like there ain't nothin' runnin' but trucks—just a steady stream of trucks headin' to New York in that northbound lane to meet the Monday morning market. Why, if it wasn't for trucks, the folks in New York would starve to death."

With time to spare before the strawberries were due at the Hunts Point Terminal Market, the drivers registered at the motel near the Lincoln Tunnel, where Crandall has been a regular for the past six years. They cleaned up, then headed out again at 3 a.m.

Finally, to market: In the small morning hours Crandall waits to back his rig, extreme left, to the unloading dock at Hunts Point Terminal Market in the Bronx. Other trucks bring potatoes from Idaho, cranberries from Wisconsin, watermelons and cantaloupes from Texas, and tomatoes, oranges, grapes, and lettuce from California.

Early the following morning, once the truck was empty, the men learned they had just missed their chance for a prompt return load, and were now seventeenth on the list of Navajo's westbound trucks. John and Crandall had no choice but to stay at the motel for the next two days without pay (though Gene paid the motel bill).

Under the terms of the Teamsters' contract with Navajo, John and Crandall, as union members, are paid fixed amounts per mile. Because they work for a subcontractor, and because the union classifies the load of strawberries as an "exempt commodity," they are not paid for time lost during any delay in loading or unloading. Nevertheless, if they can consistently make the 6,000-mile round trip from California in ten days, they can earn as much as other long-distance union drivers—$17,000 to $21,000 a year.

The men finally received a load of cosmetics bound for Los Angeles. Once we had loaded and were headed south on the New Jersey Turnpike, an attractive woman in a small foreign car whizzed by our rig. Crandall acknowledged her with two sharp blasts on the air horn. Then he turned to me and said, "You'll never make a truck driver."

"Why not, Crandall?" I asked him.

"You don't look at them girls' legs as they go by."

We were back on the open road again. □

Alert for bruise or blemish, the market fruit inspector checks 2,496 trays of strawberries while Paulson watches. Verdict: a perfect load. The drivers will swing back west to Los Angeles, carrying a return cargo of 20 tons of cosmetics.


K682

Denmark, Field of the Danes

By WILLIAM GRAVES
ASSISTANT EDITOR

Photographs by
THOMAS NEBBIA

IT WAS AN ORDINARY church tower, a familiar sight above the red tile roofs of every Danish village. The only thing missing was the village beneath it, including the church. The steeple soared abruptly from a wasteland of coastal dunes like some solitary monument to a tragedy at sea.

"It was a historic tragedy," my companion, Lars Jensen, remarked as we climbed to the base of the tower. "The church and the village are right here under us, where a great tide of sand buried them 180 years ago.

"No one knows the exact cause, and of course it took time—for years the villagers literally dug their way into church every Sunday morning. But in the end they gave up." He shook his head sadly. "What a terrible way for a seafaring village to die."

Terrible indeed, though in the manner of Danes the villagers merely conceded the battle, not the war. Near the site of the tragedy—now known as Old Skagen, on the tip of the Jutland Peninsula—they built another Skagen and ringed it with fragrant defenses of dune grass, heather, and pine. It survives to this day, a quiet fishing port of 13,000 and a monument to the human spirit.

Nothing Daunts the Danes

In weeks of travel throughout Denmark I came to think of its people in terms of Skagen. Born to a union of land and sea, early accustomed to hardship, oftentimes threatened by superior forces, the Danes have defended their homeland for a thousand years, more than once at the cost of rebuilding it from ruins.

Like Skagen, too, Denmark wears few visible scars of its turbulent past. Spared the agony of a major battle on its own soil for more than a century, Scandinavia's smallest country includes some 500 picturesque islands, lying in the Baltic under the lee of the Jutland Peninsula (map, pages 248-9).

The biggest of these is Zealand, where Copenhagen stands facing east toward Sweden. But it didn't take me long to learn there is far more to Denmark than the capital city, the green farms of Zealand, or the long north-reaching thumb of Jutland. On the island of Funen, for example, throbs Europe's largest shipyard (pages 266-7).

Denmark's total territory also includes Greenland and the Faeroe Islands in the North Atlantic. Both integral parts of the realm, they make Denmark more than twice the combined size of Sweden and Norway.

Lives and land shaped by the sea, fishermen on Møn exemplify the Danish spirit. On another shore, villagers of Skagen stubbornly fought advancing sand dunes until overwhelmed and forced at last to evacuate. Today a half-buried church tower marks their struggle (**above**).

Chagrined and breathless from an unexpected dunking, a rider in the Hubertus Hunt hangs on to her horse after it struck a fence and pitched her into the pond she was about to cross. Not a hunt but an annual cross-country race, the spectacle attracts thousands—including a wide-eyed cat and its mistress (**above**)—to the public park and royal game preserve of Dyrehaven.

The Danes respect their aristocratic traditions as they revere their royalty—in an egalitarian way. By quiet, unwritten arrangement, Queen Margrethe II dines in a Copenhagen restaurant with little notice, and Princess Benedikte causes no great stir when she rides in a hunt. Thus Europe's oldest monarchy survives quite comfortably in a nation devoted to democracy.

Skagerrak

TO OSLO, NORWAY

TO KRISTIANSAND, NORWAY

"Stand on a box and you can see the whole country," visitors say of Denmark, a low-lying land with rolling hills that rise only 568 feet.

Råbjerg Mile

Skagen

Hirtshals

Frederikshavn

Göteborg

NORTH SEA

Læsø

Vesterø Havn

Varberg

Denmark forms stepping-stones between mainland Europe and rest of Scandinavia. When Ice Age glaciers receded, plants, animals, and man hopscotched north along its islands.

Thisted

Lim Fjorden

Nørresundby

Ålborg Bugt

MORS

Lim Fjorden

Skive

Hobro

Viborg

Randers

Struer

Holstebro

JYLLAND (JUTLAND)

Silkeborg

Ringkøbing

Herning

Århus

Anholt

Kattegat

Highest elevation 568 feet

Samsø

Gilleleje

Hälsingborg

Helsingør

Hundested

Hillerød

Horsens

Odder

Vejle

Billund

Juelsminde

Kalundborg

Holbæk

KØBENHAVN (COPENHAGEN)

Roskilde

Frederikia

Esbjerg

Kolding

Middelfart

Fanø

Ribe

Odense

Slagelse

Ringsted

Kage

SJÆLLAND (ZEALAND)

Haderslev

Aabenraa

Nyborg

Kerteminde

Assens

Årøsund

Rømø

FYN (FUNEN)

Næstved

NORD

Fåborg

Svendborg

Lille Bælt

Tønder

SLESVIG

ALS

Sønderborg

Mommark

Vordingborg

Spodsbjerg

MØN

Ærø

LANGELAND

FALSTER

Nakskov

Nykøbing

LOLLAND

Rødby Havn

Gedser

Flensburg

Fehmarn Bælt

FEHMARN

Puttgarden

SCHLESWIG-HOLSTEIN

Kiel

FEDERAL REPUBLIC OF GERMANY

Warnemünde

Travemünde

Lübeck

Auto ferry

Airport

0 25

STATUTE MILES

Bælt Belt ... strait

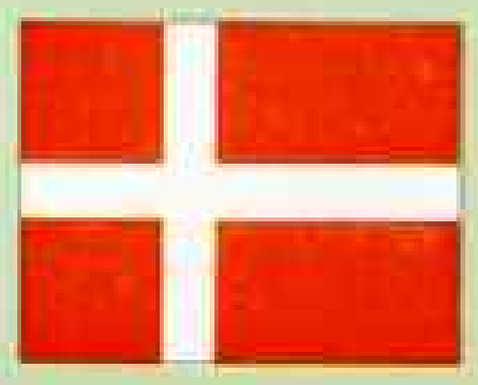
Bugt ... bay

North Frisian Islands

A 42-mile border between Denmark and Germany divides once-united Schleswig-Holstein, a territory long in dispute. Residents declare their national allegiance by plebiscite or race.

Denmark

RICH GREEN MORSEL jutting into the jaws of its Scandinavian neighbors, the Danish peninsula of Jutland and its archipelago of 500 glacier-scraped islands form a bottleneck between the North Sea and the Baltic. Straddling one of Europe's most important mercantile routes, Denmark has always entrusted her political and economic fortunes to men of the sea—from Viking adventurers to 16th-century colonists to today's merchant mariners and shipbuilders. Danish rule also extends across the Atlantic to Greenland—the world's largest island—and the Faeroe Islands northwest of Scotland.



AREA: 16,619 square miles. **POPULATION:** 5,100,000. **RELIGION:** Evangelical Lutheran. **LANGUAGE:** Danish. **ECONOMY:** Machine and metal industries; beer; fishing; animal husbandry. **MAJOR CITIES:** Copenhagen, 1,377,000, capital and chief port; Århus, 250,000; Odense, 168,000. **CLIMATE:** Winters made mild by the warm North Atlantic Current; cool summers. **GOVERNMENT:** Constitutional monarchy. (All statistics exclude Greenland and the Faeroe Islands.)

No Dane lives more than 35 miles from the sea or, for that matter, more than 568 feet above it. Endlessly honed and leveled by a succession of Ice Age glaciers, Denmark has inspired neighboring Norwegians, with their wealth of mountains, to twit the Danes with the comment: If you stand on a box you can see the whole country. Ignoring the taunt, some 5,100,000 Danes refer to their homeland with equal poetry and pride as "Danmark"—literally, "Field of the Danes."

Old Copenhagen Stays Young

In a far corner of that field, yet at the very heart of Danish life, stands Copenhagen, queen of cities. Founded in 1167 on the east coast of the island of Zealand and later declared the royal capital, Copenhagen has grown and prospered from its birth as a small trading port into a metropolis of 1,377,000 residents and a glittering rival of those other two sovereigns of the Baltic, Stockholm and Helsinki.

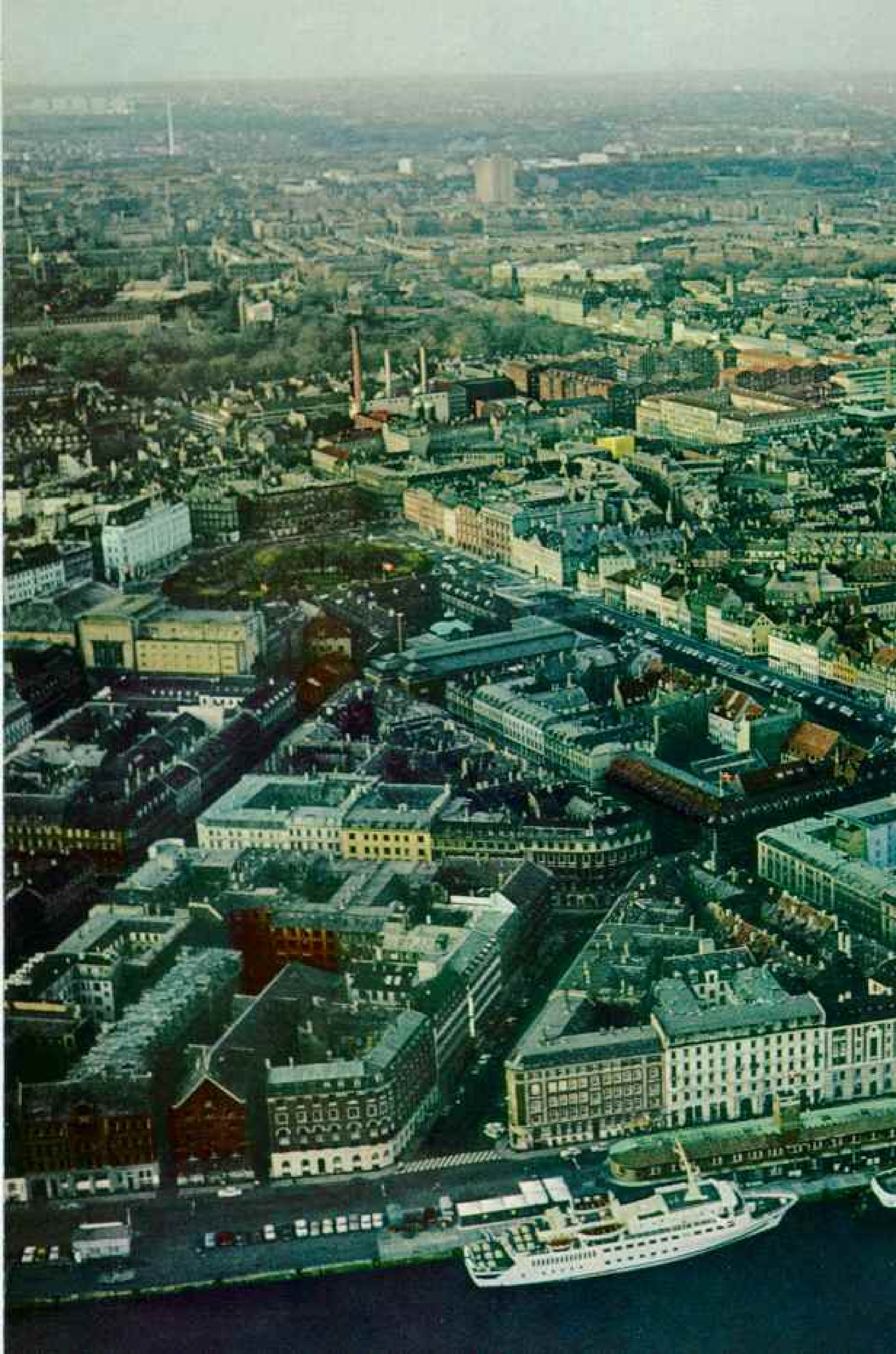
For all her age, Copenhagen often resembles an unruly princess rather than a dowager queen. No city in Europe, and perhaps the world, appeals more to young people for its exuberant way of life and for such controversial practices as nude bathing in public, free access to pornography, and communal marriage.

Despite dire warnings from abroad, the liberal trend has, according to the latest statistics, in fact reduced the rate of adult sex crime in Denmark, already one of the world's lowest.

"The figures contradict the prediction," a veteran criminologist told me one day in Copenhagen. "A similar rise in major crime was forecast when we abolished the death penalty in 1930, but it never materialized.

"As for juvenile sex crime," he added with a wink, "it may be that our celebrated pornography shops have had no effect on Danish youth simply because they can't get through the doors. There are too many foreign adults inside, all of them doubtless engaged in serious research."

Regardless of such dubious attractions, Copenhagen's familiar landmarks still draw the greatest crowds. Few visitors of any age leave the city without a glimpse of the four most famous ones: Edvard Eriksen's statue of The Little Mermaid from Hans Christian Andersen's fairy tale, perched on her rock in the harbor; Tivoli—the public garden and amusement park; the shopping mall known



FUN-LOVING COPENHAGEN *dominates Danish cultural life as well as its commerce. Cruise ships dock near the mouth of Nyhavn canal. The waterway, flanked by dormered 18th-century houses, leads to the King's New Market square, site of the Royal Theater and Royal Danish Academy of Art.*

as Strøget, or "Walking Street"; and Amalienborg, the residence of Denmark's popular 53-year-old constitutional monarch, Queen Margrethe II.

In recent years one of the landmarks became a celebrated casualty. In April of 1964 the statue of The Little Mermaid was decapitated with a hacksaw by unknown vandals, requiring the casting and addition of a new head.

With fresh eyes but the same wistful expression, Copenhagen's beloved symbol surveys a scene that for centuries has earned her city its living. Crowding the harbor's labyrinth of channels, an endlessly shifting armada of freighters, tankers, and container ships maneuvers for docking space with cargoes averaging 12,700,000 tons a year.

Journalist Makes a Glowing Prediction

A major portion of the incoming cargoes consists of raw materials, for Denmark has few of her own—neither iron nor coal, and almost no other minerals.

"Our only natural resources are ten million of these," declared economics writer Hans Bischoff, holding up his hands. "In the past," he went on, "Denmark put these resources to work on its farms, but now the picture is changing. More and more we have become a manufacturing country, a converter of raw materials in the style of Japan and some of our Common Market partners.

"Two-thirds of our land," Hans continued, "is still devoted to farming, but in terms of trade it's the other way around—only about a fourth of Denmark's exports today are agricultural products."

From Hans I heard an astonishing prediction: In less than two decades the Danes will be the third richest people in the world on a per capita income basis.

"Today, you Americans lead the world," Hans said, "and the Danes rank number seven. But by 1991, according to one Japanese survey, Americans will be down to number eight, the Danes will be third, and the Swedes second." He grinned. "Guess who's going to be first?"*

Nowhere do the Danes exhibit their wealth more artistically than on their walking street, a display window not only of Danish goods but of the Danes themselves and of virtually everyone who visits Copenhagen. Amid the eddy and swirl of shoppers, tourists, miniskirted beauties of all ages, and simply any Copenhagen resident with time on his hands, Strøget offers wares to suit every conceivable taste.

The offerings range from the fragile elegance of a Royal Copenhagen porcelain exhibit and displays of jewelry fashioned from real flowers and leaves sheathed in gold, to detailed views of the human body sheathed in nothing at all—the stock-in-trade of a dozen or more uninhibited Strøget shops.

Love of Wood Creates Fine Furniture

One of my favorite calls along Strøget is the showroom of Hans Wegner, a dean among Denmark's world-renowned furniture designers (right). One day I asked Mr. Wegner what goes into a successful design.

"This," he answered simply, holding up a heavily worn but razor-sharp chisel. "Never mind all the rubbish you hear about artistic inspiration. Of course you must have that, too, but it is of little use unless you understand and love your material.

"If there is a secret to Danish furniture, I believe it is that all our good designers began as cabinetmakers and only later became artists. After all," he added, "the tradition is hardly new—Chippendale and Sheraton were both products of it."

For foreigners and Danes alike, Strøget can be painful. Not only are prices substantial, but taxes often border on the prohibitive. For

Luster of opulence surrounds silver dealer Harald Hammer (**upper**), cradling an antique silver cup in his dazzling store. Such shops, showcases of Scandinavian craftsmanship, display elegant glassware, jewelry, and porcelain. They stand side by side with stores specializing in the risqué and restaurants featuring *smørrebrød*, the famed Danish open sandwich.

Armchair revolutionary Hans Wegner, Denmark's well-known furniture designer (**right**), helped spearhead the emergence of "Danish modern" as a design concept that revitalized the industry throughout the world. The former cabinetmaker, seated in his own version of a peacock chair, emphasizes simplicity and a sculptor's feel for his material.

*Next month the GEOGRAPHIC will report on the amazing economic success story of the Japanese.

VEGNER

that item dear to Danish hearts, a bottle of aquavit, or Scandinavian schnapps, a customer pays the equivalent of only 35 U.S. cents for the spirits and glass, and $5.50—a staggering 1,600 percent—in taxes.

Coffee brings $2.50 a pound, the best beef nearly three times as much, and even such Danish essentials as bacon and butter come high by U.S. standards.

Appetite Overcomes High Costs

Despite the cost, the Danes continue to eat at a phenomenal rate. In terms of calories Denmark's per capita consumption ranks high in the world, along with the heroic performances of the Irish, the New Zealanders, and the Americans.

"During the 1972 Olympics," calculates my journalist friend Hans Bischoff, "the people of Denmark gained a total of 2,000 *tons* in weight, just from munching snacks before their television sets."

Such extravagance is hardly encouraged by Denmark's notably high income tax. Under their essentially socialist system the Danes forgo cash in hand in return for such welfare services as free medical care, education through university level, unemployment compensation up to 90 percent of former salary, and old-age pensions. Yet the price is high for those who remain at work: Out of a secretary's pay of $6,000 a year, the government takes nearly half, and the figure for higher salaries reaches 65 percent.

Somehow the Danes make both ends meet, and even manage a wry joke or two in the process. Outside Christiansborg Palace, the stately meeting place of Denmark's 179-member parliament, stands an equestrian statue of Copenhagen's 12th-century founder, the warrior-bishop Absalon. In true heroic fashion the horse is presented rearing back—not, according to the Danes, in terror at the prospect of battle but at the notice of his year's income tax.

Danger Fails to Dampen Humor

Danes are like that, incorrigible humorists even during the most sobering of times. My friend Knud Meister, a veteran journalist in Copenhagen, tells the story of his wife's uncle, a highly respected chemist named Valdemar Friis.

During the German occupation of Denmark in World War II, Uncle Valdemar, then in his 60's, joined the resistance movement and was eventually captured. Taken to jail, he was questioned at length by an icily correct Gestapo agent. With Teutonic thoroughness the agent finally asked, "Herr Friis, have you ever had any professional honors bestowed on you?"

"No," lied Uncle Valdemar cheerfully, "this is the first one."

Perhaps the most famous Danish victim of World War II was Tivoli, Copenhagen's 20-acre masterpiece of color and light. Opened in 1843 on the outskirts of the city, the park now

A loaf of bread, a glass of wine, and . . . Tivoli. With the Moorish glitter of the Bazaar as a backdrop (**above**), a couple enjoys open-air dining at one of 20 restaurants in Copenhagen's 20-acre park. Tivoli's maze of amusements, bandstands, gardens, and 110,000 light bulbs attracts an average of five million visitors each summer.

Dreaming of greasepaint and the roar of the crowd, a Tivoli cleaning woman (**left**) curtsies on stage at the Pantomime Theater. Benches fill quickly in the evenings for programs of ballet, puppetry, and the classical Italian *commedia dell'arte*, which here enjoys its last refuge on the European stage.

is the heart of downtown Copenhagen, a glittering inlay surrounded by the City Hall, the Central Railroad Station, the Air Terminal, office buildings, and hotels.

One evening with Henning Søager, Tivoli's managing director, I strolled through the park's intricate labyrinth of gorgeously illuminated restaurants, amusement rides, bandstands, and open-air theaters, while Mr. Søager described Tivoli's darkest and most memorable hour.

"During the occupation," he began, "Tivoli became a symbol of Danish spirit, of that gift for laughter even in the midst of hardship. We had almost no illumination then, though you could still take a chance on the wheel of fortune or throw rubber balls at a shelf full of crockery. And there was always a play or a juggling act, not to mention the famous Tivoli bands.

"They were very popular, our musicians," Mr. Søager continued. "They played mostly Danish music, and their concerts became a focus for Danish patriotism and anti-German feeling."

Tivoli Rose From Its Ashes

In the meantime, the resistance movement in Denmark, as elsewhere, had become quite active in sabotaging the German Wehrmacht. Outraged, the Nazis finally struck back. On the night of June 24, 1944, Tivoli was dynamited. Nearly half its beloved buildings were destroyed.

"It was near the beginning of our season, you see," Mr. Søager explained, "and the Germans thought that would finish Tivoli for at least a year. But then, they never did understand the Danes—in less than two weeks the park reopened under tents.

"The band was there for the occasion," he added, smiling. "The Allies had recently landed in Normandy, and the first number was a march, *"Greetings to Our Friends."*

Allied victory in Europe brought an end to Denmark's long isolation, occasionally with bizarre results. Ragna Andersen, for example, recalls the day her husband heard from the National Geographic Society.

Niels Andersen, who died in 1964, was a longtime member of the Society. When the Germans occupied Denmark in 1940, they severed postal connection with the United States, thereby depriving Mr. Andersen of his monthly GEOGRAPHIC.

"He missed the magazine terribly," Mrs. Andersen told me, "but what hurt even more was losing his membership, you see, he couldn't send in his dues. He vowed that one of the first things he would do after the war was to start a new membership. When he did, he found out that the Society had been saving copies for him all those years."

Then one memorable morning in 1946 a Royal Danish Postal Service truck drew up to the Andersens' door outside Copenhagen and the driver unloaded a heavy canvas sack.

"Inside it were 70 issues of the NATIONAL GEOGRAPHIC that the Society had reserved for him," Mrs. Andersen said, still with a touch of wonder. "They were all there, beginning with 1940 and going right up to the latest issue." She suddenly frowned. "Young man, do you have any idea what 70 NATIONAL GEOGRAPHICs weigh?"

Together the Andersens dragged the sack into the library and Mr. Andersen prepared to catch up on six years of back reading.

"It was one of the happiest times in his life," Mrs. Andersen recalled. He closed the door of the library and started in—I hardly saw him for the next week, except at meals."

Skippers Taken at Their Word

Time was in Denmark when people were less patient and less trusting. Some 25 miles north of Copenhagen lies the town of Helsingør, the inner portal of the Baltic and a historic toll station for ships plying the two-and-a-half-mile-wide channel between Denmark and Sweden. From the 15th to the 19th century the Danish Crown exacted tribute from passing vessels in the form of a tax based on the value of their cargoes.

"The crown was fair about it," a retired sea captain in Helsingør told me. "It allowed each skipper to set the value of his own cargo —but the King of Denmark was no fool. He

Plumage flowing in elegant symmetry, the celebrated Royal Danish Ballet performs Tchaikovsky's *Swan Lake*. Ballet, opera, drama, and the Royal Orchestra thrive under the financial umbrella of the state-owned Royal Theater in Copenhagen, which also supports companies that tour provincial cities.

reserved the right to purchase any cargo at the declared value, so if a captain put too low a price on his goods, he often sailed away on the short end of a bargain."

Poet's Fancy Made Amleth Hamlet

To most foreigners Helsingør's fame rests not on a king but on a Prince of Denmark, Shakespeare's Hamlet. The royal castle of Kronborg, which Shakespeare chose to call Elsinore in his play, stands just north of the town (pages 272-3).

With the poet's license to alter history as well, Shakespeare made his epic hero a man who never set foot on the battlements of Kronborg. The real Hamlet—or Amleth, in Danish—was a Viking who, according to Nordic tradition, lived several centuries before Kronborg's construction, 1574 to 1585.

A more appropriate monument to Amleth and his kind stands at Roskilde in the middle of Zealand. Here, under the direction of Ole Crumlin-Pedersen, a leading authority on Viking ships, a new museum memorializes the turbulent age that launched the Danes and their fellow Norsemen on incredible voyages of conquest and discovery from the end of the 8th to the middle of the 11th century.*

Such was the fear and admiration evoked by the Vikings throughout the civilized world that an 11th-century Irish writer referred to them in awe as "those valiant, wrathful, purely pagan people."

"It was an accurate description," Mr. Crumlin-Pedersen observed as he guided me among the museum's superb restorations of Viking ships. "The astonishing thing is that the Norsemen, superb seamen as they proved to be, were relative newcomers to sail. Before they began the great voyages, the only form of propulsion they knew was the oar.

"As for courage," he added, "few people in history can match the Vikings. Part of the explanation may be that some of them actually took drugs to guarantee their bravery in

* "The Vikings," by Howard La Fay, appeared in the April 1970 NATIONAL GEOGRAPHIC. Mr. La Fay also wrote a 200-page, richly illustrated book on the same subject; it is available for $4.25, plus postage and handling, from the National Geographic Society, Dept. G100, Washington, D. C. 20036.

battle. Before an attack the Norsemen sometimes ate a type of poisonous mushroom that produced hallucinations and drove a man temporarily mad. These warriors were thought to be invulnerable, and they were known by the name 'berserk,' meaning 'bear shirt.'" The theory goes that, under the influence of the fungus, a man often rushed into battle with only a sword or ax in his hand and nothing for protection but his shirt."

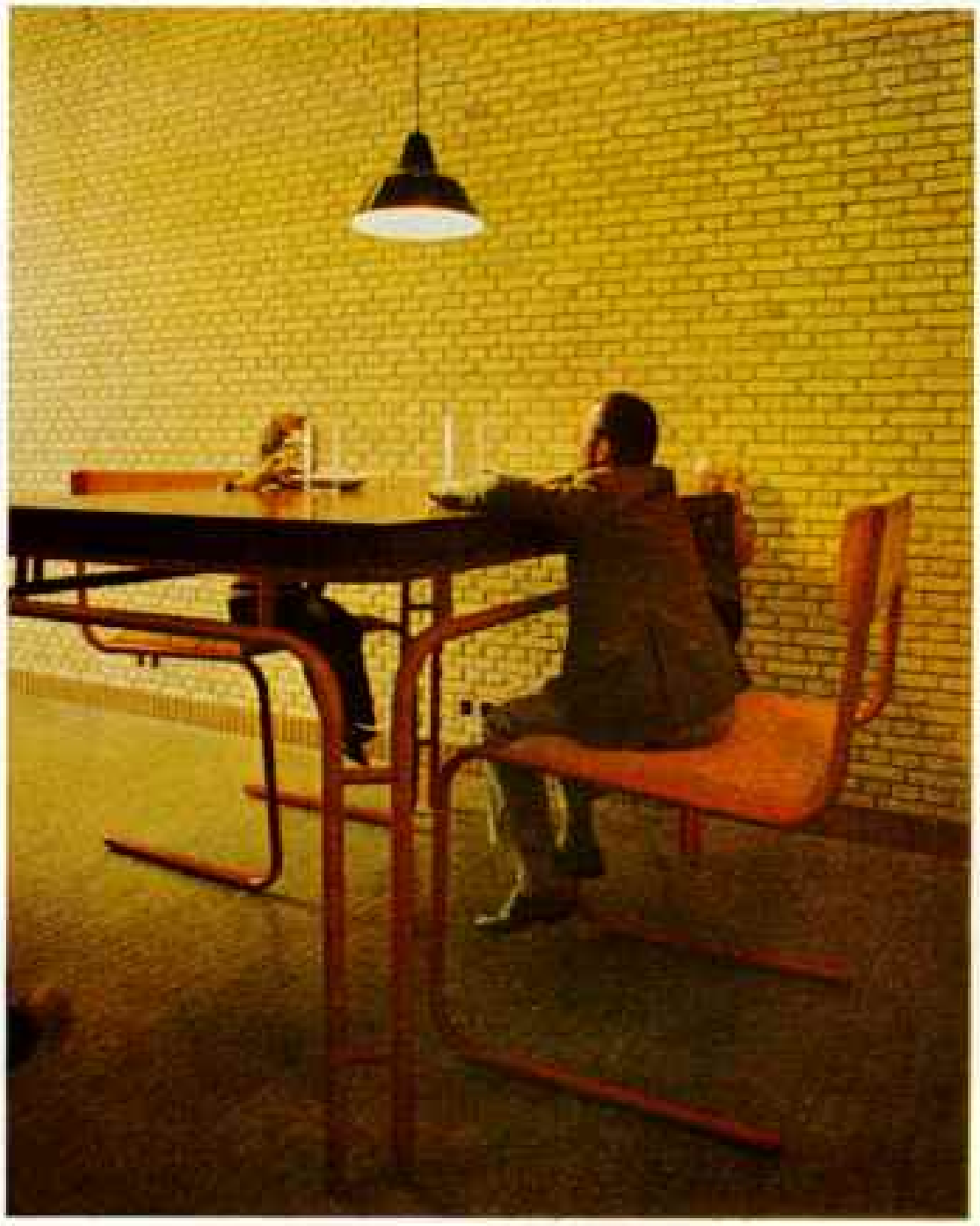
Shipyards Maintain Viking Legacy

No legacy of the Vikings runs deeper among the Danes than the genius for designing and building ships. Seventy-five miles west of Roskilde, on the island of Funen, I visited a giant complex of workshops, assembly sheds, and building docks. Here in the Lindø plant of the Odense Steel Shipyard Ltd., 6,000 workers build and launch 300,000-ton supertankers at a rate of one every eight weeks (pages 266-7).

The process is so highly automated that I found a number of assembly sheds almost deserted. An army *(Continued on page 264)*

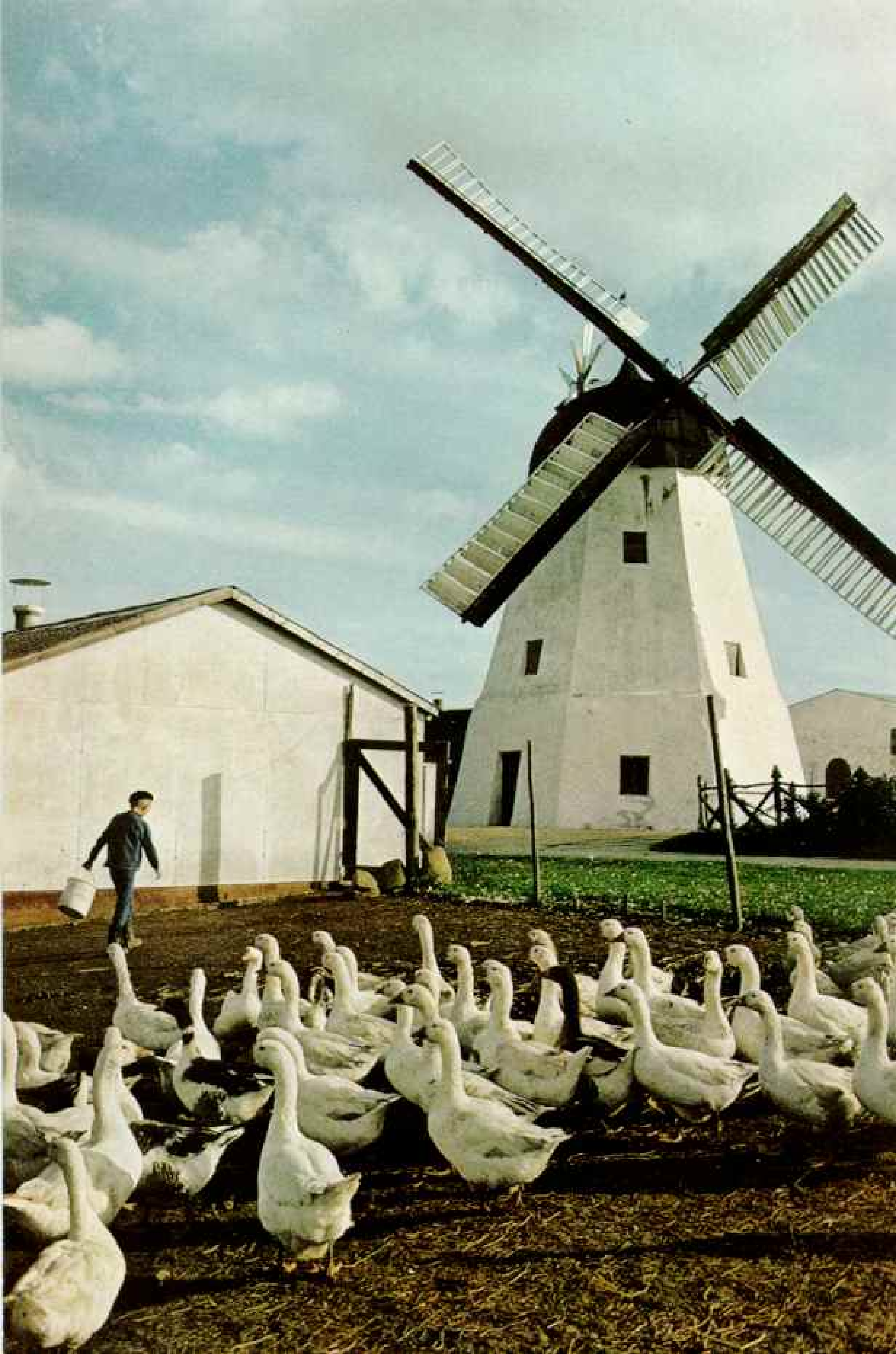
Grass-grooming Gulliver, a gardener wades a Lilliputian river in Legoland (**left**), a children's park in Billund. Created in 1968 by the Lego toy company to promote its interlocking plastic building blocks, the park has burgeoned into the most visited tourist attraction in Jutland. A miniature world of towns, villages, and countryside dominates a playland of tree-lined walks, shops, rides, and a children's theater.

Gigantic breakfast table dwarfs visitors at a museum in Århus (**below**), where an ego-deflating exhibit reminds grown-ups how a child feels in an adult environment. The Danes subscribe to the philosophy that children are not merely undeveloped adults, but smaller individuals whose size and interests must be considered.



Wagon wheels lined up on farmland, summer "garden colonies" give cramped city dwellers a chance to enjoy country living near Copenhagen. Cars park at the hubs, vegetables and fruit trees flourish along the spokes, and children romp in the grassy, open

spaces between the circles. Families relax here on weekends or for the entire summer, commuting to Copenhagen to work. Municipal governments build and maintain many of the second-home subdivisions, charging minimum rent. Other lots are privately owned.



Butter-fed and rosy-cheeked, children often share the chores on Danish farms. On the remote island of Bornholm in the Baltic Sea, a towhead goes to fetch a pail of grain for a gaggle of barnyard geese (**left**). The windmill, used for grinding grain, is the last one working on the island.

In her Bornholm barn, Mrs. Dorte Hendriksen (**above**) milks a red Danish dairy cow while keeping an eye on her infant. On their Jutland farm Tage Skov and his son spend a morning mowing grass for fodder (**below**).

Cooperative buying, processing, and marketing, intensive land use and an unrelenting emphasis on quality have long characterized Danish agriculture. Already a major exporter of animal products such as bacon, butter, and meat, Denmark entered the European Common Market in January 1973 amid predictions of substantial increases in export income.

of machines, directed as though by magic, was busily cutting, shaping, and welding enormous steel plates that weighed as much as ten tons each. An official at the yard explained that many of the building processes are directed entirely by computer.

"It's an expensive process," he added, "but over the long run it's cheaper than cutting the plates with a torch by hand. And it's a great deal more accurate, too."

Crane Operator Likes Her Job

In at least one area of the yard the computer has yet to replace man—or rather, to replace a charming woman of 24 named Jytte Dam Kristensen.

Mrs. Dam Kristensen works high above the yard in the control cabin of a giant jib crane (page 267). As coasters deliver cargoes of unfinished steel plates and sections to the yard, she empties their holds and transfers the plates to a nearby storage area, shifting 20-ton loads at a time.

During a lull between ship arrivals, I climbed the crane's 80-foot ladder and joined Mrs. Dam Kristensen in the control cabin. She was knitting a sweater and listening to Danish rock music over a transistor radio propped against the controls. Despite its small size, the cabin resembled a sitting room rather than a place of work, with brightly painted walls, several framed pictures, and even a miniature hooked rug on the floor.

Mrs. Dam Kristensen explained that nearly half the yard's cranes are run by women. Yard officials say they endure isolation and irregular work schedules better than men.

"My husband is a maintenance engineer," she said. "Whenever he comes up to inspect the controls, he asks me, 'Jytte, how do you stand it up here?' I tell him it is better than working in his smelly old machine shop, and besides"—she swept a hand across the horizon—"I have the finest view at Lindø."

She also has keen eyes to enjoy it, as I discovered when I reached the ground again. For a test of her skill I had asked her to let me stand in front of the crane while she brought the great half-ton lifting hook as close to me as she could.

Taking my place, I waved toward the control cabin and the distant thunder of the crane started. High overhead the huge arm swung slowly above me, and the hook began its smooth descent. I watched it for a moment and then glanced toward the ground, trying to judge where it would land. But Mrs. Dam Kristensen had other ideas: When I glanced up again, the hook had already come to a stop, four inches above my head.

Professional skill of quite a different sort

Shaggy and untamed, the Råbjerg Mile on Jutland's northwest coast fringes the North Sea with shifting sand and lyme grass (**right**). Riders cross dunes that rise as high as 130 feet, pushed eastward by the wind at a rate of ten feet a year. Except for this partially unchecked strip, the Danes have successfully anchored 250 miles of coastal dunes to the land by the roots of grasses and evergreens.

distinguished Odense's most famous resident, a gangling scarecrow of a man who, though childless, is adored by children the world over. Born and raised in the constant shadow of poverty, Hans Christian Andersen has enriched the lives of millions through the magic of his beloved fairy tales.

Cottage Holds Writer's Mementos

Passing through Odense on my way west, I stopped at the small stucco cottage where Andersen, born about 1805, spent his early years. Few relics of his unhappy childhood remain, though the cottage is filled with mementos of his more prosperous later years—his bed and writing desk, a collection of original manuscripts, a handsome wardrobe trunk, and a long coil of sturdy rope that Andersen carried with him on all his travels out of mortal fear of being trapped in a fire.

The atmosphere was one of modest wealth and of success finally achieved despite hardship, a frequent theme in Andersen's works. Like many another great author he had described himself, perhaps unconsciously, in one of his best known stories, the tale of the *Ugly Duckling*.

Even today the city of Odense memorializes Andersen's unique genius with that most appealing of all his creations. On travel posters bearing the city's name, the ugly duckling and the graceful swan it eventually became appear side by side.

No such happy ending awaits that other

Denmark, Field of the Dunes

Viking legacy of shipbuilding thrives on the island of Funen, home of the Odense Steel Shipyard Ltd., Europe's largest. A stand of cranes towers over a supertanker under construction, its 1,200-foot-long deck a ganglion of pipes, cables, and rigging. The shipyard turns out as many as seven 300,000-ton tankers each year. Blades of a bronze propeller on one behemoth dwarf a yard worker (**below**).

Heavy industry led Denmark's emergence from an agricultural to a more industrial economy during the past 15 years. With few raw materials, Danes rely on Swedish steel and other imports to feed their growing factories.

With a feminine flick of the wrist, 24-year-old crane operator Mrs. Jytte Dam Kristensen (**above**) can juggle 45 tons of steel plate. In her control cabin that she changed from a dull gray to a cheerful yellow, Jytte often has time to knit sweaters or even to primp a bit when not maneuvering the lift to unload ships. Her spectacular view of the harbor takes in a tanker with the seven-pointed star of the Danish Mærsk Line on its stack.

Women operate nearly half the cranes here, "apparently adapting better to the erratic schedule," says the shipyard manager.

famous bird of Denmark, the legendary stork. Once a welcome resident on many a Danish rooftop in spring and summer, the long-legged migratory visitor has all but vanished under the impact of growing pollution and loss of feeding grounds. Only in Jutland, Denmark's western frontier with the North Sea, do a few hardy pairs of storks still nest each spring after the grueling 7,000-mile flight from their winter home in southern Africa.

To Jutlanders it comes as no surprise that the stork—or any sensible creature, for that matter—would forsake the rest of Denmark for their beloved portion of it. Local legend maintains that when the first prehistoric tribes reached Denmark from the south, they found a sign at the border reading, "To Jutland." Then, say the Jutlanders, everyone who could read followed the sign, while the rest went to other parts of Denmark.

The joke is an old one, yet the Jutlanders have a point. Today, at least, more visitors follow the signs to Jutland than to any other part of Denmark except Copenhagen. No two areas of the nation contrast more sharply: Copenhagen, the crowded, sophisticated center of industry and commerce; Jutland, the wide and windswept home of Danish agriculture and fisheries.

Crossing from Funen to Jutland via Denmark's newest and longest bridge, I drove north and west through the medieval towns of Århus and Ålborg toward the tip of the Jutland Peninsula.

Århus is Denmark's sober aristocrat, a university town full of dignity and years, noted for its superb restoration of 16th- and 17th-century town houses and for the summer residence of the Danish royal family.

Ålborg Pleases People . . . and Cows

By contrast, Ålborg has a touch of the reveler. Among its attractions the city boasts a giant distillery that produces 34,000,000 bottles of aquavit a year. Not all the bottles remain in Ålborg, though a newcomer might be forgiven that impression. The city has a staggering number of nightclubs that attract weekend customers from all Scandinavia.

An equally faithful clientele disposes of the distillery's by-product: thousands of tons of corn and potato mash left over from the fermentation process.

"We sell the mash to local dairy farmers as cattle feed," a distillery executive told me. "Sometimes," he added, "I think there must be a little something left over in the mash—Ålborg cows are wonderfully contented."

Sea Battle Fought off Jutland

To a generation of Europeans the name Jutland symbolizes a battle that involved neither the Danes nor their territory. The great World War I naval engagement known as the Battle of Jutland, one of history's classic naval encounters, actually took place some 60 miles to the west of the peninsula, in the open reaches of the North Sea.

There in 1916 British and German battle squadrons met and exchanged massive blows that claimed 25 ships and some 8,500 lives and resulted in clear-cut victory for neither side.

Victory, too, eludes the tempestuous North Sea in its age-old assault on Jutland. Battered by gales and swept by fierce tidal currents, the great natural breakwater of the Baltic holds firm, providing a vast anchorage for Denmark's fleet of islands. Only once in Jutland's history has the land turned against its owners, when the wave of sand engulfed the hapless village of Skagen (page 245).

Elsewhere in Jutland drifting sand was once regarded as a blessing rather than a curse. On tiny Læsø, an island to the east of the peninsula, the constantly shifting ocean floor provided an endless bounty of salvage from shipwrecks. Located along one of the world's busiest maritime thoroughfares and beset by treacherous shoals and currents, Læsø lived for centuries on the misfortunes of careless navigators.

Today Læsø lives much like the rest of Jutland, principally by farming and fishing. Only rarely in an age of radar and depth finders do the islanders fall heir to a prize—usually a small one in the form of an unwary trawler or coaster.

Golden armor gleaming, a dress parade of smoked herring hangs at attention in the town of Allinge, on the island of Bornholm. A workman brings up a new rack of the delicacy, which islanders smoke for three hours over fires of alder wood. Far from Copenhagen, Bornholm's fishing grounds are relatively unpolluted by the industrial wastes that taint other Danish waters.

Against the day of a major windfall, however, Læsø still keeps a watchful eye on the sea. During a day's visit to the offshore settlement, I noticed a number of houses with ladders permanently braced against their roofs for access to the islanders' traditional lookout stations.

Many houses, too, had tall poles in the courtyards that I assumed to be flagpoles until an islander corrected me.

"We call the poles *fløjstangen*, meaning 'wind-vane stands,'" he explained. "In the old days wind direction meant everything to our people, for it indicated the most likely coast for wrecks. When a wreck was sighted, the spotter raised two baskets on his fløjstang as a signal, and every man who launched his boat shared in the salvage.

"But on Læsø the safety of shipwrecked crews always came first, and salvage second. Every Sunday in church the islanders would offer the traditional prayer of salvors the world over: 'Oh Lord, protect all sailors upon the sea—but if they must founder, Lord, let it happen here.'"

Jutland Mingles Farms and Factories

A hint of autumn touched Jutland as I drove south through the heart of the peninsula. Across the broad fields of barley and wheat turning amber and gold in the sun, a crisp wind traced random patterns. Here and there the whitewashed farmhouses gave way to handsome new industrial plants that testify both to the architectural taste of the Danes and to their increasing shift from an agricultural to a manufacturing economy.

Despite the trend, Denmark's 135,000 farmers have more than doubled production in the past 20 years with only a third of their former

"Deliver us from the Norsemen and their ravenous dogs," prayed the English when Danish Vikings invaded their coast accompanied by Great Danes. In the Blåholm Kennel near Gilleleje, a gentler sort of Great Dane, this one called a "harlequin" because of his markings, guards a toddler. Such shoppers as Aristotle Onassis have purchased dogs from Blåholm, paying as much as $700 for an exceptional one.

work force. The success is due to a variety of modern farming techniques and to the old-fashioned skill and energy of men like Henning Jensen.

A powerful, soft-spoken man in his 50's, Mr. Jensen owns and operates a 380-acre farm known as Rørbæk in central Jutland, northwest of Vejle. At his and Mrs. Jensen's invitation I spent a night on the farm, learning what makes Danish pork and dairy products famous the world over and gaining several pounds myself in the process.

Farmwife Offers Gargantuan Meal

Dinner that evening would have brought tears to the eyes of Copenhagen's finest restaurateurs. Disdaining elaborate sauces and gravies, Mrs. Jensen relied on the quality and freshness of her raw materials, nearly all of them produced on the farm.

For an appetizer we began with paper-thin slices of Danish ham and chilled melon, followed by grilled young trout from a nearby lake. The trout was succeeded by a tender roast of beef that seemed to melt under Mr. Jensen's carving knife, and by a mixed salad of half a dozen different fresh garden vegetables in which one could almost taste the sunlight beneath Mrs. Jensen's delicate homemade mayonnaise.

In addition I put away nearly a dozen freshly baked rolls along with a bottle or two of Danish beer, and held my own when it came to coffee and six kinds of cheese.

Between courses I managed a question or two about Rørbæk and learned that like the great majority of Danish farmers, Mr. Jensen concentrates on livestock.

"We grow our own barley and oats," he explained, "but only as feed for the animals. We run an average of 130 cows and some 400 hogs at any given time, which give us 700 liters of milk a day and 600 pigs a year for slaughter."

I asked why Danish pork and dairy products are so highly regarded, even in countries that produce the same items. Mr. Jensen thought a moment.

"You will hear many answers," he said at last, "but I think the correct one is the simplest: We are a small nation and we cannot compete with the giants, such as your country, in terms of volume. We learned long ago to concentrate on quality instead, on the best and purest stock, and to let nothing out of the country that does not satisfy us." He eyed my empty cheese plate with a smile. "Apparently it satisfies others as well."

South of Rørbæk lies Denmark's only land frontier, the boundary with Germany (map, page 248). Like most border areas, southern Jutland combines elements of the two adjoining countries. In shops and restaurants one frequently hears a mixture of German and Danish in the same sentence, and many southern Jutlanders speak both languages fluently.

The fluency stems in part from a violent past, for the region known as Schleswig-Holstein was claimed for more than a century by both Germany and Denmark. Fought over and exchanged several times, the region was split between rival factions, whose members often lived as next-door neighbors.

The mixture posed a problem during World War II for Danish resistance forces operating in the occupied area the Danes call Nord Slesvig. Although legally part of Denmark, the region had a sizable pro-German population that presented a serious threat to the Danish underground.

"We learned very quickly how we could spot a friendly household in unfamiliar territory," a former resistance leader in the town of Ribe told me. "If the house had a flagpole, especially an old one, the family was certain to be pro-Danish. Before the war began, you see, the only flag that could be flown in Nord Slesvig was the Danish one. Pro-Germans simply didn't have flagpoles on their houses."

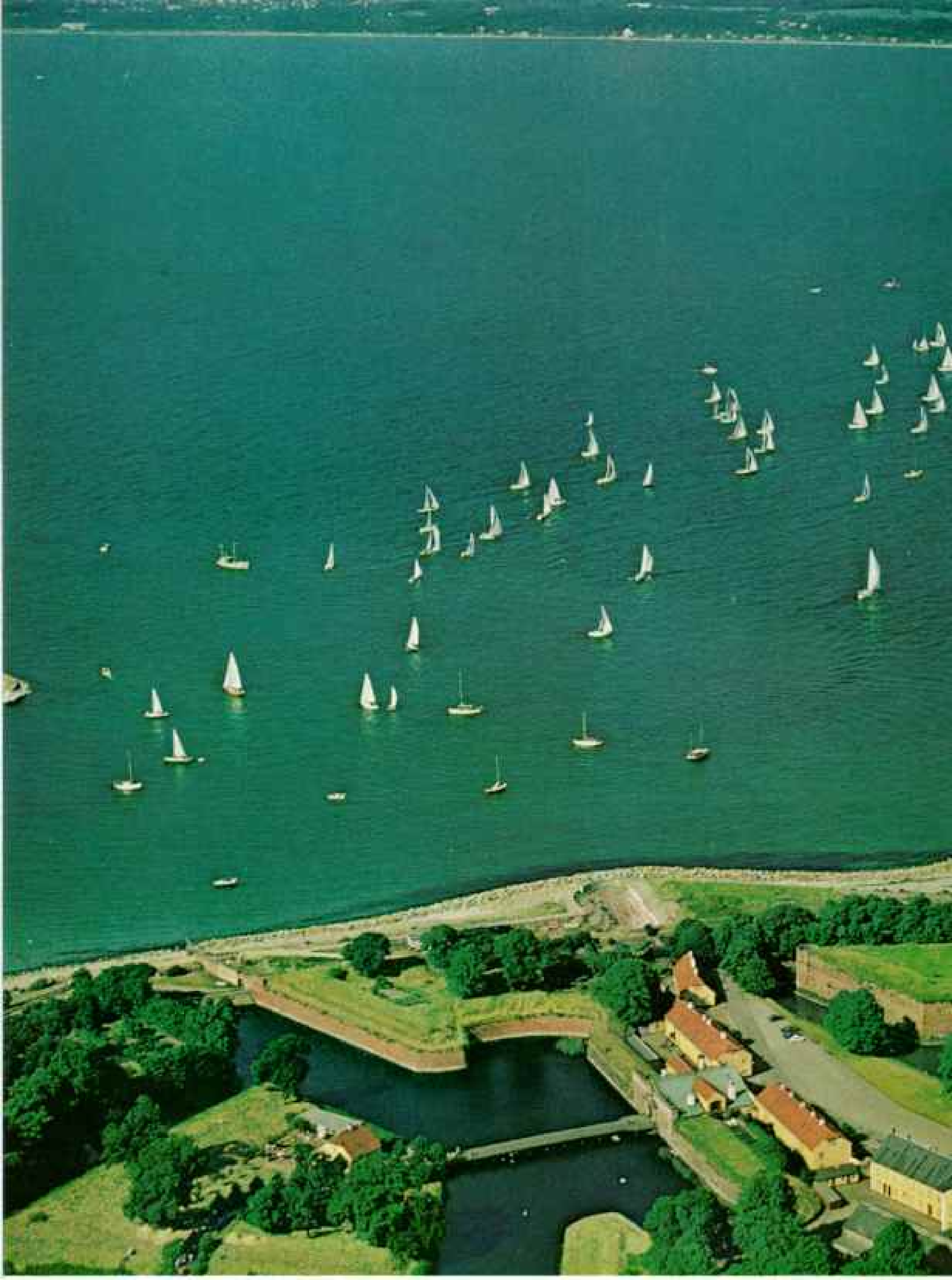
Industrial Wastes Threaten Fishery

Leaving Jutland, I took the southern route back to Zealand through the picturesque islands of Lolland, Falster, and Møn and caught a plane in Copenhagen for Bornholm.

Among all Denmark's islands, Bornholm is perhaps the most painfully familiar with war. Situated only 25 miles from Sweden and nearly 100 from Copenhagen, Denmark's eastern outpost in the Baltic has been ruled at one time or another by Russians, Swedes, Germans, and Danes. It has suffered bombardment several times by shot and shell.

A more silent but equally deadly bombardment threatens Bornholm today—the poisonous infiltration of its vital fishing grounds by industrial wastes such as mercury and lead. Amid the growing threat of pollution, Danish environmentalists issue a grim warning borrowed from Hamlet: "Something really *is* rotten in the state of Denmark."

Happily, Bornholm has not reached the



Frolicking in a channel wind, sailboats cluster between Helsingør's Kronborg Castle and the coast of Sweden. Kronborg once commanded the sea-lane into the Baltic, exacting

tolls from merchant ships. Its reputation as the home of Shakespeare's Hamlet lacks historical basis, for the real Prince Amleth lived centuries before the castle was begun in 1574.

pollution level suffered in other areas of the world, where governments have cautioned inhabitants to limit their consumption of seafood. During late summer and early autumn Bornholm's wharves are draped in gold, as fishermen hang millions of smoked herring up to dry (page 269).

Like other Baltic fishermen the people of Bornholm are victims of geography: Their sea is all but landlocked by Denmark and Sweden, resulting in dilution of its salt water from the flow of rivers. During severe winters Bornholm harbors are blockaded by ice, and I was told that a man can sometimes walk ten miles to the neighboring islet of Christiansø.

The easternmost of Denmark's inhabited islands, Christiansø once served as the country's outer defense in the Baltic, barring the eastward approach with its coastal batteries and two heavily manned fortresses. Today the island is both a national monument and home to some 120 people, mostly fishermen and their families.

The Young Come Back to Christiansø

"It's a quiet life, but a good one," Jens Peter Jakobsen told me when I called at his home overlooking Christiansø's harbor. Until his retirement in 1973, Mr. Jakobsen served for years as the island's administrator, lighthouse keeper, tax collector, justice of the

peace, customs inspector, police chief, and postmaster.

"Many of our country's remote islands are losing all their young people to Copenhagen and the other cities," Mr. Jakobsen continued, "but Christiansø has been lucky in that respect. Although our children must leave the island after seventh grade to complete their education, more than half of them eventually return home to live."

I asked about isolation in winter, and Mr. Jakobsen dismissed the idea. "Often the ice is no problem at all," he said, "and in any case today we have icebreakers and helicopter flights for emergencies.

"In the old days it was quite different. Sometimes we went for weeks without boat connections to Bornholm, though we always had supplies enough to see us through.

"I remember one terrible winter after the last war when the ice was so bad that the government decided to transport our mail by plane. Of course it was expensive, and the plane made only one flight. When it came, we loaded it down with a huge sack of letters.

"About a month later an icebreaker turned up, and everyone was very excited to see what it had brought. To their delight, the ship landed a big mailbag. People could hardly wait for me to sort it." He shook his head sadly.

"Governments, I'm afraid, are very much alike the world over. When I opened the sack, it turned out to be the same letters we had sent off by plane the month before. All we could do was put them on the icebreaker again and hope that this time they would make it."

Closed Tivoli Holds Promise of Spring

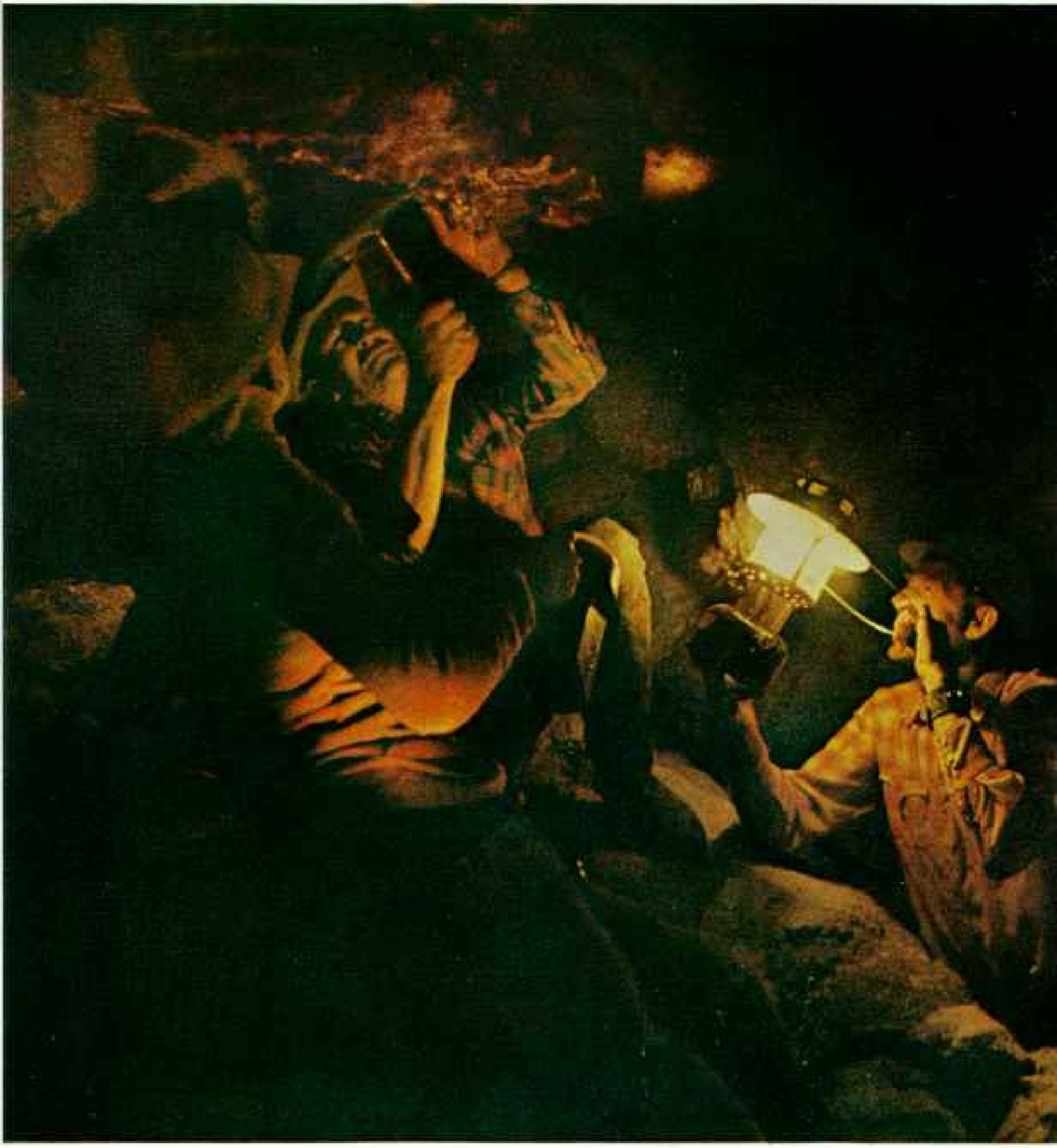
Back in Copenhagen I paid a last call on Tivoli, then officially closed for the season. With the director's permission I strolled for a time along the gravel paths strewn with the pale gold of shedding lindens and elms. On the facades of amusement rides and theaters, maintenance crews had begun removing ornaments and lights, and many of the kiosks were already shuttered. The restaurant terraces were empty of chairs and tables, leaving the final cleanup to those veteran freeloaders, the sparrows and pigeons.

The celebrated Tivoli charm was still there, only in quieter form, a blend of nostalgia and the promise of seasons to come. With another spring, the gates would open and Tivoli would once again captivate the world with its color, its laughter, and instinctive hospitality. And so, of course, would Denmark. □

Gentle as the land, spotted fallow deer roam in Dyrehaven, the royal game preserve. Over a hundred years of internal peace have brought forth a Denmark that would have astonished the old Vikings: an intensely organized, hardworking, and comfortable welfare state whose best-known hero is Hans Christian Andersen—author of fairy tales.

ARTICLE AND PHOTOGRAPHS BY DAVID S. BOYER FOREIGN EDITORIAL STAFF

The Glittering World



# of Rockhounds

THERE MUST HAVE BEEN some reason for it, something grim or tragic back in the beginning. They had called it the Dirty Beast, this little uranium mine up in the Bighorn Mountains of Wyoming.

But that was 20 years ago, in the early days of the uranium rush. Now the Dirty Beast was no longer being worked.

In the flickering light from our lanterns and candles, the name just didn't seem right. Other names kept coming to mind. Crystal Mine, perhaps? Fairyland? Dragon's Hoard? For all around us, reflecting our lights, were sparkling crystals of unbelievable beauty.

Tunnels of the Dirty Beast had caved in in places, breaking through into natural openings in the rock. Worming our way inside, we were now crawling through narrow fissures and into caverns. They were cavities that came into being thousands or possibly even millions of years ago. Some of the crystals in them may have taken thousands of years to grow.

Clusters of large, glimmering selenite crystals sprouted from the rock walls like glass Christmas trees. Billions of selenites smaller than pinheads twinkled on the ceilings. The frosting gave way in places to inch-long calcite crystals, honey colored, hexagonal, and growing like cells in a giant honeycomb. They had sharp points like cut jewels, and when we slipped and collided with them it was like running into a phalanx of spears.

The two leaders of our treasure-hunting party were cattlemen. Royce and Lloyd Tillett

Prospecting for beauty, Wyoming ranchers and their sons carefully chip a few lustrous calcite crystals from the ceiling of the Dirty Beast, an inactive uranium mine. Many such family teams of rockhounds belong to the growing legion of amateurs who collect earth's hidden glories. Most enthusiasts are dedicated to the conservation of the places they search for rocks and minerals.

own a Hereford ranch astride the Montana-Wyoming border. Their father had taught them how to rope and brand calves. And their mother, freckle-faced Wyoming pioneer Bessie Tillett, 83, had taught them to appreciate the beauty of rocks, and where to search for the most spectacular of earth's underground treasures, the mineral crystals.

From crystals come the world's faceted gems—diamonds, emeralds, rubies, tourmalines, and a host of others. But there are thousands of crystal lovers, like Royce and Lloyd, who hold that many crystals are far more beautiful as nature made them than they could ever be when cut by man.

For our trip to the Dirty Beast, Royce and Lloyd had brought along their young rock-collecting sons: Robert, 6; Jim, 8; Will, 15; and a 10-year-old lad, Norman Campbell, from a neighboring ranch. Able-bodied Bessie had stayed home this day to look after things at the Tillett ranch on Crooked Creek.

Ghost Mine Offers Rare Display

The Tilletts were lucky. There may be a million adults, and another million children, in the rock-and-mineral fraternity of North America, but not many have access to an underground mine.* The Tilletts did, and so we were marveling at one of nature's rare geological displays, mineral crystals in one of the wet, dark places where they are born.

That is an unusual experience even for rockhounds. Sometimes they find natural caves or turn up crystals in crumbling rock formations, commercial gravel quarries, or newly blasted road cuts. But they are far more likely to hunt for agate or jasper and other gemstones, for petrified wood and other fossils. And to do it not in spooky subterranean mines but in the sunlit and cheerful collecting places of the world—on mountain ledges, up canyon walls, down rocky riverbeds, along the beaches of lakes or oceans, in talus slopes under cliffs or outcrops, even along the graveled shoulders of roadways.

But hunting is only a part of the scene. Beneath one seven-ring circus tent nebulously called "rockhounding," hundreds of thousands of amateurs pursue a dozen different hobbies. They are amateurs who put together literally scores of different types of collections and produce hundreds of individualized forms of rock artistry.

Besides field collectors—the mountain

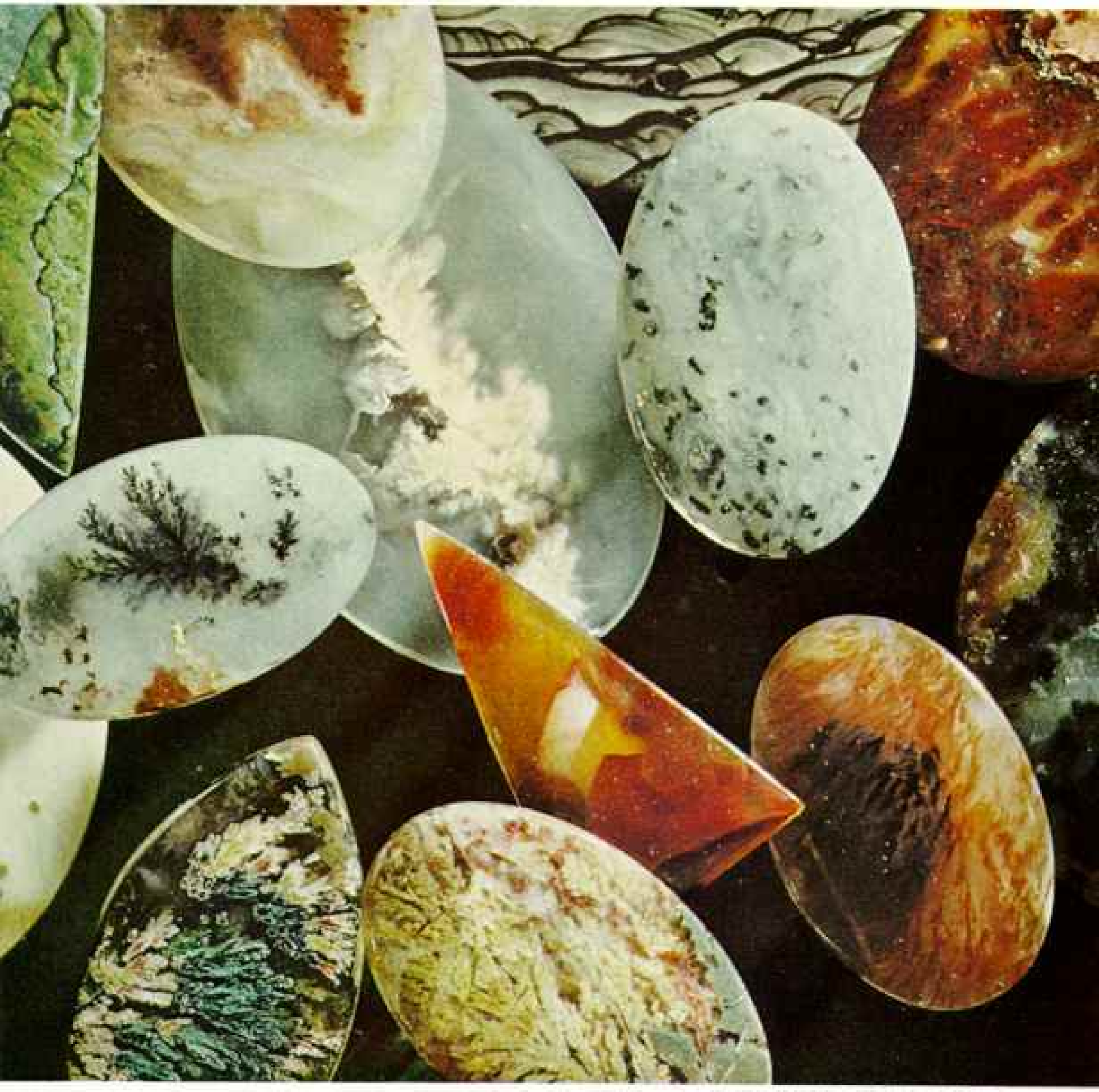
*CAUTION: Abandoned underground mines and caves may be extremely dangerous. Always consult local authorities and ask permission of owners before entering.

Scenics in stone, moss agates contain no plant life. Their wispy patterns are dendrites—foreign minerals that permeated the creamy chalcedony, a variety of quartz. While working as a logger, rock dealer Shirley Quant of Prineville, Oregon, searched stream beds and gullies for the stones, then traced them to their source. His wife ground and polished them into these cabochon, or unfaceted, shapes for use in jewelry.

climbers, the beachcombers, and the cave explorers—there are the armchair collectors, who buy specimens by mail order. There are the roaming rockhounds, many of them retired couples in air-conditioned campers, who travel around the country from rock shop to rock shop, and from mineral show to mineral show, buying and selling and talking and swapping. And there are the fossil collectors, some so knowledgeable that they qualify as amateur paleontologists. Others of similar scientific stature are the amateur geologists and mineralogists.

Outnumbering all these, however, are the rock tumblers and polishers, cutters and slabbers, gemstone cutters, gem faceters, jewelry designers, and fine-art rock carvers —the sculptors. Sculpture is the highest form of the lapidary art.

Only two things seem common to this diversity of hobbyists—the stones themselves, and the cover-all name, "rockhound." But many people regret the word rockhound, and some reject it, for it fails to suggest the importance of art, science, beauty, and knowledge to the amateurs. Further, it seems to



COLLECTION OF SHIRLEY QUART, PRINEVILLE, OREGON

Drive-in gem mines of North Carolina promise a chance to strike it rich—or to have a good time trying—for a small entry fee. Here near Franklin, buckets of earth selling for 25 cents each may yield a ruby or a sapphire.

First-time sifters (**below**) ignore a summer rain as they wash away dirt and pick over small stones. A mineowner laughed, "If I tried to hire people to work that hard, nobody would. But these people pay me for the privilege." Mine employees help newcomers recognize pay dirt—greasy-looking six-sided stones that, upon cutting, may prove to be of gem quality.

Finders keepers: A 68½-carat crystal of corundum, one of the largest ever found in a North Carolina mine, gives little hint in the rough of the prize within. Cutting exposed a star ruby in yellow sapphire. Two jewels were fashioned, leaving the rest of the stone as a remarkable curiosity.

Lured by the thought of such a find, college girls Michele Chinnis and Susan Rollins (**below**) doggedly carry on at a commercial mine patronized by rockhounds.

Other mineral collectors and their children—"pebble pups"—prefer to take off on their own, heading for the hills to explore rock quarries, stream beds, fresh-cut roadbeds, and building excavations. North Carolina and many other states publish rockhunters' guides as a public service.

ALL BY WILLIAM H. CAMPBELL

relate only to rock collecting, and leaves minerals and mineralogy somehow unaccounted for. While most collectors are likely to own both rocks and minerals, there are many who devote themselves exclusively to specimens of mineral crystals—the amateur mineralogists.

Minerals Basic to Life

What are rocks and minerals, anyway? And why are they important?

Says Dr. Joel E. Arem, Harvard-trained mineralogist, lecturer, and gemologist:

"There are basically two components of this world, minerals and energy. Even water is a mineral. Minerals are made up of elements, and from them everything else proceeds. Plants, animals, man. A plant requires minerals and energy to grow. So there is nothing more basic to our existence than minerals."

There are about 2,200 of them, with more being scientifically identified every year. They have their own chemical and atomic compositions, each crystallizing in forms determined by the internal arrangements of its atoms. Salt and fluorite grow as cubes; beryl, apatite, and tourmaline take the shape of hexagonal pencils. There are six basic geometric crystal types, and dozens of variations and combinations (pages 288-9).

All rocks are composed of minerals. Occasionally a rock may be one single mineral. Sandstone may be pure quartz; soapstone, pure talc; marble, pure calcite. However, most rocks (there are hundreds of kinds) are made up of two or more minerals.

What are called gemstones include not only single minerals like malachite, and mineral crystals like emerald and diamond, but rocks of great beauty as well. Lapidary artists fashion these gemstones into an infinite variety of decorative objects.

Traveling across the continent, I met the rock collectors on their mountains and seashores, the mineral collectors in their mines and caves and quarries, the lapidaries in their basement workshops and garages, and the serious students in their home libraries and at their scientific lectures.

They proved to be a disparate group in other ways as well. The youngest I met was Carrie Jane Woodward of Prineville, Oregon, age 4. Her sharp eyes could spot the slightest chip of agate broken off into the dirt by the prospector's pickax in the hands of Craig Woodward, her father.

WILLIAM H. CAMPBELL

With an artist's touch, Jerry Muchna of Phoenix transforms Brazilian quartz into imaginative sculpture. From the hard, clear mineral he faceted the 30 parts of the five-inch tarantula that looms before him in this double exposure.

For a year-round pansy garden (**left**), Olive M. Colhour of Seattle carved leaves of jade and petals of lapis lazuli, lavender jasper, and amethyst.

Weaving with pliers, a ring maker (**far left**) frames a cabochon-cut agate with gold wire.

FLOWER OF DARKNESS, *calcite blooms beside lavender crystals of fluorite. The spectacular fist-size specimen, a rockhound's prize from southern Illinois, grew in a crevice as hot, mineral-laced solutions rose from deep within the earth's crust. The unique arrangement of atoms in every mineral ordains each crystal's distinctive shape.*

COLLECTION OF LA FAYETTE FUNK, SHIRLEY, ILLINOIS

The oldest was Louie Mast, also of Prineville, age 85. "I can't see much anymore," he told me as he dug a trench in an Oregon hillside. "But I can tell when I hit agate or jasper by the ring of the shovel on the rock."

The poorest rockhounds I met lived in a two-room home on a dirt road, their dust-covered collection on a shelf over the table. The home of the richest was worth a quarter of a million dollars. Safe behind plate glass and under floodlights were rocks and minerals worth another quarter of a million.

Longtime Hobby for All Persons

To many a rockhound, a specimen is important because he found it, or because he plans to make something artistic from it with his own hands. Near Dayton, Ohio, I went rock hunting with Harold L. Detty, Sr.

"I've never sold a rock I found. Or anything I made from a rock I found," he told me. "They're things I don't put a price on. I've got this deterioration of the spine that makes me walk with a list. One of these days, when I can't walk at all, I'll have all these rocks. And I'll make things out of them, sitting down. And reminisce about when and where I found them."

In Coos Bay, Oregon, I sat in the den library of Mike Groben. Mike was in a wheelchair. An accident six years ago limited his field collecting, though not his executive position in a lumber company, and certainly not his buying and trading of minerals. The room was half filled with fine specimens in glass cases, and the garage held a hundred cardboard cartons full of them, for trading.

"I miss going down into the mines and quarries," he admitted. "But there's so much to know about minerals." He gestured toward his bookshelves. "There are so many good books about them. You can study the atomic makeup of minerals, the growth and geometry of their crystalline structure. You can get into their physical and chemical and optical properties. Or you can spend the time trimming and cleaning them so as to enhance the appearance of the crystals. That's how I spend my leisure time."

June Culp Zeitner of Mission, South Dakota, has spent thirty years collecting rocks and minerals, and eighteen years writing about them in the *Lapidary Journal*. "Lapidary is an art, and mineralogy is a science," she explained. "There's quite a difference. There's a certain schism between educated hobbyists and casual lapidaries. But there is often a moment of oneness. It could be on a mountain or in a mine, at a gem show or in the darkened room of a slide-show lecture. The amateur mineralogist and the lapidary artist both appreciate the beauty and the wonder of nature. More deeply, they know that nature is a common bond."

They were a special kind of people, those I found engaged in this far-flung hobby of art and science. It was difficult to tell, whether I met them in the field in boots and jeans or at mineral-club banquets in double-knit suits and formal gowns, which were the working people and which the millionaires.

Collectors who specialize in mineral crystals know that much crystallization takes place in cooling bodies of magma, or in fissures or caves in the rock where seeping water or gas brings minerals in solution. The atom-by-atom growth of crystals, from magma or mineral-rich water or gas, may require a few days, a few years, or thousands of years. The rate of growth depends on the mineral content of the water or gas, the temperatures, the pressures, the surrounding rocks.

Cavities where crystals grow may be as small as a doll's thimble or as large as a major-league baseball stadium. Most crystals are microscopic, and millions of them may grow in a single pocket in the rock. There are amateurs who have microscopes and a passion to mount and photograph these minicrystal treasures. Micromounters, they call themselves. They inhabit a wondrous world of magnified color and form, and many pursue the complex study of microminerals with scientific dedication.

But crystals can be huge; one giant weighed two thousand tons. The largest specimens normally seen, however, are those used as focal points in rock gardens, centerpieces on dining tables, conversation pieces in salons, or exhibits in museums.

Between these big crystals and the micromounts come the "thumbnails," the "miniatures," and the "cabinets." These are the sizes gathered and exhibited by most collectors. Some restrict themselves to collecting specimens of a single mineral. Or minerals of a single locality, or a single color.

A cavity of any size in the rock may be a grotto nurturing some of nature's most dazzling creations. By the hundreds of billions somewhere beneath the ground, they wait only to be released to light and sight.

I had helped release a few, with Lloyd and Royce Tillett, at the Dirty Beast uranium mine in Wyoming. Underground in the Tourmaline Queen near Pala, California, I watched Bill Larson and John McLean dig into the soft and wet mineral mixture that filled a pocket of the rock. They poked and prodded, using an old screwdriver. And then, out of the brown muck, came a strawberry glint. In ten minutes they had liberated a tourmaline crystal six inches long and as fat as a Christmas candle.

Later, after it was cleaned, I could see that it was really gem quality and might sell for as much as $2,000.

At the Yogo Mine near Utica, Montana, manager Sanae Terada and mill operator Hank McBey sorted tiny blue crystals of hexagonal corundum. Sapphires. Occasionally one stood out in intense red. A ruby. Not far along the formation that had given birth to the sapphires, I met Mrs. Stewart J. Thomas. Her husband, a rockhound and gem faceter, was out digging.

"We bought a building lot from the Sapphire International Corporation," Mrs. Thomas said, "so we could build a house here and hunt sapphires and cut them. In one year we paid for the lot. Yogo sapphires are among the finest in the world."

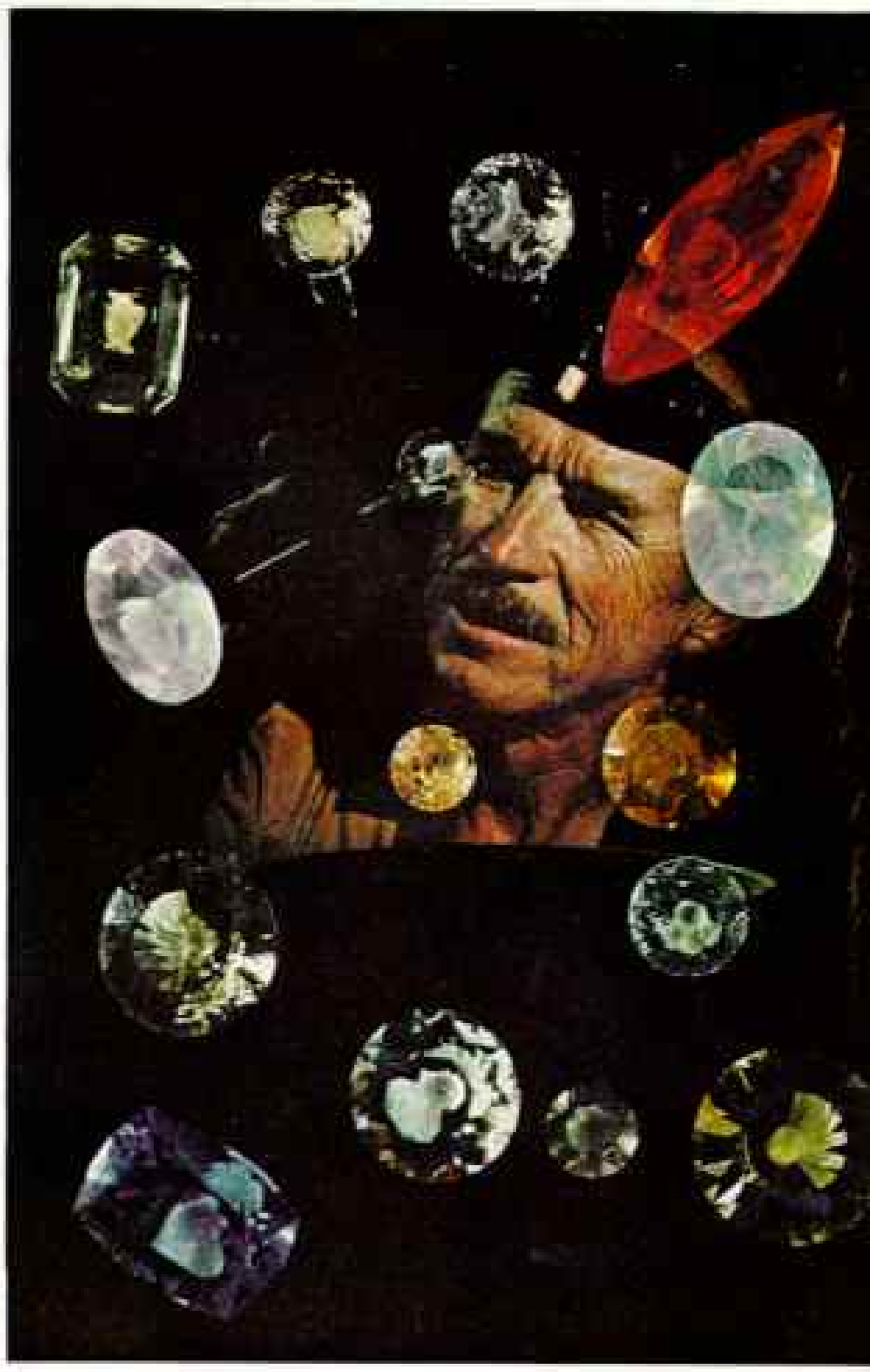
Hard-rock Miners Keep Crystal Secrets

There are many commercial gem mines in Africa, South America, and Asia, but only a few in the United States. Most gemstone and mineral specimens are found quite incidentally in pockets of ordinary copper, lead, zinc, silver, and uranium mines.

Discoveries of such pockets, however, are destined to remain forever forbidden to most men. The experience is seldom shared even by mine geologists and mineralogists who work professionally underground. Why?

Because the hard-rock miners of this world don't give them much of an opportunity.

"When miners blast their way into a pocket, and find it full of crystals," said a mining geologist in Colorado, "they rarely breathe a word of it to anyone. They just cut the stuff out, tenderly. They use wedges, screwdrivers, even pocketknives. The idea is not to damage the crystal surfaces. They salt the loot away in some dark corner of the mine, then smuggle it out, bit by bit, in their pockets or lunch boxes. And sell it to some intermediary, or some mineral dealer."



"Tidying up a rough stone and making it look pretty—that's the fun of faceting," says Quincy Howell of Boise, Idaho, here in a double exposure with a sampling of his collection of 1,700 gemstones. The retired U. S. Air Force officer taught himself to cut the tiny flat surfaces that enhance the sparkle of transparent minerals. He buys raw crystals from many lands. The unusual inch-long red opal was found in Mexico, and the variously colored quartzes in Brazil. The synthetic blue quartz, lower left, was made in the Soviet Union.

COLLECTION OF EDWARD BANCROFT, SAN DIEGO, CALIFORNIA

Lemon lollipops, actual-size sulphur crystals, solidified from volcanic gases. Sulphur also occurs in salt domes when bacteria attack calcium sulphate. The crystals are so heat-sensitive they can crack when held in the hand.

Fire-red iceberg of rhodochrosite (**right**) looms four inches above icicles of quartz from a Colorado silver mine.

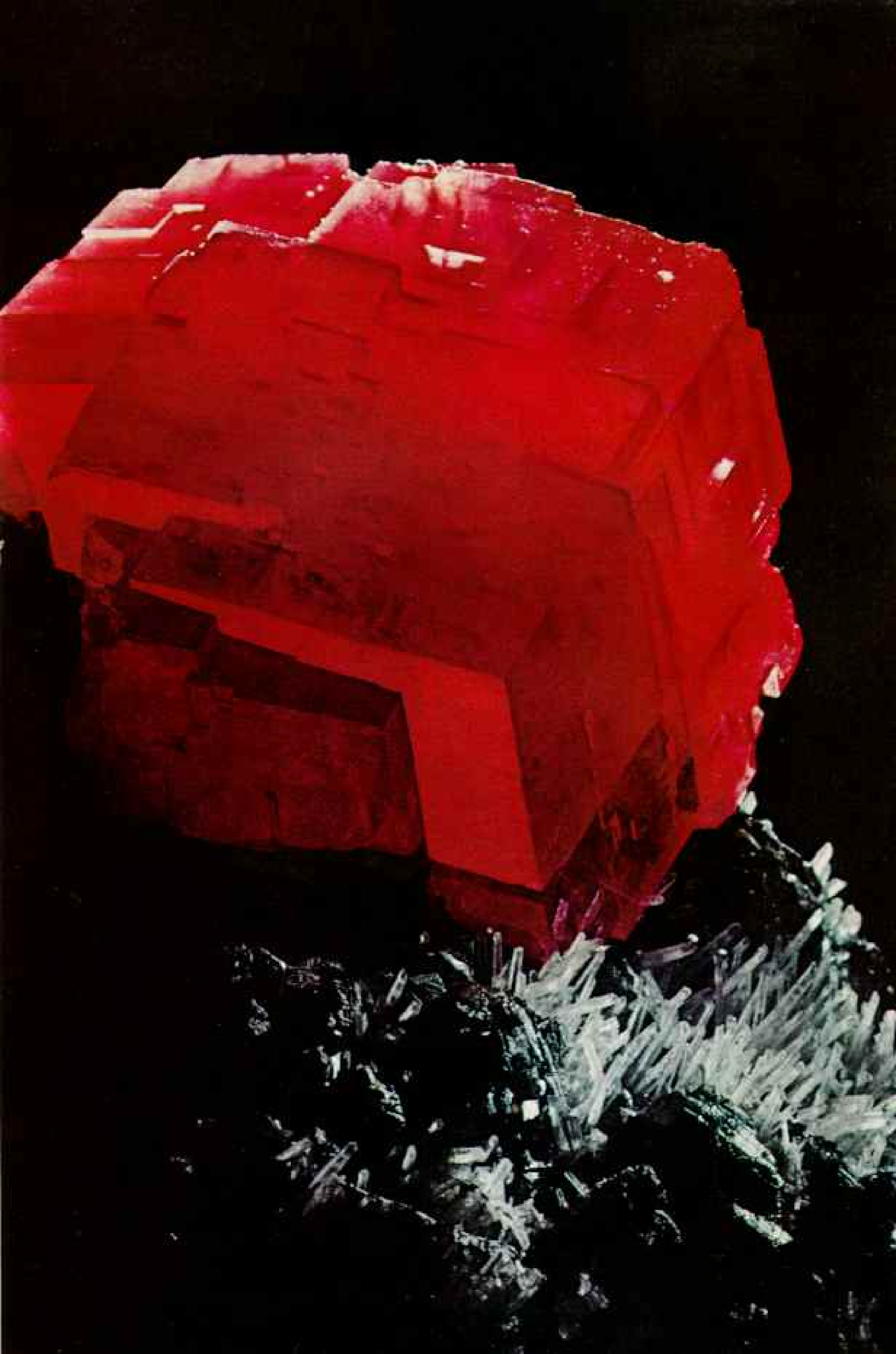
PHOTOGRAPHED AT SMITHSONIAN INSTITUTION, WASHINGTON, D. C., BY JOEL E. AREM

Dusky sugar lump, this octahedron (**above**)—two pyramids base to base—exhibits the shape common to diamond and fluorite. One telltale clue—nothing scratches a diamond except another diamond, but a penknife can mark this three-inch Canadian mineral. Experts identify the world's 2,200 mineral species with X rays and chemical analysis, but amateur mineralogists distinguish finds by tests of hardness, color, shape, cleavage, and specific gravity.

COLLECTION OF R. C. MCGINNESS, SAN MATEO, CALIFORNIA (ABOVE AND UPPER RIGHT); COLLECTION OF PETER BANCROFT, FALLBROOK, CALIFORNIA (FACING PAGE)

Cauliflower of mimetite, twice actual size, was plucked from an underground garden in a Mexican silver mine.

Pretzel sticks, laumontite occurs in minute form in many volcanic rocks. Recently, tungsten miners near Bishop, California, opened a freakish fissure filled with these giants—three inches high. The company permitted a national club, Friends of Mineralogy, to rescue specimens for museum and university collections before mining proceeded.



A specimen may be sold or traded until it is finally bought, lovingly, by a mineral collector or museum curator. He buys it to fill an exact niche in his collection or, possibly, as an investment; the prices of fine mineral specimens have been riding a very steep escalator for the past 15 years.

Depending on its size, quality, and rarity, a specimen may cost him five or ten or fifteen dollars—or five or ten or fifteen thousand! A few large, spectacular pieces, not necessarily rare, have sold for prices as high as $25,000. And an occasional clear and perfect crystal—a ruby or an emerald, for faceting into gems—for a million or more.

From smuggler to final owner, the trail may be full of secrecy and intrigue. The elapsed time may be only weeks, or it may be years. But the price may have doubled and redoubled time and again. The miner may have received relatively few dollars for a specimen that finally brings thousands.

Why Not Crack Down on Smuggling?

Don't the owners and operators of mines take a dim view of crystal-smuggling miners? And what about the collective conscience of all the collectors, mineral dealers, curators, and gemstone cutters, the ultimate buyers of glittering smuggled goods?

The answers are perhaps partly rational and partly rationalized. Most mineowners don't have the time to worry about a few thousand dollars' worth of mineral specimens. They're concerned with the week-to-week production of miners moving thousands of tons and millions of dollars' worth of rock and ore. If the rock contains enough copper, silver, sulphur, zinc, gold, or other commercial minerals, it's ore. Some mineowners are not even aware that minerals occasionally occur in such coveted and valuable aesthetic form as crystals.

"One day a copper-mine owner bought $500 worth of exotic crystals from me," a mineral dealer told me. "He was simply overcome by their beauty, and wanted to start a collection.

" 'Do you mean to tell me those things come out of mines!' " he said.

" 'Not only that,' I told him, 'some of them could easily have come out of your mine!'

"When miners are caught smuggling, they're sometimes fired. The firing, though, is not so much for theft as it is for digging crystals on company time. U. S. mines, in one year, move more than four billion tons of rock and ore. That's some 30 billion dollars' worth. So mineral specimens, worth a few million, don't have much importance."

Dealers, collectors, museum curators, professional jewelers, and lapidaries see minerals in quite another light. They believe that but for them, and the hard-rock miner smugglers, most of the incomparable natural beauty of the crystal world, and millions of gemstones, would have been ground to powder in the crushers at the mines.

Mining Methods Jeopardize Crystals

Mineral dealer Dr. Gary Hansen of St. Louis, Missouri, a onetime chemistry professor and professional miner of mineral specimens, told me the day of the crystal is dying. "Underground mines used to produce far more. Look at Butte, Montana, in the 1920's and '30's. Forty mines, and 3,000 miles of tunnels, crawling with 15,000 miners. The crystals they brought out of Butte went to collectors all over the world.

"Ed McDole started at Butte, and became the most famous miner-smuggler-mineralogist of them all. He sold to every major dealer and collector from the Black Hills to the Pacific. He came and went mysteriously, in an old black Lincoln full of treasures.

"But gradually, after midcentury, open-pit mining and strip mining replaced much underground mining. Easier and cheaper, and fewer miners. Supplies of mineral specimens began to dry up.

"Today, though," Gary said, "the U. S. and Canada need much greater production of minerals to fuel their burgeoning economies. But environmentalists are inhibiting strip-mining and open-pit mining operations. So there may be more underground mining in the future than in the past.

"Even so, miners will have less and less personal contact with the ore and with pockets of crystals. Machines will do most of the work that once was done by hand. The dynamite we once used broke rocks and minerals into good-size chunks. Our new, cheaper, modern liquid explosives crumble everything into bits. Mineral crystals are pulverized. To get them in the future, we'll just have to mine them ourselves. And that will be expensive."

To salvage more crystals out of commercial mines, for preservation by museums, schools, and universities, and to conserve crystal

sites are the goals of the Friends of Mineralogy. This new organization promotes cooperation among rockhounds and educators and mining companies. It supplements educational efforts made by the American Federation of Mineralogical Societies.

There are, in the United States and Canada, nearly 1,000 rock, gem, and mineralogical clubs and societies affiliated with the AFMS. With lectures at clubs and schools, and with scholarships, they have for years worked to advance amateur study and research in mineralogy. Wherever I went in high schools and colleges, or in the commercial worlds of mining and mineralogy, I found students, teachers, professors, mineralogists, geologists, paleontologists, chemists, and other scientists who traced their professional careers back to the day they began collecting rocks and minerals.

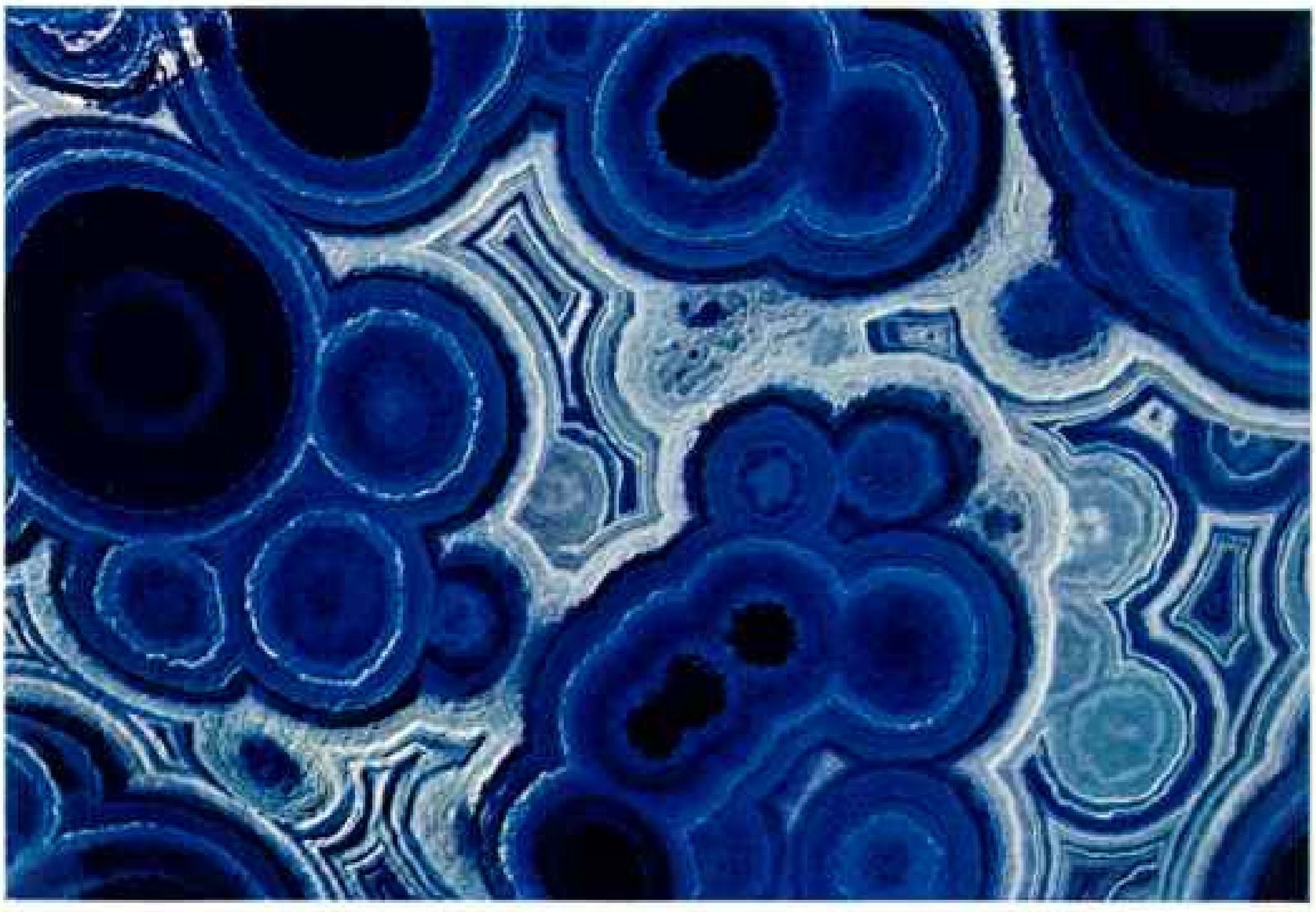
Twenty-two-year-old Pat MacDaniel of Connersville, Indiana, taking an advanced degree in paleontology at the University of Chicago, told me why he still collects.

"People need something to take them back to the childlike wonder they once felt for their universe. It helps, in your admiration and study of nature, to have something to collect. It could be insects. Or wild flowers. Or minerals, rocks, or fossils."

Fossil Seekers Probe a Coal Pit

I went fossil hunting in the rain with Ted and Helen Piecko of Chicago. The scene was Pit 11 of the Peabody Coal Company, near Coal City, Illinois. Peabody's enormous strip-mining shovels had uncovered acres of sedimentary rock ninety feet below the surface, and with it uncounted plant and animal fossils of the Pennsylvanian period, about 280 million years ago.

For eight years Ted and Helen have spent their weekends and vacations collecting fossils. Their winter nights are given over to studying paleontology, and to exchanging visits with professional paleontologists. If the Pieckos ever took time off from field trips and studies, they could compile a list of hundreds



Inner-space cosmos lies locked inside a dull bubbly-shaped mass of azurite. Cutting and polishing enhanced the incredible blue tones. Growing like tree rings from the center out, the circles are precipitated out of carbonate solutions in copper mines. The same pattern turns up green in malachite, a closely related mineral. In ancient times women ground both to make brilliant eye shadow.

of Piecko specimens in a dozen major natural history and university museums across the U. S. and in Europe. A previously undiscovered fossil lamprey from Pit 11 has been named *Mayomyzon pieckoensis*, and a jellyfish *Octomedusa pieckorum*.

As Ted Piecko puts it, "I just wish we'd started collecting years earlier. There's so much to learn." And as Helen says, "We'll probably die on a fossil dig. That's where we'd really like to die, anyway."

High Praise for a Mineral Specimen

Collecting may lead deeply into amateur science or into professional careers. But rocks and minerals remain always an art form.

To the mineral collector, a specimen is something to be placed on a pedestal, its most attractive aspect forward. It is to be viewed, exhibited, treasured, photographed, and examined by magnifying glass or microscope. Its colors, its crystal structure, and its symmetry are all to be celebrated as art in nature. A mineral crystal speaks to him of beauty and order and perfection in creation.

In St. Louis, Missouri, I talked one day with a mineral collector who expressed one aspect of this philosophy: "I met an art connoisseur on a flight from California. He saw the tourmaline crystal I was carrying home in my lap. He said it was more beautiful than any painting he had ever bought. Lots of artists become mineral collectors."

In Phoenix, Arizona, Jeff Kurtzeman added this: "If you collect stamps or coins, or just about anything else, somebody, somewhere, almost always has at least one like yours. Not so with minerals. As with original art, every specimen is unique."

In the eye of a lapidary, a rock or a mineral triggers a different aesthetic response. He may be a rock polisher, a jeweler, a gem faceter, or a rock carver. He is a working craftsman or artist first, a nature lover incidentally. He, too, will cherish a particularly beautiful specimen for its own sake. But most rocks or crystals he sees as raw material. The lapidary senses within them some new quality or brilliance, some new dimension of form and beauty. His artistic goal may be simple, or he may dream the dreams of a would-be Michelangelo.

I found them across the continent, the lapidaries, and sometimes joined them in their enterprises. I scrambled with Al and June Zeitner and Bob and Maxine Wilson up and down crumbling sediments of the badlands along the Nebraska-South Dakota border. In one September afternoon, we collected five varieties of jasper and four varieties of agate for rock tumbling, plus seven species of agatized fossils (including teeth from an Oligocene saber-toothed tiger). We also acquired five cases of sunburn, extreme thirst, and happy physical exhaustion.

I climbed with Leonard Wheeler of Elsinore, Utah, up talus slopes of southwest desert mesas to search for petrified wood and

STEVE RAYMER (ABOVE) AND WILLIAM H. CAMPBELL

Swap a rock? Make a ring? At the August mineral festival in Spruce Pine, North Carolina (**right**), and at other shows across the country, hobbyists gather to compete for prizes and demonstrate their lapidary skills. Noted mineralogists give lectures and lead field trips. Even scientists from the Smithsonian Institution in Washington, D. C., come to shop and swap, eager to acquire specimens for the nation's mineral collection.

Dealers travel the show circuit, offering roughs for pennies—or for hundreds of dollars. A bejeweled enthusiast at a Washington, D. C., gem show studies a chip she fished from a grab bag (**left**).

dinosaur bone. Over millions of years, molecule by molecule and cell by cell, the organic substance of tree and bone is replaced by silica and tinted by numerous elements. The results are some of the most dramatically patterned of all the world's rocks. Leonard would convert them into bookends, or the finest ones into cabochon gemstones for belt buckles, brooches, or bola ties.

I watched Quincy Howell of Boise, Idaho, cut faceted gems from a bubbly little sapphire crystal and a chunk of smoky quartz. The very fine diamond dust of his wheel, and the precision of his faceting machine, made possible geometric facets accurate to within a hundred-thousandth of an inch (page 287). Quincy's cut gems had won the 1970 national faceting trophy of the American Federation of Mineralogical Societies.

I marveled in Phoenix at the artistry of Jerry Muchna. From dull, coated quartz crystals he faceted water-clear gems that became a tarantula (pages 282-3), railroad train, tractor, and sailboat. He, too, had won a national trophy.

"It's my answer to the problem of how to retire happily, produce usefully, and stay young," Jerry said.

In Santa Barbara, California, rock carvers Monty and Vi McMahon painstakingly fashion slivers of rock into trophy-winning butterflies almost lifelike enough to fly. They have turned their house, their hobby, and virtually their lives into a celebration of this one individualized art form.

First, Take a Cake of Soap . . .

At some unspecifiable point of refinement, rock carving becomes sculpture. Here is the greatest challenge to lapidary artistry. I met two sculptors in a single day in Rapid City, South Dakota. The work of each said something to me of what it is that happens between a man and his heart and his hands and a rock.

Art LaCroix, a descendant of the Santee Sioux tribe, is an alderman of Rapid City and owner of a flooring and decorating firm. In the fourth grade, Art carved from a piece of soap a prize-winning figure of a horse. Not until 40 years later did he carve his second equestrian sculpture. From a block of local pink alabaster, he shaped two wild stallions fighting. In 1969 the work won best-in-show in a national competition sponsored by the Dakota Artists' Guild.

Lincoln Borglum has sculptured all his adult life. At 19, he began clambering with cables and harness over the rough surface of the emerging portraits of George Washington, Thomas Jefferson, Abraham Lincoln, and Theodore Roosevelt at Mount Rushmore.

"It's my father's mountain," Lincoln told me. Mount Rushmore National Memorial is the masterpiece of Lincoln's father, Gutzon Borglum. But Lincoln progressed from foreman to superintendent of the project, and after his father's death he was appointed sculptor and finished the epic work.

Perhaps Lincoln Borglum may never have been a pure amateur, except at heart. He loved his father's mountain, and he loved those stone faces. It was the carving of them that counted. The money was incidental.

Why People Are Rockhounds

The line that divides amateurs from professionals in the world of rocks and minerals —whether sculptors or gem cutters or collectors—is a line that is unclear, and perhaps of little importance. In the rock-and-mineral story, the beginning is with the rockhound, child or adult; the end may be geology, paleontology, mineralogy and crystallography, and inorganic chemistry. Beginning or end, it is a love for rocks and minerals and nature, in the pure amateur spirit.

For me, each person had been a page in the story. A story of differences, with moments of oneness. Close to home, in a rock quarry, I met a lady whose philosophy seemed to sum it all up: Bonnie Dunning of Arlington, Virginia. In real life she is a cybernetician for the U. S. Army, a maker of models for computers, originally a chemist; mother of a son who is a mineral collector, another studying atomic physics, a daughter studying environmental geology; wife of Robert W. Dunning, NASA physicist in biotechnology; she herself a mineral micromounter.

"Why am I out here in a hard hat and steel shoes, anyway? It may be partly because in my work I deal constantly with abstract ideas. Rocks and minerals give me something tangible to hold and to touch, a relationship with the earth.

"They provide a thrill. It's like a miner striking gold. Only better. When I open this hollow-sounding rock with my hammer, I'll be the first person in the world to see what's inside since God made it a hundred million years ago." □

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COVER: Prowling for campers' scraps, a sleek red fox roams a Maine wilderness (pages 151-205). FARRELL GRIFFIN

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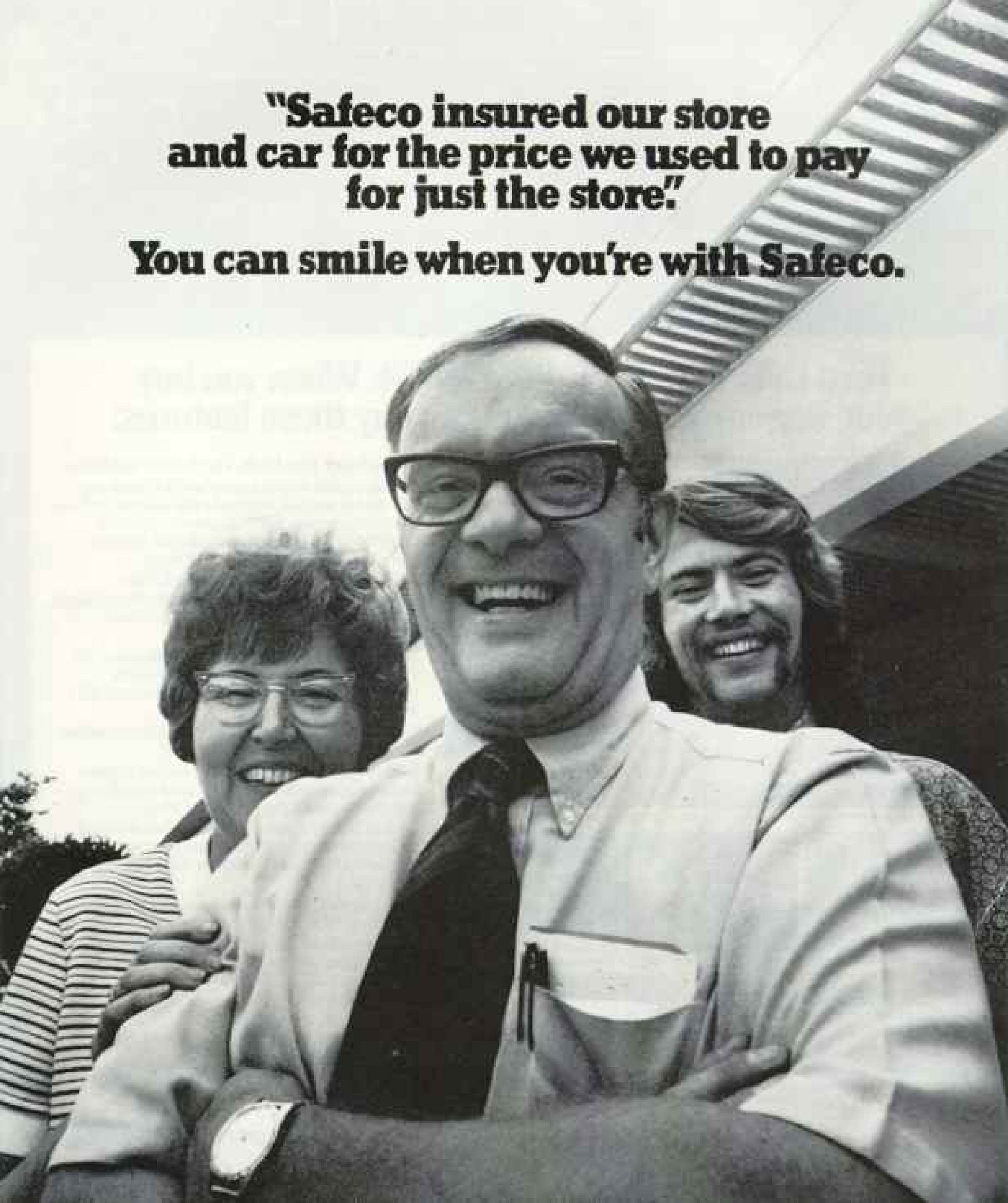

NICHOLAS DEVORE III

Braving the Arctic's untamed temper

GILDED by the midnight sun, Colin Irwin splashes westward over flooded ice, his 2,500-mile struggle in the Arctic almost over (**above**). "I wanted the challenge," the 27-year-old Englishman explains, "to test myself by living off the land in the traditional Eskimo way."

First lured to the Arctic in 1971 by an urge to dare the Northwest Passage in a small sailboat, Colin was trapped by ice near the town of Cambridge Bay. There he stayed through a long winter, living with Eskimo friends and learning the skills of Arctic survival.

During his second winter in the Arctic, Colin set out from Repulse Bay to cross the rim of America east to west by dogsled. Six months later he reached Point Barrow, Alaska, after canoeing the final 600 miles.

Blizzards, temperatures to 60° below zero F., and near-starvation beset him on his continent-spanning trek. "You don't worry about the dangers you face or the food you need," he says. "You just take each day as it comes."

Colin describes his ordeal in next month's NATIONAL GEOGRAPHIC. Wouldn't your friends, too, enjoy reading about adventures like Colin's? Use the form below to nominate them for membership.

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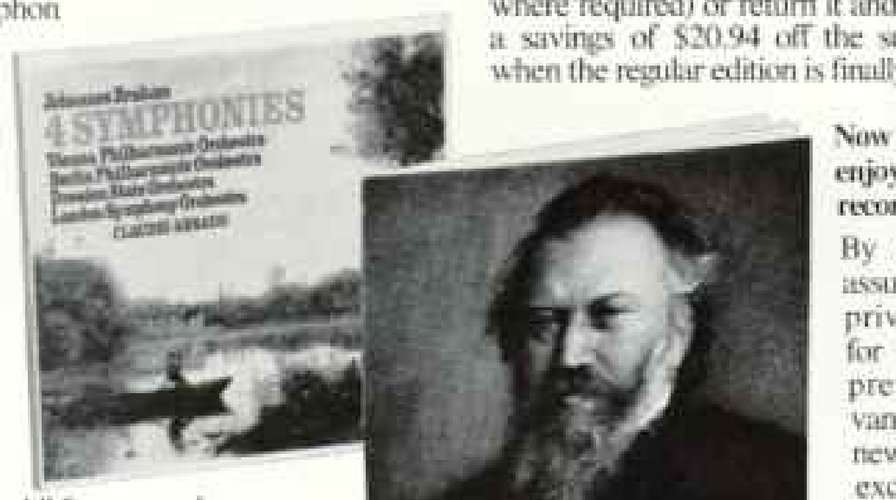

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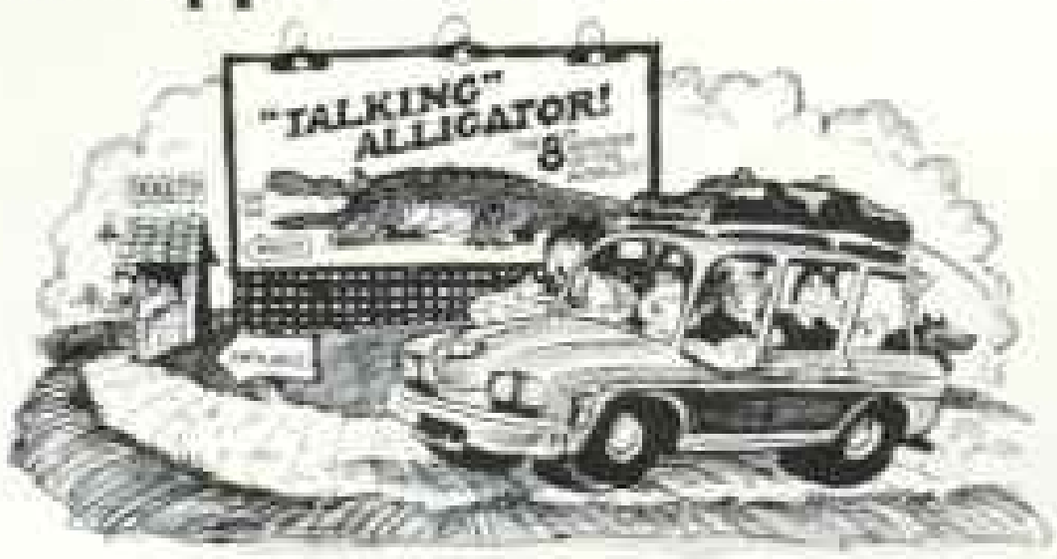

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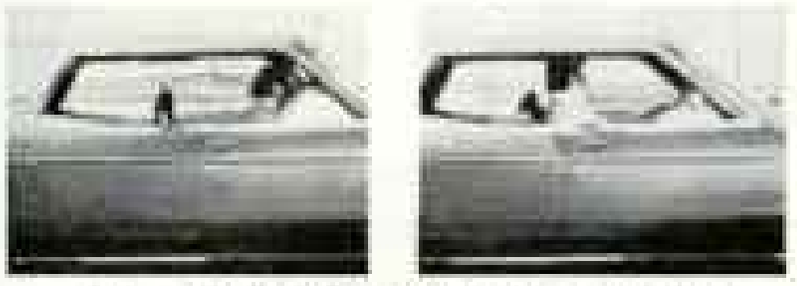

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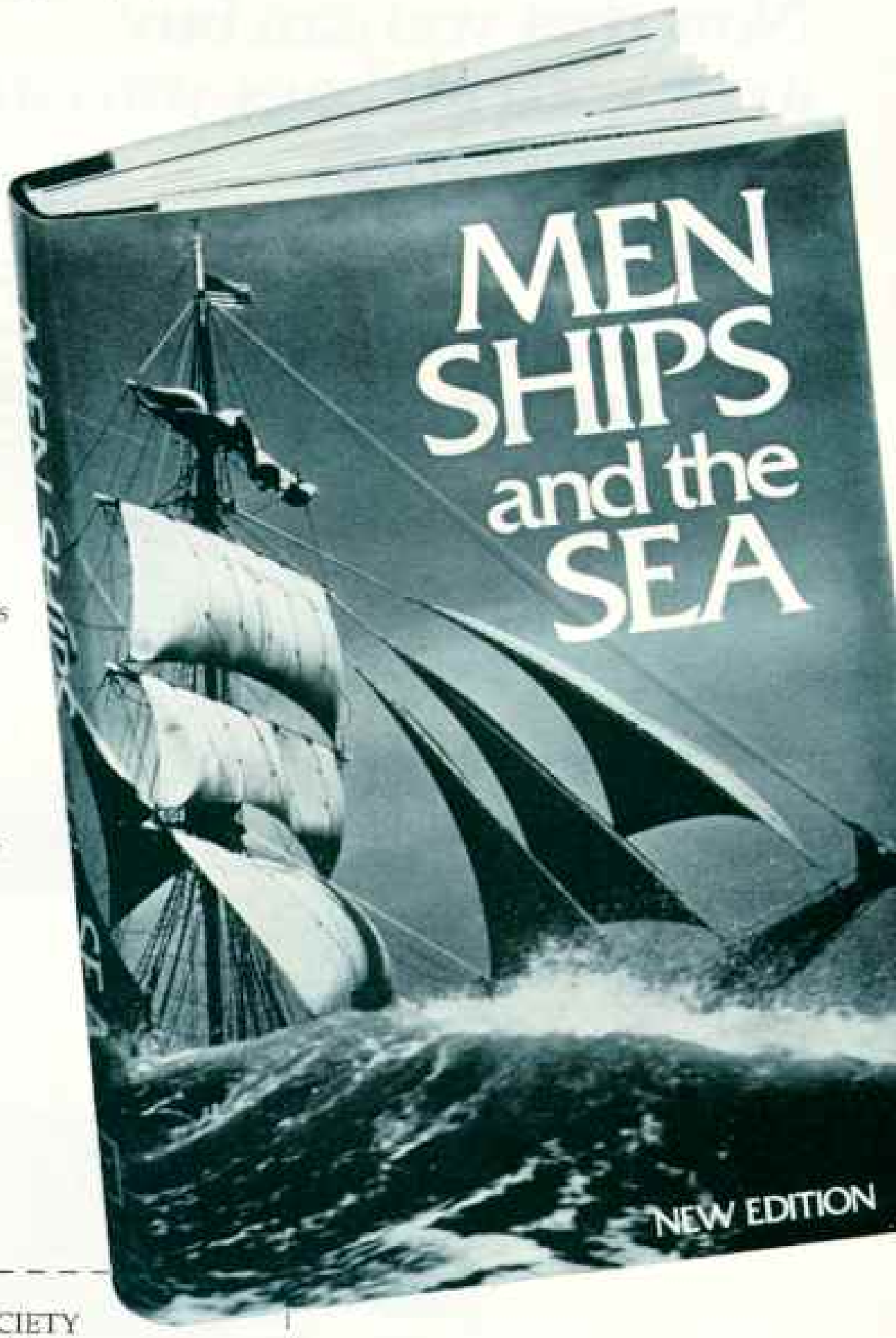

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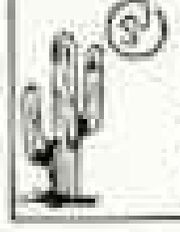

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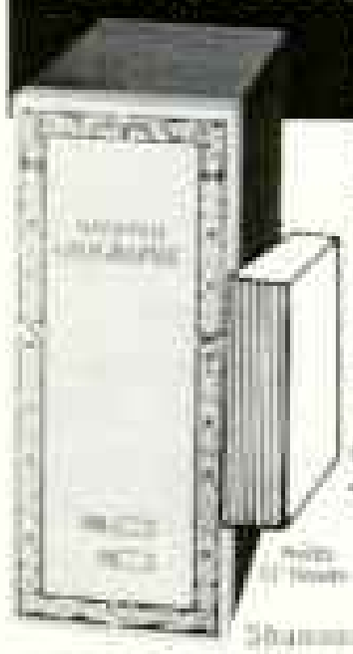

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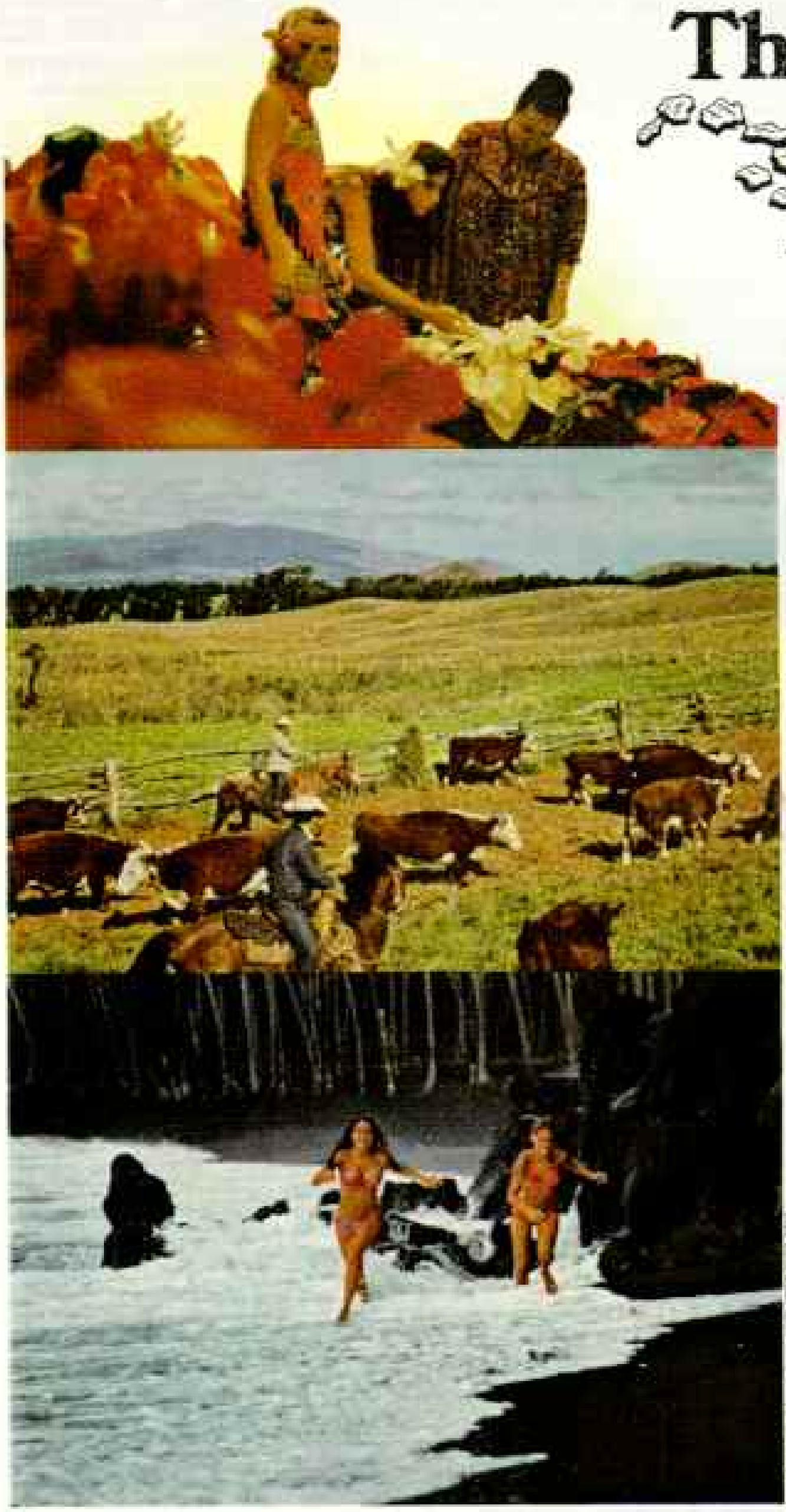

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