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DON'T KEEP FOREVER on a public road... following one after the other like a flock of sheep. Leave the beaten track occasionally and dive into the woods. Every time you do so you will be certain to find something that you have never seen before."

Those words—written by Alexander Graham Bell, my grandfather, in a 1914 NATIONAL GEOGRAPHIC—ran through my mind like a prophecy as we made a "dive into the woods" from the rushing sparkle of California's Redwood Creek.

Miles from manicured parklands and trails, we climbed logs head high and mossy green. Fallen branches made uncertain footing, splitting explosively under a man's weight.

Quickly the forest changed to a somber mood; an almost subterranean dimness. I raised my eyes; like a limitless view of the ocean or a night sky filled with stars, this wilderness of great trees stretched upward and away to infinity.

Overhead, a bar of golden sunlight slanted into our wooded world, treating leaves like stained glass, etching the texture of ribbed bark, finding Gothic gargoyles in the burls. I reached out to touch the dry, coarse bark of a great redwood.

"Visitors always want to touch the redwoods," said Howard A. Libbey, my host and President of the Arcata Redwood Company, owner of this grove in Humboldt County. Now I knew why: Only by touching them can we be sure that these marvels are real.

Apparently the wonder remains even for those who know the redwoods best. I watched as this man, a 40-year veteran of the forests, moved toward another big tree—and spread his hand across its bark.

Forest Giants Set New Records

A voice called us back to important business. "The surveyors have good news!" It was Dr. Paul A. Zahl, senior naturalist of the National Geographic Society, who had hurried on ahead to talk with the team of surveyors measuring these giant coast redwoods for us.

The news was good indeed. It confirmed the National Geographic Society discovery that Dr. Zahl describes this month: finding the world's tallest known living things (page 10).

Here, in a hidden valley, Paul Zahl had found—just days earlier—the monarch of all trees, a coast redwood measuring an incredible 367.8 feet. Moreover, the forest cathedral that we now reverently explored also held the second, third, and sixth tallest trees—giants just as awesome as the world's champion (list, page 16). Two of these record redwoods were found by Chester



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World's Tallest Tree Discovered

By MELVILLE BELL GROSVENOR
President and Editor, National Geographic Society

Photographs by
GEORGE F. MOBLEY
National Geographic Staff

C. Brown, leader of a National Park Service—National Geographic Society research project.

Dr. Zahl's report offers us a sharp challenge: Within the United States, the Age of Discovery has not yet receded into history. Lewis and Clark, Boone and Frémont have left us an exciting legacy, but their explorations did not strip away all mystery from our familiar world.

I first began to wonder about taller, undiscovered trees when, with Conrad L. Wirth, then Director of the National Park Service, I visited the scene of a great natural disaster: California's

(Continued on page 8)







REDWOODS, PAGES 2-3, BY NATIONAL GEOGRAPHIC PHOTOGRAPHERS GEORGE F. MOSELEY © N.G.S.

Glen of Giants

explored by Dr. Paul A. Zahl, naturalist of the National Geographic Society senior staff, lies along Redwood Creek in northern California's Humboldt County. Here coast redwoods (*Sequoia sempervirens*) grow taller than any other living thing yet found by man. Crowns of the loftiest trees soar more than 367 feet above the rushing waters. The tallest lifts its slender spire from a clump that appears just to the left of the airplane. Third tallest also stands within the creek bend, and the second tallest rises a short distance downstream, just out of the photograph at top (map, page 8). The champion's trunk, still expanding, indicates it may be only 400 to 800 years old.

Though the trees grow within ten miles of the coast, their record height went unnoticed until Dr. Zahl spied them from the partly cleared slope at left. Georgia-Pacific loggers, who built the road, spared some trees. Seedlings and sprouts now are rapidly covering the slope.

COURTESY OF PAUL A. ZAHL © N.G.S.



Redwood seedling, a few weeks old, is not much bigger than the common pin at its roots. It still wears the blossomlike husk on whose wings the seed fluttered down from a cone high above.

NEW CHAMPION, 367.8 feet, soars well above its fellows. Until discovery of the Redwood Creek titans, the 356.5-foot Rockefeller Tree in Humboldt Redwoods State Park claimed the record.

Men standing on the bank 7.5 feet in front of the giant include Howard A. Libbey, President of Arcata Redwood Company, owner of the tract, and Dr. Melville Bell Grosvenor, National Geographic Society President and Editor. The two discussed means of preserving the grove.



Dwarfing

the new

10-story

National

Geographic

headquarters

in Washington,

the tallest

tree towers

more than

twice as

high.

The Tallest

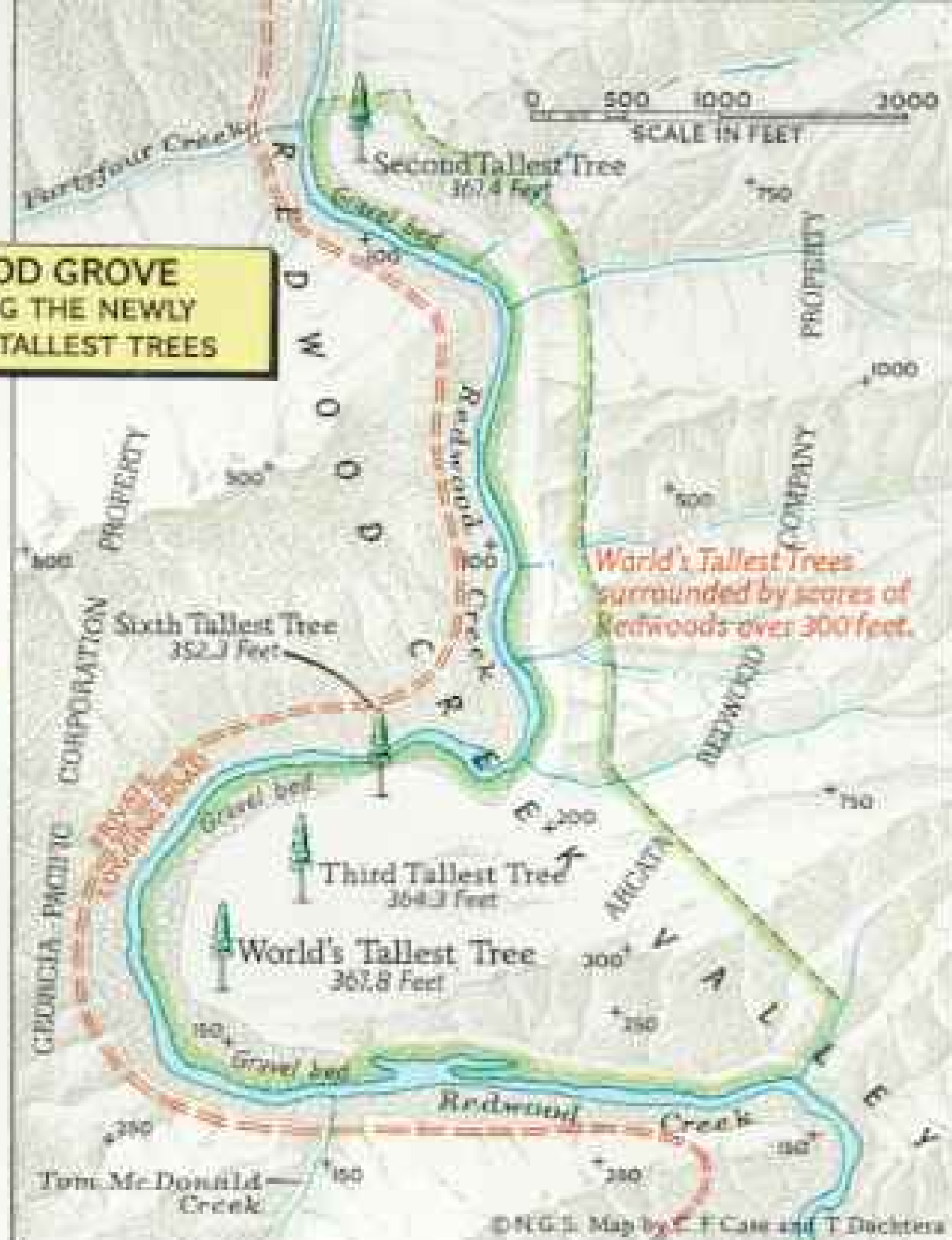
Tree

in the World





Home of tall trees, a heavily forested tract on the east bank of Redwood Creek in northern California contains the world's first, second, third, and sixth highest specimens. Private logging road of the Georgia-Pacific Corporation provides the only way in.



Bull Creek, in Humboldt Redwoods State Park. There a single flood in 1955 caused the loss of hundreds of towering coast redwoods. Disasters of this sort had prompted Dr. Wirth to obtain, in March, 1963, a grant from the National Geographic Society to study the coast redwoods and their environment. All of us hoped that knowledge gained from this survey would help prevent similar losses in the future.

Study Sparks Search for Taller Trees

To launch the study, several of us from the Park Service and National Geographic Society made a survey trip through the redwood country and visited Rockefeller Forest along Bull Creek. There I gazed upward at the overwhelming 356.5-foot tree, considered then to be the tallest in the world.

"Do you think this really is the tallest tree?" I asked park rangers. "Could there be others even taller?"

"Perhaps," said one chap. "We just don't know what may be hidden in those valleys to the north and east. I would bet there are taller trees."

The prospect was tantalizing. I knew that the men engaged in the study would be visiting those little-known valleys in future weeks. Paul Zahl had already been assigned to range

the Redwood Empire for an up-to-date article and pictures for your magazine.

"Keep your eyes open," I advised. "It would be wonderful to find a record-breaker."

They did. A few months later Paul Zahl called me from California with extraordinary news: "I think I've found the world's tallest tree," he said.

Dr. Zahl had come upon a great grove with a number of contenders for the record. Preliminary measurements indicated heights well over 360 feet. These trees stood beside Redwood Creek on an Arcata Redwood Company tract. Professional surveyors soon would be making final, definitive measurements. I promptly caught a plane to see for myself.

Our first business was to notify Howard Libbey of Arcata. Like other farsighted lumbermen, Mr. Libbey and his associates had been cooperating with our redwoods study.

"Mr. Libbey," I said, "we believe that your company owns the tallest tree in the world—the Mount Everest of all living things."

The response was electric: "On Arcata property?" With enthusiasm he called other Arcata executives.

And when should we visit the grove to take final measurements? "Right away! How about tomorrow morning?"

Next day our motorcade snaked over log-

ging roads, through miles of mountainous timber, then across open spaces of young second growth. Finally, with dramatic suddenness, we came to the bright waters of Redwood Creek.

The view inspired pure silence.

Throughout the world, it has been my good fortune to see many dramatic panoramas: Fuji by moonlight, the Grand Canyon, the Taj Mahal—each is superlative in its own way. Yet for sheer impact, the view of the magnificent grove and Redwood Creek Valley compares with any one of these.

Viewing Easy Along Redwood Creek

Here crystal waters flex into a sweeping bend of stream with a margin of gravel beach. And from the rich flatlands just beyond rise the heavy red columns of living trees that soar up, up—as eyes and spirits lift—into the deep sky itself. Other groves of coast redwoods present a viewing problem; the higher trees often crowd far into the forest, where it is impossible to see them from base to crown. But here the redwoods stand forth in their full vertical splendor.

We crossed the stream on bobbing rubber

rafts and scuffed ashore. The tallest of the grove's trees was a curiously forked redwood. Perhaps the shorter trunk had braced the taller one for its prodigious growth. Watery ripples of reflected sunlight danced on the massive lower trunk, and blackened bark told of long-dead forest fires and the healing force of nature.

All day we explored the idyllic grove. When the surveyors' computations were complete, we returned to the great forked tree: It was the new world's champion—367.8 feet tall!

I learned much about forests that day. Howard Libbey told of his company's tree-farm techniques: the way helicopters are used to reseed logged land, the building of dams to prevent erosion, the new milling techniques that make better use of each log.

Unsurprisingly, it was Mr. Libbey who provided one of the truly stirring moments of that memorable day on Redwood Creek. After a long view of the grove, he turned to me with great feeling.

"Someday," he said, "I hope this grove can be opened to the public and preserved for future generations." * * *

Sunlight and shadow dapple forest foliage beside Redwood Creek as Arthur B. Hanson, General Counsel of the National Geographic Society, emerges from the grove of giant trees.

FORCHOWE OF BELKLE DELL BROOKER © N.G.S.



Massive girth of the tallest redwood measures 44 feet. Chester C. Brown of the National Park Service (center) and Dr. Paul Zahl pull a tape around the tree at breast height while Mrs. Brown watches. National Geographic Society support has enabled the Park Service to study factors involved in preservation of California's coast redwoods.

Finding the Mt. Everest of All Living Things

By PAUL A. ZAHL, Ph.D.
National Geographic Senior Staff (Natural Sciences)

Photographs by the author

I STILL WONDER what lured me to the hidden valley of Redwood Creek. Was it a hunch or plain curiosity?

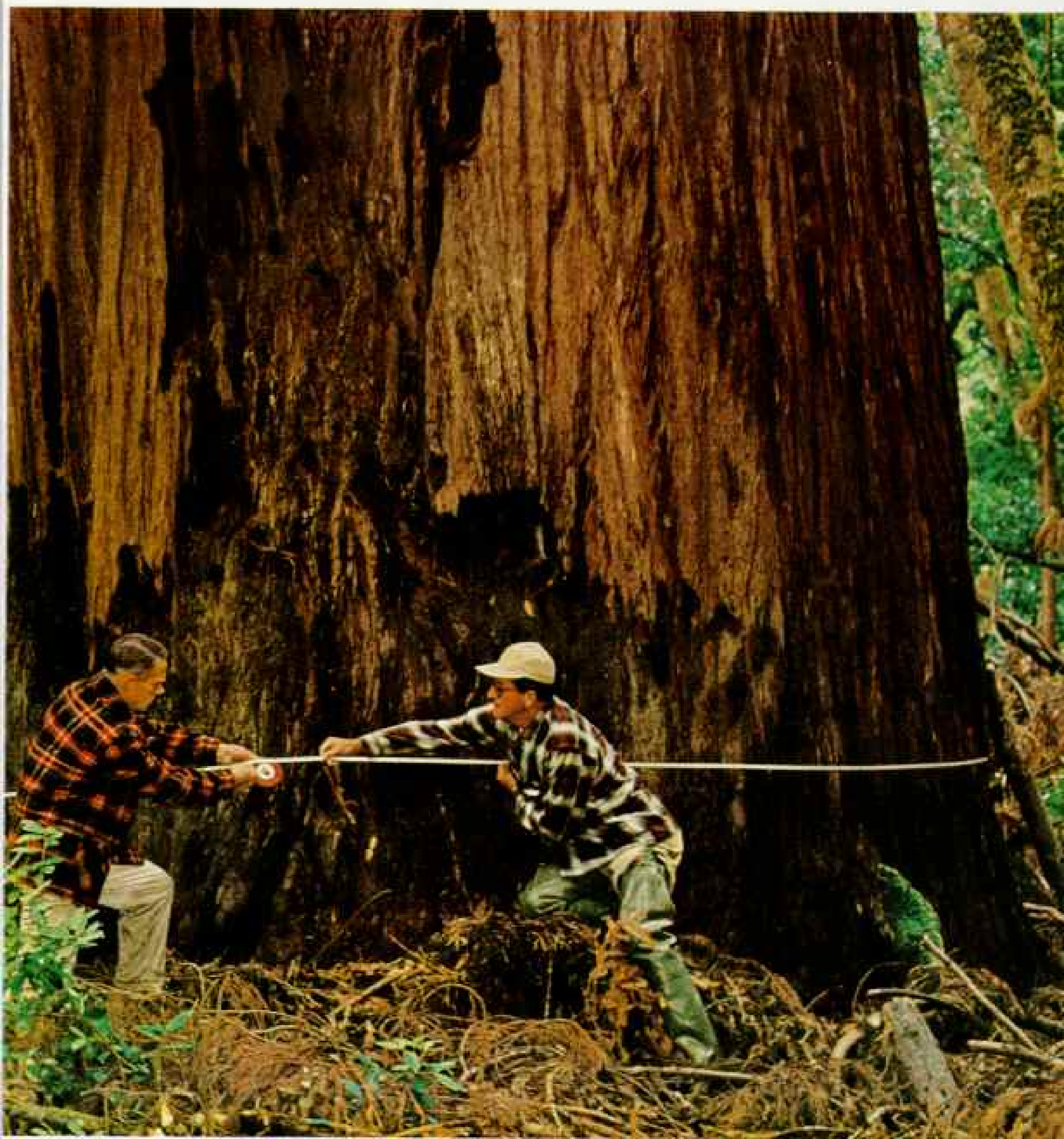
Whatever the reason, I knew the moment I beheld the tantalizing little stream that eventually I must explore it. But I had no idea I would spend many memorable weeks going into and out of that wilderness—nor could I possibly know that the valley would yield a fascinating discovery: the world's tallest known living things.

I first glimpsed Redwood Creek from a log-



ging road that twisted through patches of steep forest and past slopes of partially logged land. From a ridge behind me I had seen the shimmering blue Pacific. Now, atop an inland height, Clarence A. (Casey) Casebier stopped the pickup for a long look eastward.

"You see the trees down in the valley? Great timber!" exclaimed Casey. "But those big ones aren't on our land. Everything east of the creek belongs to the Arcata Redwood Company," Casey spoke with authority as a logging superintendent for the Georgia-Pacif-



PHOTOGRAPH BY NATIONAL GEOGRAPHIC SOCIETY

ic Corporation, along whose logging road we were driving. Heavy trucks grinding through these private domains make travel dangerous for the uninitiated; outsiders can enter only with permission. Generously, Georgia-Pacific had sent Casey with me as a guide.

"Is there any way to get down there?" I asked him.

"There's no road at all beyond Redwood Creek," he said. "The only way to get into that grove is on foot."

Casey's words jogged my memory. I had

heard vague references to the coast redwoods in this secluded valley. But no one knew much about those wilderness trees. Their isolation had protected them.

Now, gazing into the sunlit valley, I promised myself, "I'll come back."

Big Trees Influence Life's Career

My personal interest in redwoods began longer ago than I can recall, when I was a boy in California. My father loved the redwoods, and he made no distinction between the giant





THIRD TALLEST TREE
would top Rainbow Bridge
in Utah by 55 feet.

Fluted pylon of third tallest redwood soars 364.3 feet into the mist, fading out of sight. "The giant's hoary companions crowded so close about," reports Dr. Zahl, "the photographer could not back off. The only view rose straight up." Moss-fringed dead branch writhes above the camera, a Nikon with a 180-degree Fisheye lens laid on the litter of the forest floor. Mops of greenery far above seem inadequate for such massive trunks.

ENTACHROME BY NATIONAL GEOGRAPHIC
PHOTOGRAPHER GEORGE F. MOBLEY © N.G.S.



REPRODUCED BY PHIL & PAUL, NATIONAL GEOGRAPHIC STAFF © NATIONAL GEOGRAPHIC SOCIETY

Bright-orange "banana slug" (*Ariolimax columbianus*) glides over the moist, mossy floor of the forest. It protrudes and retracts bulbous eyes set on fleshy "horns." A relative of snails, the slug appears here life-size.

sequoias and their taller cousins, the coast redwoods. To him, they were all more or less the same—and all magnificent. On family outings I played among the great reddish-brown surface roots and stared upward with wonder along trunks that touched the sky.

Certainly those boyhood trips to redwood forests influenced me strongly in later years to become a biologist and naturalist. And though my work took me far from California, those pleasant memories made me want to introduce my own children, Paul and Eda Kristin, to the redwoods.

Big Timber Built California Towns

For years we talked about our family redwood expedition without actually making it. Yet I knew that with each passing year there were fewer trees to visit.

Large numbers of redwoods used to stand nearly within the ocean's spray in such coastal counties as Marin and Mendocino. Pioneers and loggers leveled many of these trees in the mid-to-late 1800's to build San Francisco and northern California towns.

Then motorized equipment enabled loggers to reach more deeply inland. The National Park Service estimates that, of two million

virgin acres of coast redwoods that once ranged from Monterey Bay to southern Oregon, 15 percent remains. Of these 300,000 acres, only about 50,000 acres lie within public parks and groves.

Nor is the trend encouraging: At the current rate of logging, all the available virgin growth may be cut half a century from now.

Furthermore, the whining chain saw is not the only hazard to the stately redwoods. During the late 1950's, floods softened the earth and high winds toppled thousands of tall trees. Many foresters have wondered if the unchecked runoff from logged-over hillsides is not at least partly responsible for the floods. Since the greatest trees are found in the river flats, the choice groves are exposed to the greatest danger.

These were the conditions that prompted Conrad Wirth, former Director of the National Park Service, to ask the National Geographic Society for a grant to study coast redwoods. Chester C. Brown of the Park Service would head this research, much of it concerned with ecology—the interrelationships of the trees with their environment. I was curious to look in on his work and also to take some photographs of forest life that



Sugar-scoop (*Tiarella unifoliata*) nods a bloom only about a fifth as wide as seen in this picture.



Oxalis wears a violet undercoat.

European garden snail (*Helix aspersa*) drags its shell over a mossy course. This Old World immigrant has spread across North America.

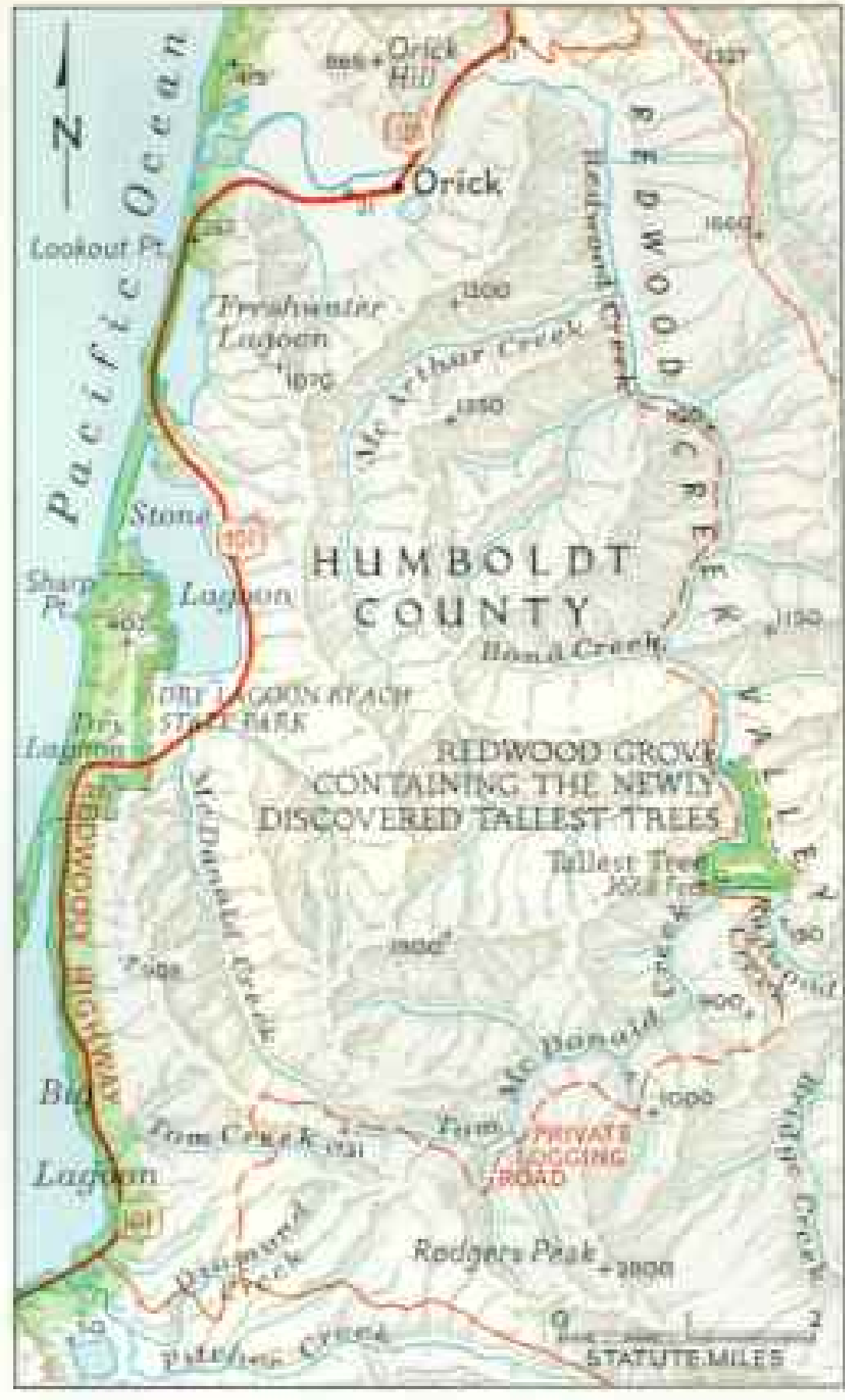


FAR BELOW THE REDWOODS' whispering tops lies a world of small things. Across the darkened forest floor animals and insects creep, crawl, and fly; mosses and lichens cling; and plants hide miniature blooms among massive trunks.

Magnificent Pepperwood Grove still stands intact beside the Redwood Highway. The Pacific Lumber Company, despite high taxes on uncut timber, has refrained from cutting the glorious trees. Save-the-Redwoods League hopes through gifts to buy and preserve Pepperwood for the Nation. Its leafy carpet of oxalis wilts in sunlight but revives in the grove's accustomed shade.



REDWOOD EMPIRE



WORLD'S TALLEST KNOWN TREES

ONLY California and a pocket in southern Oregon produce earth's tallest living things—the coast redwoods, *Sequoia sempervirens*. Trees grow in a belt 500 miles long and hardly more than 30 miles wide. Largest untouched stands flourish in northern California's Humboldt and Del Norte Counties.

In order of height, the top six trees are:

HEIGHT IN FEET	LOCATION
367.8	Redwood Creek grove Humboldt County, Calif.
367.4	Redwood Creek grove
364.3	Redwood Creek grove
356.5	Rockefeller Tree, Humboldt Redwoods State Park, Calif.
352.6	Founders Tree, Humboldt Redwoods State Park, Calif.
352.1	Redwood Creek grove

Forest monarchs of three other species grow in Pacific coast states and in Tasmania and Australia. They include a 324-foot Douglas fir (*Pseudotsuga taxifolia*) at Ryderwood, Washington; a 327-foot *Kauri* *Araucarioxylon* in the Styx River Valley of Tasmania; a 305-foot tree of the same species in Victoria, Australia; and two *Sequoia gigantea* in California—the 291-foot McKinley Tree and the 272-foot General Sherman, both in Sequoia National Park.

might illustrate the broad subject. Such a trip seemed ideal for the whole family.

And so it was that we loaded our car to browse California's 500-mile-long coastal belt, known as the Redwood Empire. All four of us—my wife Eda; daughter Eda Kristin, 15; and son Paul, 12—had a marvelous summer, and none of us had any notion of making serious explorations. Yet, in retrospect, one barely remembered incident pointed in the direction of discovery.

We were following a forest footpath in California's Humboldt Redwoods State Park, 240 miles north of San Francisco. Unconsciously we lowered our voices. On all sides of us stretched a forest floor covered with fallen needles and cones, leaves and twigs, patches of sorrel, fern, moss—an acoustical matting that quieted this grove to the reverent hush of a cathedral (pages 24-5).

Child's Remark Proves Prophetic

We drew near a great redwood surrounded by tourists as silent as we. My eyes traveled upward. Layered by coarse, deeply furrowed red-brown bark, and spotted here and there with yellow lichens, the trunk was bare of limbs for about 200 feet; above, branches formed a verdant headdress now partly obscured by the morning mists.

A neat wooden plaque described Founders Tree: circumference at chest level, 40 feet; diameter, 12.7 feet; height 346.1 feet. Recent measurements show this tree has grown; its present height is 352.6 feet, making it the fifth tallest tree.

Age was unspecified, for only after a redwood tree is cut and its rings are counted can its life span be accurately determined. We know, however, that a tree of this size could have been well along at the time of the Magna Carta, A.D. 1215, a seedling perhaps even before the birth of Jesus.

I explained to the youngsters that Founders had been accepted as the world's tallest tree—until 1957. Then a rival was discovered in nearby Rockefeller Forest, a tree measuring 359.3 feet (page 35). Surveys indicate this "world's tallest" tree has lost height, possibly by storm damage to its crown. It now measures 356.5 feet, giving it fourth rank after the three new discoveries on Redwood Creek.

"But all the redwoods still aren't measured," said one of the children. "Maybe someone else will discover a new world's record."

Prophetic as the remark now seems, it was purely casual that day. And even now not one of us remembers who said it. For the duration



Stopping in a gigantic hole, the Zahls look up at forking boughs that inspired the Chandelier Tree's name. Fungus and fire began the tunnel; man completed it. The tree stands in Underwood Park, a private development on the Redwood Highway.

Taxation of uncut timber makes it costly to keep private groves. The National Park Service estimates that little of the original two million acres of virgin redwood will remain unlogged half a century from now if cutting continues at the current rate. Public parks and groves preserve 50,000 acres.



Redwoods never die, it would appear, considering the myriad green plumelike sprouts on this fallen trunk. Such new growth, rising from the long trunk of a downed tree, occasionally produces straight colonnades of redwoods.

Losing its footing, this behemoth toppled in a high wind. Ferns spring from its bared roots. With huge trunks rising from broad, shallow root systems, redwoods resemble gigantic nails standing on their heads.

Flat leaves grow green on a redwood's low branches; its top produces short needles that often turn rust color.



KODACHROME © W. S. S.

of the summer we continued to marvel at the height of the redwoods, like every other traveling family. Beneath these mighty trees the imagination falters.

Even the great Galileo thought such heights impossible for trees. Of course, when the Italian astronomer lived four centuries ago, he did not know about the existence of redwoods. Instead, Galileo conjectured that "an oak 200 cubits



high"— 300 feet—"would not be able to sustain its own branches if they were distributed as in a tree of ordinary size."

His statement was vague, but if Galileo thought a tree's height could be limited by the hydrostatics of sap transport, then the astronomer was wrong. The amazing fact is that the redwood can lift tons of water hundreds of feet with no pumps of any sort.

Modern plant physiologists know that the vertical movement of sap is due mainly to the extraordinary cohesive properties of the wa-

ter molecule: As the molecule moves, it tugs its neighbors along.

Within the wood's sap tissues, water-filled capillaries extend from the lowest rootlets to the highest foliage. The capillaries end there in minute openings on the surface of leaf or needle, where water constantly evaporates. As one molecule vaporizes, another replaces it from below; in other words, because of the forces of molecular cohesion, the entire water column moves upward by the volume of one molecule. If trillions of molecules evaporate,



as in fact they do, the water column rises correspondingly.

So what limits the height of a tree? Why don't we find trees 1,000 feet tall? No one knows precisely, but mechanical factors surely are involved. For example, the higher the structure, the more massive its base needs to be. If wood were stone, a tree conceivably could outscale the Washington Monument; if iron, the Eiffel Tower. But wood is neither stone nor iron and must adapt to its own intrinsic properties. Also, there is the matter of wind and air turbulence encountered high above the ground. Throughout every redwood forest one sees trees "topped" by such forces, and indeed often laid flat.

Tenting Has Problems in Big Grove

Our first campsite taught the youngsters an important lesson in redwood structure. Surrounded by *Sequoia sempervirens*, we fastened one of our tent lines to a giant at least eight feet in diameter. As our son Paul drove a stake into the ground for another line, he struck a heavy root. Shifting locations, he pounded again and again, only to encounter more subterranean timber.

I am sure Paul will never forget his tent-stake experience. *Sempervirens* has no deeply sunken tap root; it must depend for stability solely on the holding power of surface roots spreading widely around the base.

Such underpinning proves quite adequate within the shelter of a grove but not in an exposed location. In a clearing not far from our camp we saw an example of a redwood that had crashed to earth not many decades before. Its root disk, now at a right angle to the ground, had become a perfect trellis for vines, ferns, and mosses. A similar monarch lies sprawled in Humboldt Redwoods State Park (pages 18-19).

A fallen trunk eventually disintegrates, but it may leave a legacy of sprouting burls to carry on. Burls are humps of germinative tissue on the redwoods, and they explain the occasional woodland sight of giant trees grow-

ing in a line as straight as the trunk of the parent tree that fell to the forest floor.

The casual visitor to the redwood forest tends to gaze upward. It is a paradox in this world of giants that the little things are also fascinating. When we lower our sights for a moment, we discover a microcosm with a splendor of its own.

Oxalis Hides From Sunshine

One afternoon in Pepperwood Grove I photographed little patches of sorrel (*Oxalis oregana*), whose emerald leaves suggest clover (page 15). From high overhead, a beam of light filtered through the forest canopy; where it struck, the oxalis leaves drooped. Then, as the sunbeam passed, the leaves returned to normal. The nature and purpose of this reaction is not known, although the conservation of moisture may well be a factor.

The soil from which the sorrel grew was a blend of twigs, needles, and general forest litter. Here and there lay small cones, each no larger than an olive—last year's redwood seed bearers. The previous autumn, millions of them, maturing both in the upper and lower branches of the trees, had released their diminutive tissue-edged seeds to scatter far and wide on the winds as they drifted down to earth. Each tiny seed has the potential to produce a colossus (page 6).

I was on my knees photographing an oxalis cluster when I spotted something easing straight toward me—a so-called banana slug, bright-orange and as long but not quite as thick as its namesake (page 14). Common in the humid redwood forest, this creature is too interesting and colorful to be repulsive. It feeds on plant tissue, leaving a path of glistening slime as it inches along.

I shifted my position to avoid the slug, then picked up a twig bristling with redwood needles, or, in more correct botanic usage, leaves. The needles were about three-quarters of an inch long and arranged with linear precision along the stem; each contained millions of chlorophyll-bearing cells in which the chemi-

Spared From Saw and Ax, Brown-ribbed Trunks Lift Their Vertical Poetry

Majestic aisles lead through Rockefeller Forest, part of Humboldt Redwoods State Park. This grove, named for John D. Rockefeller, Jr., whose generosity saved the monarchs, contains Rockefeller Tree, now the fourth tallest. Of California's titans, poet Edwin Markham said: "These great trees belong to the silences and millenniums. They seem, indeed, to be forms of immortality, standing there among the transitory shapes of time."





Like Jack the Giant Killer, 12-year-old Paul Zahl tackles the 253-foot Arco Giant near Orick. The trunk measures 60 feet in circumference.

Spice of evergreens and tang of frying bacon pervade a family room walled by nature in Prairie Creek Redwoods State Park. Floor of intertwining roots made it difficult for the Zahls to drive pegs for their tent. Sword ferns provide a natural decor of greenery.

After breakfast the travelers devote their day to hiking, fishing, exploring, or simply relaxing, "lost in worship of those lordly trees," as Stanton A. Coblentz wrote in *Songs of the Redwoods*.

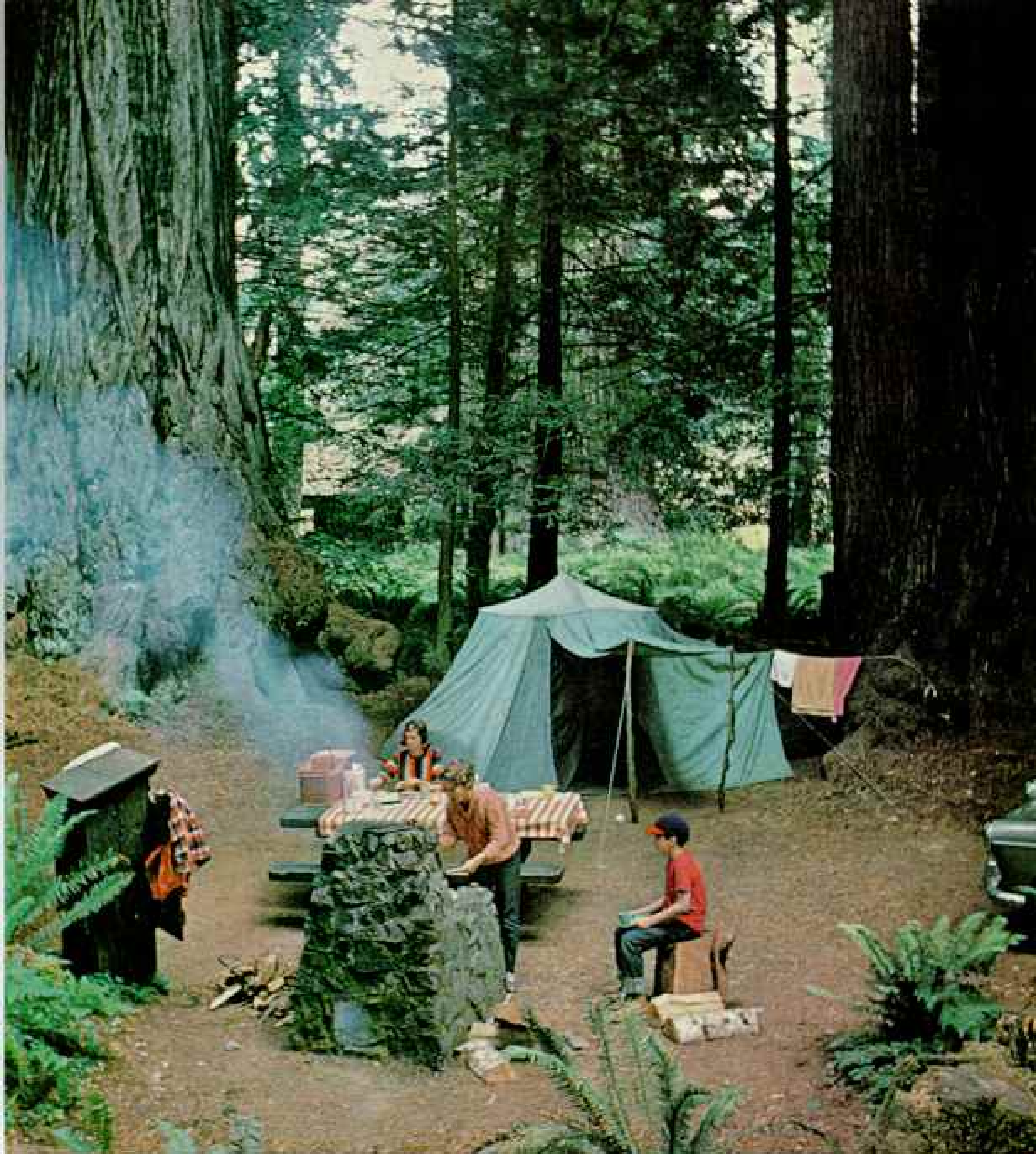
cal transformations by photosynthesis take place to produce the staggering tonnage that makes up each redwood titan. Oddly, those growing in the redwood's heights are short and scalelike, while those on the lower branches are distinctly bladelike (page 18).

Handsome ferns of many species, together with luxuriant mosses, lichens, and liverworts, flourished everywhere here on the damp forest floor. Basic moisture was provided by rain. But there was another important source of water—the fog that so frequently



sweeps in from the nearby ocean. Fly over Humboldt County almost any morning and the valleys are half-hidden by a low-hanging mist (pages 50-51). The extent and pattern of the fog's inland penetration—some 30 miles—correspond almost precisely to the areas occupied by coast redwoods.

This fact leads some authorities to suspect a correlation between the trees and fog. But other scholars point out that redwoods have not always been limited to coastal zones. In times past, there were as many as ten distinct

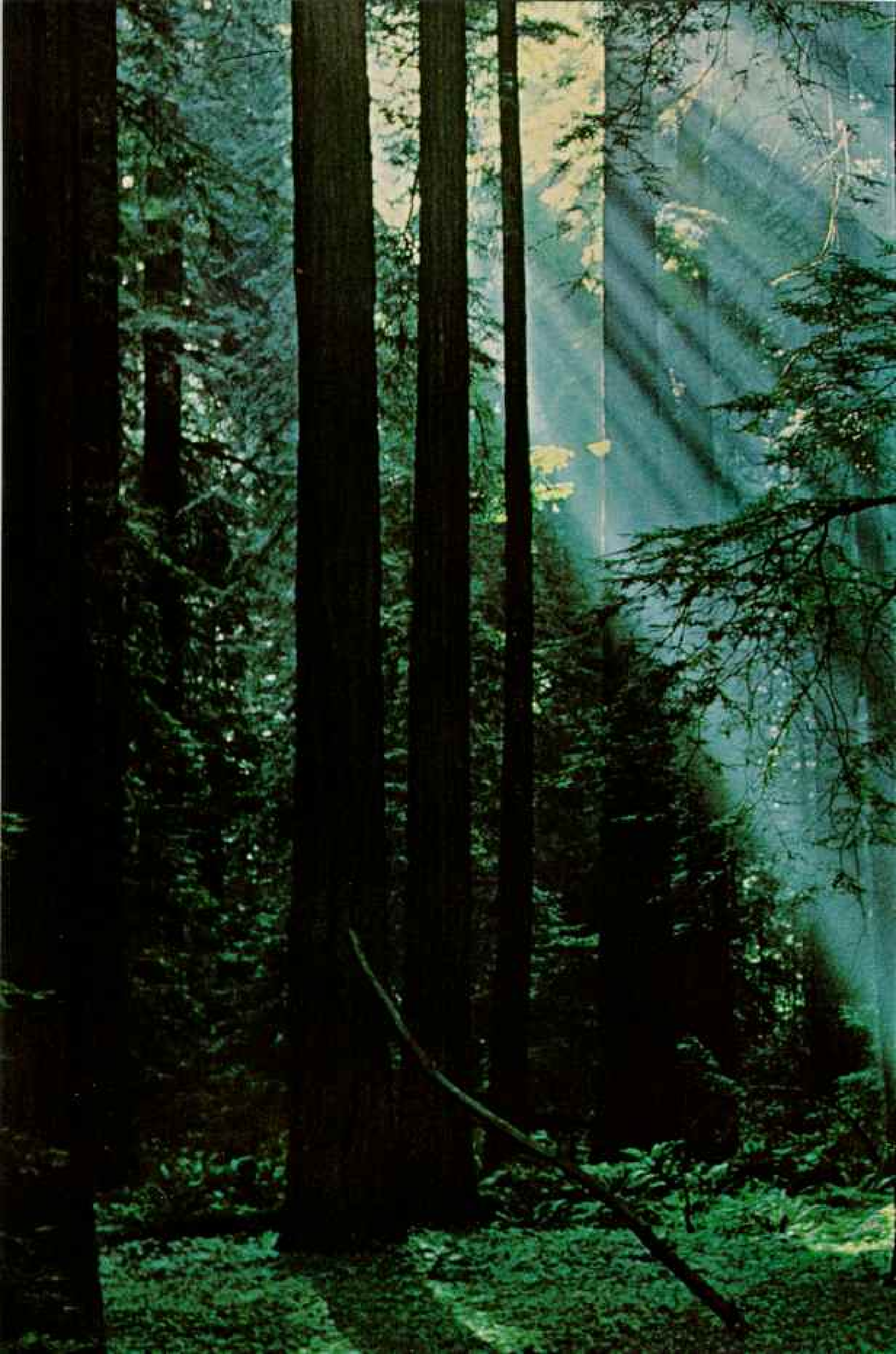


PHOTOGRAPH BY PAUL A. ZAHL, NATIONAL GEOGRAPHIC STAFF. © NATIONAL GEOGRAPHIC SOCIETY

sequoia species, some in Alaska and Labrador, others in Europe and Asia. Only the two California species survive: the massive *Sequoia gigantea** of the High Sierras (some botanists prefer to call it *Sequoiadendron gigantea*) and the taller *sempervirens* (evergreen) of the northern coastal mountains. Both species have been in California for 40 million years, a testimonial to their hardihood.

*See "Giant Sequoias Draw Millions to California Parks," by John Michael Kauffmann, NATIONAL GEOGRAPHIC, August, 1959.

Sylvan sanctuary in Humboldt Redwoods State Park recalls William Cullen Bryant's words: "The groves were God's first temples." Afternoon sun, like light streaming through cathedral windows, dapples an oxalis-carpeted forest. With their mother, the Zahl children marvel at these "majestic brothers," as Walt Whitman called the trees. ▶







REDWOODS (LEFT) AND SPRUCEFERN BY GEORGE F. HUBLEY © A.S.A.

Home in a tree near Redwood Creek leaves no clue to the identity of its long-departed occupant. Chicken-wire ceiling catches falling debris.

Roosevelt elk, wet from rain, rests in a reseeded area. Foresters say that the elk's taste for seedlings seriously hampers redwood regrowth.



The "dawn" redwood," or *Metasequoia*, a related and perhaps ancestral form, survives in China.

Iris, trilliums, ginger, and a host of other wildflowers grow widely, although not profusely, in the deep redwood forest. But along the fringes and in clearings, where the light is strong, floral decorations are often lavish, especially in spring and early summer. In July, throughout Humboldt County, I found stands of rhododendron, azalea, and iris, brilliant with blooms; also columbine, bleeding heart, salal, huckleberry, and wild rose.

Learning Humboldt Lore

As the summer passed, I photographed this variegated life of the redwood forests all along California's Redwood Highway, U.S. 101. About 200 miles north of San Francisco, the redwood scenery grows truly spectacular: Richardson Grove State Park, with its superb trees lining both sides of the highway like closely placed monoliths; Humboldt Redwoods State Park, with its famed Avenue of the Giants and its more than 50 commemorative groves; Pepperwood's vaulting forests; Prairie Creek Redwoods State Park, with its dramatic campsites, herds of Roosevelt elk, and glass-clear streams; and finally, near the Oregon line, the ruggedly imposing Del Norte Coast and Jedediah Smith Redwoods State Parks.

For two weeks we settled in the little logging town of Orick in colorful Humboldt County, only a mile and a half inland from the crashing Pacific. There we stayed in a motel owned by Lowell and Jean Hagood and ab-

sorbed some of the local lore.

Fray Juan Crespi, chronicler of the Gaspar de Portola expedition to upper California, first recorded seeing redwoods in 1769. He wrote of "very high trees of a red color," but his giants were hundreds of miles from Humboldt County.

The Spanish, in fact, hardly penetrated the Humboldt area, and so it is that the names of geographic features date mostly from the gold rush in the mid-19th century.

To Humboldt County came Capt. Ulysses S. Grant to pacify Indian tribes, and here Bret Harte wrote his first newspaper stories and got his first impressions of western local color.

Yet the dramatic development of the area waited for loggers. To this day, lumber remains the basic industry of Humboldt County, and the outdoor traditions of the logger give towns like Orick their zest. When Lowell Haggood talks about the magnificent timber in the roadless valleys here, the visitor does well to remember.

Road Leads Into Wilds

While Eda and the youngsters fished for trout in the creek, I visited some of the forest hinterlands. North of Orick about six miles I found an old logger's road that passed through state parkland, then twisted up a hillside to emerge in a logged-over wilderness. Along this road I could observe every phase in the rise and fall of *Sequoia sempervirens*, every aspect of its growth, harvest, and regrowth.

Within the parkland I often left the car to wander through the pathless forest. Shafts of misty light pierced the superstructure, here and

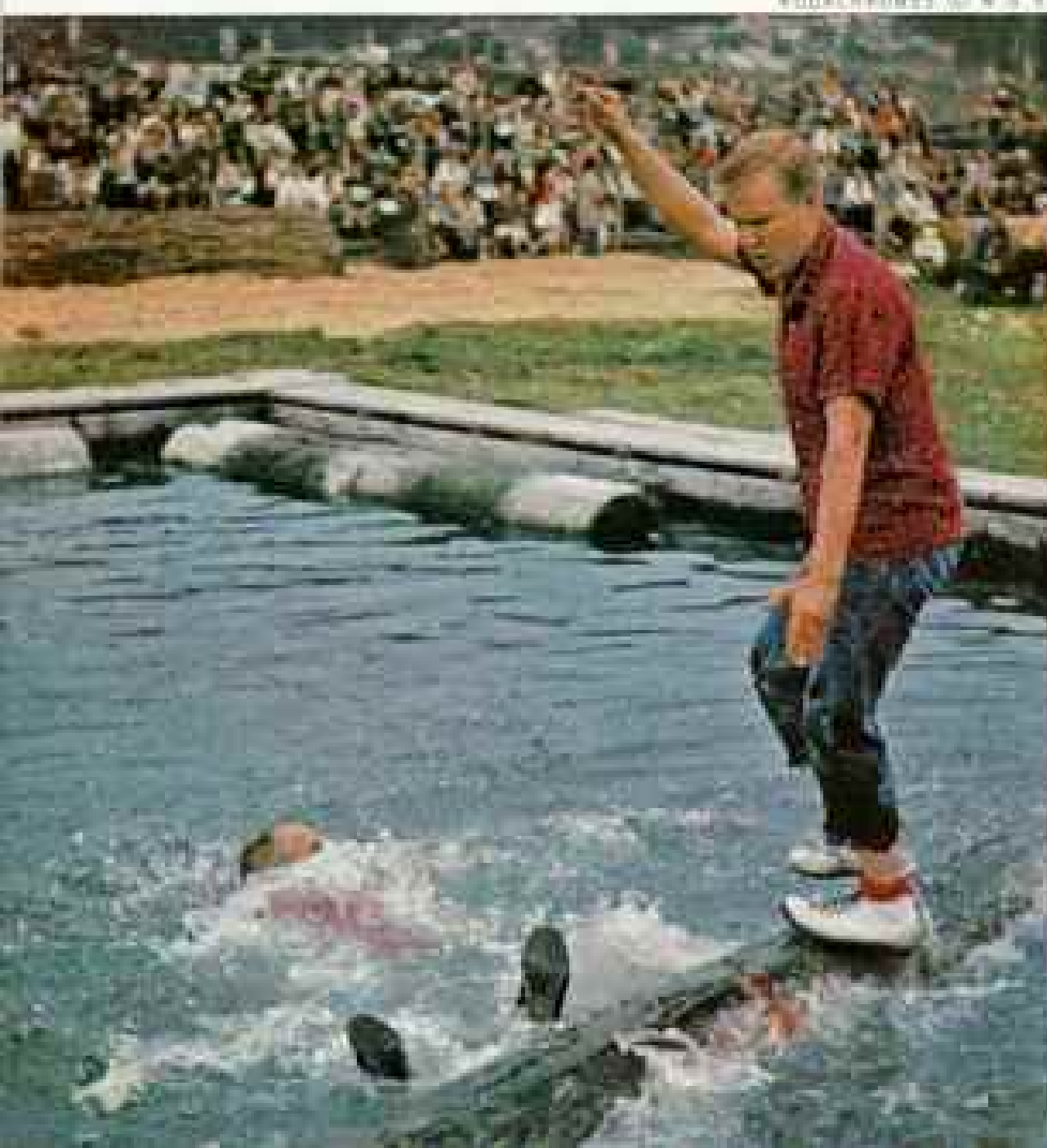


PHOTOGRAPHS BY PHIL W. ZIML, NATIONAL GEOGRAPHIC SOCIETY © N.G.S.

Each bloom a bouquet, pink rhododendrons fringe a tall-tree grove.

Study of water runoff from a cut-over redwood forest absorbs Dr. Peter E. Black of Humboldt State College, Arcata. His neutron meter accurately measures moisture in the soil. Dr. Black was one of a team of experts conducting the National Park Service-National Geographic Society survey of the conditions coast redwoods need for survival.





Round and round, faster and faster, goes the log in the water sport known as birling. The contest enlivens the Loggers' and Lumbermen's Jubilee held every July at Arcata, California. At its climax Jack Culver takes a ducking while John Wickheim holds the log. Lumberjacks with spiked poles still ride logs in millponds, herding them to the saw.

Green wall of redwoods enhances Johnson's Beach on the Russian River in Guerneville, California. Cut nearly a century ago, the forest grew anew, mainly from sprouting stumps. Many trees now tower well above
28 100 feet. The grove shades private resorts.

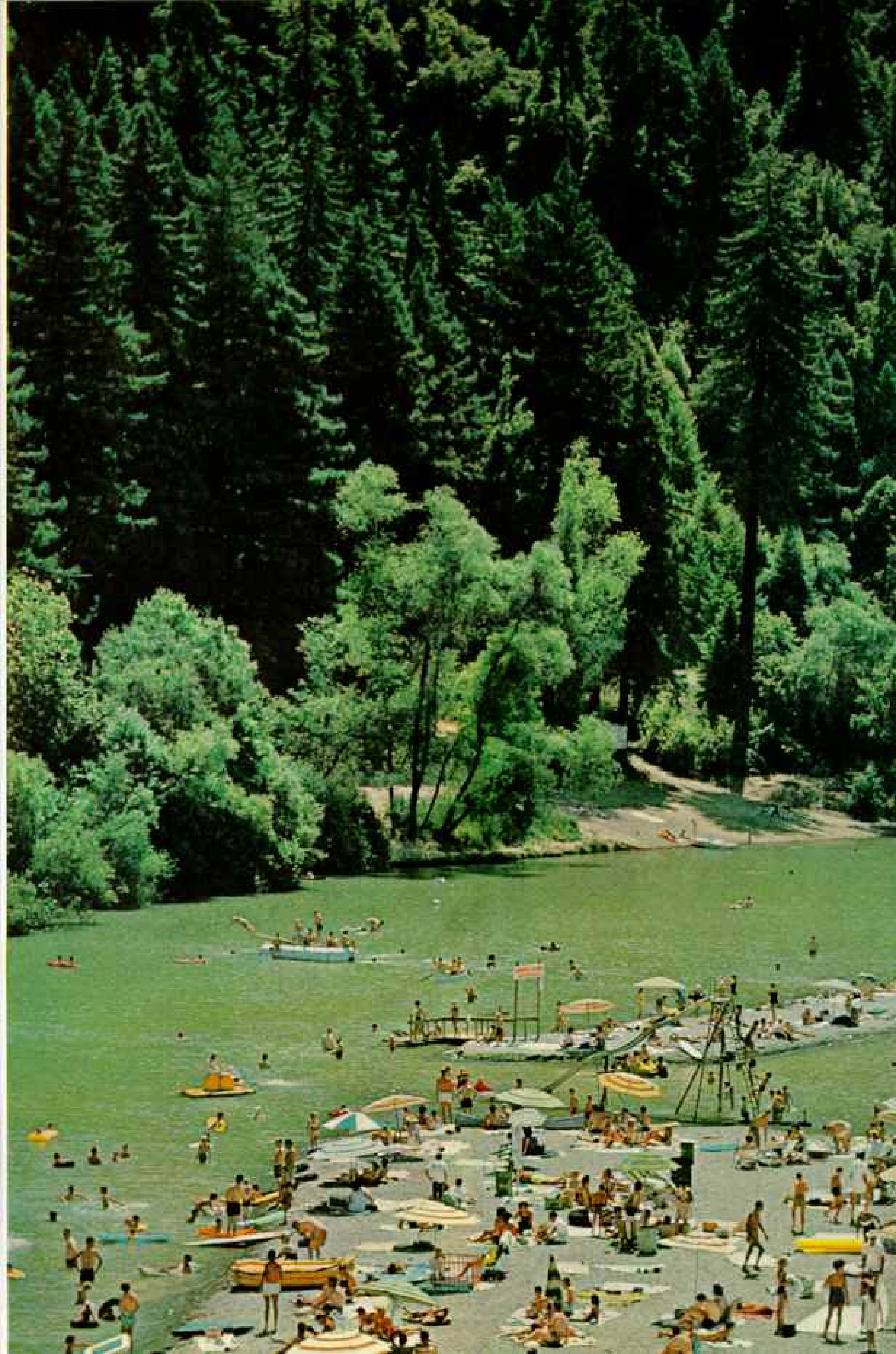
there splashing brightly on the otherwise somber forest floor.

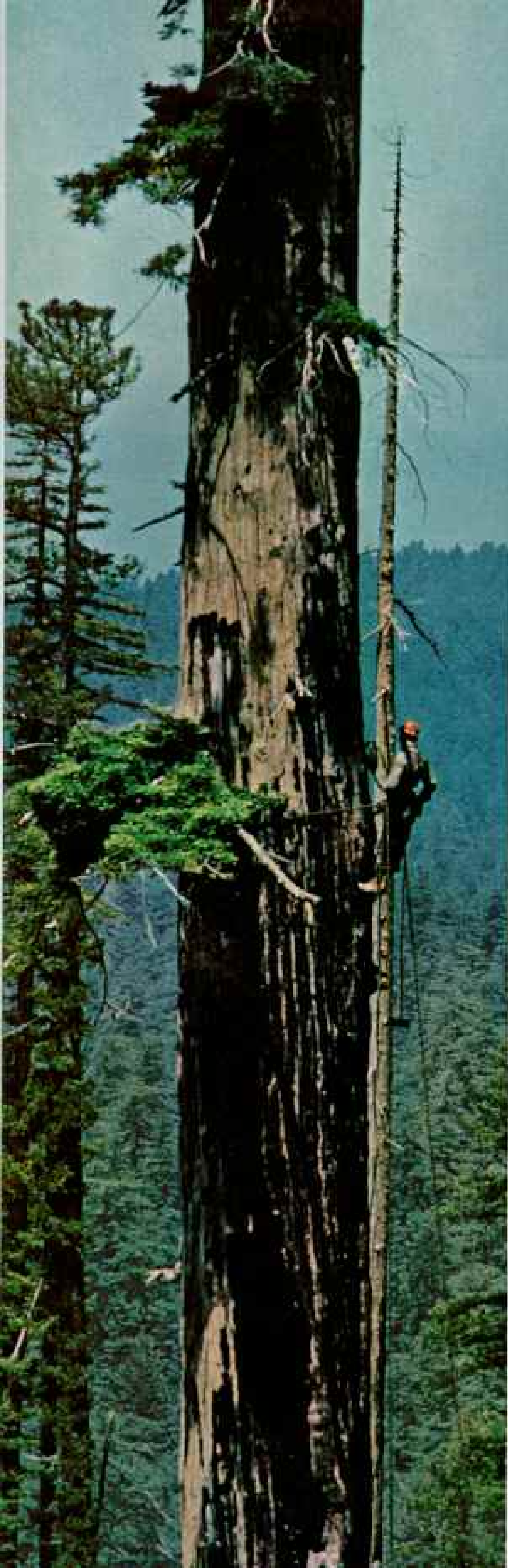
I needed no logger's eye to tell me that these trees—many approaching heights of 300 feet—had enormous market value. A single giant might yield 40,000 board feet of top-grade lumber—enough to build five modest homes. The wood of *sempervirens* is highly regarded for reasons other than quantity. It has strength, straight grain, a satiny luster when polished, and, most important, is extraordinarily resistant to rot and insects—qualities possessed in like measure by few other woods, not even that of the Sierra Big Trees.

The harvesting of *sempervirens* remains an important source of prosperity to California and the Nation. Logging in itself does not alarm conservationists. But early in this century they realized that if logging continued at random and unchecked, all the giants would soon fall. By 1918 certain individuals had banded together, not in opposition to the lumber industry, but to preserve for the people of the Nation some of California's most impressive redwood groves. Relying on private donors and organizations for financial help, this group emerged in 1919 as the Save-the-Redwoods League. Since then, its members have raised \$10,000,000—more than half the funds needed to establish northern California's four main redwood state parks.

People around the world owe a debt of gratitude to the Save-the-Redwoods League for its efforts to safeguard America's giant trees. To preserve private groves still standing along the Redwood Highway, contributions (tax deductible) are desperately needed. Send your gifts to:

Save-the-Redwoods League
114 Sansome Street
San Francisco 4, California





Above 90 feet of nothing, a "high climber" hangs a pulley on a redwood that leans downhill. Cable to a tractor will guide the tree's fall uphill onto a bed of soft dirt, lest it crash to a lower slope and splinter.

Felled giant comes apart under the chain saw. Seed trees on near slopes were spared by Arcata Redwood Company loggers in the 1950's. Scores blew down and had to be removed, damaging young trees. When the company logged the far hillside in 1960, it cleared all but a few trees. Now redwood stumps sprout among Douglas fir seedlings.



Farther up the ridge, in privately owned forest, I passed a scene that was, on first sight, depressing: miles of stumps . . . areas deeply rutted by tractors . . . the dross of logging.

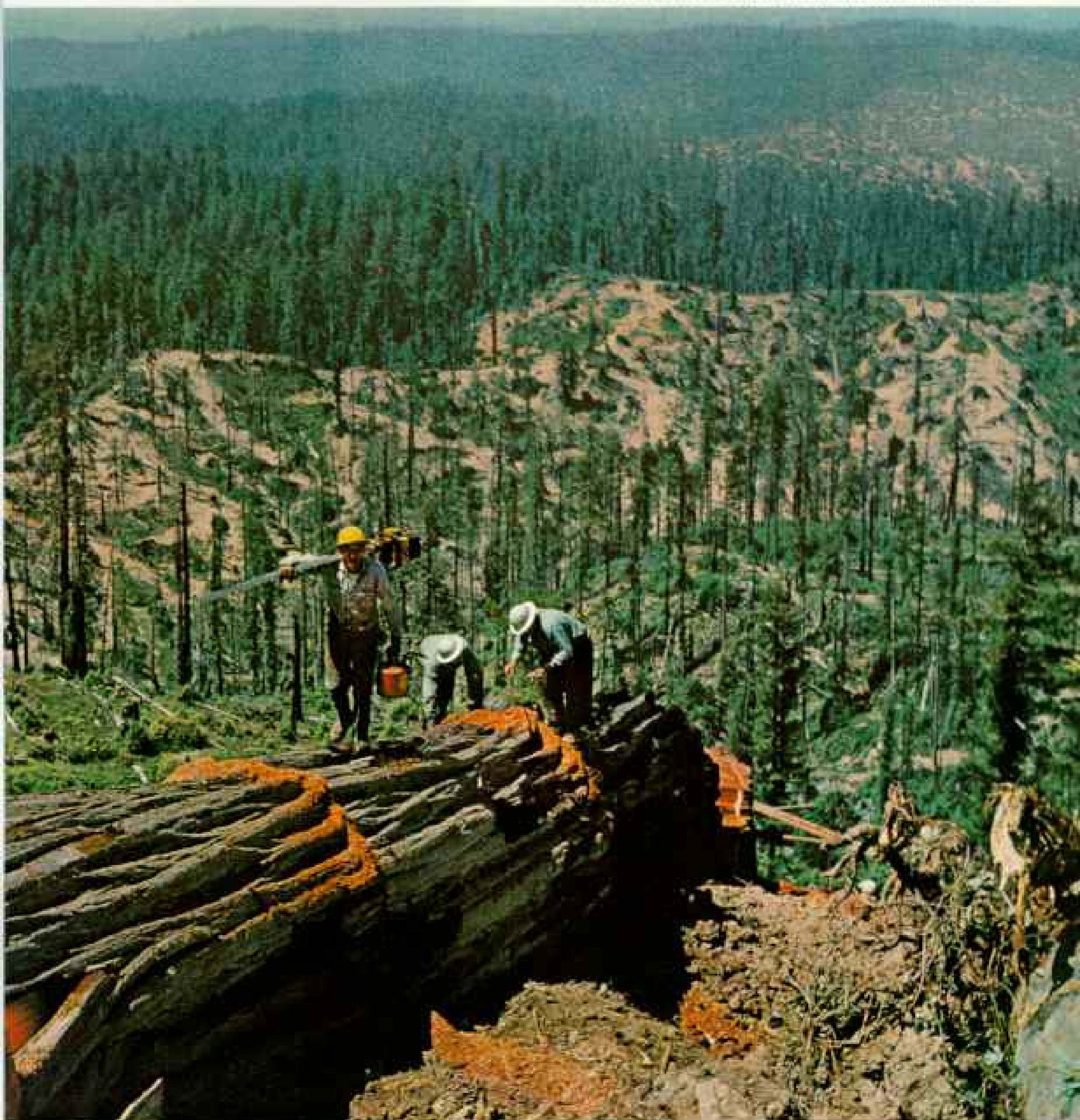
Yet a closer look showed a cycle of renewed growth already under way. Most of the stumps were luxuriantly bushy, revealing a most fortunate characteristic of *sempervirens*. I climbed up on one stump almost big enough for a dance floor. Around its edge were dozens of healthy sprouts three to six feet high. These shoots grow at a phenomenal rate, taking advantage of the still viable parent root sys-

tem, which affords them far more nutrient than a seedling could get.

A totally logged-over area is a thriving forest again in 40 or 50 years. In fact, I saw in Eureka's city park second-growth redwoods that were three feet in diameter. Yet they had grown to that enormous size within the memory of living men.

Many of the larger lumber companies here call their holdings "tree farms." They practice sustained-yield logging: One area produces a crop while another fosters regrowth. But logging men are in agreement that it takes at

REPRODUCED BY PAUL A. SAGE, NATIONAL GEOGRAPHIC STAFF © U.S.A.



least 500 years to produce a giant. "We're in the lumber business, of course," said forester Gene Hofsted of Arcata, "but that doesn't mean we are blind to our responsibilities in regard to conservation. There are practical reasons—we want to be in business 50 years from now."

He explained the two chief logging procedures: selective logging, which leaves about 50 percent of the trees as a seeding source; and clean logging, which takes everything.

Hofsted believes in the latter, especially as it applies to the region around Orick, where high winds often sweep the forests. Trees left standing for seeding purposes in a partially logged area, he explains, are frequently blown down. During one two-hour windstorm in 1959, for example, Arcata lost 10 million board feet of timber. Fallen trees create a summer fire hazard and require removal.

"Better to take everything the first time, smooth the soil, and reseed. Then we needn't send in 'cats' to tear up the land again," says Hofsted.

Lumbermen are not only concerned that new forests shall rise where old ones have been cut. Private industry has in many instances served the public interest by saving particularly magnificent groves in the Redwood Empire. Eventually, they hope, these stands can be bought and preserved.

Georgia-Pacific, for example, has left virgin trees in key spots along the Van Duzen River; Pacific Lumber Company has guarded the unspoiled beauty of Pepperwood Grove, adjoining the Avenue of the Giants; and Simpson Timber Company still keeps its loggers out of scenic tracts alongside Jedediah Smith Redwoods State Park.

Bed Cushions the Fall of a Titan

One day I joined a team of timbermen to witness the fall of a redwood giant. A normal tree on level ground can be felled easily; not so the tree that leans downhill or toward a gully. Falling down a slope or across a ravine can splinter the timber—a big loss to the mill.

The tree I was about to see cut had a downhill lean. Like surgeons in consultation, the logging superintendent and his crew studied its lean, the position of its neighbors, the slope, problems of cutting and removal—even wind velocity.

Now, like an insect on a stalk, a "high climber" wearing iron spurs scales the giant. About 100 feet above the ground, he attaches a steel cable (page 30). Below him other crewmen clear small trees and shrubs from a corridor: the line of fall. Earth-moving equipment roars in and quickly converts the corridor into a soft, loamy bed to cushion the impact.

Sawyers with double-bitted axes and 7½-foot chain saws cut a wedge out of the trunk only a few feet above the ground. The wedge must be precise, for on its size and shape will depend the exact di-

Mighty tusks of a LeTourneau log stacker reach for steaming, rain-wet timbers at an Arcata Redwood Company mill. The machine



can lift 35 tons of timber, run it up its 20-foot boom, and stack it on a pile. Men with chisel-tipped iron bars strip fibrous bark from logs.

Once discarded as saw-clogging waste, the bark now goes into building insulation, mattress stuffing, roofing felt, and oil filters.

RESEARCH BY NATIONAL GEOGRAPHIC PHOTOGRAPHER GEORGE F. WYLLIE © W.G.S.





RESEARCHED BY PAUL W. ZAHLE © NATIONAL GEOGRAPHIC SOCIETY



Growth rings

ADDING one ring each 12 months, the redwood sapling cross section at left (enlarged four times) records 13 years of varying growth.

Some species have laid down accurate weather calendars for centuries past. Building dates of southwestern Indian ruins have been pinpointed by growth rings in their pine beams, a technique

rection of fall; if the tree deviates only a fraction of a degree, thousands of board feet of quality redwood may in one instant be reduced to splinters.

At last the foreman signals, and a heavy tractor waiting well out of range tugs at the cable. Crack! The tree angles ever so slowly at first, then gaining momentum, sweeps down, and with a low, thunderous thud lands on the prepared bed. A cloud of dust and debris is the patriarch's only requiem.

Once, as I scouted the forest, I heard the whir of Chet Brown's chartered Cessna on a reconnaissance flight. I was eager to talk with Chet and the National Park Service planners and other specialists making the Society-supported study of redwood ecology. In fact, I

hoped to make some field trips with them.

The fall term of school was starting. So I interrupted my redwood projects long enough to take my family home and return alone. Then I visited Chet to ask him what he knew about the trees along Redwood Creek.

"Yes, we've flown over that area, and walked it, too," said Chet. He added that he was familiar with the Georgia-Pacific road used by Casey Casebier and me.

Chet unfolded a map to point out details of the terrain. The Cessna had flown too high for the men aboard to get more than an impression, but the forest there on the east slope looked spectacular, so it was marked for exploration on foot. One member of the party thought the trees on the creek flats



tell a tree's life history

developed with National Geographic Society backing.

Young Paul Zahl in Muir Woods, near San Francisco, counts the rings of a giant that was 583 years old when Columbus reached America. Determining the ages of uncut monarchs, such as the Rockefeller Tree at right, poses a problem; rain, drought, shade, and crowding vary yearly growth rates, and corings from trunks prove difficult to obtain and interpret. Stumps 12 feet across have shown ages ranging from 550 to more than 2,200 years; the oldest coast redwood on record. Recent measurements show the Rockefeller Tree has lost 2.8 feet off its top.



© H. W. HARRIS. HIGHEST HEIGHT (APPROXIMATELY) 4/12/1973.

seemed exceptionally tall, even for redwoods.

I recalled what Lowell Hagood had told me in Orick about those trees. He, too, had described them as "great timber." Lowell had never seen the trees himself, but he knew logging lore. He had pointed to dense ridges rising like walls east of town: "The valley behind that ridge is real virgin country. Too bad there's no road."

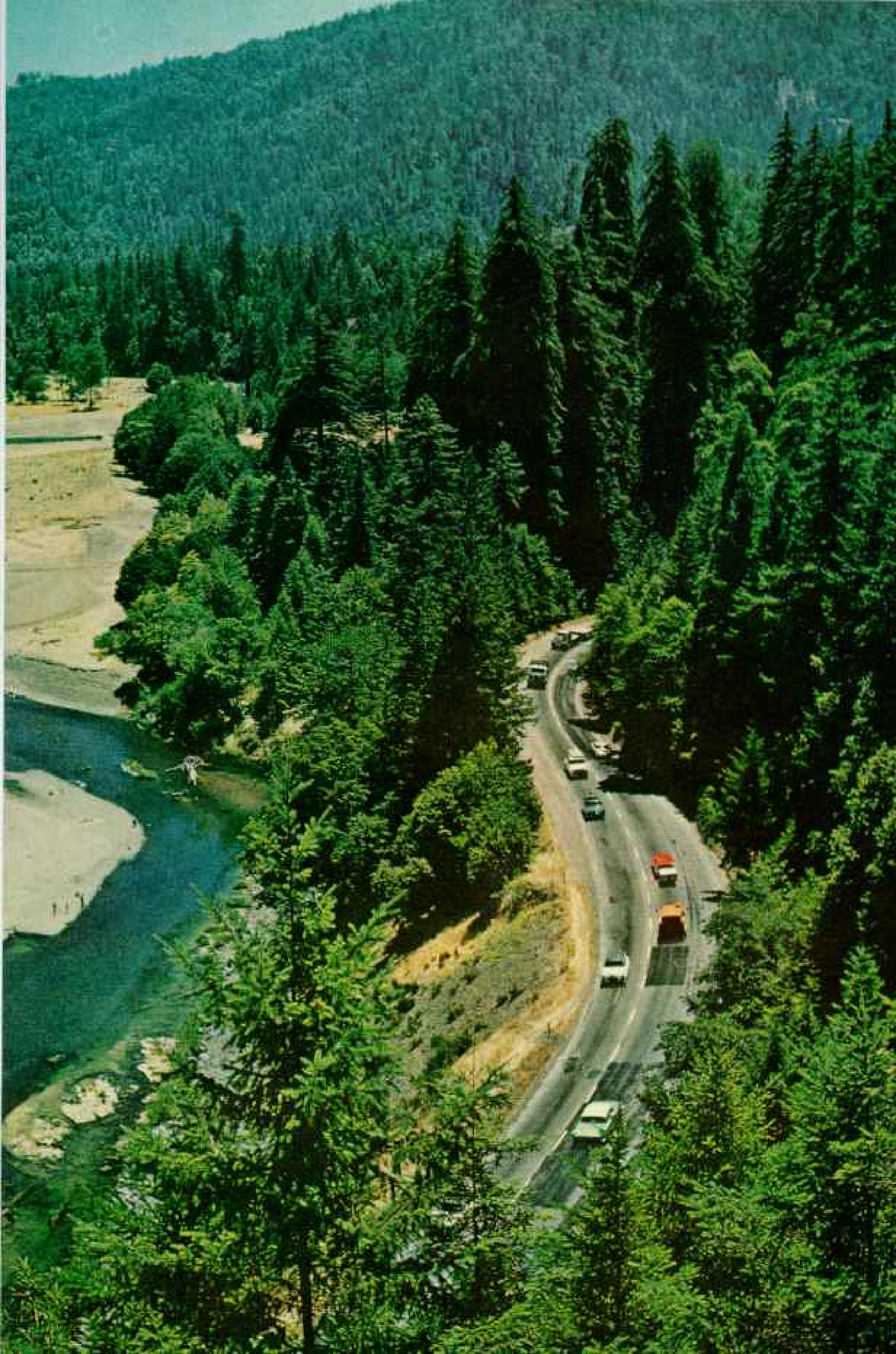
But now, as a result of my trip with Casey, I knew there *was* a road. Curiosity gnawed as I prepared for my first lone visit to the valley of Redwood Creek.

The sun was shining brightly that October day as I drove eastward off U. S. Highway 101 (map, page 16). About ten miles inland, the road descended into the valley; Redwood

Creek flowed northward, bright and blue. I parked by the stream's gravelly bed and took my bearings. Rising several hundred feet to the left was a ridge recently logged. To the right, eastward beyond the stream as far as eye could see, lay a forest of virgin redwood, towering, richly dense (foldout, pages 2-4).

Rain had been sparse, and the creek at this point was only knee deep and 100 feet across. The tracks of elk, deer, and even bear were scattered along the water's edge, and fighting to get upstream against the rapids were several big steelhead trout. To complete the picture of authentic wilderness, a flock of merganser ducks sped low over the water, veering sharply as they saw me.

I hiked half a mile or so downstream, then



back, wading when necessary. At one point where the stream seemed shallowest, I forded it to enter the woods. I was immediately enveloped by deep shade. Massive trunks crowded round me as I moved over a centuries-old accumulation of forest litter. There was no sound, except for my own almost inaudible footfalls.

Columns Loom on Every Side

I stopped in a small clearing and, pivoting slowly, counted the number of great trees visible from that single spot: 30 with trunks at least ten feet in diameter, some perhaps 14, even 16 feet. From my earlier vantage point across the creek, I had seen that they were sky-piercingly tall—just how tall I had no idea. But I determined to find out.

On my next visit to this spot I brought an Abney level, a small sighting instrument for determining the height of anything, from a tree to a skyscraper. To be sure, figures indicated by this simple device are only approximate, but they are useful in preliminary measurement. For absolute precision, a surveyor's transit, chain, and book of tables are, of course, essential.

On the 12th of October, anyone hovering in a helicopter over Redwood Creek Valley about seven miles southeast of Orick would have seen a lone man there on the gravel bars, pounding in stakes, attaching twine, sighting through an instrument, wading the stream, disappearing into the woods, reappearing, writing in a notebook—then repeating the whole routine at other points along the stream. I had already spotted at least half a dozen trees that should be among the tallest in California's Redwood Empire.

But in a redwood forest, one's senses play strange tricks. Scale and comparisons are missing, and it is hazardous to guess tree height without the support of an instrument. My Abney figures indicated that some of the spires rising there on the flat before me, as well as some farther downstream, were about

320 feet high; several were of the order of 335 feet; and one even seemed to reach 350 feet—still nearly ten feet short of the great tree in Rockefeller Forest, then thought to be a record 359.5 feet high.

Even so, this was a forest I devoutly hoped would never hear the ring of an ax.

I returned to the spot again and again. Then one afternoon I set out to climb the partially logged ridge west of the stream, hoping to make some pictures to document the little-known grove. The going was not easy, what with the steep incline, the stumps, brambles, and logging debris. Every so often I turned to photograph the great grove to the east where the trees stood so tall. Finally, when I had climbed about 300 feet above the valley floor, I felt tired. Fortunately, I decided to sit down—otherwise I might have missed the discovery altogether.

Record Tree Soars Above Rivals

While catching my breath, I scanned the treetops before me—then suddenly started. One particular redwood rose above the others like a giant candle. I had already measured its companions—all of them about 320 feet tall. But this great tree stood somewhat inland—and that explained my missing it earlier. From the stream it had looked no taller than its neighbors. Hastily I sketched its position on a piece of paper, then hurried down the bank to get my level and measuring line.

I tried to take careful readings but ran at once into difficulties. In triangulating with an Abney level, it is essential to take an accurate measure of the distance from one's sighting position to the tree's base. For this job I had a 300-foot length of heavy twine. I attached one end to the trunk, then stretched it taut across Redwood Creek to a stake on the far bank. Naturally, the twine got soaked in the stream. Had this changed its length?

After several readings from different points, I came to an astonishing figure. Much as I wanted to believe my rough computation, I

Traffic Curves Into Lofty Arcades of Greenery Along the Eel River

For 400 miles in California, U. S. 101 bears the name Redwood Highway. The route often tunnels among trees so tall and dense they cloak the roadway in twilight, even at midday. Here traffic flows below Inspiration Point in Richardson Grove State Park.

Proposed freeways through redwood country pose a threat to publicly owned groves, notably this and Prairie Creek State Park. Governor Edmund G. (Pat) Brown, a champion of the trees, has declared: "As long as I am Governor in California, none of the state's redwood groves will be destroyed or cut down in order to build freeways."



ENTANGLED AND CORRECTIONS (OPPOSITE) BY GEORGE F. MULLER © N.E.C.

Measurement of colossi calls for a team



BESIDE the chill current of Redwood Creek; pipe-smoking Dr. Zahl and Paul Fritz (right) of the National Park Service pull a rubber raft across the stream. Rodman William L. Hebard (left) uses a two-way radio to discuss the proper placement of his surveyor's rod.

Holding steel tape taut, Jarrold B. Cone establishes his base line from a tree to a sighting point. By establishing a triangle, the men determine the big tree's height. Cone's red ribbon will mark a surveyor's stake.

Leaning Tower of Pisa would rise just above the mid-point of the sixth tallest tree, a 352.3-foot pillar seen in the center of the page opposite.







SEATAUNGTONS (JEFFERY) AND RODCHENKOVES BY GEORGE F. WISLEY © N.S.I.

Planting time: Helicopter pilot Robert Griffith whirls above redwoods en route to his low-flying job of broadcasting redwood, Douglas fir, and spruce seeds over a lumber company's tree farm.

Douglas fir seeds, treated with rodent repellent, will drop onto logged redwood lands that require a quick cover to hold the soil. Redwoods grow more slowly, but the two thrive in mixed groves.

Copter swoops across a logged-out tract seeded three years previously. Many seedlings and sprouts have already reached five to six feet and in another five years will blanket the slope.



simply could not: According to the Abney level, this was easily the world's tallest known tree—about 370 feet!

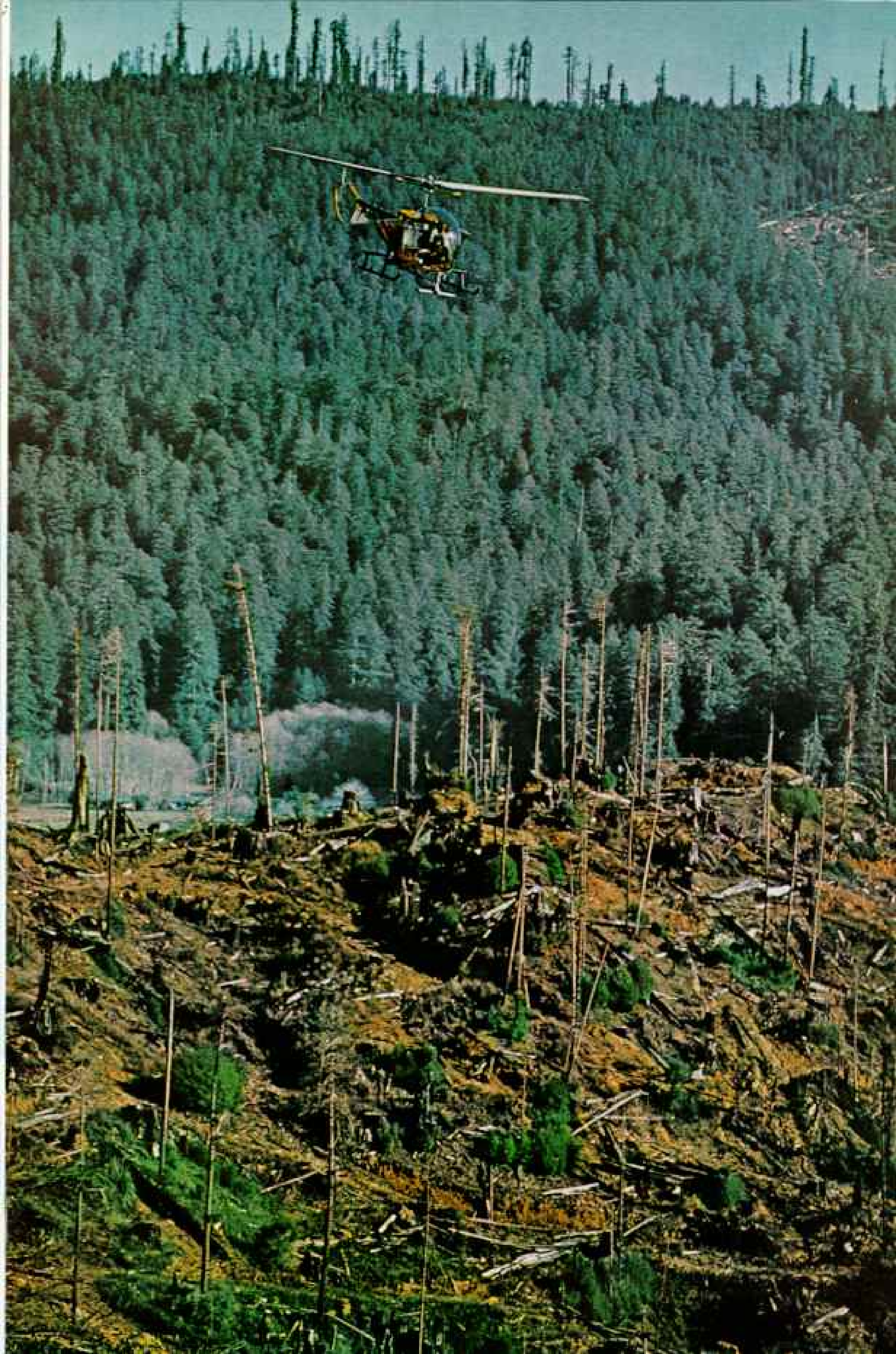
My misgivings increased when I drew a tape around the massive trunk. Four and a half feet above the ground, where circumference is measured, the tape showed 44 feet—and several trees in this very grove had a greater girth (pages 10-11).

I stepped back and sighted straight up the trunk. It was a strange-looking tree. About 14 feet above ground, the trunk divided into two spires, one rising perhaps 250 feet, the other soaring far higher. For symmetrical beauty, this tree was not queen of the forest, yet this specimen—for reasons known only

to nature—had shot up through the woods and left its thicker, sleeker brothers far behind.

Why had no one bothered to measure it before? It had been accessible only to loggers and timber cruisers, men more interested in the board-foot content than in records of height. Furthermore, any logger or early trapper could only have noticed this tree's towering nature from the high, opposite hillside.

I took other readings. Each came close to the same 370 feet. True, my level could give only approximate height; and possibly the creek water had affected my measuring twine. But even allowing for a wide margin of error, I was convinced that this redwood must be a contender for the title of the tallest tree.





Feathery shoots of a burl tickle the chin of Eda Kristin Zahl. Planted burls can become giant-size trees.

Bushy seedling, less than a year old, grows in wet humus.



There was only one thing to do. I would hire professional surveyors to check my figures. And so, representatives of Kleiner and Nilson of Arcata, California, and the Beed Engineering Company of Eureka, came to the creek bottom. Their findings were by no means final; a slight lean of the tree would have to be reckoned for, along with a correction for base-line angle. But perhaps my own

PHOTOGRAPHS BY PAUL A. ZIMM © W.S.A.



Like crocuses popping up in spring, redwood sprouts grow from a burl that Dr. Zahl soaked in water for three weeks.



early measurements were not too far afield.

With growing excitement, I met Chet Brown in the lobby of his Eureka motel. Handing him the sheet of preliminary figures, I watched him read. He whistled softly.

Next day, Chet accompanied me back into the valley where we spent the day inspecting various trees I had singled out. Within just a few acres we counted more than a hundred

New generation, growing from stumps, replaces a grove logged 20 years ago. Beyond blossoming spikes of fireweed, a jagged snag testifies to fire which foresters believe occurred three and a half centuries earlier.

Wire-mesh trap collects the natural fall of redwood seeds. Thus foresters can estimate the number of offspring likely to result. Chuck Bender and the author's son count seeds in a trap set on a sprouting stump to prevent curious elk from trampling it.



giants ten feet or more in diameter—most of them at least 300 feet high. In this grove of giants there might be other trees even taller than the contender I had found.

I was unable to join Chet when he and associates Paul Fritz and Richard Youse went back to the grove for further study. They took Abney readings on other high trees and marked them for measurement by surveyors.

By this time I had called National Geographic Society headquarters with word of the spectacular grove. Melville Bell Grosvenor, the Society's President and Editor, responded with typical enthusiasm: He stepped aboard a California-bound plane so that he could be on hand the day the surveyors made final measurements.

The big, dynamic President of Arcata



Three swimmers get acquainted. Zahl children found the newt (*Taricha granulosa*) under a rock in glass-clear Eel River (page 36).

Green plumes of five-finger fern billow from perpendicular walls of Fern Canyon, near Prairie Creek Redwoods State Park. The canyon carries runoff from some 100 inches of rain in winter. The Save-the-Redwoods League hopes to preserve this green bower.

Sandy calling cards, footprints of a black bear and her cub lie near Redwood Creek within a hundred feet of the tallest tree. Seeds and cones sprinkle the ground.

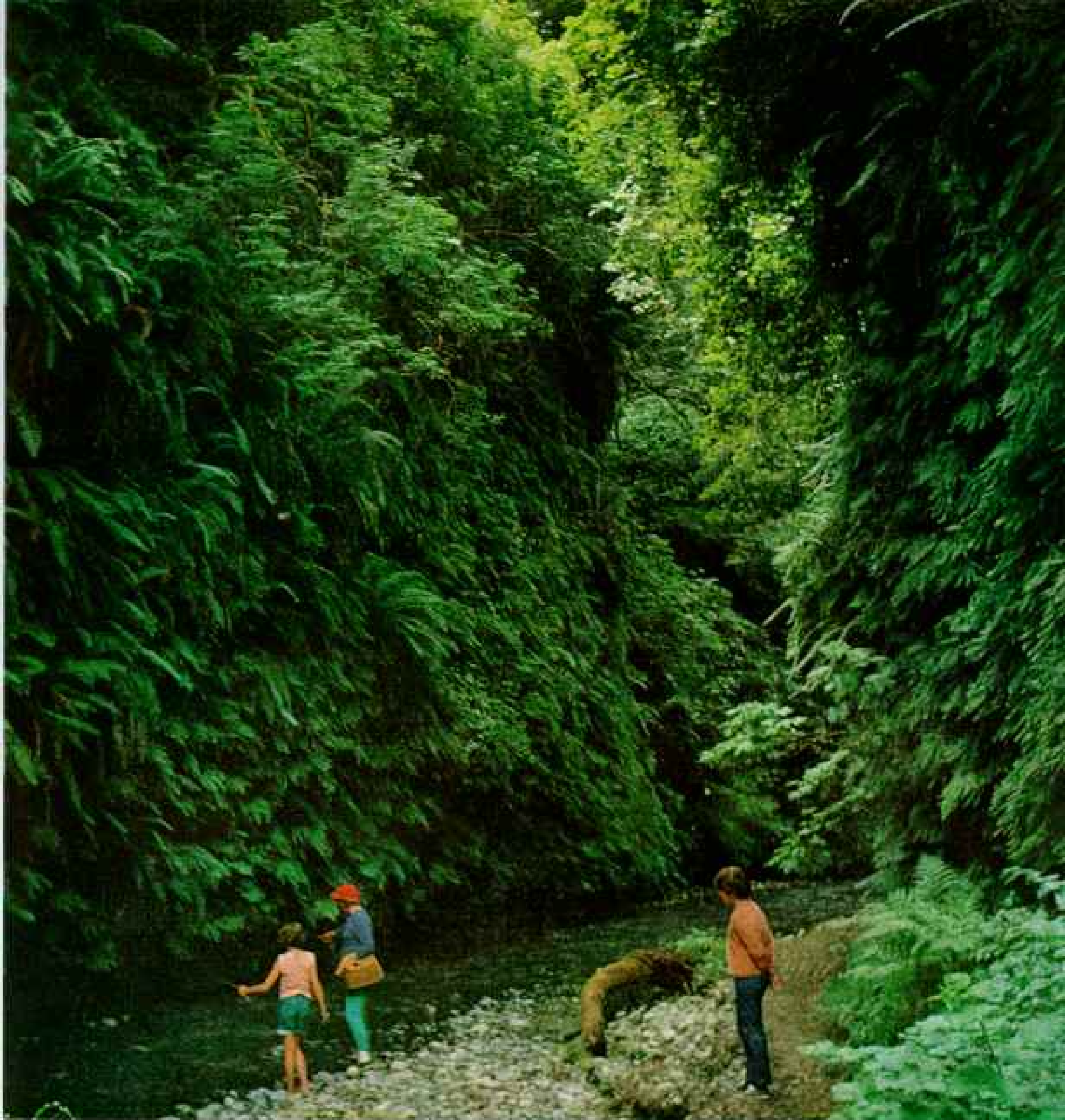


Redwood Company, Howard A. Libbey, had a similar reaction. Grinning broadly, he placed long-distance calls to timberlands manager Harry W. Wier and the company's chief forester, Gene Hofsted.

"I've just heard we've got some very tall trees on our property," he said. "We're going out for a look tomorrow. Try to be here."

Surveyors Tackle a Difficult Task

With Chet and his Park Service colleagues, our party numbered 14 men—"Probably the largest crowd of palefaces ever assembled in this grove," someone observed.



EXTREMELY TALL TREES, LOOKING UP, GEORGE Y. WOODS AND CONTRIBUTORS BY PAUL R. JONES © N.C.S.

But on this particular day the most important members of our party were Oscar G. Larson, a surveyor for Arcata, and the surveyors I had retained earlier. We were asking these men to perform a difficult task: to measure accurately some of the world's tallest trees, to arrive at precise figures, and to issue a joint affidavit.

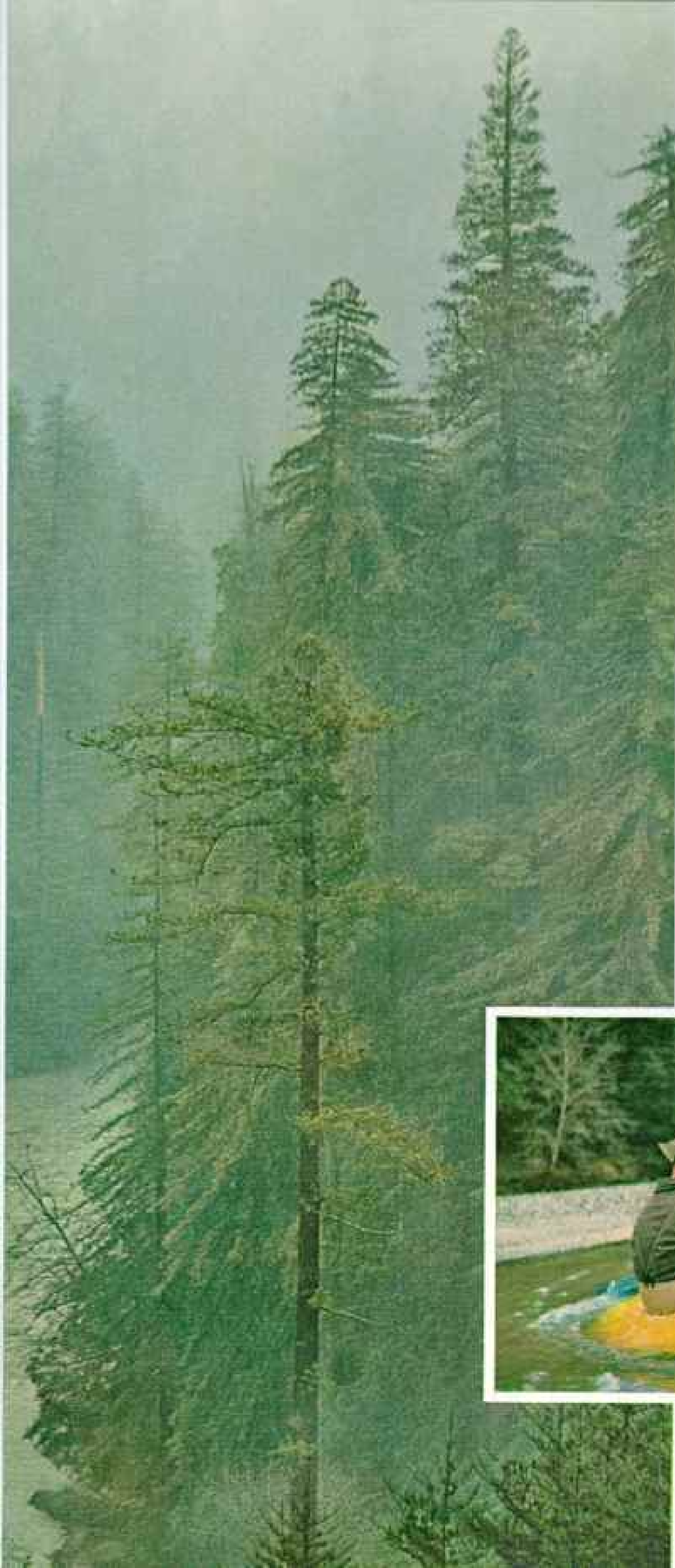
Each surveyor had his professional pride and reputation at stake. Chet and I felt even more personally involved. Would these trees really be close contenders—or champions?

It was a slow, careful process. The surveyors sighted treetops, read angles, measured

base lines, consulted books of tables—and then went through the whole procedure again. Finally, the three men compared their computations—and the figures agreed.

Giants Sweep Win, Place, and Show

Their agreement would completely change the tree world's hall of fame. The four tallest trees in this grove—as attested by the surveyors' jointly signed statement—showed heights of 367.8 feet, 367.4 feet, 364.3 feet, and 352.3 feet. These trees would rank as the first, second, third, and sixth tallest living things known on earth (list, page 16).



London's Big Ben would fall short of the second tallest tree, 167.4 feet high.

Rain-drenched second tallest tree spears above its companions. Redwood Creek surges through a misty canyon of green.

Leafy crown in this air view hides the monumental trunk of the second tallest tree (center). Far below, a yellow raft lies beached beside Redwood Creek.

Riding the current, Paul Fritz and the author splash downstream to the highway near Orick. The voyage gave them a chance to appraise other groves along Redwood Creek.



FRITCHPOM (LEFT) AND STRICKLAND BY
JOHN F. WOLFE © R.S.S.



Running salmon lure shoals of fishermen

IN BLUE-GRAY MIST on an August morning, anglers flock to the Klamath River, only 20 miles from the newly explored redwood grove. Salmon and steelhead trout by the hundreds of thousands run the gantlet to upstream spawning grounds. At the run's height, the small-boat fleet covers the river.

Regrowth redwoods on surrounding hillsides hide cabins of summer visitors, many escaping from the heat of California's central valley. Town of Klamath lies two and a half miles away, beyond the ridge at right.

Lucky angler, calling it a day, uses a hefty pole to carry his catch. Larger of the two Chinook salmon weighs about 40 pounds.

PHOTOGRAPHS BY PAUL A. EARL © N.Y.C.



The second and third trees were among those that Chet and his men had pointed out. Less than five inches of height separated my find, the champion, from No. 2.

"Wouldn't it be marvelous," mused Dr. Grosvenor that evening, as some of us discussed the day's events, "if that grove could be preserved for the American people?"

That, of course, lay in the future. For the moment, Mr. Libbey of the Arcata Company had assured us that no lumbering would be done in this vicinity for an indefinite period.

Meantime, I had one more field trip to make. I had still not seen the seven miles of Redwood Creek downstream from the big grove. What if another champion lay just beyond the next bend of the creek?



With the announcement of a new world's record, I knew that other redwood enthusiasts would begin searching for a new and even taller champion. Perhaps quite soon someone would find a greater tree—and perhaps, down Redwood Creek, we ourselves might make that discovery.

"Has anyone ever gone down Redwood Creek by boat?" I asked Paul Fritz of the National Park Service.

"Not that I know of," he replied. In fact, old-timers had cautioned against such a trip. In wet weather, waters can rise suddenly and dangerously; we would also have to watch out for swirling rapids.

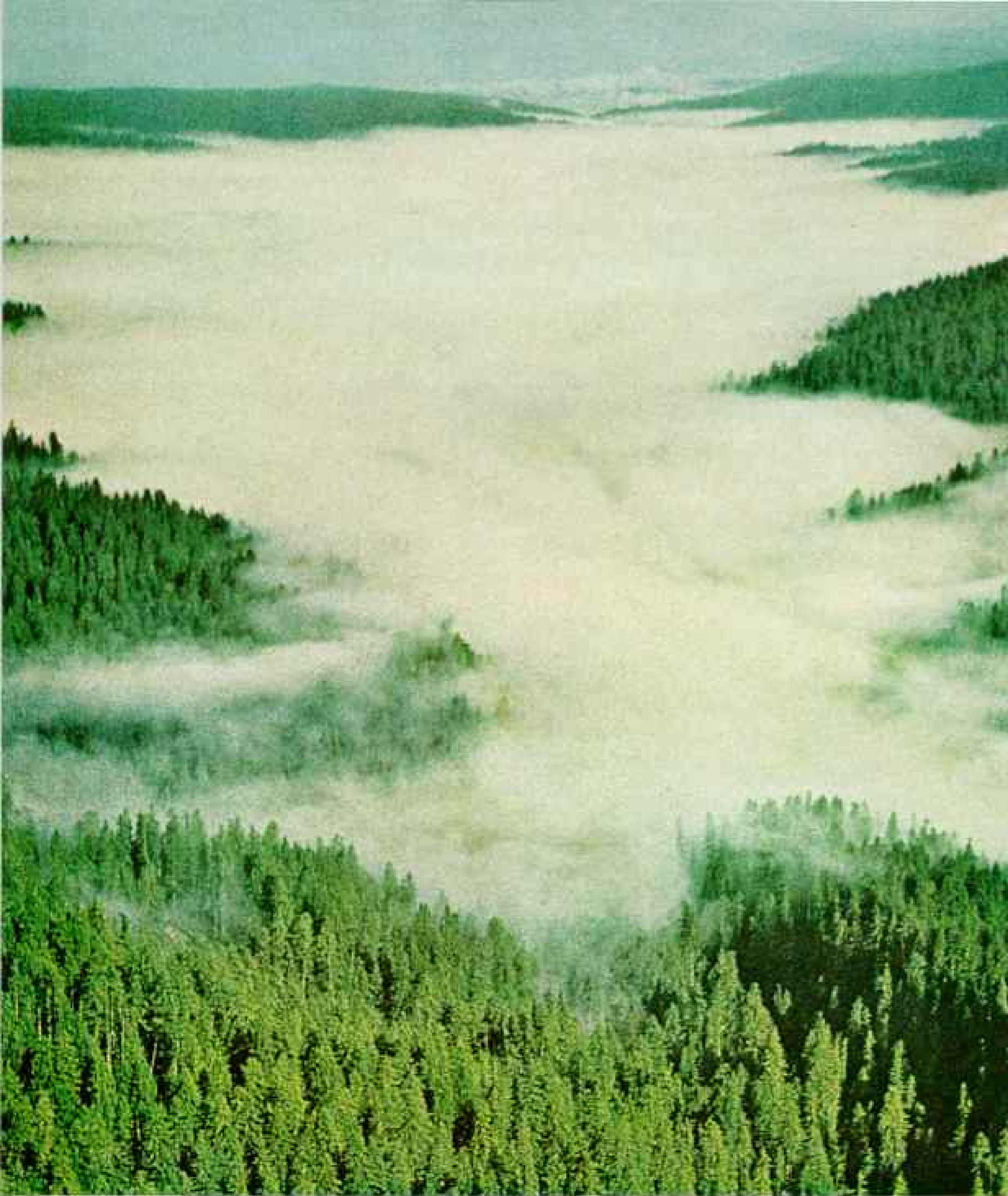
But what's the point in exploring if there aren't a few unknowns?

George Mobley, NATIONAL GEOGRAPHIC photographer, joined us on the bright, dry day when we set out in two inflated life rafts. On the first bend we learned how to use our little aluminum oars; we whirled like tops until we had the hang of it.

Paul Fritz shared my raft, and since he weighs somewhat more than 200 pounds, our gunwales were frequently awash. Thanks to the dry fall weather, the stream was at its seasonal low (page 46).

Walls of Green Form Canyon

We floated with the current down this evergreen canyon, sometimes becalmed in long stretches of slow water, sometimes whirled suddenly around hairpin bends into



swift rapids. Struggling with the oars, we managed to prevent swamping.

Twice we had to make portages. But the scenery lightened these mild difficulties. Alternately deep and narrow, wide and shallow, the creek carried us between sheer walls of towering redwoods, past broad flats rich with maple, oak, alder, and man-high bracken.

On a reconnaissance sortie ashore, we came

upon one of the thickest trunks I had seen anywhere in the valley—almost 20 feet. But, alas, some years or decades back it had been snapped off clean 70 or 80 feet above the ground. What a tree that must have been!

During the greater part of our journey, as we drifted past line after line of redwood treasure, we saw no sign of human intrusion. This was certainly one of the few remaining



Sunset over the Pacific silhouettes a seed tree that loggers spared to start a new stand of redwoods.

Rolling mists nourish trees

Tongues of fleecy fog off the ocean fill the fingers of a valley north of Eureka. All up and down the Redwood Empire this scene repeats itself day after day. Mists blanket glades, drip from evergreen needles, and veil spiky branches. Largest stands of timber thrive where the fog prevails, suggesting that mist-borne moisture spurs coast redwood growth.

redwood wildernesses neither protected within public preserves nor yet scheduled for logging. If we saw no giants to challenge our new champions, we still saw some of the most extraordinary scenery in the world.

Paul Fritz was especially caught by it. A talented landscape architect, Paul knows what to do with extraordinary scenery. Once, when we pulled our rafts up on a gravel heap,

I listened to him think aloud. He considered the planning that would be required to give access to the magnificent redwoods. He talked of the protection they would need.

"These are things we could do for the public," he said. "They should be able to view these trees forever."

I wondered whether those were words of prophecy. I hoped so.

THE END

The World in NEW YORK CITY

By PETER T. WHITE
National Geographic Staff

ONE NIPPY DAY last autumn, I helped farmer Herbert Gericke paint the barn. He was happy about his farm: "Beets, celery, kale, spinach—60 different vegetables and fruits, as good as any in the country!"

Mr. Gericke's face lit up when his son Richard said, "Farming is my life. At the end of the day, you can look back at what you did and be proud."

Down the road, I listened to another farmer's son: "How'd *you* like to work 90 hours a week? Me, I drive an oil truck, 40 hours a week. Why shouldn't we sell the land, so they can build houses?"

Remarkable, I thought, to hear all this right in New York. For here I was in one of the city's five boroughs, the one known

America's sky-reaching metropolis,



as Richmond or Staten Island, barely five miles as the ferry plies from the Island and Borough of Manhattan.

True, New York City has only a handful of farmers left. Yet these few reflect the range of outlook to be found among vanishing farmers across the entire United States—from those who want to stick to the soil no matter what, to those who cannot get away from it fast enough.

Here was another bit of evidence to prove what has so often been denied: that in surprisingly many ways, New York *is* America.

In somewhat more obvious ways, of course, the City of New York—now in its fourth century of steady growth

in size and complexity—clearly mirrors the development of the United States. Seven out of ten Americans now live in urban areas, a trend epitomized by New York City's astounding concentration of humanity.

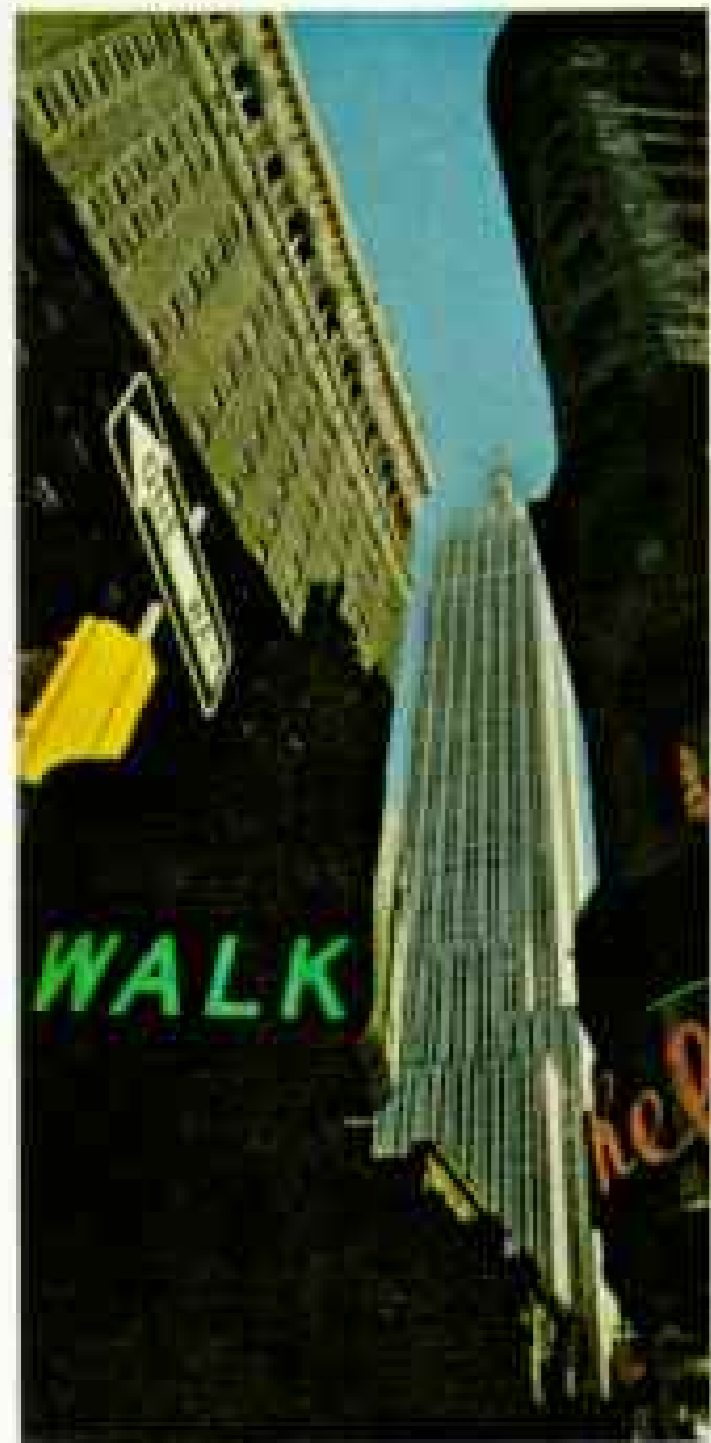
Just the two boroughs on Long Island, Brooklyn and Queens, house 4,660,000 people, more than either Chicago or Los Angeles. The Borough of the Bronx, the only part of the city not on an island, holds 1,450,000, more than San Francisco and Boston together.

The city lost 110,000 residents from 1950 to 1960, but today's 8,100,000 New Yorkers outnumber the citizenry of Colorado, Wyoming, Montana,

host to millions for the 1964-1965 World's Fair, spreads below earth's tallest building



Famed Empire State Building, spiring 1,472 feet above Fifth Avenue, makes pygmies of nearby giants. Two million visitors a year ride its high-speed elevators to the 102d floor to view the



city as a living map—an everyday backdrop for the building's window washers (foldout).

Limited in its ability to spread out, Manhattan took to the air and produced the most fantastic array of skyscrapers in the world. In recent years the biggest and costliest building boom in its history has changed New York's face at incredible pace.

Gleaming pinnacles of steel and glass, aluminum and bronze, anchored in the underlying rock of narrow Manhattan Island, lend hold new credence to New York's proud title: America's mightiest city.

FORWARDING AND BY ESTABLISHED SPECIALISTS BY NATIONAL GEOGRAPHIC PHOTOGRAPHER THOMAS BERRELL © N.G.S.

THIS PAGE FOLDS OUT

Idaho, New Mexico, Arizona, Utah, and Nevada together.

America's premier city is the greatest hub of communications and transportation and the mightiest seat of commerce and finance on the globe. It is also the world's busiest center of manufacturing; the 1960 census lists Brooklyn alone as home to more factory workers than Pittsburgh and Detroit combined.

To support its myriad enterprises, New York has the world's densest concentration of telephones and secretaries, of salesmen and psychiatrists. Its 60 major bridges, four automobile tunnels, and two dozen ferryboats link a monumental complex of parkways and expressways. (See the double U. S. Atlas Map, *Greater New York and Tourist Manhattan*, distributed with this issue.)

Wilderness and Witchcraft Survive in City

Thus this City of New York, home of the World's Fair of 1964-1965, vigorously reflects much of what is mightiest and most modern in America. In quieter fashion it reflects even more. Parts of Queens are today as free of people and as calmly frequented by herons and egrets as the swamp primeval in the Florida Everglades.

Nor does the magic city lack magic in the literal sense: dozens of women who claim the title of witch, and who can spawn hope or terror in thousands of hearts in Manhattan—as sorcerers do in Haiti and New Guinea. I discovered, in short, that in surprising ways New York is not only America, but indeed the world.

Until recently I was unaware of much of this, even though I landed in New York as an immigrant a quarter of a century ago and have lived there many years. My home has been in a quiet neighborhood called Elmhurst, in Queens, in a five-story apartment house that surprised my wife when I first took her there.

"It reminds me of my little home town in Illinois," she said. "Everybody in the building seems to know everybody else."

Typically well-disciplined New Yorker that I was, I never lost my temper while squeezing or being squeezed in and out of the subway. I read as much as I could of the *Times*, which on some Sundays weighs five pounds. In icy winter I'd browse in the hush of the gigantic reading room of the New York Public Library at Fifth Avenue and 42d Street. In summer, on days not too hot and muggy, I might lunch on the sunny terrace of the miniature zoo in Central Park. For close looks at life, and to get material for magazine articles, I traveled to Paris or Alaska, or to Laos or Brazil.

"You've been taking this wonderful city of New York too much for granted," said my wife.

She was right. This time I would look closely at life at my doorstep. I would start by finding out how the city strikes its visitors. Every year brings about 14 million of them, according to the New York Convention and Visitors Bureau. Half come on business, the other half simply to look.

"*Vista fantástica!*" bellowed Mr. Carlos Martínez, a Colombian. He and his wife had just taken a helicopter



Snow-blinded pedestrian struggles through Manhattan during last winter's worst storm, a 14-inch fall.

"East Side, West Side, all around the town"

Cargo nets swing at an East River pier of the Fulton Fish Market, as crewmen aboard the trawler *Andrea G.*, out of Gloucester, Massachusetts, unload their catch. The market, largest seafood wholesaler in the eastern United States, handles 180 million pounds a year.

Beauteous show girls parade as caged birds on the stage of the Latin Quarter, a big Broadway nightclub.





ALBERT WILDEY, JACQUEL KNO AND DEAN CONGER © N.Y.C.

Sands of Coney Island almost disappear on summer Saturdays and Sundays, when more than a million sunbathers throng the beach. On this midweek outing, a family finds the resort strangely quiet.

More than eight million New Yorkers, nearly the population of Greater London, crowd into less than half London's area. Four of the five city boroughs are on islands; only the Bronx lies on the mainland.

Fruits and vegetables painted on his barn advertise products grown by Staten Islander Herbert Gericke (left), one of New York City's few farmers. Richard Gericke will help his father plant young fruit trees.



ride off lower Manhattan, for five dollars each. They had flitted along the tops of massed skyscrapers (pages 92-3) and skimmed across the harbor that gleamed so blue that day in the sun. As only the helicopter-borne can, they had looked the Statue of Liberty in the face (pages 74-5). Mrs. Martinez said: "How beautiful she is, your statue, how serene."

Earlier they had toured the city within the city that is Rockefeller Center. They had glimpsed the wondrous roof gardens: "Four acres," the guide said—"bigger than the Hanging Gardens of Babylon." And Mr. Martinez had been highly impressed by the Radio City Music Hall—the world's largest indoor theater, seating 6,200—and by the length and stamina of its celebrated chorus line, the Rockettes.

On the grounds outside the United Nations headquarters I found a grandmotherly lady from Ohio, smiling at a bell inscribed "Long Live Absolute World Peace." Its metal includes melted-down coins from 60 nations.

"How nice," she said. "And wasn't it kind of Israel to send the stone for the base, and of the Japanese to give the bell and the little

roof over it. It shows that people everywhere can be good."

The U.N. occupies six blocks on Manhattan's East Side that are, strictly speaking, not part of the city at all, but instead form an international enclave (page 77). Here were flying the flags of 113 nations, in alphabetical order from Afghanistan to Zanzibar.*

United Nations Holds World Hopes

To New York, this means the year-round presence of some 2,000 members of foreign delegations, plus another 3,600 employees of the U.N.'s international Secretariat—spending altogether some \$78,000,000 annually. To the tourists, traipsing after the pretty girls from many countries who act as guides, the United Nations presents a symbolic kaleidoscope of mankind, searching amid the most modern surroundings for ways to avert destroying itself by the most modern means.

Not every visitor views New York appreciatively, at least not right away. A lady from Canada had a typically disconcerting experience when she stepped out of the gigantic bus terminal on Eighth Avenue into the 15-block section of theaters and commotion known loosely as Times Square (pages 62-5).

"How depressing," she said later. "So much dirt, so much rush, so many faces with defeat in them. A little boy ran up and shouted, 'Want a taxi?' The taxi was standing right there, so I didn't give him a tip. He screamed through the window, 'Cheap, cheap,' and I felt guilty."

I met the lady again, and she said: "I've changed my mind about New York."

Why? Well, she had seen the city from the observation deck on the 102d floor of the Empire State Building. This is still the tallest

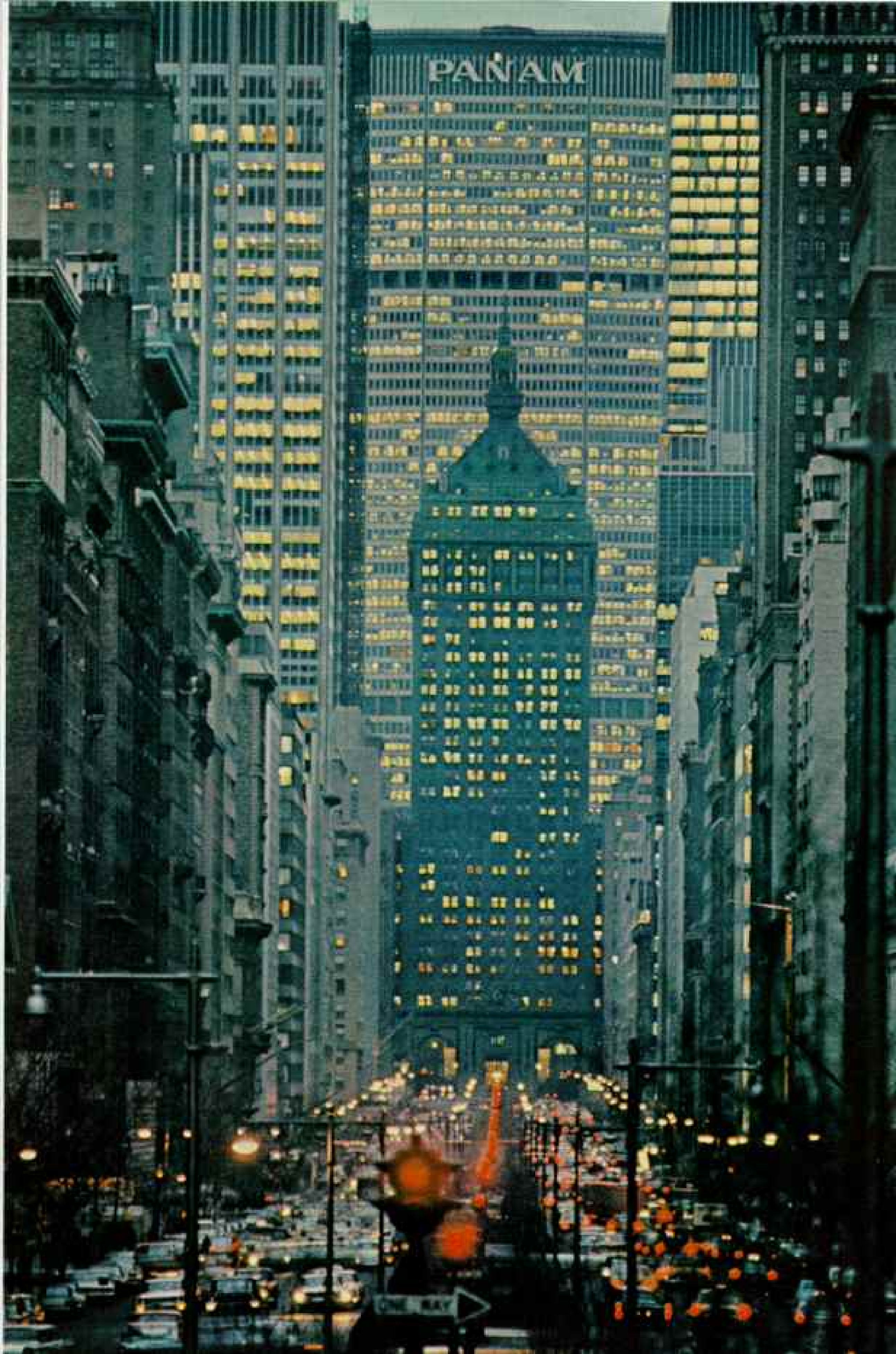
*Last April, shortly after the author visited the U.N., Zanzibar and Tanganyika agreed to unite. For a comprehensive account of U.N. headquarters, see "Date Line: United Nations, New York," by Carolyn Bennett Patterson, NATIONAL GEOGRAPHIC, September, 1961.

New look on Park Avenue: Pan American Building, 59 stories high, rises directly above the maze of railroad tracks leading into Grand Central Terminal. Its roof accommodates a heliport. Dwarfing its towered neighbor, the New York General Building, Pan Am boasts 2.4 million square feet of floor space, making it the world's largest commercial office building.

To the distraction of motorists, girls invade the street while waiting for traffic to pass; proper Peke prudently hugs the curb.

ALBERT HOLZERT AND THORAC REEBER (OPPOSITE) © H. S. S.





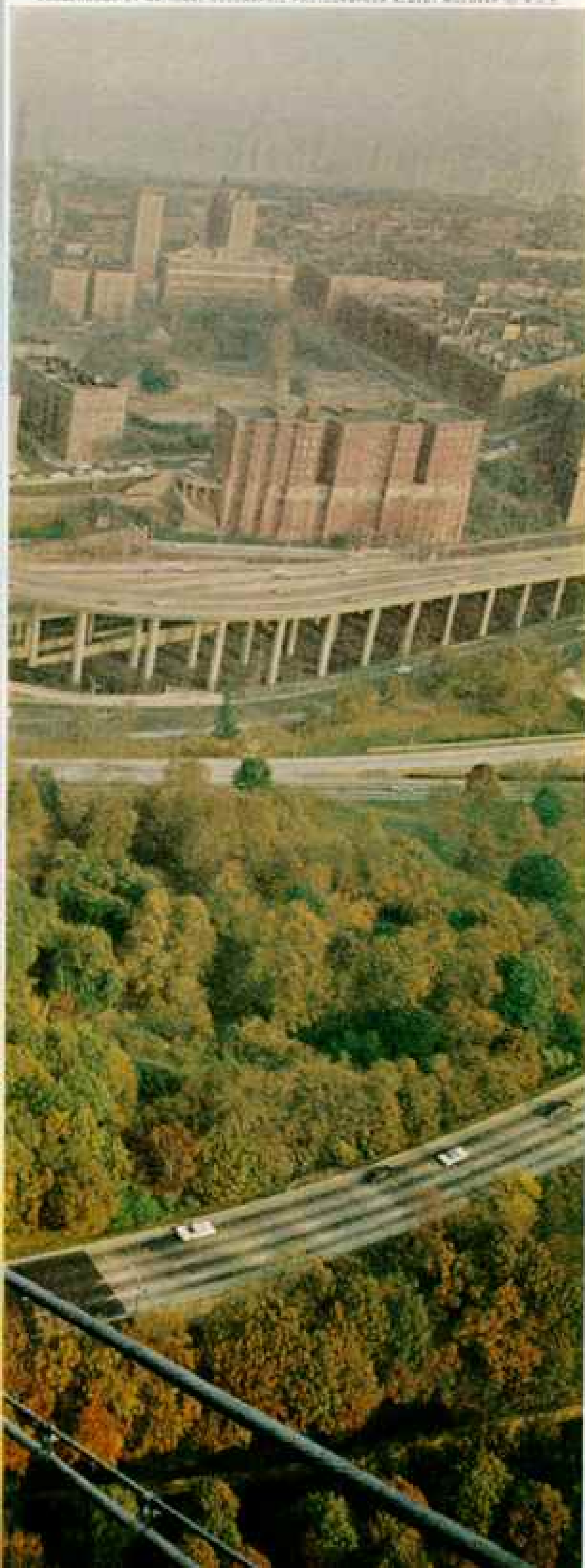
Tightroping up a suspension cable, electrician Edward McCabe nears the top of one of the twin towers of the George Washington Bridge, 600 feet above the Hudson River. Linking upper Manhat-

tan (background) with the New Jersey Palisades, the structure's two levels carry 14 lanes of traffic. Each of the four supporting cables measures three feet in diameter and contains more than 26,000



separate wires. Towering apartments and ultra-modern, two-block-long bus station straddle the sunken expressway beyond curling cloverleaf; the terminal can handle 10,000 passengers an hour.

FORSCHEMME BY NATIONAL GEOGRAPHIC PHOTOGRAPHER ALBERT ROSSNER © R. G. P.



building in the world—at least until 1970, target date for completion of two 110-story towers proposed for a World Trade Center in lower Manhattan.

"It was a rainy afternoon," she said, "and there I was in a stream of white clouds. But once in a while the clouds split, and I could look down in one direction or another. For a moment there was a little sun, too, and the buildings gleamed, and so did the pavements and the cars way down there—all so wet, all so clean. I loved it."

I was happy to tell her that famed but shabby Times Square was sprucing up for the World's Fair crowds. The pedestrian malls would be widened and landscaped with shrubbery and hundreds of boxes of azaleas and chrysanthemums. Darkened electric signs would blaze forth once more. And the 59-year-old Times Tower, now owned by the Allied Chemical Corporation, was having its façade lifted in a unique manner.

"We've stripped away all that Gothic masonry," explained an engineer. "But the steel skeleton remains. It will be reinforced and covered with marble and a lot of glass."

Fair Expects 75 Million Visits

The New York World's Fair—dedicated to "man's achievement in an expanding universe"—was making itself seen, heard, and felt long before its opening.

The city had ordered 430 new subway cars to carry visitors from Times Square to the Fair in 19 minutes, for 15 cents. Taxis appeared freshly painted in World's Fair colors—blue and orange.

Every day brought word of marvels to come. From the Vatican, the "Pietà" by Michelangelo. From General Electric, demonstrations of nuclear fusion. In the New York City Pavilion, a model of all five boroughs—840,000 structures in all, with the Empire State Building a foot high; the great Episcopal Cathedral of St. John the Divine, actually 265 feet in height, scaled down to 2½ inches. Thus the entire city fits into a space 160 feet long and 100 feet wide, for viewing by visitors suspended in cars that make them feel as if they are in helicopters.

At the muddy World's Fair site in Queens I watched the rise of the Hall of Free Enterprise, of the Billy Graham Pavilion, of the Festival of Gas. Fair officials supplied figures: "One hundred sixty buildings [pages 84-5], 3,500 park benches, 6,400 public telephones. We expect 25 million people during 1964 and 1965, each making an average of three visits.

Six billion dollars will be spent in New York because of the Fair."

In any other city in the world, such figures would rouse wonder and awe. But not in New York. "The World's Fair is just an incident in passing," said the manager of one of New York's biggest hotels. "An important incident, yes, but no more."

My wife was not surprised to hear this. After all, doesn't New York present a veritable world's fair every day of every year?

True enough. In scarcely a fortnight the New York stage had offered us a satirical revue from London and a classical tragedienne from Paris, a monologist from Vienna and the Bolshoi Ballet from Moscow. Each week, too, brings luminaries of the concert world to old Carnegie Hall and to the new Philharmonic Hall in the Lincoln Center for the Performing Arts (pages 90-91). And every day New York's unsurpassed wealth of museums illuminates man's achievements in every period of history.

The Metropolitan Museum of Art glories in ancient sculpture, in medieval armor, in sublime paintings of the Renaissance; tapestry glows in the Metropolitan's Cloisters, which were brought from Europe and reconstructed in Fort Tryon Park (pages 96-7).

Other museums concentrate on modern art (page 98), on American art, on Tibetan art,



"Smash hit!" Blond Carol Channing, star of the musical *Hello, Dolly!*, and director Gower Champion, with Mrs. Champion, pore over reviews at an opening-night party at Delmonico's. Composer-lyricist Jerry Herman stands between stage stars Gretchen Wyler (left) and Lisa Kirk.



Human tidal wave engulfs Times Square.



REDOCHROMED BY NATIONAL GEOGRAPHIC PHOTOGRAPHERS GEORGE F. WHEELER (LEAFLET) AND BOB EDGELL © N.G.S.

on Broadway's Great White Way as revelers ring out the old year and hail the new.

on primitive art around the globe. And the American Museum of Natural History, with its 58 halls, is one of the world's pre-eminent institutions devoted to natural science.*

New York, moreover, steadily adds major new art museums in new buildings that are in a sense museum pieces themselves, designed by leading American architects. Five years ago it was the Guggenheim, a six-story snail's shell in concrete, by Frank Lloyd Wright. This year it's Huntington Hartford's Gallery of Modern Art—a nine-story block of pearly marble with lacy edges, by Edward Durell Stone (page 99).

One day on Bruckner Boulevard in the

Bronx I passed a building that looked like just another factory, until I noticed three totem poles. I had chanced on the research annex of the Museum of the American Indian.

Curator Charles Turbyfill relished my amazement at his unparalleled collection of pottery, of weapons—of all that held beauty and utility and spiritual significance for the Maidu, the Kickapoo, the Maya, and some 600 other tribes of the Americas.

For me, even Mr. Turbyfill's quiet bailiwick symbolized the overwhelming ways of

*See "Behind New York's Window on Nature: The American Museum of Natural History," by James A. Oliver, NATIONAL GEOGRAPHIC, February, 1963.

Neon rainbows glaze Seventh Avenue as one of New York's 500 street sweepers plods a strangely



New York—just as much, I thought, as all the noisy building activity I ran into every day. If only all of *that*, too, could be tucked away in some corner of the Bronx.

But no. The whole city wallowed in an orgy of destructive construction. Or constructive destruction? Iron wrecking balls and piles of rubble. Dust, and grand old trees uprooted. Bulldozers, and holes in the ground three stories deep. Torn-up sidewalks. Scaffolding. Banging and clatter, cranes and concrete mixers. Skeletons of steel, mounds of brick.

Thus crumbled many a landmark, fine or ugly. Entire Manhattan neighborhoods passed to dust and rebirth. A 25-story apartment

deserted Times Square on a rainy January night.



grew in Brooklyn, on the site of Ebbets Field of Dodger days. Apartment developments replaced narrow tenements in the Bronx and houses in Queens. One-family houses gnawed into the hillsides of Staten Island.

The city's Commissioner of Buildings, Harold Birns, surveyed the statistics: "9,080 buildings completed in 1963 alone, costing roughly \$900,000,000, and 3,649 buildings demolished."

Since World War II, New York has put up as much new office space as Chicago, Los Angeles, and San Francisco combined.

Dogged by construction noise, I sought peace in the Brooklyn Botanic Garden, in the famous Japanese stone garden copied from the Ryoanji Temple in Kyoto.

A booklet stated that the rocks before me symbolized quietness, timelessness, and stability. They had been arranged to inspire meditation. I took off my shoes, as prescribed. I put on paper sandals and stood on a wooden platform, ready to meditate.

But then? Bang, clatter, hammers and saws! "Sorry, Mac, garden's closed," shouted a guard. "We're working on the temple!"

Con Edison Turns Powder to Power

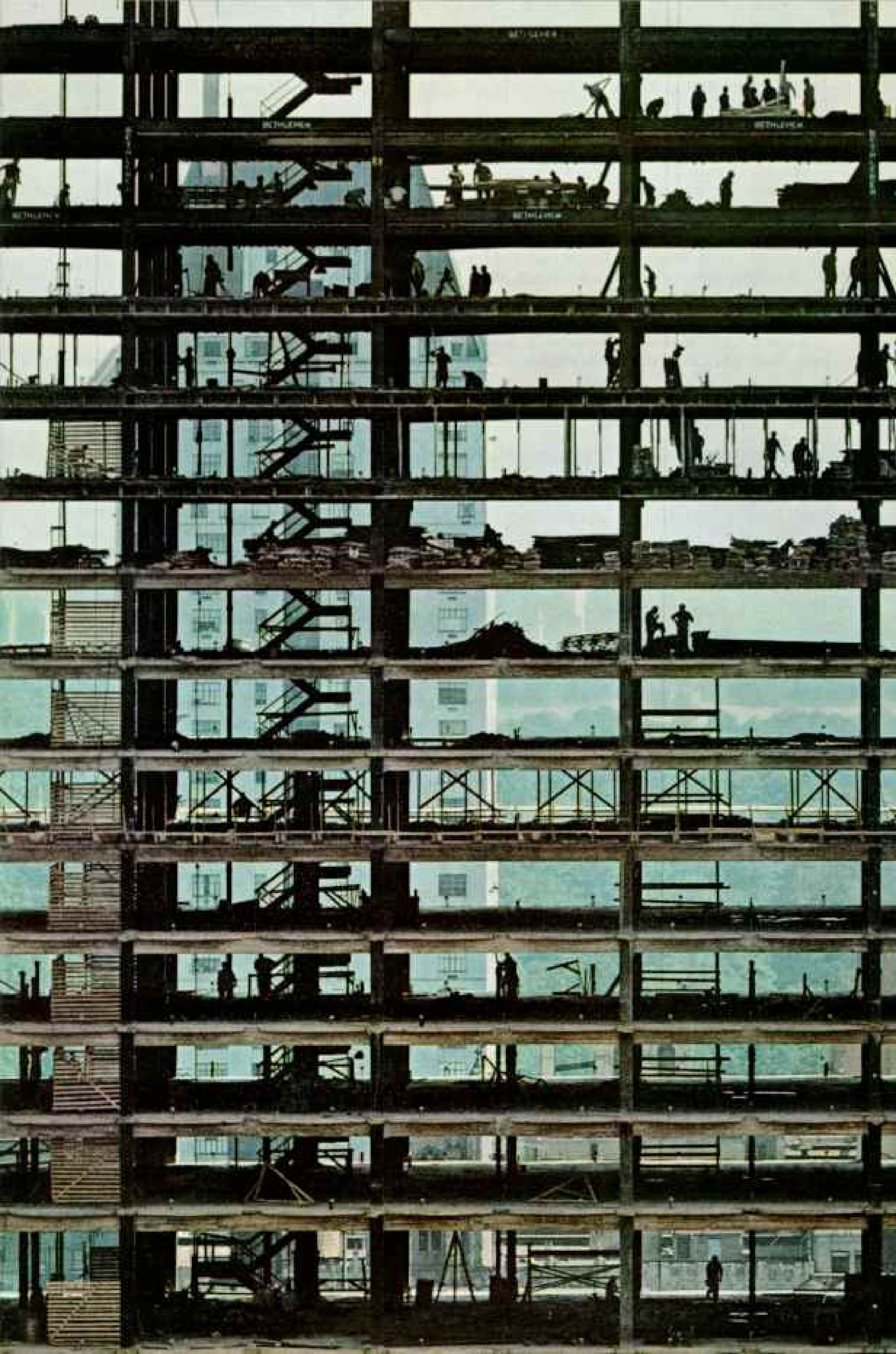
Probably the biggest noisemaker in New York City is Consolidated Edison, the company that supplies gas and electricity to most of the buildings and dutifully tears up the streets, laying new pipes and cables to keep up with all those new customers.

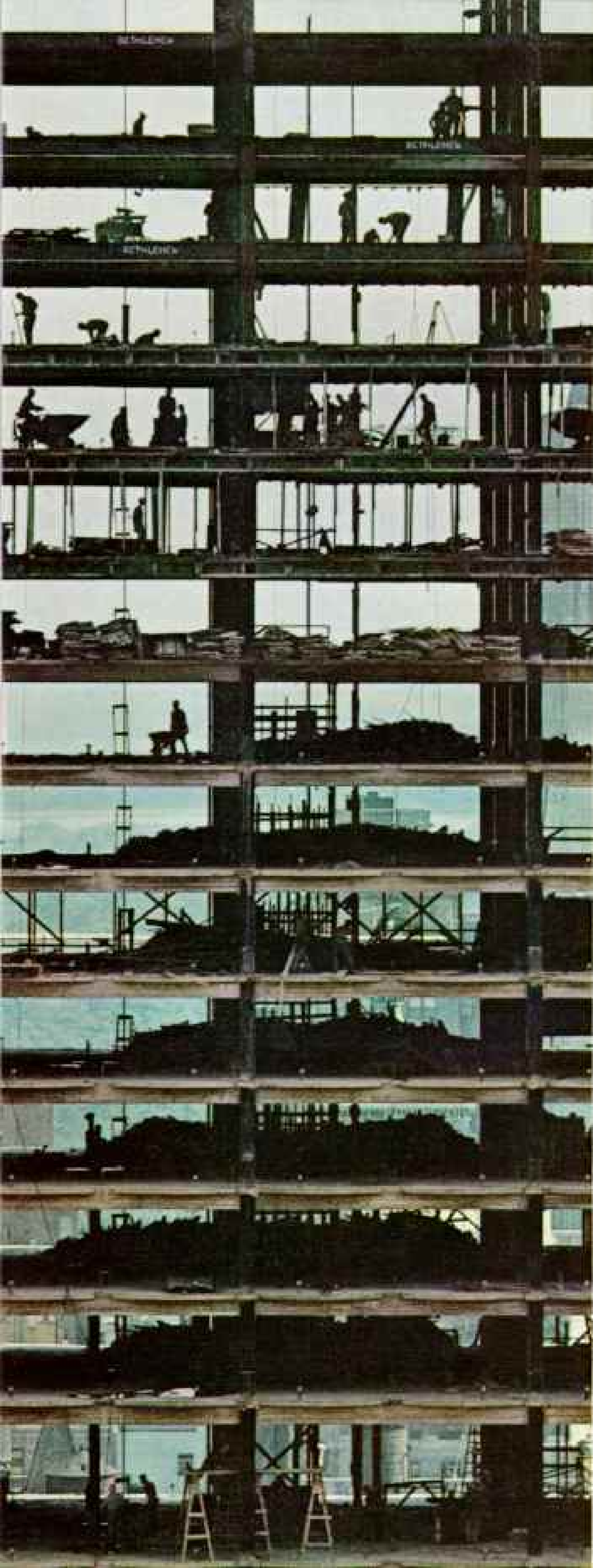
But when I stood high on the roof of the company's power station in Astoria, in Queens, I sensed only tranquillity. Across calm waters I saw Manhattan, the Bronx, a sailboat making for Long Island Sound.

Underneath us, machines ground coal as fine as talcum powder, to be injected into furnaces 11 stories tall. The result is heat, then steam, and finally electric power from generators in a hall as big as a hangar for a dirigible. Some of Con Edison's steam is piped through a tunnel under the East River to skyscrapers in Manhattan—to heat them in winter, to run their air-conditioning machinery in summer.

Consolidated Edison was blasting another tunnel for pipes and cables through granite 200 feet below the East River. I went there to watch the placing of dynamite. The foreman asked, "Would you like to pull the switch?" Boom! Boom! Boom-boom! I had become one of the noisemakers myself.

To be sure that New Yorkers can obtain enough food energy—that's the ulcerating





EXTERIORS BY LEE LOCKWOOD, BLACK STAR, AND
NO EXTERIORS BY ALBERT WOODRUF GELDMAN TO R. O. S.



Honeycomb of lights, windows of the new New York Hilton at Rockefeller Center offer guests sweeping views of the city. Opened last summer, the 40-story, 2,153-room hotel calls itself New York's first blue skyscraper. In daylight its tinted windows give the entire building a blue cast.

Immense trellis in the sky, the steel skeleton of the Hilton appears here seven months before completion. Sure-footed Mohawk Indians, all but fearless of heights, balanced on narrow girders and juggled hot rivets to assemble the towering frame. Concrete poured for the floors would build 18 apartment houses of 20 stories each.



"We make them feel at home," says co-owner Robert Kriendler of the celebrities who regularly patronize the "21" Club, one of the most distinguished of New York's thousands of restaurants. Miniature blimp and airliners dangle from the ceiling of the paneled Grill Room on the first floor of the club's brownstone at 21 West 52d Street.

Strains of Chopin fill the penthouse apartment of Earl Blackwell, president of a public relations firm. Among the guests, artist Salvador Dali (left) and writer Cleveland Amory (second from right) enjoy the music of 15-year-old virtuoso Emanuel Ax, from Poland.

task of Albert S. Pacetta, Commissioner of Markets. He worries about milk from 40,000 dairy farms, from Pennsylvania to Vermont; eggs by the tens of millions, from Georgia to Minnesota; more than a billion pounds of beef a year, half of it arriving on the hoof; five billion pounds of vegetables and fruit, from 50 states and 30 foreign countries.

One morning at four o'clock, as I fought my way through the wholesale produce market along Washington Street in Manhattan, I got claustrophobia. The place looked as if all those five billion pounds of vegetables and fruit had just been dragged in.

At the Fulton Fish Market, close by the Brooklyn Bridge, trawlers land what they catch off New England (page 56), and trailer trucks unload specimens of virtually everything that swims in the Western Hemisphere.

Before dawn come buyers for supermarkets and restaurants. About nine o'clock comes

Mrs. Eva Stolt. She is 64 now, and suffers from arthritis, but still she is here four times a week, as she has been for 22 years.

Dealers give her leftover fish. She cuts it into little pieces. Then she's off to feed stray cats (page 81).

"There are hungry cats in many buildings around here," she said. "The poor things are so frightened, they come out only when I come."

New York Nurtures Brainpower

To me, Mrs. Stolt symbolizes something: that some of the best things in New York are little, or little known, or at least quite modest.

For example: New York counts 200,000 students in 35 colleges and universities. New York University. Fordham. City College of New York. But naturally I think most highly of Columbia College (page 101). That's my school, and while Columbia University shows 23,000 registrations, its undergraduate college



for men limits itself to 2,800. Aside from the men's undergraduate body of Brown University in Providence, Rhode Island, that's the smallest college in the Ivy League.

Or is *this* widely known? That among the public high schools that furnish the greatest number of graduates who go on to doctoral degrees, nine of the country's top ten are in New York? Six, in fact, are in Brooklyn.

When I visited one of these roosts of the brainy, the Bronx High School of Science, I asked the principal, Dr. Alexander Taffel, "Do your kids really have a computer lab?"

"Well, yes," he said, "but that's nothing to get excited about. Over at Stuyvesant High in Manhattan they're building a cyclotron."

The colossal City of New York itself becomes a modest thing when viewed in the setting of its immediate environment, within the so-called New York Metropolitan Region.

Geographically, this region reaches beyond the five counties formed by the five boroughs of New York City (map, page 57); it includes seven other counties in New York State, nine in New Jersey, and one in Connecticut. As for population, the city's present 8,100,000 compares with the region's 17,700,000. By

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REPRODUCED BY NATIONAL GEOGRAPHIC PHOTOGRAPHERS DEAN JENSEN (HORSE) AND THOMAS HERRIN (DINNER)



1985 the city will hardly have gained—according to an estimate by the Regional Plan Association—while the total for the region will have risen to 22,000,000.

Such staggering figures are the daily concern of the Port of New York Authority, the guardian of the region's mighty transportation facilities (pages 80-81).*

New York's piers accommodate 170 steamship lines. Ten railroads maintain terminals here; their freight cars float around the harbor on barges, taking cargo to and from the ships—more than a million carloads a year.

Said Thomas C. Young, of the Port Authority staff: "Every day about 10,000 long-distance trucks come and go. Our bus terminal

in midtown Manhattan handles 7,000 buses a day; about 63 million people use it in a year."

At the Port Authority's new piers in Brooklyn, I saw the *Havmøy* from Oslo loading piles of tires for Antwerp. The *Maria Costa*, just in from Genoa, disgorged Olivetti typewriters and Perugina chocolate. The *Shimane Maru* would sail through the Panama Canal to Nagoya, as soon as she'd stowed crates of machinery from Youngstown, Ohio.

We drove on to the John F. Kennedy International Airport in Queens, where 42 airlines dealt with 13,000,000 passengers last year (pages 104-5). "About 3,600,000 were on in-

*See "Here's New York Harbor," by Stuart E. Jones, NATIONAL GEOGRAPHIC, December, 1954.

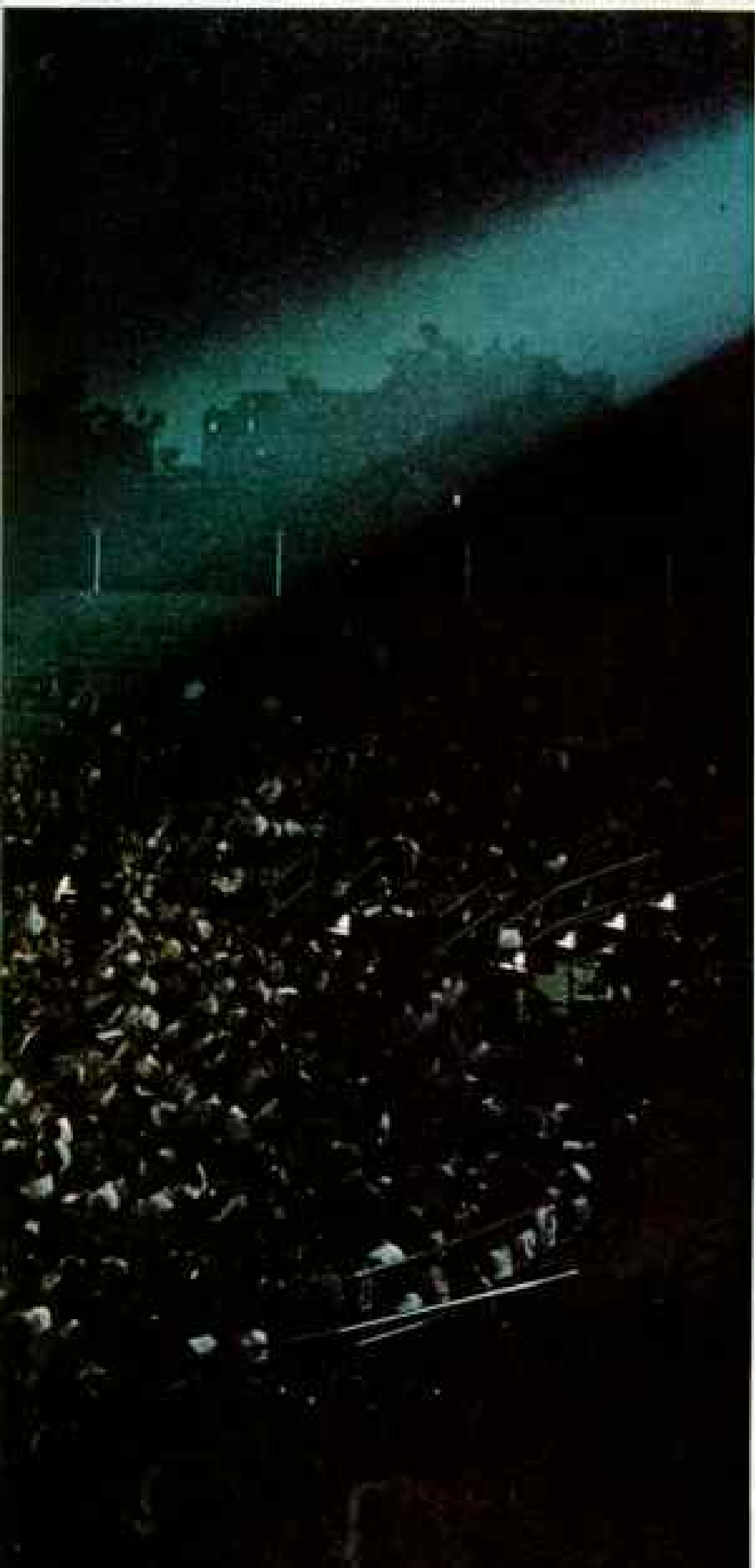


ternational flights," Tom Young said. "Four times more people now arrive from abroad by plane than by ship."

The Garment District: Productive Chaos

Manhattan's busiest spot is not a transportation terminal but an area just south of Times Square—the garment district, where buyers from stores across the country bounce into showrooms to appraise toddlers' wear and infants' wear, misses' wear and sportswear, maternity wear, swimwear, sleepwear—whatever man produces ready-to-wear. Most of it is produced right here: five billion dollars' worth annually, nearly two-thirds of America's output of women's wear.

RESEARCHED BY NATIONAL GEOGRAPHIC PHOTOGRAPHER ALBERT WICKHAM © N.G.S.



Cutters and sewing-machine operators spill from the subways by the tens of thousands. The streets are choked with big trucks, little trucks, hand trucks, and clothes racks on wheels. Imagine 400 jobbers, contractors, and manufacturers per block—all needing pickups and deliveries!

I ducked into the Trade Show Building, where 123 firms exhibited that day. I ducked right out again when a lady buyer from Salt Lake City, whom I had not met before, greeted me warmly in the belief that I was an old friend and a salesman of Teen Coordinates and Stretchies.

The garment district provides one of the world's most monumental headaches—the unhappy possession of Traffic Commissioner Henry A. Barnes.

"The trouble is that nobody seems to make a whole dress," says Mr. Barnes. "One man cuts patterns, another shop makes button-holes, another does embroidery. And everything has to be moved from one shop to the next. It's the world's biggest production line—and the line is right on the streets!

"The area is strangling itself," the commissioner laments, "but if I cured the problem, I'd kill the industry."

Much of Manhattan is, in fact, a huge business center: Furs, men's wear, electronic equipment, plastics—some 22,000 workshops crowd floor upon floor. Blocks of wholesale houses for textiles, for furniture, for toys. Great department stores; clusters of specialized shops—for cut-rate vitamins, for police equipment, for clergymen's needs, for wedding gowns.

Into the sea of offices around Madison Avenue crowd most of New York's 1,350 advertising agencies. Also many publishing firms. New York houses seven out of ten of the country's largest magazines, and 15 of the 20 most prolific book publishers. I asked why.

"Because the magazines want to be close to the ad agencies, the sources of advertising revenue," said Col. Frank Forsberg, Executive Vice President of Holt, Rinehart & Winston, Inc. "To find authors for our books, we go all over the country—after all, talent is everywhere—but the editors, the put-together talent, you'll find in New York."

Bard's poetry imbues the August night with magic during a performance of *The Winter's Tale* at the open-air Delacorte Theater in Central Park. Each summer the New York Shakespeare Festival troupe stages three productions; admission is free.



The names Holt, Rinehart, and Winston once stood for three firms, but there had been many mergers: "Bigness pays off," said the colonel. "But remember, big business needs colossal financing, and the money market is in New York too."

He referred to the financial district on the lower tip of Manhattan, where 300 years ago stood 300 little houses with stepped gables, the Dutch settlement of Nieuw Amsterdam. The end of the town was a wooden wall, roughly where Wall Street is today.

Now this is the world's financial center, the densest concentration of skyscrapers. Here the big corporations borrow from the big investment banks, or issue shares or bonds through underwriters. Here bustle the Cotton Exchange, the Coffee and Sugar Exchange, the Commodity Exchange for dealing in copper and silver, rubber and hides.

Why do they press together here—the an-

alysts, accountants, lawyers, and brokers, the myriad specialists of the financial community—like sardines in upended cans?

For efficiency. A specialist explained: "We need advice from many people, in a hurry. What's the significance of a new government regulation? A proposed merger? A foreign revolution? Such things are best discussed across the table."

Stockbrokers Must Be Fast Walkers

Discussions here affect the wheat fields of Kansas, the automobile factories of Michigan, the studios of Hollywood, the tin mines of Bolivia. And the fortunes of 17,000,000 American investors fluctuate day by day on the New York Stock Exchange (pages 82-3).

Wearing a badge marked "Guest," I stepped onto the Exchange floor, made of springy maple. "To save our feet," said an Exchange official. "We never run; there's a rule against that. But we walk very fast."

I closed my eyes and listened. The voices and echoes in the great hall sounded as if they came from an indoor swimming pool.

We walked to the post trading in the stock of American Telephone & Telegraph Company. Here stood George M. L. La Branche, Jr., of La Branche & Co., wearing a Phi Beta Kappa key and a Racquet Club tie. He was a member registered by the Exchange as the A. T. & T. specialist; other members with orders to buy or sell this stock met at his post.

What if for a moment there should be no buyer? "I'll buy," said Mr. La Branche. And if there is a buyer but no seller? "Then I sell," he said. "That's my job, what we call 'making a market.'"

Mr. La Branche's decisions—to buy from the low offerer or to sell to the high bidder—quickly show up on stock tickers across the country: as a slightly higher price for A. T. & T., or a slightly lower price.

I walked a block from the Exchange to the graveyard of old Trinity Church. Within three blocks rose five of the country's seven biggest banks. The Irving Trust Company was putting up a new building across the street from Trinity, and the pneumatic hammers seemed to be shaking the graves.

The Stock Exchange needed a big new building too—and this saddened Mrs. Maggie Walsh Petersen, who lives right around the corner. Her little house on Moore Street would have to go, and a lot of others as well. Only Fraunces Tavern, where George Washington said farewell to his officers, and four other houses would be saved.

JAMES P. HARRIS (LEFT) AND ALBERT ROBERT © 1953



Oh's and ah's burst from spectators at Macy's annual Thanksgiving Day parade.

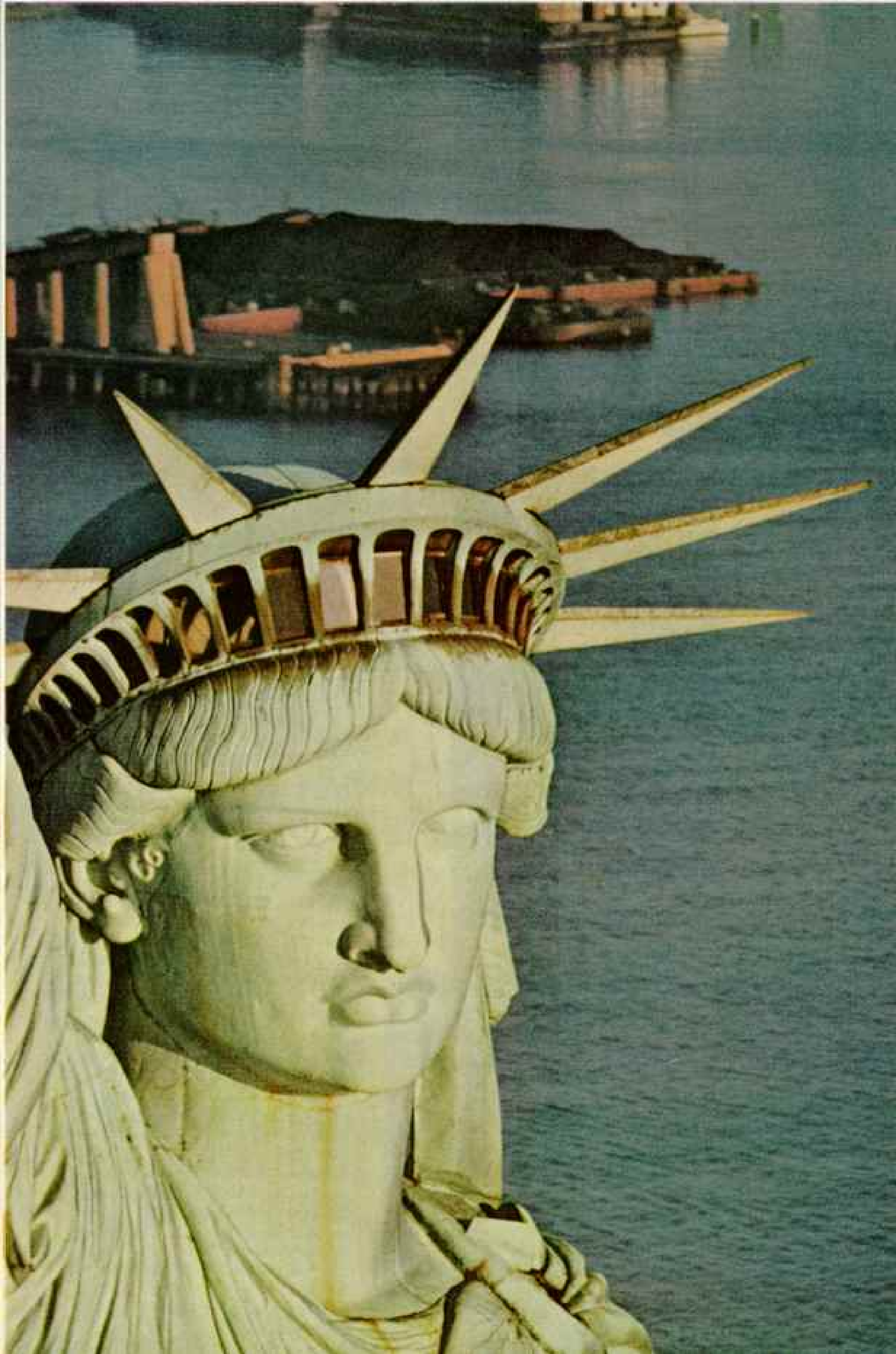
Cross-eyed Bullwinkle, a television-star moose, floats down Central Park West. Donald Duck bobs behind. Macy's employees guide half a dozen such gigantic Dacron figures along the two-mile parade route.

*"GIVE ME YOUR TIRED, your poor,
your huddled masses yearning
to breathe free. . . . I lift my
lamp beside the golden door!"
Thus, in the words of poet Emma
Lazarus, the Statue of Liberty
welcomes the world to New York.*



*France's gift to the United States,
the majestic lady has held her
blazing torch of freedom above
the harbor since 1886. Last year
848,000 admirers visited her. By
elevator and spiral staircase, many
reached her seven-rayed crown,
22 stories above Liberty Island.*

ERTACHROMES BY THOMAS REBBIA (ABOVE)
AND DEAN CONGER © N.G.S.





Caldron of cultures

FROM almost every nation the immigrants came, seeking the opportunity symbolized by the Statue of Liberty. Isolated by barriers of language and custom, the first waves of newcomers clung so closely together that whole sections of the city took on foreign airs: Little Italy; Chinatown; Yorkville with its Germans; a Spanish complex; even an Arab enclave. The checkerboard of polyglot peoples gave New York diversity and vitality. Cries of *Ein prosit*, "Cheers," ring out in a Yorkville rathskeller (above). In the Bronx Zoo (upper left), a Negro child pets the ducks. Venerable Hasidic Jew talks with friends outside a Brooklyn synagogue (center). Typesetters prepare pages for a Chinese daily (left).

Having thus welcomed the family of man, New York fittingly provided the first permanent home for the United Nations (opposite). The glass-faced Secretariat reflects the rising sun onto the East River; behind soars the spike-topped Chrysler Building, second tallest in the world.

"They're destroying our history," said Mrs. Petersen. "A Civil War gun shop. The Eastern Hotel, built with mahogany that came in sailing ships. Some houses here date back almost to the Revolution, and we should restore them, not tear them down. What do you think they want to put up? A marina, and a motel for boats—a boatel!"

David Rockefeller, President of the Chase Manhattan Bank, finds nothing wrong with the boatel. Not that Mr. Rockefeller doesn't honor our heritage. After all, his father restored Colonial Williamsburg. But as Chairman of the Downtown-Lower Manhattan Association, he sees many of the old houses as liabilities. They bring little in taxes, yet this is some of the most valuable real estate in the world, and the city must encourage redevelopment to gain new revenue.

New York Walk-up Versus Paris Garret

Jean Cartier from Paris also lives in lower Manhattan—in an old building that even Mrs. Petersen would consider a total loss. Jean calls it heaven. He paints. Two other painters have had the floor above him. On the top floor lives a sculptor whose wife is a dancer.

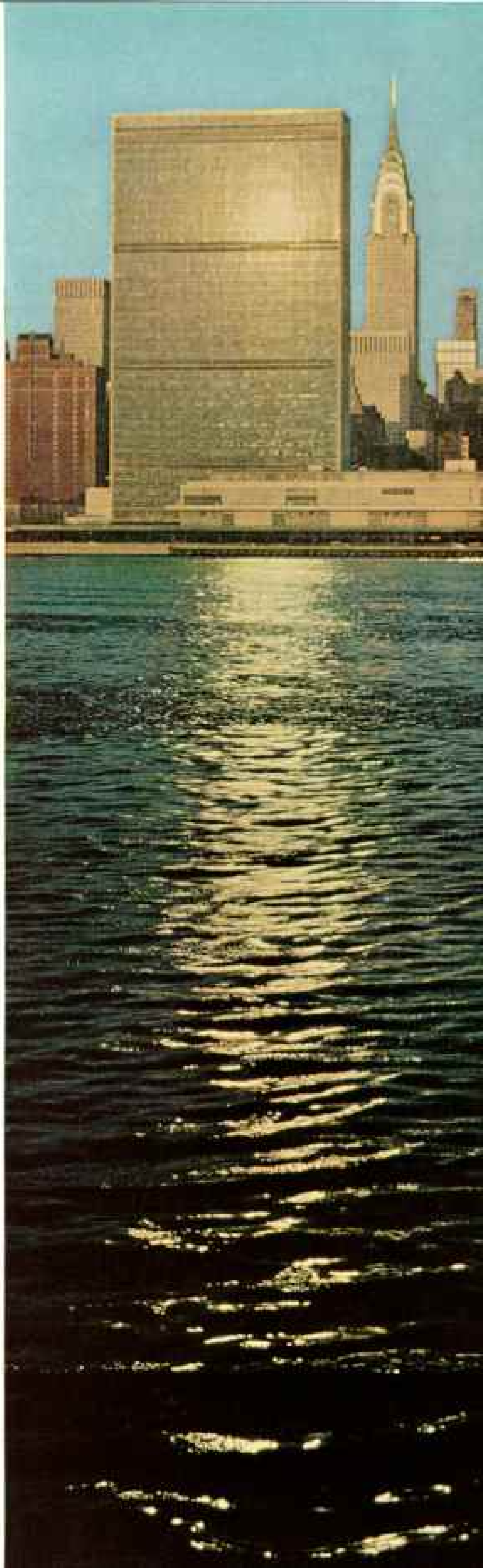
Jean loves New York. "It's the center of modern painting," he says. "In Paris one paints in a garret, and the paintings look cramped. Here I have 14 windows, and my paintings are big. Competition is terrific, but if you're good you have a chance. That's true American freedom."

Strolling through lower Manhattan, Jean and I came to St. Paul's Chapel, the oldest church building on the island. George Washington prayed here after taking the oath as President in 1789, when New York was the capital of the United States.

I stood beside his pew. Many a Sunday he had put in his diary: "Went to St. Paul's Chapel in the forenoon." In the afternoon he'd write letters. Private correspondence he dated like this: "New York, June 3, 1790." But official letters to the Senate he began thus: "United States, August 4, 1790." In a way, then, hadn't Washington himself said that New York was America?

We went on to a greenhouse full of cut-rate flowers and to Cheeses of all Nations, on Fulton Street. Thirty-one kinds of cheese from the Netherlands. From France, nearly 400. The manager offered me a bit of Manchego from Spain. "Nice and nutty. No charge." Any cheese from Albania? I could order some. Iceland? Certainly!

Jean was pleased. "In Paris, half the time



you ask for something, they are sorry, this cannot be had in France. But New York has everything, if you'll only look for it."

Before long, Jean may be looking for a new studio. His building is listed for demolition.

Newbold Morris is a tall and distinguished New Yorker who, like the sentimental Mrs. Petersen, worries about old buildings. An English ancestor of his bought land here in 1670; another signed the Declaration of Independence. Morris, formerly President of the New York City Council and acting Mayor, is now Commissioner of Parks. Together we inspected his domain of 35,700 acres—two and a half times the area of Manhattan.

"Two million trees," said Mr. Morris. "Lots of sycamores; they can stand the smog."

We drove over the Henry Hudson Bridge into Riverdale—to Wave Hill, a stately home along the Hudson. A Morris had lived here; also Theodore Roosevelt and Toscanini.

"This estate was to make way for apartments," said Morris, "but the owners gave it all to the Park Department instead."

Parks Endure Vandalism and Soot

En route to Van Cortlandt Park we stopped at a stone fountain. It had been deliberately smashed. "Just look at this mess," Morris said. "Vandals destroy \$400,000 worth of park property a year."

The Van Cortlandt mansion, built in 1748, is now a museum, but Morris was at home here too. A Morris had married a Van Cortlandt. Caretaker Hagop Yacoubian, an Armenian who came six years ago from Lebanon, talked eagerly about the mansion's past. Morris was delighted: "He knows more about the place than I do! It doesn't matter when you came, but what you do after you get here."

We moved on. Carl J. Schiff, Mr. Morris's Director of Horticulture, joined us and rhapsodized about trees: "Trees relieve eye strain. Trees absorb sound. Trees give off moisture, and this moisture cools the air. . . ."

Now we were driving through the narrow "shoestring parks" that line Eastern Parkway, en route to Forest Park and Cunningham Park in Queens. Mr. Schiff said: "Just think what our trees must put up with! The ashes and soot in the air contain sulphur dioxide. Moisture mixes with it and forms sulphuric acid. . . ." He shuddered.

Then we were on the Park Department golf course at Douglaston. Greenery ranged as far as the eye could wander.

It was dark when we crossed Queensboro Bridge back to Manhattan. Headlights of cars

moving along East River Drive gleamed like endless strings of pearls, pulled by some invisible hand. Then across the East Side, past new apartment towers, past elegant three-story townhouses, and across Park Avenue to Fifth Avenue. And into open country again—Central Park!*

After that day's driving I used my car often. I found that from Elmhurst I could turn north and be on the Grand Concourse in the heart of the Bronx in 25 minutes. If I turned south, I would just as quickly be in the new Civic Center in Brooklyn.

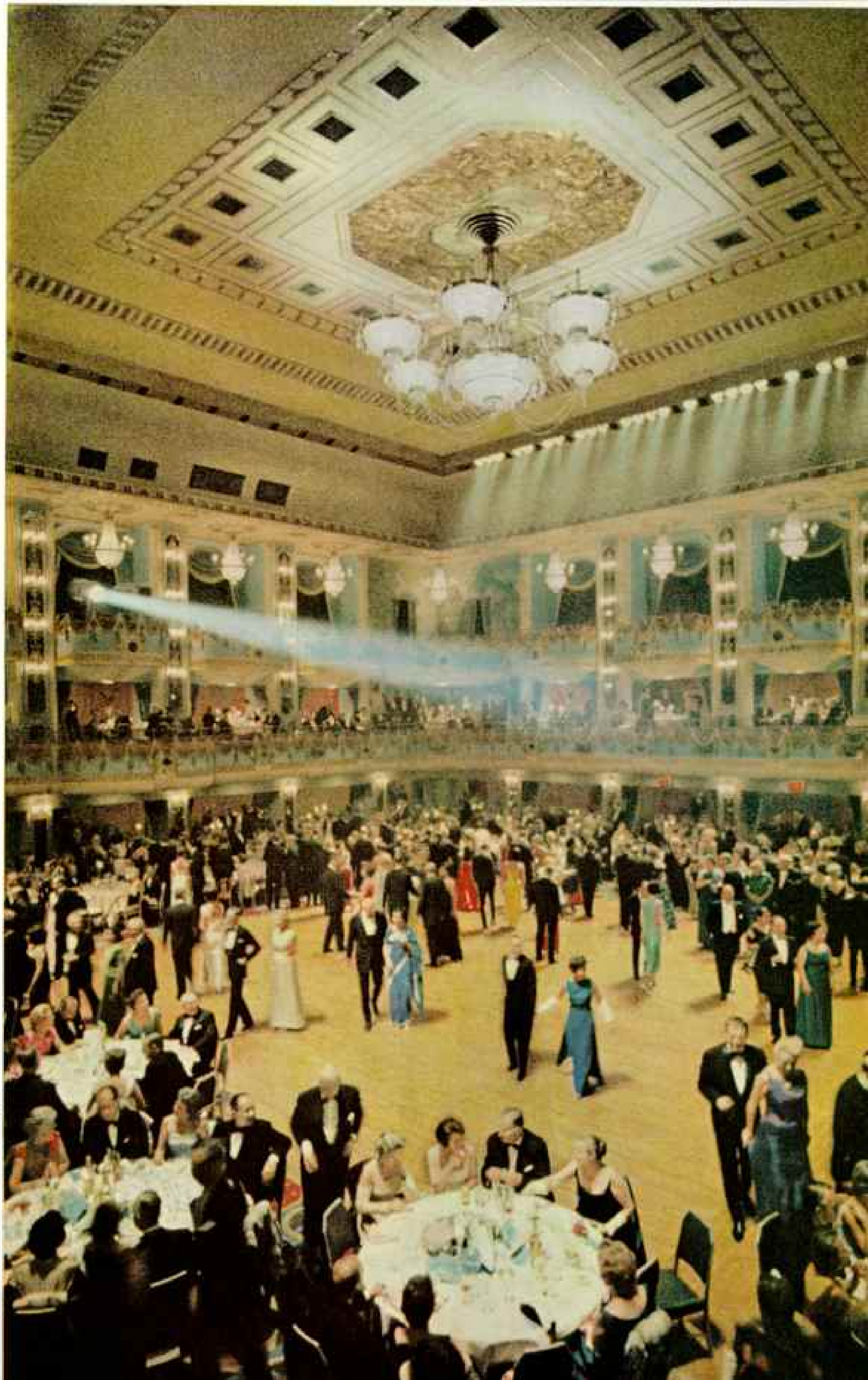
The Belt Parkway let me circumnavigate

*See "Central Park: Manhattan's Big Outdoors," by Stuart E. Jones, NATIONAL GEOGRAPHIC, December, 1960.



Phalanx of waiters serving a banquet at the new Americana Hotel bears snowball desserts on glowing bases of colored ice.

International soiree, the United Nations Day Ball finds delegates from more than 100 nations and other distinguished guests dining and dancing in the Grand Ballroom of the renowned Waldorf-Astoria.





EXTRACTION BY C.E. REPPERT © N.Y.C.

Brooklyn without a single traffic stop. In passing, I observed progress on the Verrazano-Narrows Bridge. Here was being swung, across the Narrows of New York Bay, the world's longest single suspension span, stretching 4,260 feet between towers. The 12-lane bridge would end the splendid isolation that has kept Staten Island a rural anachronism in New York.

The Village: Historic Haven of Artists

When I could find a parking space, I would stop off in lower Manhattan, in old Greenwich Village. Here Thomas Paine and President Monroe had lived, Samuel Morse had invented his telegraph, and Fiorello La Guardia had been born.

Over the years the Village had been a hilly wilderness, a tobacco plantation, and a refuge from yellow fever farther south in Manhattan; next, a fashionable area of townhouses, and then a crowded neighborhood of the poor. Artists moved in and complained—about the rising rents, and why did the Village have to be spoiled by tourists?

That talk, common 40 years ago, hasn't stopped yet. Still living here are television star Dave Garroway, actress Kim Hunter and her TV-writer husband

Like a castle in the sky, turrets and towers of Manhattan appear to float above the bay in this view from Staten Island. Each morning the sight rewards ferryboat commuters on the five-mile, five-cent trip from St. George (foreground) to the Battery.

Least populous of the boroughs, Staten Island—officially known as Richmond—is the only one without direct bridge and tunnel connections to Manhattan. When completed, however, the spectacular new Verrazano-Narrows Bridge will link it with Brooklyn (page 111).

Physically nearly three times the size of Manhattan, hilly Staten Island still counts scarcely a quarter of a million residents.



Befriending the homeless, Mrs. Eva Stolt passes out bits of fish to stray cats on the waterfront. Four times a week for the past 22 years, she has collected leftovers from the Fulton Fish Market, sliced them into little pieces, and made her rounds of alleys and tenements.

Nation's busiest roadstead, New York Harbor sees a vessel enter or leave the port on an average of every 20 minutes around the clock each working day. Some 4,000 tugs, lighters, barges, dredges, and ferries shuttle across its waters.



PHOTOGRAPHS BY NATIONAL GEOGRAPHIC PHOTOGRAPHER ROBERT WELLS (HORNY) AND DAN WATZ, BLACK STAR © N.G.S.





ENTRANCE BY NATIONAL GEOGRAPHIC PHOTOGRAPHER ELLERY BELMONT © N.G.P.

Music of money, an incessant hum, resounds across the trading floor of the New York Stock Exchange, world's foremost securities marketplace. Each day 2,000 brokers, clerks, and reporters crowd the half-acre floor where millions of shares change hands. Horseshoe-shaped trading posts each handle 60 to 100 different stocks. Big annunciator boards at each end of the room notify Exchange members, wearing white badges, of incoming telephone orders from their offices. Moving ticker tape, projected at upper right, posts minute-to-minute prices of shares in top companies. Energetic floor brokers have walked as many as 15 miles in one 5½-hour business day.

Shredded evidence of fortunes made and lost strews the deserted floor. At day's end, workmen sweep away half a ton of buy or sell slips and ticker tape.

Robert Emmett, playwright Edward Albee, anthropologist Margaret Mead, actor Maurice Evans, and Joseph Crivelli.

Mr. Crivelli is one of the 75,000 Villagers who aren't famous. He lives near the corner of Bleecker and MacDougal Streets, and when he comes home from work in the Fulton Fish Market, he wants peace and quiet. Can he get it? Never on Friday. Nor on Saturday. Often not even during the week.

"The honky-tonks, the types, the goings on..." Mr. Crivelli left himself speechless.

What pulls these crowds? Is it the many off-Broadway theaters, the coffeehouses, the shops with weird jewelry, the yearning to get away from the Bronx, or from Cincinnati, and be free? A big magnet is the folk singing and guitar playing, the parading of beards and treader pants around Washington Square on Sunday afternoons (page 94).

I stopped a tall man with a beard and a gold ring in his left ear lobe. "Would you call yourself a beatnik, sir?"

"Some people use that expression," said the girl with the man. Her face was very white, her stockings black. "It used to mean non-conformist. Some still say they're beatniks, to impress the tourists."

The man said: "I call myself a tramp. I ride the trains, all over the country and to Mexico. Excuse me, we must go."

One afternoon I stopped the car in Harlem. I ate a sweet-potato pie, and admired the flower boxes and bright brass doorknobs of the brownstones on 138th Street. Then I drove on, into a scene of agitation. An old peddler had been knifed to death by two young men.

At the police station a lieutenant said, "What can you do, life is cheap in the city."

He heard who had been killed. "Oh," he said. "Oh, my God. Julius! I knew him, he knew my father..."

A Time and a Place to Unwind

In the city it sometimes seems that time is as precious as life itself. I had been rushing through crowds and traffic from one appointment to another. For each appointment canceled, I'd make two others—"shoehorn them in," as the phrase goes.

I carried a tiny radio receiver, and as I drove, I put it to my ear. An antenna on the Empire State Building might be broadcasting my number, meaning that my telephone answering service had a call for me.

The voice would bark, "Three Two Five... Six Six Seven... Eight One One." That was me, Eight One One.

Came the day when a little boy said, "Mister, you got two different shoes on." Then I knew that I had to unwind.

AN EXHIBITION BY ALBERT WOLFE © A.S.C.



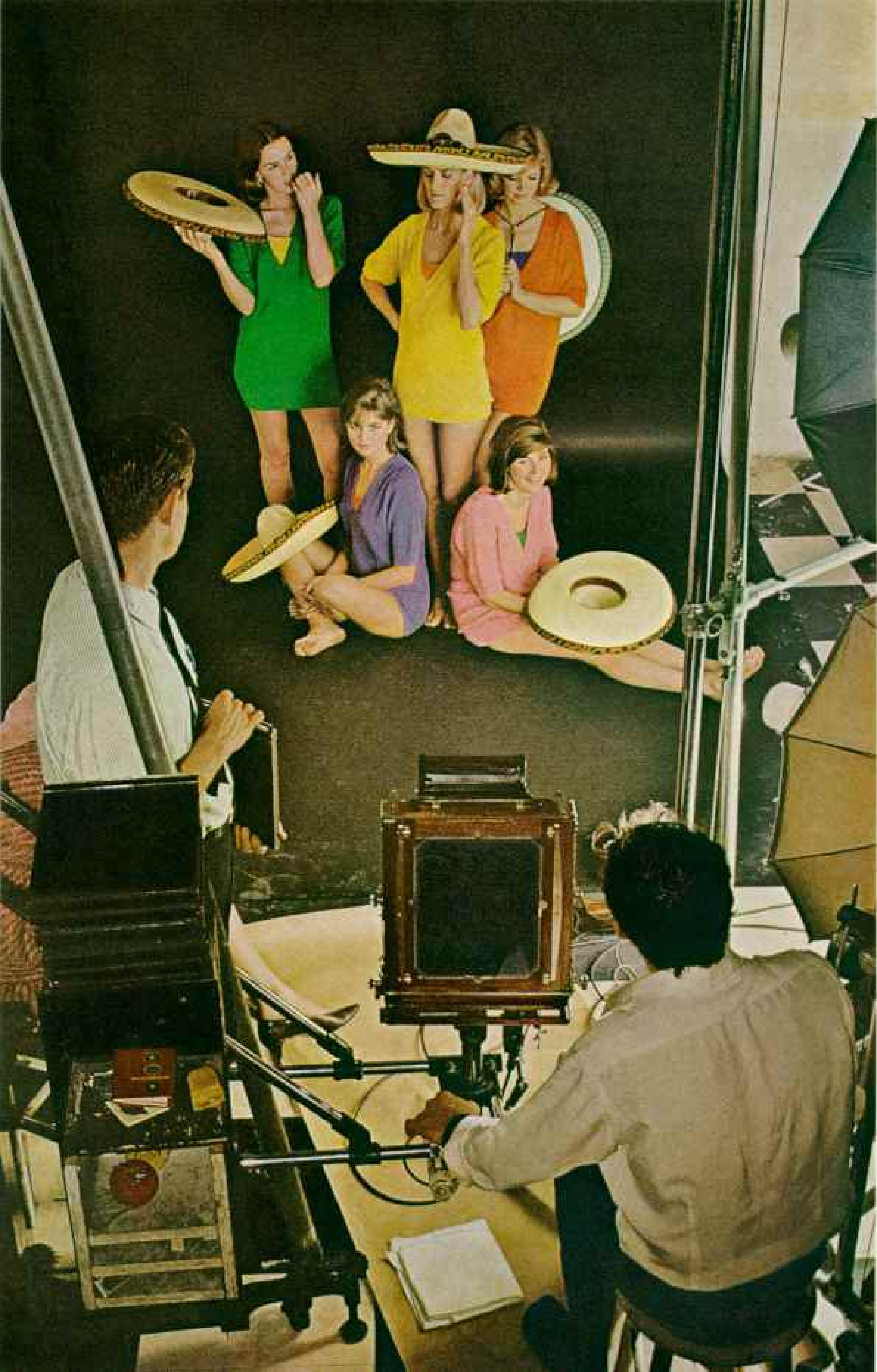


buildings raised for the huge exposition, nine times the size of the 1962 Seattle Fair. Unisphere at left

center, a steel globe 13 stories tall, keynotes the Fair's theme: "Peace Through Understanding."

RENDERING BY NATIONAL GEOGRAPHIC PHOTOGRAPHER MARK FONNER © N.G.P.





But where? By now I knew so many far-away places in the City of New York.

I could go back to City Island, the yachting center with the look of a New England fishing village, where I had seen a wild swan drink the fresh water running from a swabbed-down deck. Off City Island was Hart Island, with its potter's field. I had scared up pheasants in that tall grass, among the flowering chicory and wild aster and seaside goldenrod. . . .

I decided on the Jamaica Bay Wildlife Refuge in Queens—a 12,000-acre lagoon. There I sat on the island of Canarsie Pol, with Superintendent Herbert Johnson, next to wild shrubbery planted by birds. He said, "They brought the seed in their droppings."

I thought I heard a chicken in a barnyard. Johnson said it was the call of the brant, a small sort of goose. "In spring you'll see herons here, and egrets and glossy ibises. So much land is being filled in along the Atlantic

coast that they've come here now four years in succession. They want peace for their nests."

For generations this has been an instinct of humanity too—to look for peace, for opportunity, for a life in some way better, and to seek this in America, through the gateway of New York City.

New York: Mixing Bowl of Many Peoples

More than 7,690,000 newcomers to America passed through one building on the tip of Manhattan—Castle Clinton, then known as Castle Garden—an immigration station from 1855 to 1890, now a national monument.

The Mayor of New York, Robert Ferdinand Wagner, Jr., who is of German extraction, proudly submits that within his constituency reside more people with Irish ancestors than in Dublin, and more with Italian ancestors than in Rome. In lesser but none the less characteristic measure, one can find in New

On a make-believe beach in his penthouse studio, fashion photographer William Helburn poses models for a magazine layout.

Need a vicuña bathrobe? A mink sweater? Saks Fifth Avenue caters to the luxury trade. Here in the Salon Moderne, designer Sophie of Saks stages a press preview.

Mutation mink move from auction to processor through the garment district, clothier to the Nation.







York today representatives of just about every nationality and way of life on earth.

The most aristocratic refugees in New York, the princes and generals of Tsarist Russia, meet once a year to toast the past and listen to its music.

In the Brownsville section of Brooklyn, I met Mrs. Goldie Burkes, who also came from Russia many years ago. She and her husband own a pushcart, with a permanent spot near Pitkin Avenue. For 25 cents I got four pounds of apples.

"You have to sell cheap, or people don't come," said Mrs. Burkes. "They come from all over, people in fancy furs, too."

Mrs. Burkes was short and gray, and wore a bulky dress of quilted cotton. It was a cold day, and she had started work before dawn. She looked at me: "Ever since I'm a little girl I wanted education, so I could work in an office. I like clean. In an office

Pomp and pageantry of Verdi's *Aida* enthrall a packed house at the opening of the Metropolitan Opera's 1963-64 season. This extraordinary picture is the first ever permitted in color of a first-night performance at the Metropolitan.

Borne by slaves, Radames returns triumphant from battle. Carlo Bergonzi sings the role in *Aida*.



EXTERIORS (LEFT) BY REGIONAL GEOGRAPHIC PHOTOGRAPHERS, SCOTT MILDRETT AND JOHN S. CLETCHER, III; EXTERIORS BY ALBERT MORGAN; T. V. S.



Realization of a dream, Lincoln Center for the Performing Arts opened in 1962 the first of six buildings—Philharmonic Hall, new home of America's oldest symphony orchestra. The center will also hold a new Metropolitan Opera House; a theater for dance, operetta, and musical comedy; a drama theater;

you go clean, like you. Here you can't go clean. But so long I have my health, I'm happy. It's a good country."

Now it was dark again, and Mr. Burkes said: "Let's go home, I'm hungry." Mrs. Burkes had been on her feet since 4 a.m., and now she would go home and cook supper. Her daughter had it easier. She had married a certified public accountant.

Mr. Burkes transferred his unsold produce from the pushcart to a hand truck, and a Negro came to put it into a warehouse overnight. The two men had a friendly exchange.

Said Mr. Burkes: "*Ver mine kapora!*" That was Yiddish—and roughly translated it meant: Get lost.

Said the Negro: "*Zoll zein geschvollen vi a Chinaman!*"—May you swell up like a Chinaman!

A bystander called to the Negro, "*Ver geschossen!*"—Get shot!

Mrs. Burkes urged harmony. "*Vemen noch*

kennen mir hobn tau shleppen?"—Who'll push the hand truck?

And why shouldn't a Negro in Brooklyn know Yiddish? New York might not really be the melting pot some people think it is, but it certainly is a vast mixing bowl—probably the most concentrated, the most highly spiced, in the great kitchen that is the world.

Sauerbraten, Spaghetti, and an Irish Jig

I stopped in a luncheonette manned by six Greeks. Two had landed less than six months before. They hardly knew English. But they were making a place for themselves in their new homeland, like true pioneers.

In Queens I stopped at a neon sign: Long Island City Turn Hall. Lots of beer, and the monthly meeting of the soccer club *Eintracht*. The name means unity, peaceful coexistence.

"We have players from England and Yugoslavia and Scotland," said John Brandeis, secretary of *Eintracht*. "Our trainer is Hun-



a library-museum; and the Juilliard School of Music. The \$160,700,000 project is due for completion in 1967.



Shining bars of Richard Lippold's abstract sculpture "Orpheus and Apollo" hang above a scale model of Lincoln Center in Philharmonic Hall's glass-walled Promenade.

PHOTOGRAPHS BY JEAN LUNGER AND THOMAS HEBBLE (LEFT) © R.I.C.

garian. Our treasurer is from Buenos Aires."

In the background harmonized the singing society *Frohsinn*, meaning gaiety. Mr. Brandeis said: "We're all very German when it comes to eating. We eat *Bauerwurst* and *Bratwurst* and *Sauerbraten*..."

Italians eat heartily too. For the annual Festival of San Gennaro, the patron saint of Naples, lights were strung overhead along Mulberry Street. Smoke rose from booths with hot plates. What was cooking? A man wrote it for me: *salsiccia ca' pummarola*. "That's Neapolitan for sausages with tomato," said my friend Elio from Rome. "Frankly, I don't find Italian food in New York very Italian. Maybe your kitchens are too clean."

Two loudspeakers on the Rectory of the Church of the Most Precious Blood flooded the street with music: "Sweet Baby, You're the One" and "Shake, Baby, Shake." I talked to a Franciscan friar. What did he think of the carnival stands and all the hubbub?

"Isn't it a fine thing," he said, "when money circulates and people are so happy?"

A week later Mulberry Street had calmed down. Once more I could sit in peace at the Puglia Restaurant and ponder the things I was learning. Why do Arabs and Norwegians prefer Brooklyn? The U. S. Census says they do. And how, in New York's mixing bowl, has so much cultural treasure remained so pure? The dancing of the Irish, for instance.

I had seen it at a *ceili*—meaning "get-together"—of the *Counra na Gaeilge na Bronx*, the Bronx Gaelic League. Andy McGann's Ceili Band blazed away, and three groups of 16 dancers each did a 16-hand reel—children, young mothers, middle-aged men. They ended with a fierce shout.

"An expression of enjoyment," said Mr. Rory O'Flaherty. He wore a gold ring in his lapel, the token of fluency in Gaelic. "Irish dancing is more alive today in New York than in Ireland."



SKYSCRAPER FOREST,
*golden towers of Manhattan appear
to float between the darkening pools of the
Hudson (left) and East Rivers. This fabulous
view from a helicopter captures the magic
of dusk when lights wink on all over the island, like a
million fireflies greeting the night.*





FOUNTAIN (TOP) BY PHILIP BOBBENNA AND BY EXHIBITION BY ELBERT WOLFF © R. G. S.

Greenwich Village: The name conjures bohemian adventures and artistic abandon. To millions of Americans it represents an unconventional way of life, like that of Soho in London and Montmartre in Paris. But while its reputation lives on, this section of downtown Manhattan has changed with the passing years: True, artists still hang their work on fences and walls, and these knitting at right wear the proper air of indifference to passers-by. True, the fountain at Washington Square, heart of the Village, still sprays youngsters on a steaming hot summer day (above). But the Village of half a century ago—daring symbol of artistic revolt and freedom—lives only in memory. Today its special charm lies in old brownstone houses, narrow, irregular streets, casual inhabitants, coffeehouses, and off-Broadway theaters.



Dancing for joy also characterizes the most tradition-minded minority in New York. The men wear noble beards and hats ringed with sable, like the Renaissance patricians painted by Titian. The little boys know the first five books of the Bible by heart. They call it the Torah, for they are Jews—remnants of the Hasidic branch of Judaism that flowered in Eastern Europe two centuries ago. *Hasid* means the pious, but these people go beyond piety. They give their lives entirely to the joy of communicating with God.

In New York live some 1,800,000 Jews, almost as many as in Israel. Among them the Hasidim are the tiny fraction whose zeal brooks no compromise. They frown on the State of Israel. Why? Because it was founded by men, and not by the Messiah.

I watched as they joyously celebrated Succoth, the feast of the harvest that also gives thanks for shelter during 40 years' wandering in the desert. The synagogue was small and unadorned, and so crowded that men clung to the walls to get a look at their rabbi, their *zaddik*, one so devout that they think he can work miracles. For this, men had come from far away to Williamsburg in Brooklyn. From Canada. From Argentina. From France. From Israel itself.

Jammed into the singing crowd I swayed, perforce, with the rest. A tiny space was kept clear for the rabbi, a famous scholar in his 80's. There he danced, dressed in white and silver, with the Torah in his arms.

High Life at the Towers

In ultramodern Manhattan, too, I was happy to find so much of the old still alive. Off Madison Avenue I met an itinerant sharpener of knives and scissors, with his workshop on his back. And in the Village, Joe Price, who was 77, still delivered onions by horse cart. The horse wore flowers behind his ears.

On Third Avenue, Conrado Perales rolled cigars by hand. A cooper on Ferry Street made barrels as they were made in old Nieuw Amsterdam. Independent craftsmen survived by the hundreds, happy to repair things reasonably, rather than tell you to throw them away and buy expensive new ones.

But I suspected that it was as easy as ever to spend lots of money in New York. And my wife proved it beyond question.

This episode began when I proposed that for a while we move from Elmhurst to the Towers of the Waldorf-Astoria.

"Everyone needs a little change now and then," I said. "You'll love the view east from the 29th floor, when the sun rises over Queens and the East River. And there's an extra air exhaust right in the shower, so that for once I won't have the mirror all fogged up. Never mind the cost."

I added that the neighbors would be nice and quiet. Cole Porter has an apartment up there, and so has Adlai Stevenson. Should the Duke of Windsor be in town again, or the Shah of Iran, they would be staying in the Towers too. "Let's go," said my wife.

Standing Room Holds True Opera-lovers

We also went to the opening of the Metropolitan Opera (pages 88-9). Reporters recorded the arrivals. Mrs. John R. Drexel III in pink-and-white brocade. Miss Patrice Munsel in red ostrich feathers. Miss Hope Hampton in chinchilla. My wife wore a black look.

During the last act, while Aida and Radames expired melodiously along the Nile, I went up to the fifth tier, to the standing-room regulars. By the eerie light of an exit sign, one sat on the carpeted steps. Another leaned against the wall. Neither looked at the stage. A third looked asleep.

Actually all three were concentrating deeply. Later I learned that they were a mathematics teacher, a secretary, and a food salesman. During the opera season they were up here four or five times a week.

"She was terrible," said the teacher. "A great voice, but miscast," said the secretary. The salesman said, "You've got to hear three or four *Aidas*, then the production begins to move." How many had he heard? "About a hundred. You see, each performance is different." Could greater love be found in Vienna or Milan?

Next morning my wife said sorry, she simply couldn't go to the United Nations Day Ball unless she too had something spectacular to wear. I said, "Try Ohrbach's, on 34th Street off Fifth Avenue. They're stylish and very reasonable."

My wife went to Bergdorf Goodman, at 58th and Fifth, where ladies have been known to spend \$100,000 a year. She went on to Abercrombie & Fitch, on Madison Avenue, for a \$90 embroidered cardigan, and to Hammacher Schlemmer, on 57th Street, for scissors to slice off the tops of boiled eggs.

"Such a handy gadget," she said, "for only six dollars. Now let's get you something nice."





ROYAL ARMOR AND DE SÁNCHEZ (LEFT): BY ALBERT VOLZENT © N.S.A.

The Metropolitan

K NIGHHOOD still flowers in a spectacle of 30 complete suits of 15th- and 16th-century armor (above), part of the treasure of 365,000 works at the Metropolitan Museum of Art.

Medieval fervor for the religious life finds expression in the Cloisters (opposite), a branch of the Metropolitan in Fort Tryon Park high above the Hudson. Here the museum has reconstructed parts of five cloisters from French monasteries. A visitor in the Gothic Chapel stands beside a sculptured effigy of a 13th-century French nobleman on his bier. Fully armed, the life-size figure lies with hands clasped in prayer, feet resting against a small lion, symbol of courage. Tomb of Armengol VII, a Catalan count of the same era, fills the niche at left.

Twelfth-century English cross was carved from walrus ivory. Metropolitan Museum Director James J. Rorimer (right) and Thomas P. F. Hoving, Associate Curator of the Cloisters, pin together the three pieces before placing the rare cross on display in a Romanesque apse on loan from Spain. Carvings depict scenes from the Old Testament and Christ's Passion and Victory.



We walked up and down Third Avenue, where a hundred big and little shops show some of the world's best antiques, and some of the worst. Shrewdly I steered her to a certain window.

"This little desk chair," I said, "is a masterpiece of 18th-century craftsmanship, signed by Etienne Meunier, cabinetmaker to Louis XV. A work of art, of lasting value."

"I don't like it," my wife said, "but let's ask how much it is."

I remembered the price—\$2,250. Now the clerk said it had gone up to \$2,850. "A similar chair was just auctioned at Sotheby's in London for \$4,500, and it wasn't even signed. Ours is still a bargain."

He was right. European antiques often are cheaper in New York than in Europe, and quite a few foreign dealers buy here what they then sell in Europe, often to visiting Americans. Sure enough, my chair was sold soon afterward—to a visiting European.

Time to Head Home to Queens

One evening, after tea and string music in the Palm Court of the Plaza Hotel, we stepped across the street and into a carriage for a ride through Central Park. It was an old landau, and it creaked gently as we clip-clopped along at four miles an hour. The lights of Fifth Avenue twinkled through the trees.

A victoria passed us. "Show-off!" said our

PHOTOGRAPH BY ELLIOTT KOLBERT © NATIONAL GEOGRAPHIC SOCIETY



The Modern

OASIS of tranquility, the sculpture garden of the Museum of Modern Art entices visitors to an alfresco lunch. Internationally acclaimed for its pioneer work in collecting and displaying the visual arts of the past 100 years, the museum also conducts classes in painting, sculpture, and crafts. Daily screening of classic films in its small theater attracts capacity audiences.

The Guggenheim

SPIRAL ramp circles the six-story snail's shell of the Solomon R. Guggenheim Museum. The late Frank Lloyd Wright designed the controversial building; its art—much of it the most modern of modern—has caused less debate than the structure itself. Visitors usually ride the elevator to the top and walk down the sloping gallery, rather than start from the bottom.

coachman, Wenzel Generowicz. "Why rush?"

Back we ambled to the Plaza, for dinner in the Oak Room. Maybe it was that leisurely ride through another age. Or the brochette of spring lamb *persillade* and the Edwardian surroundings—the ceiling was 23 feet high, and the dark paneling hadn't been changed since the Plaza opened in 1907. I don't know just what it was, but my wife objected when I lit her cigarette with my lighter.

"Please use a match, dear," she said. "I don't like the smell of gasoline."

That did it. Back we went to old Elmhurst, to Borstelmann's delicatessen and Hanley's gas station, to Rosen's hardware and Trauner's pharmacy, to Dr. Lawrence, who treats our cat, and to Dr. Nyilas, who treats us.

Elmhurst is a typical bit of Queens, and of New York. People take the subway to go off to work; and people come to work here, in one of the country's biggest plants for aircraft instruments.

The wreckers come, and Mr. Rosen's store is gone. Apartments sprout, and soon Macy's will come to Elmhurst with a revolutionary new department store. Shaped like a pancake and big enough to cover two football fields side by side, it will enable customers to drive on ramps right up to the floor they want, and to park their cars there while they shop.

Two gas stations on Queens Boulevard



The Hartford

NINE-STORY MONOLITH of polished Vermont marble, Huntington Hartford's new Gallery of Modern Art opened last March on Columbus Circle. Designed by Edward Durell Stone, the gallery houses paintings by Turner, Constable, Degas, Monet, Cassatt, Orozco, and others.

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REPRODUCTION OF THE PHOTO BY THOMAS REEDER AND SYDNEY BY JEAN COULON © N.Y.C.





ENTERTAINMENT BY THOMAS NEDDIS © H. R. S.

Dinner by candlelight in the 65th-floor Rainbow Room of the RCA Building rewards young New Yorkers with a superb view of the skyline at dusk. Floyd Peterson is a radio advertising producer; his wife Eileen, a theatrical press agent.

have acquired police dogs to discourage robbers. I found chisel marks on my door—a burglar had moved on to simpler locks. "Self-defense is common sense," said a subway advertisement, and I began to take jujitsu lessons from Prof. Naraki Hara; maybe I would also try karate. Teachers of these violent arts dotted the city, as once had schools of tap dancing. It was a sign of the times.

Or was it? Books I bought at the Museum of the City of New York made me wonder. For instance, I learned that jujitsu was taught to fashionable New York ladies 60 years ago. Then, much as now, Central Park was described as being "practically in the possession of the idle and the vicious," and the Short Tail Gang and similar tough gentry terrorized the unwary.

And had the crosstown traffic jams of former days been any less frustrating for being

caused by wagons and horse cars?

New perspectives also changed my mind about the Elmhurst Playground. I remembered it as an oasis of green—the Moore homestead, dating back to 1662. Now it was paved with asphalt.

But high school boys played basketball there, admired by high school girls. A fluffy little girl was learning to walk. A little boy attacked the monkey bars, and an old couple dozed in the sun. The chess tables, the horseshoe-pitching pits, the whole place was alive, useful to so many people. Before it had been prettier, but dead.

My friend Ed has long hated New York, to the last subway stop, the last shove in the ribs: "In those apartment buildings you're always feuding with someone you don't even know. Somebody is constantly banging on a radiator for more heat, or shouting down the hall to turn down the radio. This city makes animals of us." Ed fled to rural Virginia.

But Melanie Kahane from South Dakota, now a leading interior designer and married to TV commentator Ben Grauer, delights in her chic townhouse. "In New York, space may be sliced as thin as cocktail bread," she said, "but you have as much privacy as you wish. People don't just drop in, as they do in suburbia, simply because they

are neighbors or happen to drive past your door. You pick your friends from a social, cultural, and intellectual smorgasbord—and that's the height of civilization."

Could it be that both these views of New York were valid? What you find in New York, it seems, depends a good deal on who you are and how much money you have to spend.

Submerged World of Hopeless Poverty

Unfortunately nearly a million and a half New Yorkers are poverty-stricken: members of families with incomes under \$3,000 a year. So says the Commissioner of Welfare, James R. Dumpson. He disburses welfare payments to half a million New Yorkers—nine out of ten being children, or aged or disabled adults, or mothers without a husband's support.

I went among those poor people of New York, into what Mayor Wagner called their



ILLUSTRATION BY ALBERT BULLOCK © NATIONAL GEOGRAPHIC SOCIETY

Engrossed in an impromptu seminar, Columbia College students and their guests relax in Ferris Booth Hall between classes. Picture window at left frames domed Low Memorial Library on the Morningside Heights campus. Columbia University began life as King's College in 1754. It now enrolls more than 23,000 in 20 different schools.

"submerged world of utter, abject, grinding, hopeless poverty." Their origins varied, but a large part were Negroes and Puerto Ricans. New York now held a quarter as many Puerto Ricans as Puerto Rico, and more Negroes than any other city in the world. I saw them in Harlem, in Bedford-Stuyvesant in Brooklyn, in Morrisania in the Bronx.

But did I really know what I was seeing? I remembered an earlier time when I watched young people hurry to evening classes. Nearby an old man rummaged in litter cans. How sad, I thought. Here is youth, eager for its future. And age—defeated, the dreams gone.

I asked the old man what he hoped to find. "Books," he said, "paperbacks. Why buy them if you can pick them up free?" Off he went for dinner at the automat, far from sad.

And so it was in Harlem. The great housing development that looked so new, so airy, with

such a healthy lawn—wasn't it wonderful? Yes, but it had a dark side.

To make room for the lucky new tenants, three times as many others had been ejected from the old tenements being torn down. Many were more miserable than before. They had to break the associations of a lifetime, and squeeze into other old houses already shockingly crowded, at shocking rents.

A tenant in one new development said, "If I step on that lawn, I can be fined. If I earn a little more, I'll no longer be eligible for city housing. I'll be evicted."

The thousands of rickety tenements, so full of roaches and rats—weren't they horrible? Undoubtedly. But this didn't inhibit the good spirits of the Smith family.

Their wall held a calendar from the Carver Federal Savings and Loan Association, picturing distinguished Negroes: the author

Claude McKay; Henry O. Flipper, the first Negro graduate of West Point; Dr. Ernest E. Just, the marine biologist.

The children entertained me. Charles, 15, lifted weights. Ruth Ann, 8, twirled a rolled window shade for a baton. Jonathan, who was 6, lifted weights too, and 8-month-old Ronald untied my shoelaces. Perhaps they were happy because they were together, because they were loved.

In a public school I met children who were not so lucky. Twelve-year-old Willie had just threatened to kill the principal. But she wasn't angry. She said: "He has no father, nobody to give him breakfast. Sometimes he gets food out of garbage cans. The average child accepts fate, but Willie is very bright. He sees TV, all the happy families in the commercials. He thinks nobody likes him, and he gets frantic."

For many a poor Negro woman—bent by work and responsibility and trouble—comfort lay in religion. How beautifully dressed they were, Sunday morning in Shiloh Baptist Church. How the singing filled the heart.

The pastor spoke of sin and redemption, of much to be thankful for. Little choruses chanted yes, yes. Emotion mounted. Ladies in nurses' caps fanned those overcome by their feelings. God will not leave you, said the pastor, God will speak to you. . . .

I sensed someone behind me quietly crying.

Spanish Harlem: Struggle Against Odds

Thanks to my friend Jan Voors from Belgium, who knows New York as few native New Yorkers do, I was also invited into a home in Spanish Harlem, where every block is a fortress and outsiders are rarely welcome. "But you'll find Puerto Ricans exceedingly courteous," Jan said.

The head of the family was 18-year-old Juan. His mother served coffee and disappeared. Women don't talk to strangers. The little children had been sent out of the room, but they kept peeking.

This family was getting ahead. The oldest girl was valedictorian of her parochial high school class and would go to college. Juan, formerly prominent in a street gang, worked in a camera store. But it hadn't been easy.

In blocks like this, where so many felt cowed and exploited by the world outside—here the heroes were those who were tough, who took no nonsense from anyone, who made money by any means, even if it meant selling narcotics. Heroin made some happy, some of the time; but then came a thousand worms crawling in one's stomach, a thousand arrows sticking one's skin.

Was it surprising that people turned to the *botánicas*, the shops with miraculous powders and candles? There one could also find a *bruja*, a witch, who could summon up the spirits of the air or perhaps the even more powerful spirits of the water, to make others do one's will. This kind of magic existed in the West Indies before the Spaniards came. It thrives in New York today.

Few Jobs Left for the Unskilled

That newcomers from the countryside suffer in the city is nothing new. Photographs in the Museum of the City of New York, on Fifth Avenue, tell the truths of 70 years ago: Juan's block was a mess of shanties then. Hardly fit for pigs, the newspapers called them. But they were full of squatters straight from the farms of Ireland. The threat then wasn't heroin; it was tuberculosis.

At least there had been plenty of work for cheap immigrant labor. That's what had brought New York its greatness. Descendants of the shanty people were affluent and influential citizens today.

Wasn't there still plenty of work for everybody? I would see for myself. I'd be a dishwasher.

I visited employment agencies, big hotels, restaurant chains. No luck. Then I walked from one restaurant to another. A friendly policeman sent me to a cafeteria, but they didn't need me.

"We carry the world's finest *kopchunkas*," said a sign on the old lower East Side. That was Russian, meaning dried whitefish. Schapiro's Kosher Wines now faced a pig glowing in neon—the sign of a *carniceria*, a Puerto Rican meat store—and the men waiting at the barber's joked in Spanish and played guitars. No job on Rivington Street.

Twin spires of St. Patrick's Cathedral rise 330 feet above Fifth Avenue, yet seem lost amid the structures surrounding the block-long Gothic-style church. Before its bronze doors, Francis Cardinal Spellman applauded 100,000 of New York's sons and daughters of Erin as they marched up the avenue during the St. Patrick's Day parade last March. St. Patrick is patron saint of the Archdiocese of New York.



I walked past the storefront homes of gypsies, who spoke Romany, derived from Sanskrit, and smiled because the *gajos*, the non-gypsies, took fortune-telling so seriously. In Chinatown I passed men who only a year ago might have worked in offices in Peking or in rice fields near Canton. They had come to New York via Hong Kong. No job on Mott Street either.

"There isn't enough unskilled work any more for all the unskilled men," said an official at the State Employment Service. "A lot of dishwashing is done with machines now. Why should people take time to show you how? You might not work out."

Could I be a ditch digger? "No, that takes skill too; you might slice into a gas line. Get a car-washing job."

At last I did, out on Coney Island. I dried

the bumpers, while six others wiped the rest of each car after it had rolled off the washing line. When business slowed around midday, the boss at once laid off two men.

I sympathized. He had to keep down his overhead. But how must a man feel when he has done his best and finds that his labor is not wanted?

Pilot Project Trains Problem Youth

The woes of the unwanted unskilled belong not only to New York. They challenge all America—and as before, New Yorkers lead in the search for solutions. Dr. Sol Chaneles, a sociologist with the Department of Correction, outlined his promising project.

"There's a terrific need for people who can operate data-processing machines," he said, "but to apply for the necessary training, you





Jet-age gateway to the United States, John F. Kennedy International Airport—formerly New York International at Idlewild—handles 13 million passengers a year. Incoming flights light a huge board (above) in the 11-block-long International Arrival Building. Airline terminals, each of distinctive design, include the Trans World Airlines Flight Center (left), whose soaring cantilevers evoke the grace and beauty of flight. Sightseers may use a terrace atop the lofty control tower (below).



EXTERIORS (LEFT AND TOP) AND AIRBORNE BY THOMAS HEDER © N.A.A.

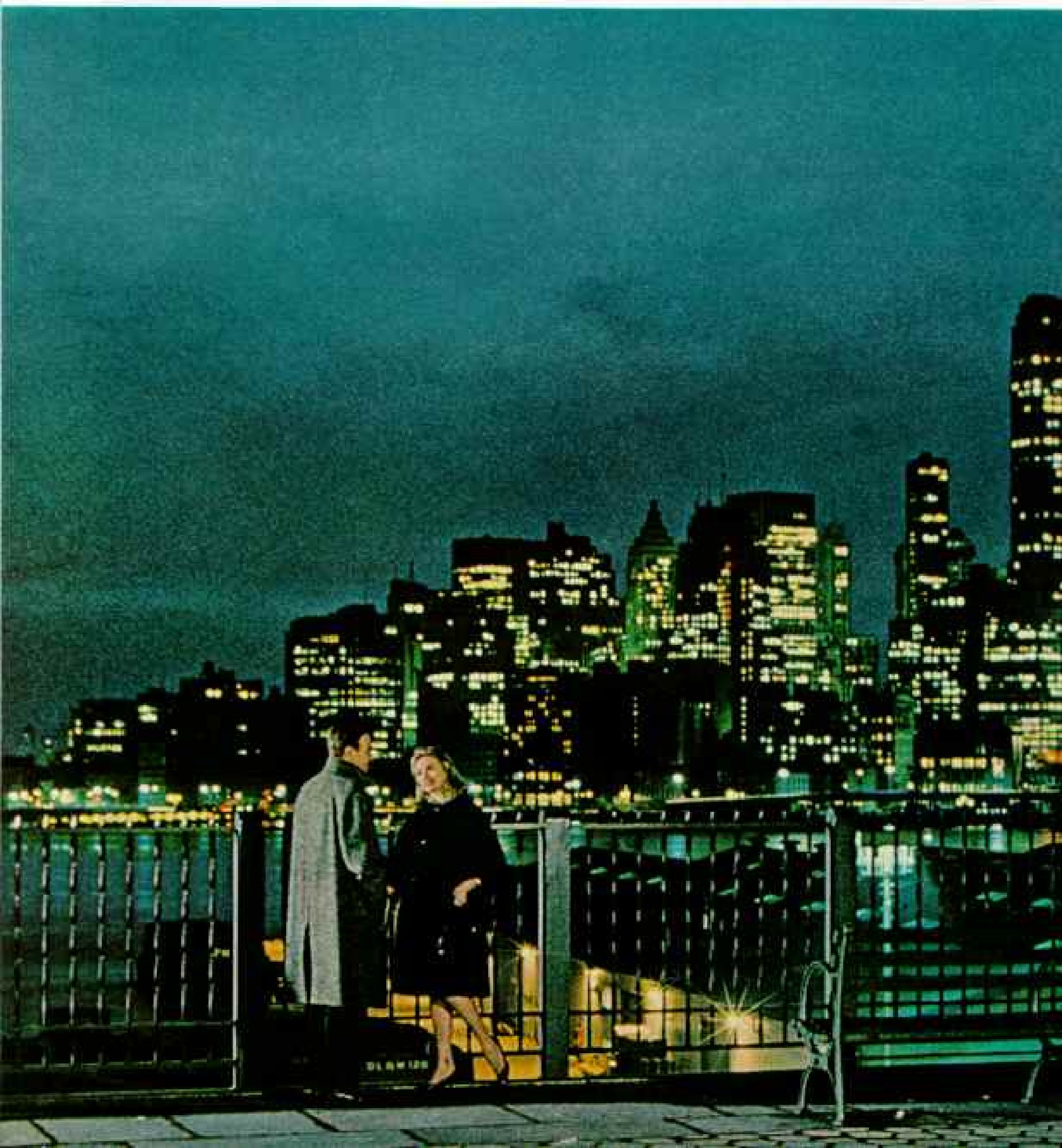
have to have at least a high school education. We gave the IBM aptitude test to a group of boys, all problem youths. Few had been through high school. But they did as well as any other group."

After two months' training, these lucky boys would step into jobs. Big corporations awaited them, with up to \$4,500 a year to start, plus paid vacations. Dr. Chaneles said: "Just think. The American ideal is that the individual can rise, that next year will be better than this, that futures are built by planning ahead. None of this makes sense

to boys like these. Their families move around, their neighborhoods are razed, they can't get a steady job. Or any job. They live from day to day. The future means nothing. Now their new skill will put them into a new world. Buying furniture. Getting married. Living as men who are not despised, as responsible individuals with something to look forward to."

In his modest way, Dr. Chaneles was attacking the problem of underdevelopment—of lethargy and hopelessness—that bedevils so much of the world.

Soon I would be traveling again. But before



leaving, I went to the Junior League Ball at the Plaza, in honor of 36 debutantes home on Christmas vacation from college.

Each girl, escorted by two young men, walked into the middle of the ballroom. In the spotlight, with all eyes upon her, she curtsied. It was a moment of trepidation.

A Matter of Having Brothers

The most graceful, the most serene curtsy was that of Mary Ann Livingston Delafield Cox. When I danced with her, I asked, "Were you afraid?"

She smiled. "I was not afraid," she said. "You see, I had my brothers with me."

Would the day come when everyone could feel that way?

I thought of the brass plaque in St. Paul's engraved with George Washington's Prayer. Our first President beseeched Almighty God to incline the hearts of the citizens "to entertain a brotherly affection and love for one another."

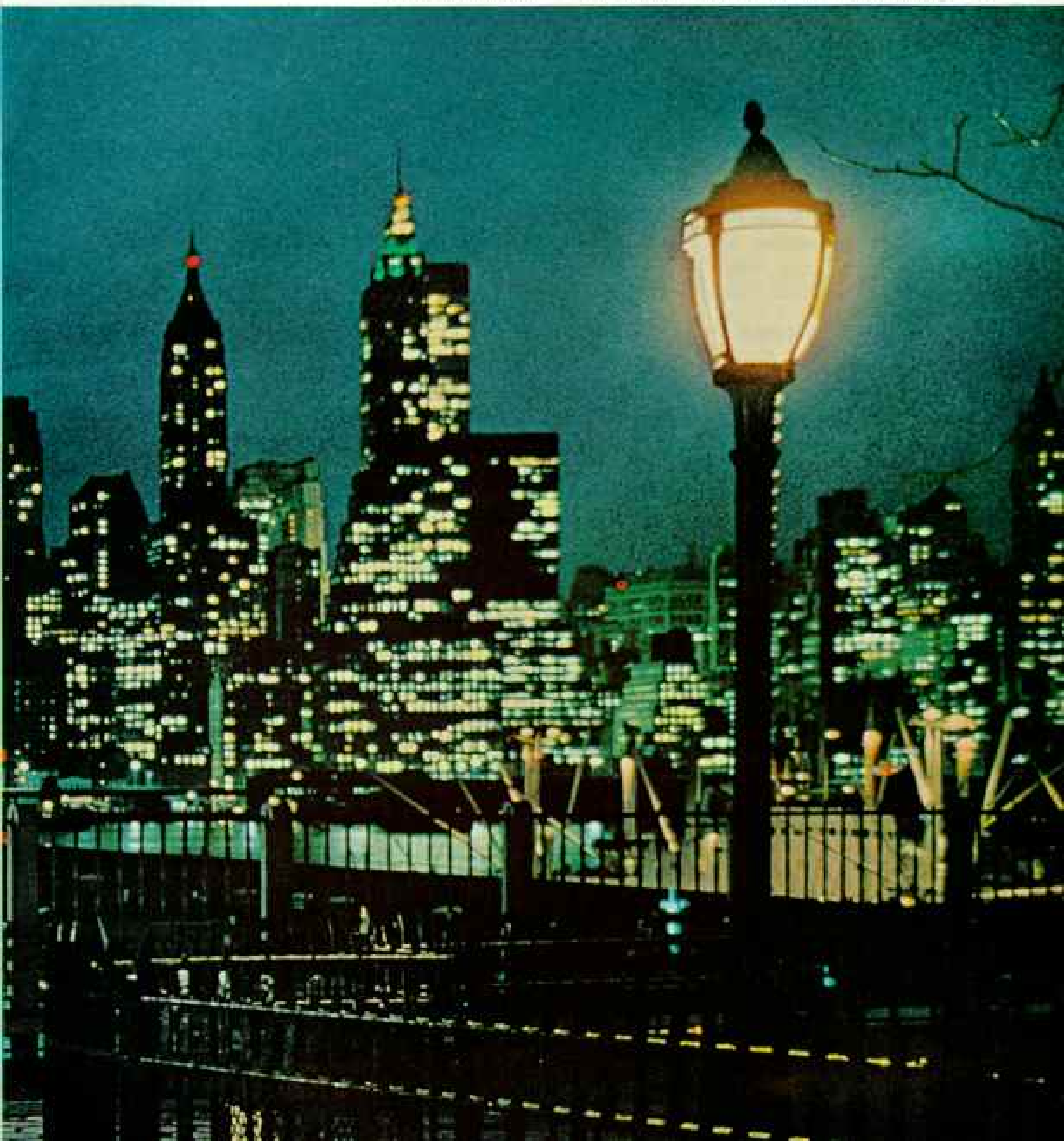
And I said to myself, Amen—for New York, for these United States, and for the world.

THE END

Heights. Myriad pinpricks of light prove New York's workaday world is still very much alive.

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NEW YORK CITY MAP LAUNCHES United States Atlas Map Series

By RALPH E. McALEER
Chief Cartographer, National Geographic Society

THE LATE PRESIDENT John F. Kennedy was fond of quoting poet Robert Frost's remark: "What makes a nation in the beginning is a good piece of geography."

The martyred young Chief Executive wanted all Americans to share his love for this richly varied land. One of his last official acts was to help start a "See the U. S. A." campaign. As summer, 1964, arrives, a travel-minded people is on the move as never before.

A spokesman for the American Automobile Association has told me that 94.5 million Americans will travel by automobile in 1964 on vacation and pleasure trips. They will drive an incredible total of 130 billion miles—roughly equivalent to 700 round trips to the sun.

Magnet for 1964: New York World's Fair

Millions of these vacation travelers have singled out the New York World's Fair as their destination. Thus the double map of **Greater New York and Tourist Manhattan** (following pages) is a timely choice to introduce the newest project of the National Geographic Society: a carefully planned, comprehensive series of uniform-size United States Atlas Maps.

The new U. S. Atlas Series is the logical outgrowth of the eminently successful National Geographic Atlas of the World, planned and designed by the Society's former Chief Cartographer, James M. Darley. Jim retired on April 1, 1964, after devoting half a century to advancing the art of map making. As Cartographer Emeritus, he continues to give the Society—and the U. S. Atlas program—the benefit of his matchless knowledge and experience.

Like the two-part map of New York City tucked into the pages of this issue, subsequent U. S. Atlas Plates will be distributed to members as supplements to their magazine. (In addition, remaining World Atlas Plates will be issued until members have received the complete series.^{*)}

Everyone in the Society's 42-man Cartographic Division has tackled the monumental new mapping project with enthusiasm—but none more eagerly than Jim Darley himself. "What we need is a series of the finest state maps ever produced," he says emphatically. "The most accurate and attractive general maps, each incorporating an up-to-date, detailed road system to guide our members on their expanding travels."

Each of the 50 United States will have its own 11-color map, indexed on

Place name printed on transparent plastic goes into position on this issue's supplement, **Greater New York and Tourist Manhattan**, first map in the Society's new U. S. Atlas Series. Chief Cartographer Ralph E. McAleer (left) and Cartographer Emeritus James M. Darley compare the book's dummy with that of its companion, the Atlas of the World.





the reverse side. To obtain maximum detail, two maps each will be devoted to sprawling Texas and California. Scales will vary from 6.6 miles to the inch for Delaware to 31 miles to the inch for East and West Texas.

The new maps, designed for tour planning in the living room and easy handling in an automobile, measure 20 by 15¼ inches unfolded. As with the World Atlas Plates, the popular "bleed" design eliminates margins, permitting the use of every square inch for geographical information.

Insets will detail state capitals and major cities, as well as areas of special interest to vacation travelers: for example, on California, the Redwood Empire will be depicted separately; on Virginia, an inset will focus on Colonial Williamsburg.

Like New York City, the Nation's Capital will warrant a double map, printed on both sides. Single maps will be devoted to Los Angeles, Chicago, and Philadelphia. Others will show this country's far-flung Pacific and Caribbean dependencies. Physical and political maps of the United States will be included, as well as a revised map of the National Park System. In all, the series will comprise at least 64 plates.

Color Code Depicts Roads by Type

In 1963 alone, the Nation spent nearly 13 billion dollars to extend and improve the already vast road system that veins the face of the United States. To simplify this complex network, Society cartographers have designed a special color code, using combinations of yellow, green, and red lines to distinguish various state, U. S., and interstate highways, toll roads, and freeways.

Through the pages of its magazine, as well as through its maps, the Society for more than 75 years has stimulated and nurtured the growing urge of Americans to explore their world—and now, particularly, their own Nation.

As President Kennedy said, "Americans have been richly endowed with a land that is both beautiful and bountiful."

The maps of the Society's new U. S. Atlas Series will serve as incomparable traveling companions for the millions of Americans who take to the highways in future years to see this rich endowment.

*A complete place-name Index to the World Atlas Series of 57 uniform-size maps is available; it is particularly convenient for those who preserve their maps in the Atlas Folio. The Index may be ordered at \$2.00 per copy, as may individual Atlas Maps at 50 cents each, by writing to Department 172, National Geographic Society, Washington, D. C. 20036.

Fairgoers' Guide to New York

THIS YEAR, all roads lead to the spectacular New York World's Fair of 1964-1965, called by its president, Robert Moses, "An Olympics of Progress."

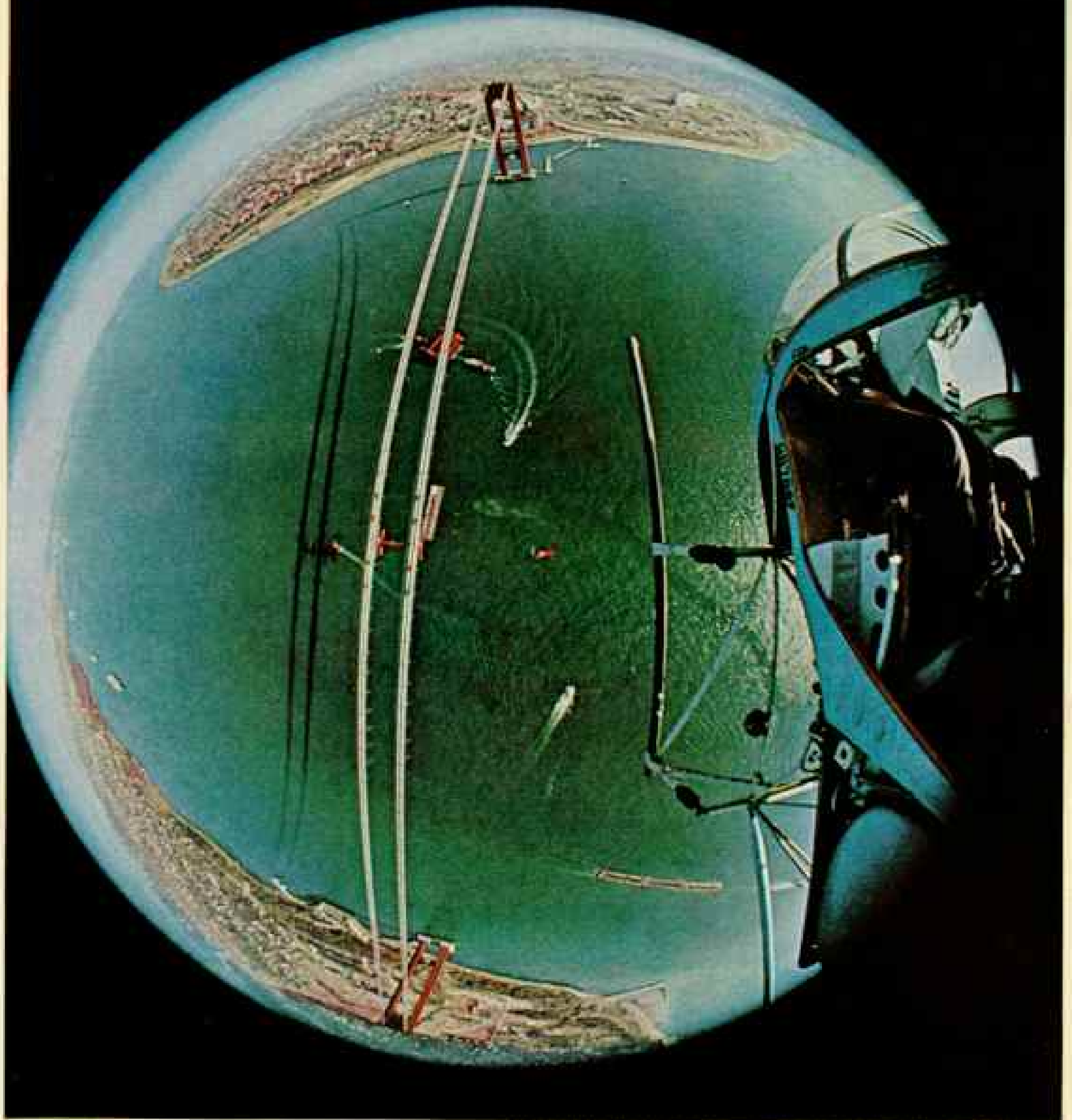
As a useful guide for visitors to the Fair—and for those who travel in spirit to "The World in New York City" through the 56-page article by Peter T. White in this issue—National Geographic cartographers have prepared a two-part supplement map, **Greater New York and Tourist Manhattan**.

To most visitors, New York City means Manhattan Island, a 20th-century forest of asphalt, concrete, steel, and glass. As old buildings come down and new ones go up, as streets are blocked off, widened, or made one way, this borough continually changes. The result: a real challenge to map makers.

Despite these obstacles, Manhattan was mapped street by street from 89th Street to the tip of the Battery; so were parts of Brooklyn. Society cartographers spent countless hours afoot, in automobiles, and even in helicopters, making certain that every notable building was included—and that buildings no longer in existence or now being demolished were *not* included.

This field work proved well worth the effort. For instance, one cartographer came across a tall monument in Brooklyn built like a lighthouse above Wallabout Bay. Neglected and aging, it was not on any map; its purpose seemed unknown to local residents. Investigation proved it to be the Prison Ship Martyrs' Monument (J6 on the **Tourist Manhattan** map), honoring the thousands of Americans who died during the Revolution on British prison ships anchored in Wallabout Bay.

To simplify a visitor's search for individual buildings, the Manhattan map provides an index of more than 500 place names, and a distinctive series of colors: orange for theaters, museums, and galleries; purple for hotels; dark green for churches; pink for colleges and hospitals; black for government buildings;



ARTISTOPHOTO BY NATIONAL GEOGRAPHIC PHOTOGRAPHY ALBERT BOLSONI © N.G.S.

Awesome arc of cables between Staten Island (bottom) and Brooklyn, seen in this Fisheye-lens view from a helicopter, will support the 4,260-foot main span of the new Verrazano-Narrows Bridge.

yellow for other important buildings. Such detail in mapping Manhattan is possible on a scale of 3 inches to the mile.

Greater New York, drawn at 2.1 miles to the inch, accurately traces the lacework of expressways ringing the city—including some \$125,000,000 worth of improvements on access routes to the Fair (coordinates E-F6). All recent highway changes have been included. An extension of the Van Wyck Expressway, for example, built in time for the Fair, is depicted by a double red line on the map.

The most spectacular new highway branches from the New Jersey Turnpike and crosses Staten Island, Brooklyn, and Queens. When

completed next year, it will enable fairgoers to bypass Manhattan completely.

Key to this new route lies at the Narrows, the pinched mouth of New York's great harbor, which probably was first sighted in 1524 by Giovanni da Verrazano, a Florentine explorer in the service of France. The world's longest single suspension span, bearing his name, will leap this gap (above).

This will be one way to approach the Fair, but the new Atlas Map shows an even more exciting route: Along dotted green lines crossing the East River, 35 speedy hydrofoil ferries skim with 20 passengers each, directly to the Fair's Marina.

THE END



ANCHORAGE

"And, behold . . . the earth did quake, and the rocks rent." St. Matthew's account of the first Good Friday saw fearful repetition almost 2,000 years later when, on March 27, 1964, the earth again strained its thin coat and burst its seams, spewing sudden destruction. The gruesome dance, strongest quake to strike North America since an 1899 shock in Alaskan wilds, dropped buildings and pavements as much as 30 feet in downtown Anchorage. In the chill morning mist two days later, troops patrol the shambles of 4th Avenue.



PHOTOGRAPH BY NATIONAL GEOGRAPHIC PHOTOGRAPHER WERTZELLE BARRIS © N.G.C.

AS CAROL TUCKER watched, fascinated, the small porcelain figures began to dance on the counter top. Earthquakes were nothing new in

Alaska—out on the Chain, as old-timers call the Aleutian Islands, Mrs. Tucker had been through scores of heavy tremors. Here in Anchorage, on the third floor of a modern,

FEEL THE DREAD

EARTHQUAKE!

windowless department store, instinct warned her that this was no ordinary quake. Instead of subsiding after a moment or two, it grew steadily stronger. The building began making ominous sounds.

Mrs. Tucker started across the heaving floor toward the escalators. Before she could reach them, the lights went out. . . .

- One hundred and twenty miles to the east, Bernard Whalen and his friend Jim Aubert were helping unload the 10,000-ton Liberty ship *S.S. Chena* at the pier in Valdez, a town of 1,100 people on Prince William Sound.

Aboard ship, Whalen glanced at his watch. It was 5:36 p.m., less than half an hour until quitting time for the workers on board and for two dozen other longshoremen on the pier. Whalen felt a shudder run through the ship. His first thought was that the "jumbo gear"—the heavy cargo-lifting rig forward—had giv-

en way on the deck. Jim Aubert, standing beside No. 3 hatch, thought that for some reason *Chena* was getting under way. Both men glanced toward the pier. . . .

- Far down the Gulf of Alaska, on bleak Kodiak Island, U. S. Navy Lt. Raymond Bernosky set out in the late afternoon from Kodiak Naval Station to tend beaver traps with a friend. The two men left their car, an International Harvester Scout, several hundred yards from the beach and started on foot for a low hill inland.

After a time, Lieutenant Bernosky looked back at the car. What he saw sent him and his friend streaking for high ground. The Scout was afloat on a nightmare flood tide that was sweeping silently and swiftly up the hill. Both trappers made it to the hilltop—the friend only after colliding with a floating chunk of ice three and a half feet thick. . . .

- Meanwhile, to the east in Juneau, Alaska's capital, State Senator Yule Kilcher of Homer sat trimming his fingernails in the Baranof Hotel. He had just finished the fourth nail when a prolonged tremor shook the building.

Shocks Slam Across 500-mile Arc

It began years before that fatal Good Friday of March 27, 1964. Deep in the earth, perhaps 12 miles beneath the region north of Prince William Sound, fearful and little-understood forces were at work on the earth's crust, twisting and straining the great layers of rock as a truck strains its laminated springs going over a bump. Eventually, at a point called the focus, the rock gave way, snapping and shifting in an instant with the force of 12,000 Hiroshima-size atomic explosions.

The devastation spread with terrible speed in an arc 500 miles long (maps, pages 120-21). Crackling through the earth at thousands of miles an hour, the shock wave sliced, churned, and ruptured the land like some enormous disk harrow drawn over the surface. Highways billowed with the upward thrust of the shock, great concrete slabs overlapping one another like shingles set awry. Rail yards heaved and buckled, twisting tracks into bright curls of steel. Serene, snow-capped mountains shuddered, loosing cascades of ice and rock that sheared slopes razor clean of brush and trees.

Towns and cities suffered bizarre torments. Among neat buildings and ordered streets, the earthquake seemed to give way to caprice, demolishing one building and sparing its neighbor, leaping hundreds of yards—often half a mile—to deliver massive, jackhammer blows. Where power lines and fuel tanks lay, circuits occasionally ruptured; the crackle of their sparks was like the sputtering of fuses connected to gigantic powder magazines.

The shock wave struck and raced on, but in passing it stirred other, sequel forces. Somewhere off the crescent of Alaska's southern coast, the sea bottom had heaved and plunged violently, setting millions of tons of water in

By WILLIAM P. E. GRAVES National Geographic Staff

SEWARD Secure in his mother's arms, a young survivor rests in a temporary shelter. Eyes still reflect the fear inspired by seismic sea waves, tsunamis, that swept through the port. Honored recently by selection as one of 11 All America Cities, Seward suffered a knockout blow from the seismic sea wave that destroyed docks, warehouses, and rail yards (pages 128-9). When asked what the All America City would do now, the mayor responded, "Work on our second award."







motion. It was the motion of a tsunami, a seismic sea wave, whose effect onshore can be that of a battering ram. The time was 5:36.

In those agonizing moments, the 49th State suffered damage estimated as high as \$750,000,000—slightly more than 100 times what it cost to buy Alaska from Russia in 1867. On the floor of the United States Senate, Ernest Gruening of Alaska declared that the disaster “surpasses in magnitude that suffered by any state of the Union in our Nation’s entire history.”⁹

Fortunately, the loss of life proved far below first estimates. After three weeks, Alaska announced 115 people had been lost; 4,500 were rendered homeless.

Control Tower Reveals Earthquake’s Power

I arrived at Anchorage International Airport by jet from Seattle two days after the first shock. Like my fellow passengers—many of them Alaskans hurrying home to what could be either minor inconvenience or complete ruin—I spent the flight up the state’s panhandle hunched by a window for a glimpse of the damage. Far below, the land lay seemingly serene and unscarred beneath its white mantle. Experience was soon to teach me that, even during a treetop pass in an airplane, the eye can overlook frightful disaster.

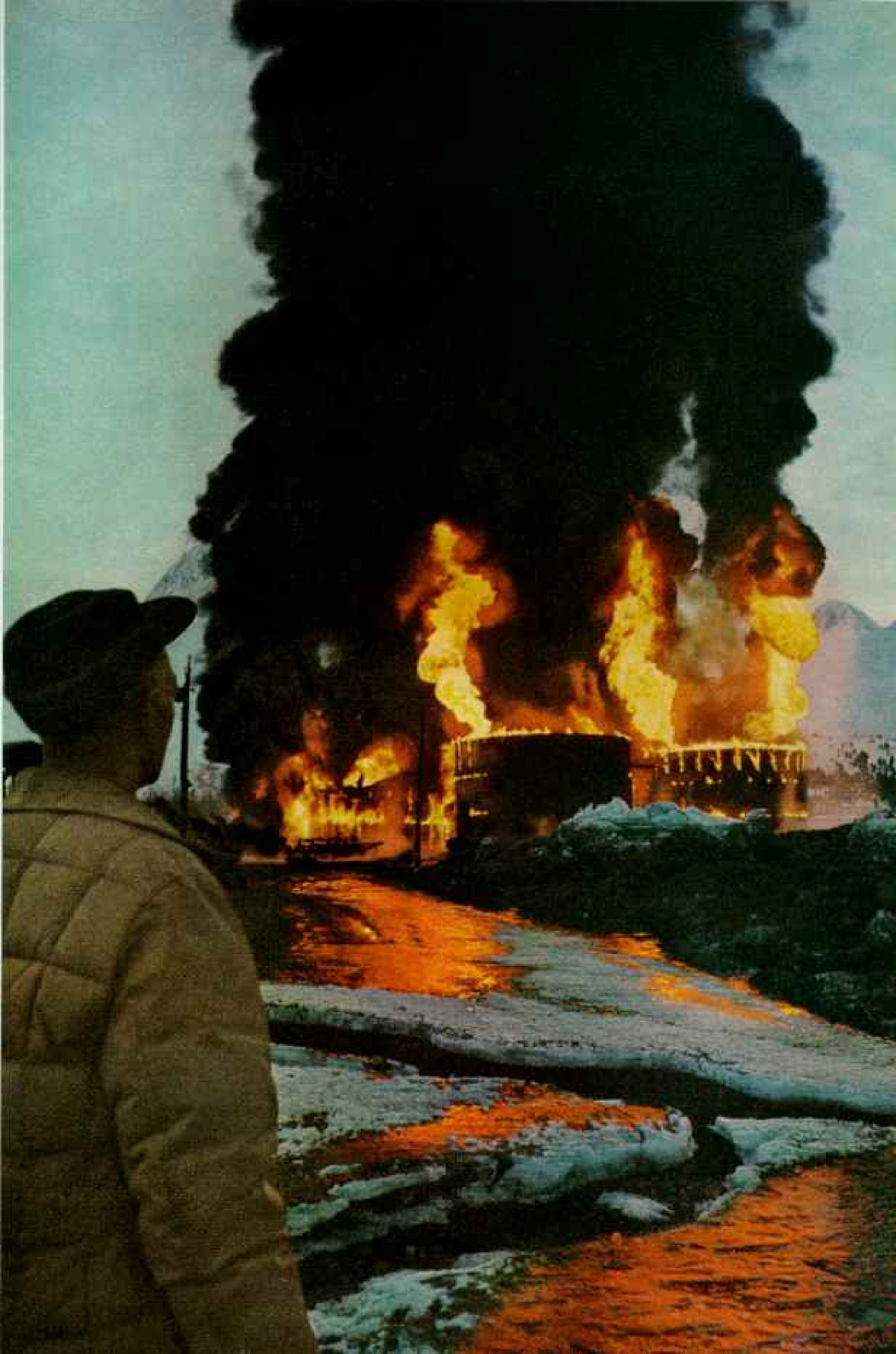
There was no overlooking the Anchorage control tower. It was a sickening jumble of twisted steel girders and shattered glass, in which the controller had died. The capriciousness of the earthquake began to sink in—the terminal beneath the tower seemed virtually unharmed.

Aside from the horror that had once been the Turnagain residential area, Anchorage’s greatest ruin was 4th Avenue, its main street and amusement center (pages 124-5). There was something uncannily selective in the destruction of 4th Avenue. For the most part, the street’s south side is lined with thriving stores, a fur shop or two, and small company offices. On the north side stood a scattering of dingy cafes, tired amusement parlors, and an over-age movie theater.

⁹ Senator Gruening vividly portrayed his state for NATIONAL GEOGRAPHIC in “Alaska Proudly Joins the Union,” July, 1959.

KODIAK Snow’s gentle veil fails to disguise the hideous wreckage that was Kodiak. Quake-spawned floodwaters ravaged the downtown area, sinking dozens of fishing boats and hurling others atop homes and stores, blocks inland from the waterfront. But, like stricken Alaskans everywhere, Kodiak’s people tried to take the catastrophe in stride, and even managed an occasional wry smile. Said one man to City Manager Ralph Jones: “I wished you every success when you campaigned to clean up Kodiak, but this is ridiculous!”

Weeks after the quake, Kodiak’s foundations appeared to have permanently slumped some five feet. Other areas along Alaska’s southern coast suffered similar settling or rising of the land.



In the split second it took the earthquake to flicker the length of 4th Avenue, the shock scythed the ground out from under a score of buildings on the northern, older side of the street (pages 112-13). So neat was the job on the Denali Theater that the building dropped 10 feet below sidewalk level without popping a single lightbulb on its old-fashioned marquee. On the south side of the street the shops and offices quivered, lost a window or two, and stood firm.

Shopper Gropes Her Way to Safety

A block south at 5th Avenue and D Street, in Anchorage's newest department store—a five-story building with solid vertical panels in place of windows—there were still 25 minutes until closing time. Good Friday shoppers had thinned to a handful, and the store had a pleasant, leisurely air about it. Carol Tucker, the wife of George Tucker, a prominent Anchorage builder, browsed among china and bedding on the third floor.

Friends in Anchorage today who know Carol Tucker's story find it hard to explain just how it is that she's alive. Carol has given up trying to explain. I called on her one day not long after the earthquake and found her hobbling about the house in a leg cast.

"It's really a luxury," she said, smiling and tapping the cast with her knuckle. "I tore a few ligaments falling down the escalator in the dark, and the doctor thought they would heal quicker this way."

She is a very pretty woman, in her late twenties. I found it hard to picture her amid the horror of a darkened and crumbling building. As she began quietly to talk, however, the picture grew appallingly clear.

When the lights failed, Mrs. Tucker had stumbled to the escalators and started down.

"I'm not quite sure whether I used the 'Up' or the 'Down' escalator," she told me. "The power was off, and it didn't seem the time to stand on ceremony."

On the way down the first flight, she tripped and fell, perhaps because she refused to brace herself with her hands, but instead kept them clapped to her head.

"I knew I had little hope of getting out of the building alive," she explained, "but if I were knocked unconscious, then I had no hope at all. Things were falling all around in the dark, and I couldn't take the chance."

After what seemed hours, she reached the second floor. It was then that Mrs. Tucker came close to despair.

"The floor was heaving so badly," she said, "that I couldn't stay on my feet. It was like the floors in fun houses, the ones that spin and float up and down." She frowned. "I used to think they were wonderful."

Somehow she managed to climb down the next escalator. On the ground floor, for the first time, she had light to see by from the show windows. Desperately she struggled across the still-rippling floor to an alcove inside the main entrance. She cannot explain why she didn't make a dash for it right then, past the glass doors to the relative safety of the street. But she paused, and a moment later great sections of the building's façade broke loose and sheared down outside the doors like so many guillotine blades (page 123).

One section killed a young man crouched on the sidewalk. Another mortally injured a woman in a passing car. A third slab struck a parked car, reducing it to a height of 18 inches. Carol Tucker turned for the back door.

"I came out in the parking lot," she said, "and I remember a man taking my arm. They say that I passed out then for a second or two. It seems a silly time to have done it."

Bouncing Autos Herald Quake

Looking back, Carol thinks the thing that troubled her most was the loss of her purse on the third floor.

"It wasn't the money," she says, a trifle embarrassed. "It was the identification—if I'd been killed in there without it, my family might never have known what happened."

Older hands than Carol Tucker were momentarily mystified by the earthquake. Joe Kramer, a longtime Anchorage taxi driver, thought his fellow motorists had gone berserk. Automobiles began fishtailing toward him like dodgem cars at an amusement park.

VALDEZ

In a nightmare scene, fuel-oil tanks ignited by sparks from severed power lines splash fire across the cracked, ice-paved land. In the wake of the first great shock, harbor waters rushed landward, then seaward as if someone had pulled the plug in a giant bathtub. The town of 1,100 counted 31 dead and 225 homes destroyed or damaged.



"It was when they started bouncing two feet off the ground," Joe recalls gravely, "that I knew it was more than just the drivers." Sensibly, he parked his cab in an open spot.

Where the earthquake did not demolish outright, it often left grotesque scars. When the rocking died, several of Anchorage's large office buildings and apartment houses showed walls veined with hundreds of branching fissures in patterns that suggested lightning in a summer sky.

Alaskans Call Upon Their Faith

Other buildings offered pathetic contrasts. One 4th Avenue florist shop was snapped violently in two. In the rear half of the shop, tall bouquets of Easter flowers stood serenely untouched in their vases. In the yawning show window, a breeze idly rocked the small wicker Easter baskets slung on ribbons and filled with miniature cotton-wool rabbits.

Anchorage, indeed, was filled that weekend with the spirit of Easter. In the city's agony, more than one Alaskan must have recalled the terrible words of St. Matthew describing

Christ's death upon the Cross: "And, behold . . . the earth did quake, and the rocks rent" (27:51). Prophetically, that dreadful moment, too, had fallen on a Friday—the first Good Friday—at the ninth hour of daylight.

Many reacted from the depths of their faith. The wife of an Army sergeant at Fort Richardson, just to the northeast of the city, remembers standing with her 16-year-old daughter in their violently quaking front yard and hearing the girl say tearfully, "Lord, that's enough now. Please stop it."

Comedy lightened the ordeal of others. On a bluff overlooking Anchorage, Air Force Maj. John Mandeville was taking a nap when the earthquake struck. As the major was putting on his boots, the shock neatly dislodged his home from its foundation and tipped it down the slope (page 126).

"I got the left boot on all right," he explained later, "but when I reached for the right one, it had disappeared. Then I saw one of my oxfords passing by, so I grabbed it and put it on."

Other crises called for invention. In the



Force of thousands of atomic blasts shakes a 500-mile-long swath of the Nation's largest state. Orange bursts mark heaviest hit towns. Huge sea waves, born of the quake's impact, sweep down the west coast of North America and lash Hawaii's beaches. Coastal configurations, rather than distances, determine wave height. A nine-foot wave rolls over Crescent City, California; yet in Puget Sound, 400 miles to the north, water rises only half as high. Scientists speculate that waves up to four feet high in the Gulf of Mexico 15 minutes after the quake were caused by vibrations of the earth.



Aladdin Beauty Palace at 6th Avenue and C, hairdresser Myrtle Barnes had just applied a powerful permanent-wave solution to a customer's hair when the earthquake struck.

"I had to get that solution off," Myrtle told me, "or the lady would have lost her hair. But the earthquake had cut off the water."

I asked how she had solved the problem, and Myrtle blushed.

"I scooped the water out of the tank above the toilet," she said. "It's perfectly clean, and the customer didn't feel like arguing."

Weather Eased Quake's Aftermath

Anchorage, for the most part, will always be grateful for two things about the earthquake: that it occurred late in the day, when few people were downtown, and that temperatures for at least a week following the disaster were normal for March—in the 20's and 30's. Had Alaska had a cold snap—and in the 49th State, March cold snaps can run well below zero—not only would rescue and shelter problems have become nightmares, but urgent repair jobs, such as the splicing of ruptured water mains and gas conduits, would have been dangerously—in some cases, perhaps fatally—delayed.

Alaskans, I learned during those first days in Anchorage, are incurably stouthearted and possessed of a saving sense of proportion. Time and again as I walked through the ruins, I passed homeowners and shopkeepers burrowing among the indescribably forlorn remains of their lives. And almost always as I passed, there was the brief glance upward and the smile. Finally, pausing beside what once had been a home and what now more than anything resembled a giant pile of jackstraws, I asked the owner outright how he managed a smile.

His answer was simple yet perhaps representative of all Anchorage as it faces the challenge of rebuilding:

"It's easy. I'm alive."

Anchorage, for all its suffering, had one great advantage over most of Alaska's other stricken communities—the city stands roughly one hundred feet above sea level. That fact probably accounts for the city's incredibly low death toll. After three weeks, with almost all wreckage searched, authorities placed the figure at nine known fatalities out of a population of 55,000. In terms of cold percentage, the number is almost grounds for rejoicing. There are, after all, towns like Valdez.

The port of Valdez lies at the head of a fiordlike sliver of water some 30 miles from

the open expanse of Prince William Sound. Majestic snow-girt mountains—Valdez calls itself the "Switzerland of Alaska"—shoulder the small community almost into its own deep-water harbor. I flew to Valdez—Alaskans pronounce it "Valdees"—one crystal day in a light Army plane piloted by a National Guard lieutenant, John W. Spalding.

The dark, spruce-tufted islands, home of deer and Alaska brown bear, slipped by in blue water laced with spray and now and then flecked with floe ice. At the mouth of Valdez Arm the first ominous signs—a green plank several shades too bright to have been long afloat, a shattered orange crate, a red-handled house broom—broke the pattern of whitecap and ice. As the fiord narrowed, what

PHOTOGRAPH BY ARNOLD PARKS AND
EXPLORERS BY RUSSELL AL JARBER, U.S. ARMY © U.S.



"Did it truly happen?" The Honorable Ernest Gruening, junior United States Senator from the 49th State, shares the shock of fellow Alaskans as he surveys damage.

Crashing into the street, the front wall of the five-story J. C. Penney store in Anchorage killed two people and crushed several cars. Opened only a year and a week prior to its destruction, Penney's today plans to rebuild.







Wrenched Remains of 4th Avenue Buildings Attest the Earthquake's Fury

The day in Anchorage was seasonably warm, only four degrees below freezing. A few last-minute Easter shoppers were still in downtown stores; traffic was light on the main streets. Then at 5:36 p.m.: "Oh, my God, what is happening?" cried a motorist as the pavements rippled like ocean waves. For horror-filled moments, Alaska's largest and fastest growing city trembled on the brink of total destruction. But, miraculously, though property damage in Anchorage exceeded 285 million dollars, only nine people are known to have died. The 15-story Anchorage-Westward, city's largest hotel (background), survived almost intact.

No gun-slinger of the old West ever cleared out a saloon faster than the quake emptied the D&D Cafe on 4th Avenue. Overturned chair and plaster-dusted cards face up on the table depict the frantic exodus better than words.



REARVIEW MIRROR: COURTESY OF MARSHALL LOCKNER, ELDER STEEL, AND AN ARCHIVE OF W. J. BARRETT © A.S.S.



PHOTOGRAPH BY B. C. LARSEN, NATIONAL GEOGRAPHIC STAFF © N.G.S.

Torn in two when the earth opened at its roots, a birch tree testifies to awesome forces that split the Government Hill section of Anchorage. Red house slid 70 feet down the slope, carrying its owner, Maj. John Mandeville (in green jacket).

had begun as random debris thickened, until at last the shoreline became fringed with a ghastly gruel of wreckage and ice.

The tragedy of Valdez is only partly due to the quake (page 118). Despite the hammering the town took, it lost no greater proportion of its homes and buildings than many another Alaskan community. What brings a stricken look to the eyes of Valdez residents even today is mention of the wave.

It came up the fiord, just after the earthquake, like some monstrous sea creature. Witnesses differ over its appearance—some say it came as a fearful, instantaneous rising of

the tide; others recall a mountainous wall of water. One thing is certain: In the triphammer impact of the wave and its terrible backwash, the pier at Valdez, with 28 stevedores and on-lookers, vanished forever.

"One second she was there, the next she just wasn't," Jim Aubert told me, still in tones of wonder. "I saw maybe a dozen people turn and break for the beach, but she was a long pier—maybe a hundred yards—and they hadn't the slightest chance. She was sucked under all at once, like—well, just like the bobber on a fish line when a big one hits."

There was a catch in his voice. "My eyes can't seem to get rid of it."

Disaster and miracles ran together that day. *S.S. Chena* "bottomed" three times—touched down with her keel on the harbor floor. The first drop sheared her lines clean, and with unimaginable skill and luck, her captain rang for power, got it, and bounced off the bottom twice more before he could stand down the fiord, running a blockade of derelict fishing boats and insane currents to the safety of open water. I asked Bernard Whalen why the ship hadn't broken up. He thought a moment and then shook his head.

"Just wasn't our time, I expect."

Valdez that day, and for many days after, was more ghost town than a living community. Because the earthquake had knocked out the water and sewage systems, all but about

50 of the 1,100 residents had been evacuated. I joined the 50 for lunch at a mess hall in the town's nursing home. At the height of the meal, a strong tremor—one of more than a thousand that occurred in the week after March 27—rattled the building. But fear had done its worst and passed on. Dutifully, yet wearily, everybody got up and unhurriedly filed to the doors.

Unlike Valdez, Kodiak felt the earthquake's jar well before the wave. To Karl Armstrong, editor of the weekly *Kodiak Mirror*, walking during the tremor was like marching across a field of Jell-o. Yet Karl was determined to

Serpentine fissures furrow the snowscape adjoining Anchorage's 9th Avenue (right). Ruins of a new but still-unoccupied apartment house strew the ground at upper center; scores expected to move into the six-story building the following week. Old Providence Hospital, now a nursing home (top), fortunately suffered only minor damage.





reach a phone, to cover what he thought at first was a great, but strictly local, story.

"But when I tried to get Anchorage," he told me, "the line was blocked. I knew then that the quake was everywhere."

Like Valdez, Kodiak had a wave. Actually, it had more than a dozen of them—Karl stopped counting after that—but only four really mattered. The first was the incredible, almost silent tide, the one that temporarily marooned Lieutenant Bernosky and his friend. Coming that way—smooth and fast but without a crest—the wave probably saved countless lives in Kodiak, for it warned

the 5,000 townspeople to take to high ground.

"We got out," Karl recalls, "and most of us gathered on Pillar Mountain with our blankets and our flashlights. After a while, Pillar looked like a hill in summer with hundreds of fireflies on it."

Kodiak's King-crab Fleet Swept Away

Down in the harbor, Capt. Bill Cuthbert of the 131-ton crab boat *Selief* felt a jar as he was having supper in the galley, and silently damned all greenhorn fishermen who couldn't steer clear even of an 86-foot boat. By the time he got on deck, most of Kodiak's 160 crab and



Raging Wall of Water Topped by Flaming Oil Sweeps Into Seward

Fleeing for their lives, dockworkers race frantically for high ground. Behind them a thirty-foot-high wave, covered with burning oil, surges at a speed of more than 100 miles an hour across the railroad tracks and into the port's east end. Locomotives and boxcars, their wheels shorn off by the impact, hurtle ahead of the comber. Twisted rails, oil drums, and pier pilings ride the lip of the fiery flood, second and largest of a succession that swept over the ill-fated town.

Railroad agent Earl Chambers witnessed this never-to-be-forgotten moment. He watched the wave swallow the workshop at left and bear down on his automobile as he and his wife sped for the hills.

Artist Pierre Mion—one of a six-man NATIONAL GEOGRAPHIC team that flew to Alaska to cover the disaster—interviewed Mr. Chambers and other residents on the spot. From their recollections he re-created the climax of Seward's agony.

salmon boats were bucking at their moorings. Quickly, unbelievably, the first high tide disappeared, and for a brief time Kodiak's fleet looked as if it were all in one gigantic dry dock. Then the sea came back, and in moments Alaska's largest king-crab fishing center was all but wiped out, boats, canneries, and all.

No one argues about Kodiak's big wave—it was a cresting, thirty-foot-high wall of water that thundered up the channel, lifting 100-ton crab boats on its shoulder and flinging them like empty peanut shells over the harbor's stone jetty and sometimes two or three blocks into town (page 116).

"Couple of boats went over the jetty and come back without a scratch," one crab-boat skipper remarked dryly. "But that's nothing—Kraft's store, she done it twice."

Another saying grew up in town that night: "Come to Kodiak to see the tide come in and the town go out."

Selief logged a good many hundreds of yards by wave action that night. At one point Captain Cuthbert remembers a breather between waves, or tides, when he ran out a mooring line to the nearest thing at hand—a telephone pole. Finally he came aground several blocks in from the waterfront.

"About that time the marine operator was calling boats on the radio," Bill Cuthbert said with a faint smile. "When she got to me, she says, 'Where are you, captain?'"

"So I told her—"By dead reckoning, in the schoolhouse yard.'"

Another crab fisherman managed to anchor his boat in the harbor channel after the big wave came in, but found himself harassed by debris coming out on the backwash.

"I didn't mind the little stuff," he told me, slightly aggrieved, "but then I got hit by the Standard Oil Company building. Lousy thing, she cracked my bow."

As I walked through Kodiak a few days later, I could well believe the figures—77 of

160 crab and salmon boats gone or fearfully mauled, two of three canneries swept away, and the other unable to operate for two to three months.

Seagoing Store Survives Disaster

Benson Avenue, Kodiak's main street, was a nightmare jumble of heeled-over boats and crippled buildings, jammed together prow to window sill. In the thick of it all was the town's conversation piece—the much-traveled Kraft's general store.

Several residents of Kodiak insist that they saw Kraft's picked up on the first tide to sail majestically out on the ebb, clearing the jetty neatly. The store then altered course, they say,

Pre-quake port of Seward—a section photographed last September by a United States Army reconnaissance plane—shows rail yards, docks, oil tanks, and a few homes.



floated back into port, reversed, streaked out once more and back, and came to rest at last, as one fisherman put it, "only a couple hundred yards from her mooring."

I never found anyone who would swear to the story, but from the look of Kraft's that day on the beach, I could believe she had been to sea.

Kodiak's story was widely reported, and offers of help poured in from the "Lower 48," as Alaskans fondly call the other mainland states. One letter came from the manufacturer of Kodiak's parking meters. The president graciously offered free replacements.

"Thanks for your kind letter about the meters," the city manager promptly wrote back.

"How about a few streets and sidewalks to go with them?"

Kodiak town was far from the only segment of Kodiak Island life to take the earthquake hard. Alf Madsen, a hunting guide, described the back areas.

"Around the lairs where the big Kodiak bears had been hibernating," he said, "the tracks showed the animals were troubled. Usually when a bear leaves hibernation, his tracks meander, like he was still getting the sleep out of his head. This time those tracks went straight as an arrow downhill, with a lot of big leaps in between. Those bears woke up in a hurry."

By an eerie coincidence, down the coast

Pall of disaster funnels skyward from still-blazing fuel tanks in Seward one day after the earthquake. All dockside facilities have vanished, swept away by the tsunamis.

PHOTOGRAPHS BY UNITED STATES ARMY





ENTRUSTED BY NICHOLE PERRY © NATIONAL GEOGRAPHIC SOCIETY

Expressions mirroring their calamity, the homeless and dispossessed file through a Civil Defense emergency kitchen at Seward. Even as aftershocks rocked the state, Army, Navy, Air Force, Coast Guard, and commercial transportation rushed in tons of supplies.

from the town of Kodiak, a half-forgotten legend seems to have foretold disaster. It came about in Kaguyak, a fishing village of Aleuts, Alaska's hardy mixture of Eskimos and early Russian settlers.

On a low-level aerial tour of Kodiak Island's badly battered east coast, I spotted what had once been Kaguyak's trim harbor and cluster of a dozen homes. The homes were strewn along three miles of reed bank bordering a lagoon behind the village site. The seismic waves had breached a barrier of land seaward of the community and simply bulldozed Kaguyak into extinction.

It was a wonder that anyone survived, yet in Anchorage a few days later I found 38 of the original 41 villagers living in a grade school turned temporarily into a refugee camp. Among the three dead or missing was Simmie Alexandroff, the village chief. I talked with the newly elected chief, 26-year-old Roger Williams.

Williams, a slender, quiet-spoken man with

faintly Asian features, began his account of that terrible afternoon seemingly with little emotion. It was only when I glanced down to make a note that I realized his fingers were desperately locked together and that both hands trembled pathetically.

Third Wave Washes Kaguyak Away

The story of Kaguyak is repeated in the fate of many small villages along the Gulf of Alaska—the initial high tide with its warning to the experienced, the fearful ebbing of the water, and then the monstrosity high wave, thundering ashore and carrying everything movable—boats, houses, even fair-size churches—into terrible oblivion with it. What makes Kaguyak different is that it died on the third, rather than the second wave, and that Roger Williams had a premonition it would.

Like experienced Alaska fisherfolk, when the tremor brought the first high tide, Kaguyak's two-score villagers took to the slope of a nearby hill. There they waited as the water

receded once, knowing they would probably spend the night there.

When the water had come in and withdrawn a second time, far below normal ebb tide, several of the men, Williams included, made a dash for the village to pick up essentials for the coming night—flashlights, a small portable radio, blankets.

Williams split off from the main party at his house, rummaged quickly for what he wanted, and then sprinted back among the sodden but still-standing houses for the refuge on the hill. Only then did he realize that the others were still in the village. But it was too late.

Dories Offer Only Hope

Those on the hill watched in horror as a terrible wave mounted offshore and swept in on the village. The six tiny figures trapped in the open did the only thing they could—they raced for two small dories beached beside the houses, bravely hoping somehow to ride out the incredible wall of water.

The miracle is that three of the men managed it, abandoning their boat as it swept past the hill in the wave's fantastic backwash. One villager was found the next day, drowned where he had been pinned under the roof of a house. The other two had vanished.

All through the account, Williams seemed to hint at some foreknowledge of the third wave and its terrible danger. Finally I asked him outright if that was so, and he nodded his head sorrowfully.

"All of us should have known," he said. "Once long ago—too long to count—our village was wiped out in such a way. And I remember the old people saying always, 'The third wave is the worst—watch out for the third one.' They were right."

It fell to Mrs. Alexandroff, Simmie's widow, to compose an epilogue to the tragedy. Asked by refugee workers for a formal statement of her loss, she answered with great dignity: "Simmie my husband is a fisherman, and he was swept out to sea and die. I didn't see him go, but I know he gone as we don't find him after last wave."

On my way out of the school I met another Kodiak Islander, Mitchell Inga, aged 9. Like the other Aleut children there, Mitchell was bright of eye and quick to laughter—reassuring signs that among the youngest, at least, memories were beginning to fade and soften. Mitchell had clearly been having some

fun with his Anglo-Saxon benefactors, for when he saw me, he raised his hand in the best tradition of the old West and said, "How! I'm an Indian."

"You're nothing of the kind," I said. "You're an Aleut, and you know it."

"That's right," he answered, delighted. "From Old Harbor. Who are you?"

Old Harbor was a village 30 miles from Kaguyak that had been almost as completely wiped out. From the air I had seen its ten forlorn and battered buildings—all that remained of the village's original 30 homes—and a derelict fishing boat or two in the wreckage-choked harbor. Of its 240 residents, 227 had been evacuated to Anchorage.

"I was in an earthquake," Mitchell said proudly.

"What does an earthquake feel like?"

Some of the laughter went out of Mitchell's eyes, and he thought a long moment. "It feels," he said gravely, "like the ground will never stop."

I asked him then if he wanted to go back to Old Harbor. Most of the Aleut people, I had found, were fiercely loyal to their villages and planned to return as soon as possible. But not Mitchell.

"No," he said, rubbing his stomach opulently, "it's fine here. Lots of good stuffs to eat. And besides,"—once more his voice took on a solemn tone—"back there the mountains are split, like my house."

Seward Wrecked by Water and Fire

In the days following the earthquake, there was a touch almost of macabre pride among the towns that were hardest hit. In any competition for the most ruinously blasted, however, Seward would have swept the field. The small port and railroad terminus south of Anchorage on the Kenai Peninsula almost went under from the triple blow of earthquake, fire, and wave (painting, pages 128-9).

Seward's waterfront had the dreadful look of something worked over by a blowtorch. What had once been freight yards now was a terrible gray wasteland, broken only here and there by the barely recognizable shapes of melted oil tank cars and boxcars. Near the site of a former oil storage tank farm, a 60-ton locomotive had been overturned and fused with two freight cars into some giant suggestion of a Chinese puzzle.

The work of fire has at least a certain cleanliness to it. Water's devastation has none. Back



Wading icy, ankle-deep water in the devastated dock area at Valdez, military pallbearers move the weighted body of a longshoreman to a boat for burial in the outer bay. Flooded ground prevented normal interment. Happily, Alaska's figures for loss of life proved far below the first estimates. Only 115 people perished in the earthquake and seismic sea waves.

Alaska Governor William A. Egan (right) arrives in his home town, Valdez; he finds it badly damaged, his own house included.



EXTREMES (OPPOSITE) BY MARSHALL LUDMAN, TERRY STAY, AND PHOTOGRAPH BY WEE A. HARTER © W.A.

of Seward's burned-out no-man's land ran a broad and sickening belt of smashed houses, upended freight cars, flattened automobiles, and boats with their backs so badly broken they had an almost surrealistic look.

Gene Kirkpatrick and his brother Jim, one a railroad man, the other a stevedore, described the holocaust that had been Seward that afternoon and night.

"The lid blew off in the storage-tank area almost the first thing," Gene remembered. "Then, when the fire was really roaring, the wave came up Resurrection Bay there and spread it everywhere. It was an eerie thing to see—a huge tide of fire washing ashore, setting a high-water mark in flame, and then sucking back."

To Jim Kirkpatrick, perhaps the most memorable sight in a night few will ever forget came just as dark crept over the town.

"We had lost our waterfront by then," Jim said, "and a lot of the snapped-off pilings were floating around upright, because their lower sections were waterlogged. Then the top sections with all that coating of tar and oil caught fire, and when it got dark, you could see them out on the water, like a string of candles on Resurrection Bay."

For many years Seward's fortunes have been joined to the 470-mile-long Alaska Railroad. The town provides the main transfer point for oil and other cargo from ship to rail and thence into the state's vast and hungry interior. Seward residents insist that without reconstruction of the port and the rail line—a job that may run beyond 20 million dollars—the town cannot survive.

The blow would be ironic for Seward. The week after the earthquake, the community was to have received an All America Cities Award for industry and civic improvement.

"That's all right," one Seward resident answered grimly when I offered my regrets. "That bay out there and the pass behind the

town aren't named Resurrection for nothing."

One of the last flights I took in Alaska was a search and rescue sweep by helicopter among the islands in lower Prince William Sound. Nearly a week after the earthquake, there were still a few remote settlements—some no more than a single family—that had not reported in, and the Army and Air Force were both flying sorties at the request of the Alaska Government.

The Army Piasecki H-21 swung southeastward from Anchorage over Turnagain Arm and headed for the town of Whittier. We passed low over burned-out oil storage tanks, then for more than an hour we swept the shores of islands without seeing any sign of life. At last we came to Chenega Island and began a circuit from the south.

Pilings Mark a Vanished Village

Quite suddenly below us there was a single red roof and a twin-engined amphibian beached nearby. We banked for a landing, and I could see the neat white frame building beneath the roof, with a wide clearing all around.

The pilot passed word back that it was Chenega village, but I knew he had made a mistake. Chenega was listed as a fishing settlement of some 80 inhabitants and more than 20 homes. I should have noticed that the single building below was perched on a bluff, and that the clearing around it had a peculiar fringe.

The building was Chenega's undamaged schoolhouse, and the clearing with its fringe had been Chenega. As I stepped out of the helicopter, I faced five or six acres studded with stumps.

For a moment I had the impression of a stand of timber cut to the last tree, then I realized that they were pilings. The pilings had kept Chenega off the cold Alaskan ground, and when the time came they had



TURNAGAIN

Waves of tortured earth, whitecapped with snow, flow into the waters of ice-clogged Cook Inlet. Lengthy shadows cast by early-morning sun streak the face of Anchorage's most heavily damaged



ANISCHRONY BY U.S. DEPARTMENT OF COMMERCE, COAST AND GEODETIC SURVEY

residential section. White arrows locate largest remaining segments of the home of the Lowell Thomas, Jr.'s, strewn over two hundred yards.

Mrs. Thomas's unforgettable story begins on page 142. Aerial photograph will aid map makers in revising coastal charts made obsolete by the quake.



held it up for the tsunami as a golf tee holds a ball for the club.

All the homes had been swept away. When the wave caught Chenega, it simply plucked it forever from sight. There are no miraculously comforting figures to Chenega's death toll. Of 80 Aleut villagers, 23 were lost, 13 of them children. The amphibian on the beach carried a U. S. Bureau of Indian Affairs team who told us the story gruffly.

There was nothing to be done for the village—the survivors had already been evacuated to Cordova, across Prince William Sound. We gave the amphibian a push off the beach, then lifted off in our helicopter.

My last few days in Alaska a friend introduced me to Governor William A. Egan on

one of his inspection tours of the disaster areas (page 135). I remarked that the world knew only too well what Alaska had lost, but I wondered if the 49th State could find any comfort in its misfortune. The Governor's weariness dissolved in a smile.

Alaska Turns to Tomorrow

"Yes," he answered. "To begin with, thousands of new friends. But even more important, Alaska has found a reaffirmation of the spirit we all knew was in her people but that sometimes gets buried—the same spirit that tamed the land and that started rebuilding it the moment it stopped shaking."

It was no idle statement, I realized later, as I thought back over the Alaskans I had



PHOTO BY WINIFELD PERD AND SUBCAPTION BY JOHN T. FLETCHER © N.Y.C.

Assessing the damage, President Johnson's personal representative, Edward A. McDermott (light coat, dark hat), with U. S. Senators Gruening (center) and E. L. (Bob) Bartlett, gaze over the chaos of Turnagain. Alaska's recovery, Mr. McDermott prophesied, will strain the state to its limit. Fisheries, the chief industry and source of income to nearly one-tenth of the population, will take years to recover. The 470-mile-long Alaska Railroad, which linked the interior with the port of Seward and ships bound for what Alaskans call "The Outside," will cost some \$25,000,000 to rebuild.

Poignant words of sympathy from an "almost seven" boy in Port Chester, New York, cheered Anchorage's mayor. Hearts and hands of all ages reached out to Alaska; a Girl Scout troop in California contributed its baby-sitting savings; one woman forwarded her "Easter bonnet money." Swamped by requests from children to learn the fate of Santa Claus, Civil Defense officials happily reported that Mr. and Mrs. Claus and all the reindeer survived the quake in fine style.

come to know and admire in one short week—Carol Tucker, the Anchorage housewife; Jim Aubert, longshoreman aboard *Chena*; Myrtle Barnes, the resourceful hairdresser; Capt. Bill Cuthbert of Kodiak; and of course Mitchell Inga, my bogus Indian friend.

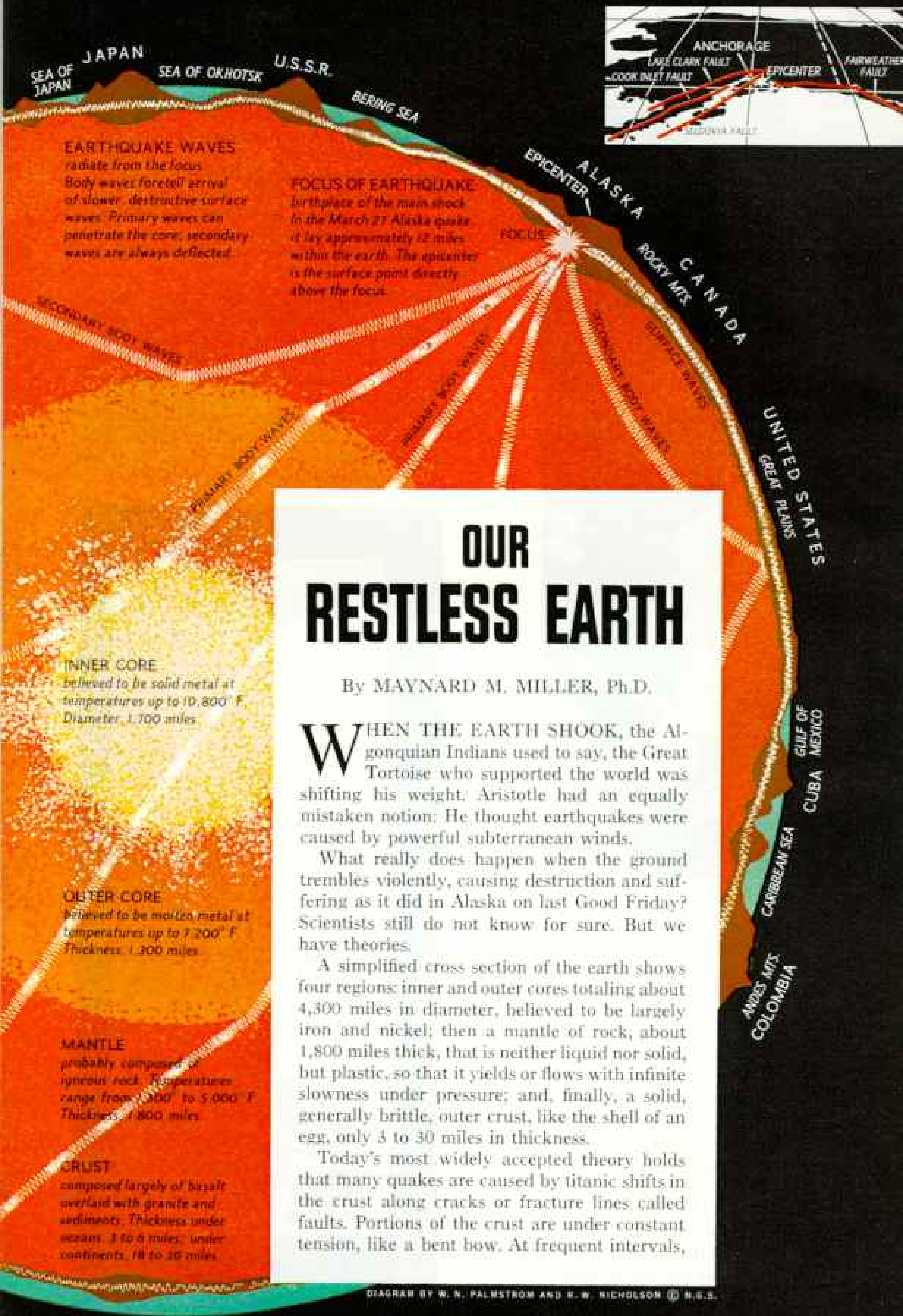
I was sitting thinking of them all in the coffee shop of the Anchorage-Westward Hotel, while I waited for the airport bus. The waitress, whose name is Ann and who is very pretty, brought me coffee and put a glass of water down beside it.

"The Health Department just declared it safe," she said. "Drink it down. It'll make a good Alaskan of you."

So I did, and then, before the bus arrived, I drank a second one just to make sure.

* * *





EARTHQUAKE WAVES
radiate from the focus. Body waves foretell arrival of slower, destructive surface waves. Primary waves can penetrate the core; secondary waves are always deflected.

FOCUS OF EARTHQUAKE
Birthplace of the main shock. In the March 27 Alaska quake it lay approximately 12 miles within the earth. The epicenter is the surface point directly above the focus.

INNER CORE
believed to be solid metal at temperatures up to 10,800° F. Diameter: 1,700 miles.

OUTER CORE
believed to be molten metal at temperatures up to 7,200° F. Thickness: 1,300 miles.

MANTLE
probably composed of igneous rock. Temperatures range from 1,000° to 5,000° F. Thickness: 1,800 miles.

CRUST
composed largely of basalt overlaid with granite and sediments. Thickness under oceans: 3 to 6 miles; under continents: 18 to 36 miles.

OUR RESTLESS EARTH

By MAYNARD M. MILLER, Ph.D.

WHEN THE EARTH SHOOK, the Algonquian Indians used to say, the Great Tortoise who supported the world was shifting his weight. Aristotle had an equally mistaken notion: He thought earthquakes were caused by powerful subterranean winds.

What really does happen when the ground trembles violently, causing destruction and suffering as it did in Alaska on last Good Friday? Scientists still do not know for sure. But we have theories.

A simplified cross section of the earth shows four regions: inner and outer cores totaling about 4,300 miles in diameter, believed to be largely iron and nickel; then a mantle of rock, about 1,800 miles thick, that is neither liquid nor solid, but plastic, so that it yields or flows with infinite slowness under pressure; and, finally, a solid, generally brittle, outer crust, like the shell of an egg, only 3 to 30 miles in thickness.

Today's most widely accepted theory holds that many quakes are caused by titanic shifts in the crust along cracks or fracture lines called faults. Portions of the crust are under constant tension, like a bent bow. At frequent intervals,

when the strain becomes intolerable, the rock gives way at some weak point, often far beneath the surface.

As the crust makes this sudden shift, it releases pent-up energy in enormously powerful waves that make the whole earth vibrate like a giant bell. Some of the waves circle the globe; others may pass completely through the earth at speeds of more than eight miles a second. All record their passing in the jiggling of pens on sensitive measuring instruments called seismographs.

Here is a sample of the signature of the Alaska earthquake, as recorded by a seismograph at Georgetown University in Washington, D. C., 3,300 miles away.

But what creates these enormous stresses in the earth's crust? Years ago it was thought that the earth was cooling; as it shrank, the crust presumably buckled and cracked. Today most geologists believe exactly the reverse: The earth's interior is a mighty furnace, producing prodigious heat through the breakdown of radioactive elements such as uranium and thorium. I have felt that heat two miles deep in a mine in the Kolar gold fields of Mysore, India. There the rock walls registered 156° F.

Tests indicate that heat increases steadily with depth; at the base of the crust it may reach 1,300° F., the temperature of molten aluminum. Only enormous pressure keeps the mantle from becoming totally liquid.

Possibly, as some geologists believe, this heat causes expansion of the earth, stretching the crust like a balloon. Or it may be, as others suggest, that temperatures and pressures cause abrupt molecular changes in the rock, just as these forces can change graphite into diamond in the laboratory. Accompanying changes in volume could cause uplift or subsidence and a shifting of the crust.

Still another theory—most attractive to me—pictures the plastic material of the upper

mantle seething in slow convection currents, somewhat like jam boiling on a stove. These currents, though infinitesimally slow, drag against the solid crustal rocks, in places pulling and torturing them until they rupture, with shocking release of power.

Whatever the actual mechanisms that trigger earthquakes and their aftershocks, they seem to be associated with the same forces that build mountains. Preliminary reports indicate that some of Alaska's coastal land mass has been thrust upward six feet or more by the Good Friday quake.

Earthquakes also are intimately related to volcanoes. Four out of five of the world's shocks are recorded on the Pacific rim, called the "rim of fire" because of its many volcanic peaks. Alaska suffers because it lies within this earthquake belt, one of earth's most unstable areas.

Many active fault lines constantly threaten Alaska with tremors. As the diagram shows, four of these lines—the Lake Clark, Cook Inlet, Seldovia, and Fairweather Faults—are bent and compressed in the recent quake region. Three converge near Anchorage. This ominous pattern may well be the key to the Alaska shock.

However, it was not the rock slippage itself, but rather the vibration, sliding, and settling of loose glacial-alluvial deposits, that caused the heavy damage. These deposits respond to shocks much as grains of sand dance on a board when it is struck.

Earth Trembles Many Times a Day

During the course of a year there may be a thousand shocks that do some damage, and another 100,000 that could be felt by human beings. But the 1,200 seismograph stations around the globe may detect half a million tremors in 12 months' time.

This constant quivering of our restless planet, strange as it seems, has beneficial as well as destructive results. Seismic waves provide almost our sole means of studying the earth's deep interior.

But, more important, repeated uplifting of earth's crust, with its attendant quakes, is essential to life as we know it. Mountains are constantly eroding; if they were not raised again, the world would become an awful place of stagnant seas and swamps.

Thus these seismic tremors that sometimes alarm and hurt us are the inexorable ticks of our planetary clock, the pulse beats of earth. Were they to stop, ours would indeed become a dead world.

* * *

The Author: Maynard M. Miller, Professor of Geology at Michigan State University, has twice made glaciological studies under grants from the National Geographic Society's Committee for Research and Exploration—in Alaska in 1961, and with the 1963 Mount Everest Expedition. In Alaska he studied earthquake effects on glaciers, following up the classic Society-sponsored research of Ralph S. Tarr and Lawrence Martin in 1909-11.



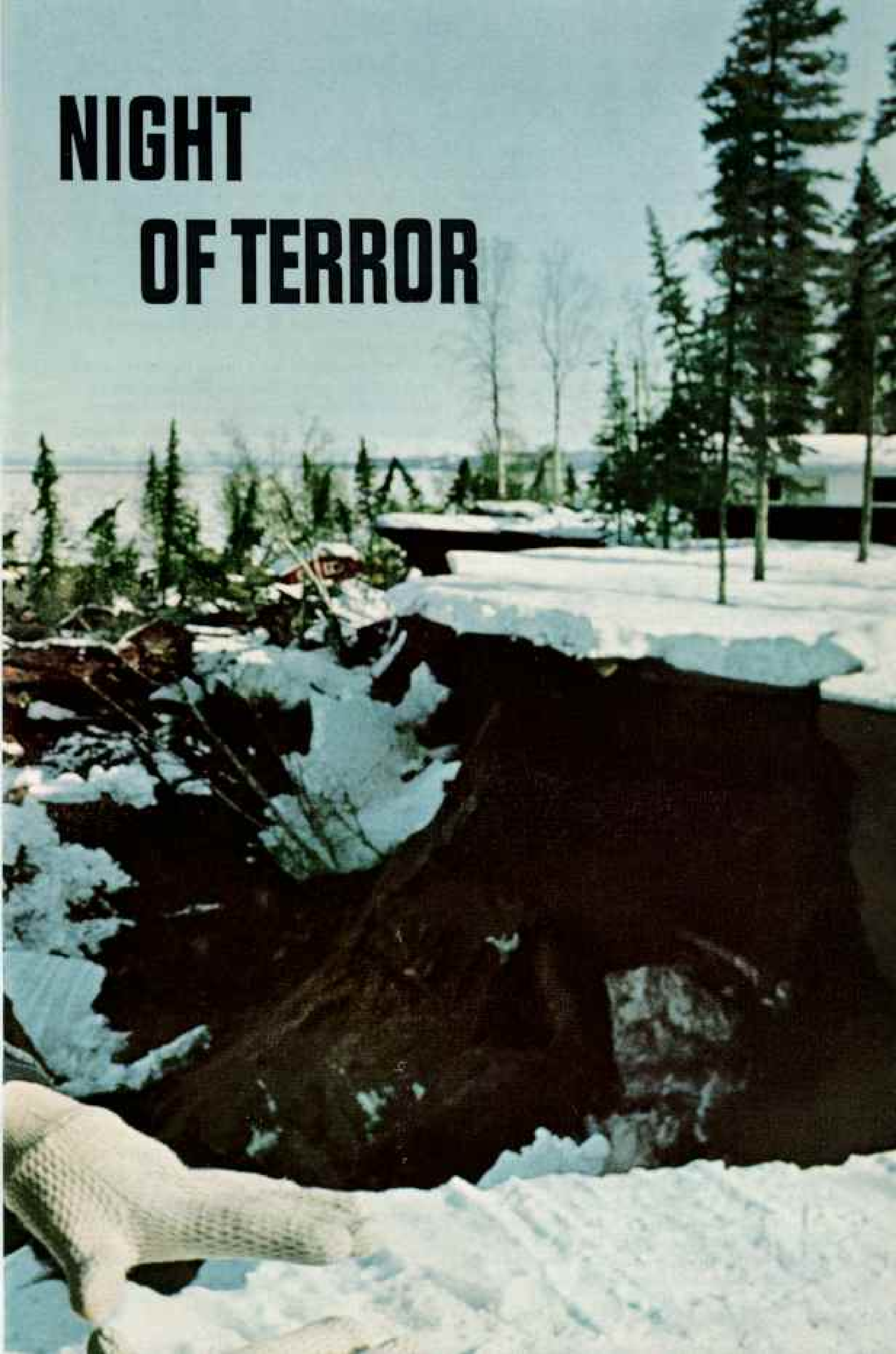
AN ALASKAN FAMILY'S

*"A crack opened
between Anne and me.
David screamed:
'We're going to die!'"*

MRS. LOWELL THOMAS, JR.,
*still stunned and disbelieving four days after
the disaster, stands on the street that
once led to her house. Its ruins lie on the
Cook Inlet beach far below. On the
following pages, Mrs. Thomas tells
how she and her children miraculously
escaped when both house and lot slid
from their clifftop perch.*

KODACHROME BY W. E. GARRETT © N.G.S.

NIGHT OF TERROR



ILL START from the grim beginning. On that bad Good Friday, Lowell left for Fairbanks in our plane about 3 p.m. We had had a snow storm for two days, and it was just letting up enough for Lowell to take off.

About five o'clock I went upstairs with the children to watch TV. Dave and I sat on Anne's bed for a while with her—she had a headache. Of course we all took off our shoes.

David is six, and Anne eight. They both were in cotton shirts and pants, and I wore a red wool dress and nylon stockings.

House Collapses Behind Fleeing Family

It was a little after 5:30 that I heard a rumble. I had heard one before, just preceding a mild earthquake last summer, but we also hear frequent rumbles from the big guns firing at the Army base.

Something instantly told me that this was another earthquake. I leaped off the bed, yelling "Earthquake!" I grabbed Anne and called to David. They both moved with lightning speed. We had reached the front hall when the house began to shake.

We rushed out the front door with David protesting, "But, Mommy, I'm in bare feet. . . ." Bozie, our 80-pound German shepherd, must have slipped out with us.

We were about ten feet beyond the front door when it suddenly seemed that the world was coming to an end. We were flung violently to the ground, which was shaking up and down with the sharpest jolting I've ever felt. It seemed an eternity that we lay there in the snow.

Within a few seconds the entire house started to fall apart, splitting first right at the hallway we had just come through. We heard the crashing of glass, then that horrible rending sound of wood being broken apart. The trees were crashing all about us, adding to the terrible din.

I looked toward the car to see if it was shaking as much as during the last quake,

and as I watched, the garage collapsed on top of it!

Now the earth began breaking up and buckling all about us. A great crack started to open in the snow between Anne and me, and I quickly pulled her across it toward me.

This was the only moment during the entire quake when I felt any panic. Seeing that fissure widen next to me was the exact picture I'd always had in my mind of what happened in a violent earthquake. And the fact that it opened between me and Anne, threatening to separate the three of us, truly frightened me for a moment.

Then our whole lawn broke up into chunks of dirt, rock, snow, and ice. We were left on a wildly bucking slab; suddenly it tilted sharply, and we had to hang on to keep from slipping into a yawning chasm (painting, pages 146-7). I held David, but Anne had the strength and presence of mind to hang on by herself. Although crying, she was still able to obey commands—thank God, because poor Dave was hysterical, and I could only hold him tightly.

Now the earth seemed to be rising just ahead of us. I had the weird feeling that we were riding backward on a Ferris wheel, going down. I always hated riding on them anyway. And I also had the brief fearful thought that we were falling down into the sea. (Our beautiful home had stood on a high bluff about a hundred yards from Cook Inlet.)

The worst of the rocking stopped, and as I looked around, I realized that we and our entire property had fallen down to sea level. I could see nothing left of the house, except part of the roof, and it looked terribly close to the water.

Trapped Between Cliffs and Sea

I remember noticing the kids' bright-yellow and red swing set perched on a cake of ice of its own, but all I could think of was that the water would probably rise, and we would be trapped. The cliffs above us were sheer, with great sections of sand and clay constantly falling. The jumbles of earth all about us had stopped moving, but large hunks were breaking apart everywhere.

The children were both hysterical, crying and saying over and over, "What will we do? We'll die. . . ." I knew we'd have to move now, carefully, but fast. I had to find a way up that cliff, and we would have to climb over the great chunks of earth without falling into holes and crevasses.

I knew I couldn't carry both children, or even one—Dave weighs a chunky 75 pounds,

The Author: Tay Pryor Thomas's life has been filled with adventure ever since, as a girl, she flew to far parts of the world with her father, an airline executive. Marrying Lowell Thomas, Jr., she set out with him in a single-engine plane across Africa and Southwest Asia; they described their 45,000-mile odyssey in *NATIONAL GEOGRAPHIC* in "Flight to Adventure," July, 1957, and "Sky Road East," January, 1960. Then the Thomases, with 2½-year-old Anne, flew to Alaska to make a television film. Mrs. Thomas's book *Follow the North Star* appeared in 1960; the same year they moved to Alaska, establishing their home at Anchorage.

and Anne is a husky eight-year-old. So my first job was to calm them down and explain what to do. I told them that we would get out all right, but that we had to stay calm. (It's still an awesome thought to me that I never felt calmer—I had often heard that this happens to people at times of great crisis.)

I suggested that first we say a prayer asking Jesus to take care of us and guide us, and both children stopped crying, closed their eyes, and fervently pleaded with Him to take care of them.

This had an extraordinary effect on them and on me. Anne was ready now to climb on her own, and although David was still worrying about his bare feet and frostbite, he had stopped crying.

Neighbor's Children Call From Car Roof

The next 15 or 20 minutes were one great nightmare as we clambered up and down the great slabs of earth and snow. I found one large tree leaning against the cliff and thought for a few moments that we might be able to shinny up it (page 149).

Anne made a brave attempt but climbed only a few feet. I knew Dave could never do it, so I looked for another way up. We started walking to the right, staying far enough away from the cliff to avoid the still-falling sand.

It was then that I first noticed Dr. Perry Mead's house—he was our next-door neighbor. Nothing showed but the flat roof. I could see two of their little children standing on top of a car. (There were five kids in the family.) They were crying and yelling, so I called to them to stay right there, that I'd bring help.

I was terribly torn between going over there to try to get them, and moving on up the cliff. But I was literally carrying David at this point, and hauling Anne up and down the steep areas, and since I couldn't possibly handle two more small children, they would probably be safer standing on that car roof, I thought, than scrambling among the rocks and crevasses.

A man appeared above the cliff. All three of us immediately yelled, "Help, help, come get us!" and he shouted down that he would find some rope, then disappeared.

He was an unbelievably welcome sight, but the kids became hysterical again when he disappeared. I tried to assure them that help was on the way, and we found an extra-large mound of snow-free earth to wait on. Our feet were really in bad shape by now; none of us had any feeling left in them at all.

As we stood waiting for what was probably

only five to ten minutes but seemed an hour, I realized that there were many more houses flattened along the cliff in the direction we were heading—not just the four homes on the bluff side of Chilligan Drive.

The Bashaw home, originally directly across the street from us, was now sitting right on the cliff just above us. Broken water pipes stuck out beneath it. The electric wires were lying down the cliff and across the rocks near us. This alarmed me, and without scaring the kids any further, I tried to warn them not to touch any wires.

On the water side I recognized what was left of the Evanson home, and it was another heartening sight to see Dave Evanson standing by it. The children started calling to him for help, but I quickly hushed them, because it looked as if he was having plenty of troubles of his own.

I was puzzled by the position of the Evanson home. It had been quite a distance down the street from us, and now it appeared to be right next to the Meads'. With a shock I realized that I could not even see the Schultz home, which had been between the Evansons' and the Meads'.

I wondered if little Julie Schultz, Anne's best friend, had been home at the time of the quake.

All these thoughts whirled through my mind as we waited for what seemed like an eternity. I kept glancing back to the sea, concerned

that it might be moving in. For the first time I began to feel the cold and started to shiver. Poor David, in blue jeans and cotton shirt, was shaking now, his lips blue.

Suddenly six or eight men appeared at the top of the cliff. One man, whom I still cannot identify (a great pity because we feel eternally grateful to him), started down the cliff toward us.

The children both hugged our rescuer, and I could feel their sense of relief as they told him how cold they were. He put his black wool jacket around Anne—and for a week she wore it almost constantly. It is dirty and worn and much too big, but it will be her most prized possession for a long time to come.

She was all set for the climb now, starting right out on her own while our friend picked up David and carried him the rest of the way.

*"I knew
we'd have to
move now,
carefully,
but fast"*



With the children taken care of, I turned to poor Bozie, our dog. He was whimpering and shivering, and I tried to coax him up the cliff, but he wouldn't come. I had to leave him, and it hurt, but there was nothing else to do. We still had a treacherous climb ahead ourselves.

At the top there was still a steep, sheer rim which I really don't think I could have scaled by myself. But many willing hands hauled us up quickly. I remember thinking, why, I don't even have to help, they can just lift me as an inert bundle.

Once over the top of what was left of our street I saw Wanda Mead, her face so strained

and white, and told her about her two children. Then we were hurried to a car, and before I could look around at what was left of our lovely street, we were whisked away. The man driving, Harold Rhett, took us to his home a few blocks away. There we were rushed inside and wrapped in many blankets.

Earth Continues to Tremble

We must have lain on the Rhett's couch about an hour. The biggest job was trying to warm up. We were shaking, but there was no heat or electricity, so we were unable to warm anything hot to drink.



PAINTING BY NATIONAL GEOGRAPHIC ARTIST ROBERT L. WHITE © N.G.S.

I had the children rub their feet, and the feeling seemed to come back fast, much to David's relief. My own were staying numb, and I began to think that I might have a real frostbite problem.

Suddenly we had another strong earth tremor. We all ran out of the house. I had taken off David's wet pants and my soaked dress, so we were just wrapped in blankets. The wife of our host suggested we get into their pickup truck to stay warm.

We sat there another half hour, feeling the earth continue to tremble and seeing the trees wave above us. The people from the houses

Riding a maelstrom of earth and snow, Tay Thomas and her children, David, 6, and Anne, 8, dig stiffening fingers and toes into their disintegrating chunk of front yard. Shocks sever sleeping from living quarters as their house toboggans downward. Only moments earlier they fled the dwelling, shoeless and thinly clad, into a below-freezing temperature.

around us were standing in the street in small groups—no panic, no emotion showing—calmly discussing what to do next. Their calmness helped me.

Another great help was the radio in the pickup. Station KFQD was broadcasting, and the announcer was matter-of-factly discussing the quake, including the after-tremors, and saying that there was no need for alarm.

"Stay in your homes or cars and wait for further word," he kept repeating, saying that so far as he knew there was little actual damage anywhere.

This bothered the kids. "Wait till he sees our street," they said.

People now began bringing armloads of blankets and food from their homes, loading their cars to move farther away from the inlet. This was fine with me. I became very impatient to move on, especially when the announcer began to broadcast warnings of possible tidal waves.

Mementos of a Life of Travel

I suddenly felt overwhelmingly alone without Lowell there to make decisions, and wondered where we should go. Then I remembered that our church and the minister's home were both well back toward the mountains, and would be the perfect place to head for. It was now, too, that it first dawned on me that we had nothing left of our personal belongings—not even the clothes on our backs, because we had shed most of them for our neighbors' blankets.

Lowell and I have always been the sentimental kind. We had collected albums of family pictures which we treasured. And we had boxes and boxes of slides and movies which we had collected all over the world. Lowell's office had been in our home, and he kept all his valuable camera equipment there, all his papers and manuscripts.

But we were also collectors of other things—antique furniture, china and silver, and curios from our travels. We had Tibetan religious paintings, straw beads from Timbuktu,

petrified wood from the Saudi Arabian desert, and brass from India.

They had all meant so much to us, partly reminding us of our pleasant travels, I guess. But at this moment of realizing that all this was gone, it just didn't seem to matter. I was too overcome with thankfulness that we had escaped unharmed, and I could sense that both children felt the same.

They did not even talk about Bozie, perhaps because he had been suffering from a crippling hip disease, and we knew he had only a few months to live. But David cried over our two cats. He was especially attached to the impish black kitten, Sylvester.

Another thought I had while waiting in the pickup truck was what extraordinarily calm, cool-headed people these Alaskans were. The men made plans, the women and children went on carrying armloads to cars—while everything around us shook with after-tremors.

We had often thought, during our four years here, that Alaskans were a special breed of people, made from the same strong mold as early American pioneers. Now the community reaction to this sudden catastrophe was dramatic proof of it.

Neighborhood Accounts for All Except Two Children

I'm afraid I was feeling less and less calm with every passing moment. I was greatly relieved when the Rhett family, who had given us shelter, were ready to move out to a safer area. The wife drove the station wagon, loaded with their children and overnight supplies; the husband led the way in the pickup with the three of us. He had just made another quick trip over to Chilligan Drive, and he reported that everyone was accounted for except two of the Mead children.

My heart sank. Could these be the two I had left standing on the car? This horrible thought tormented me for many hours that night and the next day. Did I make the right decision? Should I have tried to return to collect those children?

As we drove down the familiar streets of Turnagain, I was appalled at the wide cracks in the roads—gaping, jagged fissures that looked bottomless. I began to think we would inevitably find some too wide to cross, that we might have to remain in the area after all.

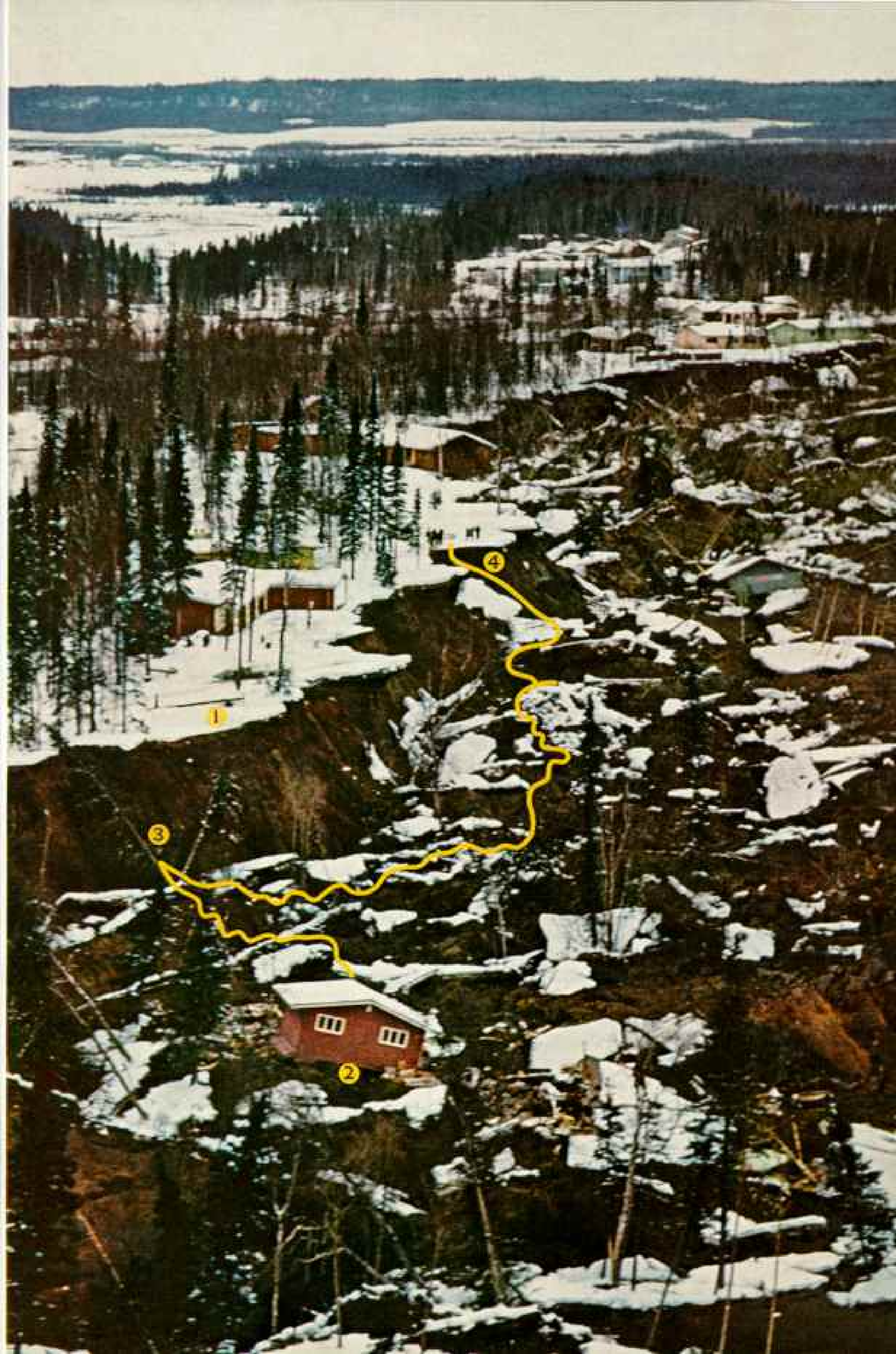
We made our way, surprisingly quickly, out to the Seward Highway—the main artery out of the city. Traffic was amazingly light. Ambulances and police cars with flashing red lights sped past us, and soldiers directed traffic. The world was inky black, pierced only by car headlights and—surprising to me—the brilliant flashing of the railroad crossing lights. The bells were clanging too, and I wondered where the train was. I realized later that the quake must have triggered the warning mechanism, and it probably clanged needlessly for hours.

Soon we were climbing the hill to St. Mary's Episcopal Church and its rectory. Both buildings were dark, and for a moment I was terribly afraid that no one was there. Now what would I do? I had forgotten that all electricity was off, and when our minister, Alexander "Sandy" Zabriskie, greeted us at the door I felt another tremendous wave of relief.

But once in the doorway we found a cold, dark, thoroughly messed-up house. Sandy's family had gone to a less damaged home for the night, and

Saw-tooth edge of a quake-carved escarpment overlooks scrambled remnants of Turnagain homes. Driveway 1 is all that remains of the Thomas property. From the driveway's end, the bedroom wing slid to its present position 2, beside wreckage of the rest of the house. Here the Thomases' harrowing ride aboard their island of frozen earth ended. The three tried vainly to use a tipped tree 3 to reach high ground. They finally scaled a bluff of shifting sand 4, where neighbors and friends hauled them to safety.





he had returned only briefly to check on his own house.

The moment Sandy closed the door and turned to tell me what to do next, I felt better. First he lit candles, and then brought us a platter of cold roast beef and a carving knife.

This was all the kids needed. Candles meant a party, and they forgot fear and became excited over a greasy platter of cold, almost raw meat. It was food, and they were starved—it was now about 8:30. They needed no forks, plates, or napkins. We knelt around the table, and I whacked off big chunks of the rare meat which the kids gobbled up.

Their spirit was contagious and I began to eat some myself. No beef ever tasted better!

While we ate, Sandy collected clothes for us. His four children were much younger than Anne and David. Wool socks were the most welcome find for all of us, oversized boots for Anne, pants for David—which came only to his hips and couldn't be buttoned—and pants and a shirt of Sandy's for me. His wife Margy wore a smaller size, I found regretfully.

A Long Night of Running to the Door

Just when warmth was returning to our bodies and spirits, we heard another slight rumble and the house began to shake. There was no need to yell to the children. They rushed ahead of me to the front door. I did stop to blow out the candles, to avoid danger of fire. Then, in the darkness, I fell right over the Zabriskies' great black dog who was running in the same direction. The two big bruises from this mishap were virtually the only injuries suffered by the three of us during the entire quake.

By the time I had picked myself up, the tremor had stopped and Sandy was assuring us that we needn't worry about any more strong jolts, and that we shouldn't try to run outside each time. We tried to accept this, but during that long night ahead, when the area was almost constantly shaken with after-quakes, the kids and I rushed toward the door almost every time.

While Sandy was talking of moving us down to join his family, the Warren Twiggses came to the door. He is the senior warden

of the church and had come by to see if there was any damage or something he could do to help. Since they had plenty of space at their home, it was quickly decided that we should join them for the night.

I noticed no more cracks in the pavement, but it was snowing heavily and the street was a sheet of ice. Ordinarily I worry about such driving conditions, but at this point it didn't concern me in the least.

Nightmares Break Children's Sleep

My thoughts, now that we were assured of a place for the night, were about Lowell. Surely he must be worrying terribly about us. How could I possibly get word to him? I was concerned that he might try to fly right back, and the weather at that moment couldn't have been worse. I also wondered if Fairbanks could have suffered from the quake.

Warren Twiggs was due at his Federal Aviation Agency communications job at midnight, so I asked him to try to get word through to Fairbanks. I had not heard a radio since leaving the pickup, and I did not know what the communications problem might be.

The Twiggses' home looked normal, except for no heat or electricity. Margaret Twiggs and I decided our first move would be to bed the children down for the night.

This was easier said than done; they refused to consider leaving me to go into one of the bedrooms, and the couch right by the front door looked the most inviting to me. So we made a bed on the living-room floor with all the blankets we'd collected that evening, topping them off with two of the Twiggses' sleeping bags. Soon the children were warm and comfortable. They slept for a few hours after midnight, but both frequently awoke in terror from nightmares.

I lay on the couch under blankets, still not really warm. We were lucky that the temperature outside did not drop below 20 degrees that night. Sleep was out of the question, because I wanted desperately to get in touch with Lowell. A constant monitoring of the radio seemed wisest. The Twiggses had one portable, and I perched it on the arm of the couch and lay listening all night long.

Collapsed like a house of cards, a family-room wall supports Tay Thomas as she sifts through the ruins of her home. Most of their furniture gone, the Thomases managed to recover many cherished possessions, including a rare Tibetan flag, memento of Lowell's travels with his father. To their daughter's delight, her doll survived (below).





Sudden tragedy etches the face of Mrs. Perry Mead (left), who lost two sons. Perry, aged 12, re-entered their crumbling house to rescue his baby brother; both perished. Their father, Dr. Mead, exemplifying Alaskan spirit, toiled day and night to save others despite his own grief. Mrs. Thomas and Anne seek to comfort their neighbor.

I heard that all the homes along the Turnagain bluff had fallen away. The relief was tremendous to hear reports from rescuers that all persons appeared to have escaped—all but the two Mead children. I winced at the frequent pleas “Urgent to Dr. Mead . . . needed immediately at Providence Hospital.”

Perry Mead is Alaska’s only neurosurgeon, and he spent the next 24 hours as a truly heroic individual—going from bed to bed at the hospital tending to the needs of his patients, tears streaming down his face from the sorrow of losing his two children.

It was not for another 24 hours that I finally learned that the two I had seen, Penny and Paul, had been rescued at just about the same moment we were pulled up the bluff. The oldest boy, 12-year-old Perry, had helped them out of the house and then returned to save his baby brother. Neither was seen again.

I also learned for the first time, via the radio, of the tremendous damage suffered by the downtown area. We, living in Anchorage, watching it grow day by day, felt tremendous pride in each large new building rising up into the sky, a dramatic symbol of our growth and progress. Now, one by one, I heard that many of our major buildings might have been severely damaged and would be closed until they could be inspected.

By midnight, communications were beginning to filter in from communities around us, and we heard terrible stories of sea-wave destruction in Kodiak, Seward, and Valdez. It was an eternity to me before contact was re-established with Fairbanks, and I heard with relief that it had felt merely a strong jolt.

The broadcasters began to relay messages from local families to relatives in other Alaskan towns. There was no hope of getting any word out to the “Lower 48” yet. The Twiggsses’ phone was not working properly, and I could only listen to “Please tell my husband John Smith that his wife and children are fine,” and “To my mother, Mrs. James in Fairbanks, all is well.”

Word Comes of an Inbound Plane

Locally, there was a continuous stream of “Tell John his father and mother are at the Stewarts,” or “The Johnson family wants to know the whereabouts of daughter Ann.” I heard many of our friends asking about family members, and, as the night wore on, reports poured in locating the lost.

It was several hours later that I first heard that a Wien Airlines propjet was en route from Fairbanks to Anchorage, bringing doctors and supplies. I just knew that Lowell would be on that plane.

I knew that the pilot would be Merrill Wien, the airline's head pilot and one of our closest friends. The weather was still grim—snow and fog—but Lowell and I had both flown with Merrill under many tough conditions. We knew he was just about the best there is, and I had no fears for them that night.

Radio Call Reunites the Family

Suddenly the radio announcer said, "If anyone knows the whereabouts of Mrs. Lowell Thomas, Junior, and family, please contact us immediately." I ran to the telephone and was so overwhelmed to find it working that I could hardly talk to the person who answered. But I got the essentials through, and just half an hour later, in the first light of dawn, I watched our Travelall roar up the street.

I practically laughed out loud at the sight of this great, muddy station wagon—I thought it had disappeared with the house! I had completely forgotten that Lowell had taken it to the airport. It was like receiving an unusually exciting Christmas present to realize that one material possession was left.

Words cannot describe our reunion. The kids and I were tremendously relieved, but Lowell's emotions were those of a man who had not known for many hours whether his family was dead or alive.

All I wanted to do now was to cling to him and talk. But he felt he should return to Chiligan Drive immediately to see if there was anything he could salvage, and if he could find the dog, to whom he was greatly attached.

We tried to keep occupied during his absence with the practical necessity of cooking breakfast for six people over one tiny Coleman stove. Margaret Twiggs did a remarkable job of producing eggs, bacon, and coffee for all. But the children! They jumped and rolled and ran all over the small living room, their leaping and laughter shaking the house. I was distressed at such behavior, but Margaret assured me that it was a very good sign of return to normalcy.

I was beginning to wonder how much of this new development I could put up with, when the kids screamed that Daddy was back. They were out the door like a shot—and no wonder.

Lowell was coming up the walk with little black Sylvester in his arms and Bozie trotting along beside him. That kitten and the big German shepherd were never so overwhelmed with lavish affection.

When the excitement died down slightly, Lowell told us of making his way down the cliff—to find a thoroughly subdued and shaking Bozie lying by the bedroom wing.

The bedroom stairs were exposed, and he walked up them and into the rooms. Pictures were still on walls and some furniture still standing. But other belongings were everywhere. Lowell realized that much of this could be salvaged if the water did not rise any farther. Waves were lapping at the garage, and the sea had virtually covered the Mead home.

At David's bedroom door he pushed the bed back to get inside and out popped a little black head. Lowell has never been overly fond of cats, but at this moment he said he was highly pleased to find little Sylvester.

Struggling to salvage belongings, Tay and Lowell Thomas remove a cushion and one-legged table from their splintered home. In Fairbanks when the quake struck, Mr. Thomas suffered an agonizing night before he learned the fate of his family.

ILLUSTRATION BY W. E. GARRETT © R.E.C.





Exhausted survivors David, Anne, and Mrs. Thomas stand on a fragment of land where earlier their German shepherd, Bozie, trotted toward a whole house, a warm hearth, and carefree children playing near the trellis. Now the bedroom wing tilts like a sinking ship in the tangle of toppled trees.

REDUCED FROM BY THE THOMAS LINNETS
AND W. S. GARRATT © W.A.S.





(Next day friends digging among our debris picked up a box of clothing and out walked mama cat—unhurt but probably having run through seven of her nine lives.)

Easter Sunday, 1964, will always have a special place in my memories—and it won't be visions of Easter bonnets or a leisurely holiday dinner. The church was cold at 8 a.m., without heat, and we and many of our friends who were homeless, too, clumped down the aisles in borrowed boots and weird assortments of misfit clothing. Anne was still wearing her rescuer's coat, far more meaningful to her than a new Easter bonnet; David was still holding up his pants, and I was still wearing Sandy Zabriskie's corduroy pants and wool shirt.

Victims Offer Aid to Others

The singing has never sounded so enthusiastic, nor has the spiritual warmth been so noticeable, although it was so cold in the building that people's breath showed as they sang. Prayers of thanksgiving have never had more meaning, and the Epistle for Easter Day is indelibly etched on my mind: "If ye then be risen with Christ, seek those things which are above. . . . Set your affection on things above, not on things on the earth. . . ."

Sandy told the congregation there were two lists hanging in the hallway, one for the "haves"—those who had clothing and household goods to contribute—and one where those who had lost everything could write down what they needed.

At least 20 of St. Mary's 150 families were homeless, and yet at the end of the three services that Sunday the "have" list was more than three pages long, and only two names stood on the "have not" list, put there by the minister himself!

When the service was over, several of the men offered to help Lowell salvage some of our goods. I had not wanted to return to the ruins, to see my lovely home in such a grim state, but Lowell felt I had to go. Only I would know what feminine things would be most important, and where to look.

Within an hour after the church service a large group of Lowell's friends had gathered by the bluff, including many members of his mountaineering club. The house was one horrible, twisted mass of wreckage—with only the bedroom section fairly intact.

As I crawled up the stairs after the mountaineers, I had the silliest thought—all those

muddy feet on my carpets! But then I made myself think practically and helped pick out the items for first priority: all clothing, the pictures on the wall which could never be replaced, my jewel box containing little of value but many sentimental mementos, Anne's dolls, some medicines, and a few books. Our large library was in the destroyed section.

Then I wandered about the debris for a while, finding the oddest items in the most unlikely places. Boxes of Lowell's precious film were scattered all over the sand. One of my Steuben vases perched on a mound of clay, looking as if on display in a store window.

The men pulled away one of the kitchen walls, revealing the refrigerator, almost intact. When Lowell opened the door, he found two dozen eggs, all unbroken!

Like almost all other Alaskans, we had no earthquake insurance to cover any of this great loss. Lowell worked around the clock for three days to salvage whatever he could. And we could never adequately thank the mountaineers and the Spenard Rotary Club, whose teams of men and boys spent all three days carrying heavy packs up those cliffs.

I'll never forget watching what some might call rough, carefree teen-agers, carefully digging in the dirt and debris, then gingerly bringing me some small piece of antique china, or a small box of Kodachrome slides.

Pride in Being an Alaskan

Now, as I sit writing this, just one week later, I look out the window of the new little home we have bought. I feel a sense of gratitude for each material possession we were able to salvage. But I feel many more, stronger feelings: a tremendous pride at the privilege of being called an Alaskan.

What a magnificent people to have endured what they have with calmness and strength, and to be ready to tackle an almost hopeless recovery task ahead! Here are people who still live with the desire to help their neighbors rather than just outdo them. I look forward to the long months and years ahead when we will all be working together to rebuild our shattered city and state.

The strongest feeling of all, I know I share with Lowell, the children, and thousands of other fellow Alaskans: a fervent thankfulness toward God for having spared our lives during one of the world's worst earthquakes. We are thankful for the opportunity to rededicate our lives to His service.

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◀ **COVER:** Tallest living thing, a 367.8-foot redwood discovered by the National Geographic Society, lifts its spire in northern California (pages 5-7).



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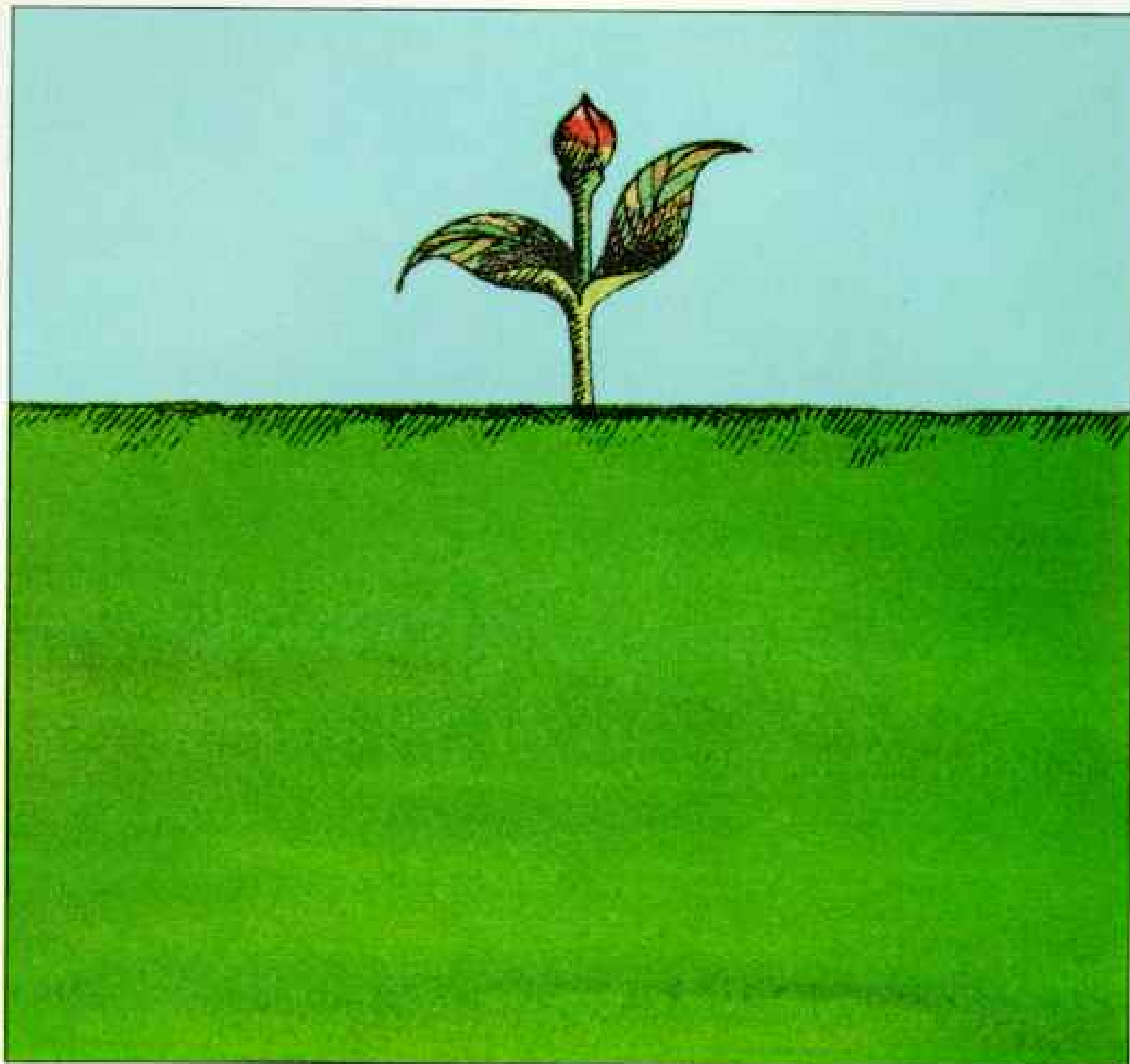
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"Those issues carried pictures of Kodiak after the great eruption of Mount Katmai," he said. "The few copies still around are nearly worn out—and they may now be lost."

Unhappily, these issues are long out of print. So, too, are most of the earliest—and rarest—editions of the GEOGRAPHIC, beginning with Volume I, No. 1, of October, 1888.

Complete sets of our 76-year-old journal are so much in demand, however, that the National Geographic Society shortly will begin reprinting its early volumes. Details will be announced in the GEOGRAPHIC for October, when the first of the reprints will become available. The new program will enable libraries, schools, and collector-members to fill out their sets from the very first issues.

As a record of contemporary life, edited always with a view toward permanency, the GEOGRAPHIC remains a reference source constantly consulted by students and teachers, scholars and travelers. Youngsters interested in their grandparents' time turn first to early



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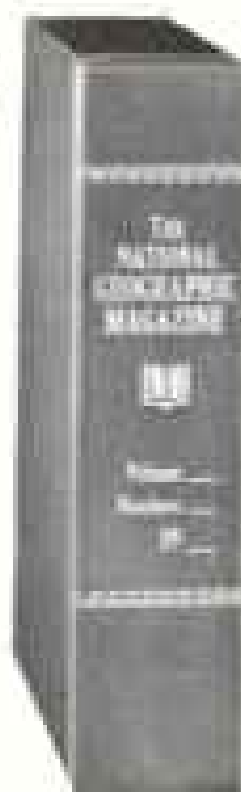


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Cape Hatteras...

Conservation saved it for you. See it on your way to the New York World's Fair.

There may be pirate gold buried on these wild and lonely North Carolina beaches. Certainly, ships with costly cargoes were wrecked there. But to most men, the wild shifting dunes, the foaming breakers, the haunting loveliness of sea and sand are treasures enough.

A dedicated group of North Carolina citizens thought such treasures should belong to the entire nation. A newspaper editor campaigned to preserve them. Members of such groups as the Audubon Society and Izaak Walton League joined in.

But, there was no money for land purchase. So public-spirited citizens raised it themselves. They got substantial help from private foundations. And the state of North Carolina appropriated matching funds.

Today, more than seventy miles of this

primitive region is your Cape Hatteras National Seashore.

You and every other American own it, as you should. For along this windswept beach, among these wind-carved dunes, you can find satisfaction no crowded street can offer, a spiritual regrowth that renews and strengthens your ties with Nature and with mankind. Through conservation, this wild beauty will remain to give your great-grandchildren satisfaction when they, too, make their rendezvous with the land.

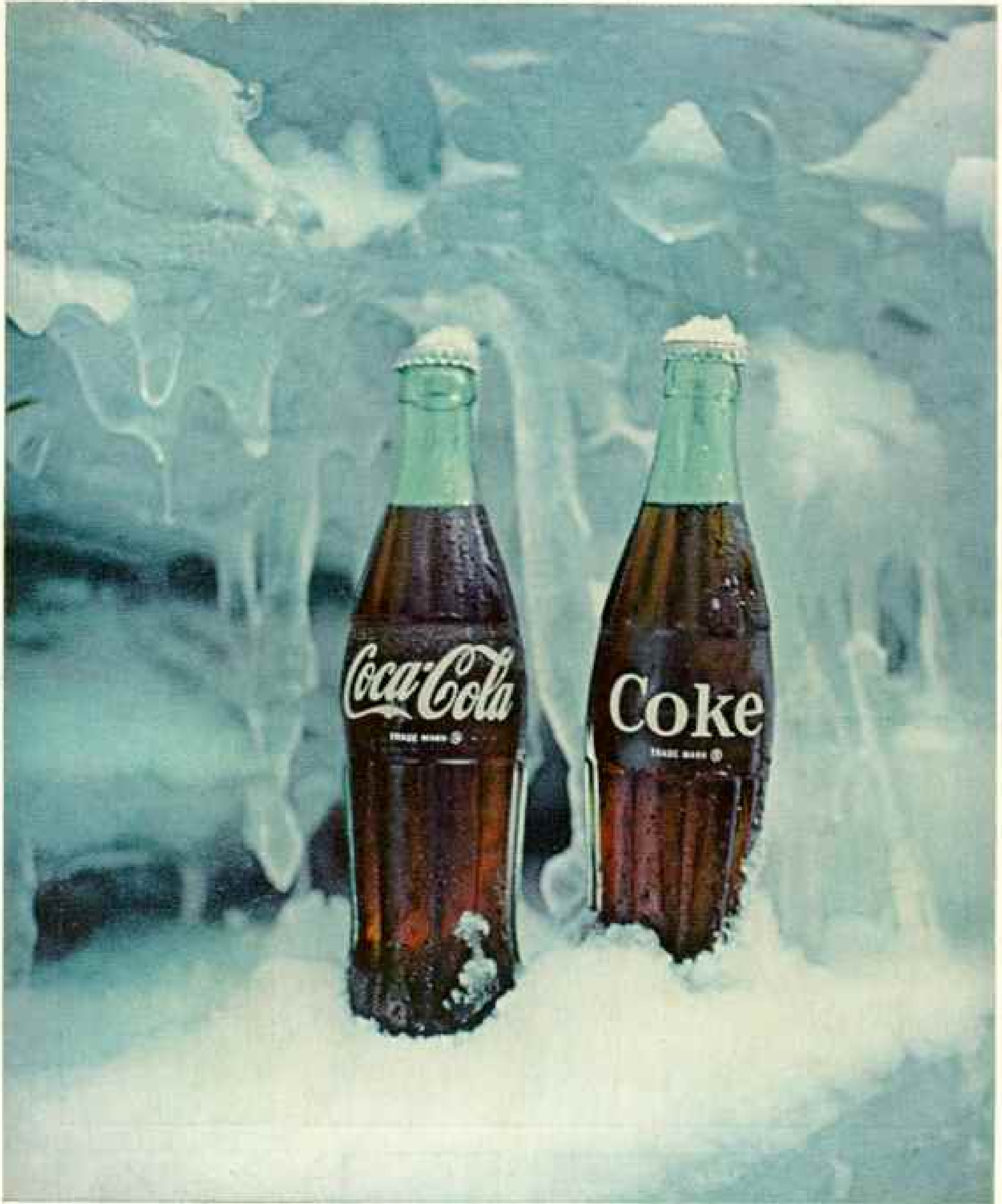
Cape Hatteras must not be the last of America's scenic glories to be so preserved. We need more natural areas set aside, so that all Americans, for all time, can keep the look of far horizons in their eyes.

Such conservation helps everybody. It needs everybody's help.

Free tour service: If you are driving to the New York World's Fair, let Sinclair help plan your trip to include visits to Cape Hatteras or other National Parks. Write Tour Bureau, Sinclair Oil Building, 600 Fifth Avenue, New York, New York 10020.



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(Only 240 calories)
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The Nutrition Story of Kellogg's Special K

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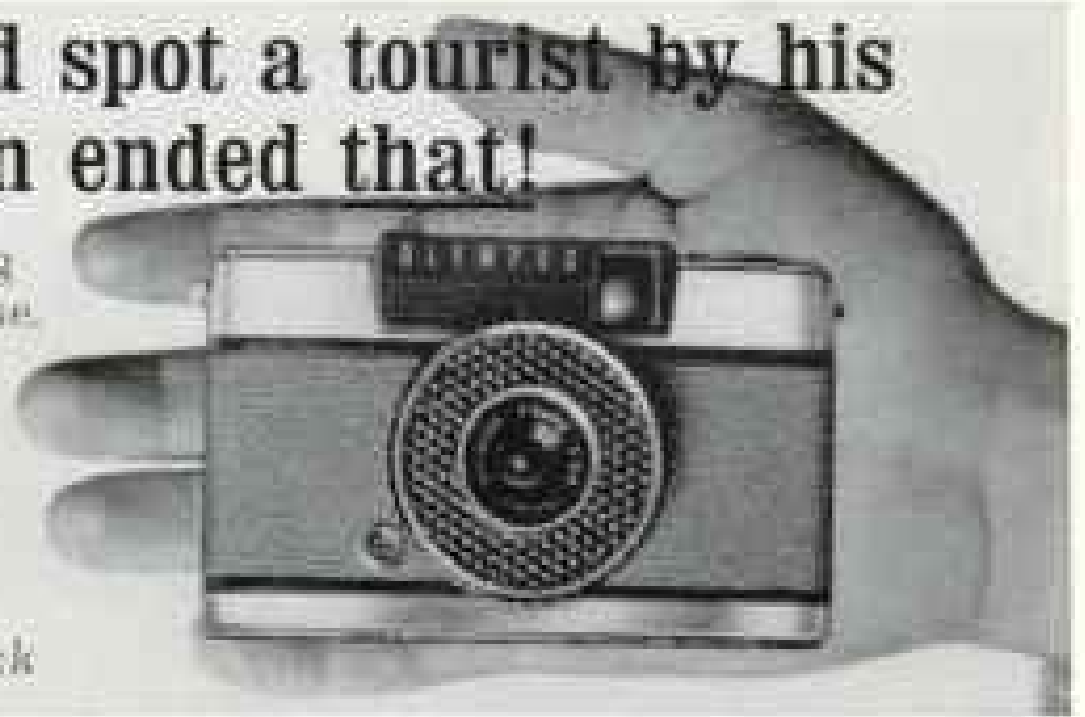
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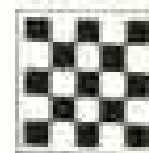


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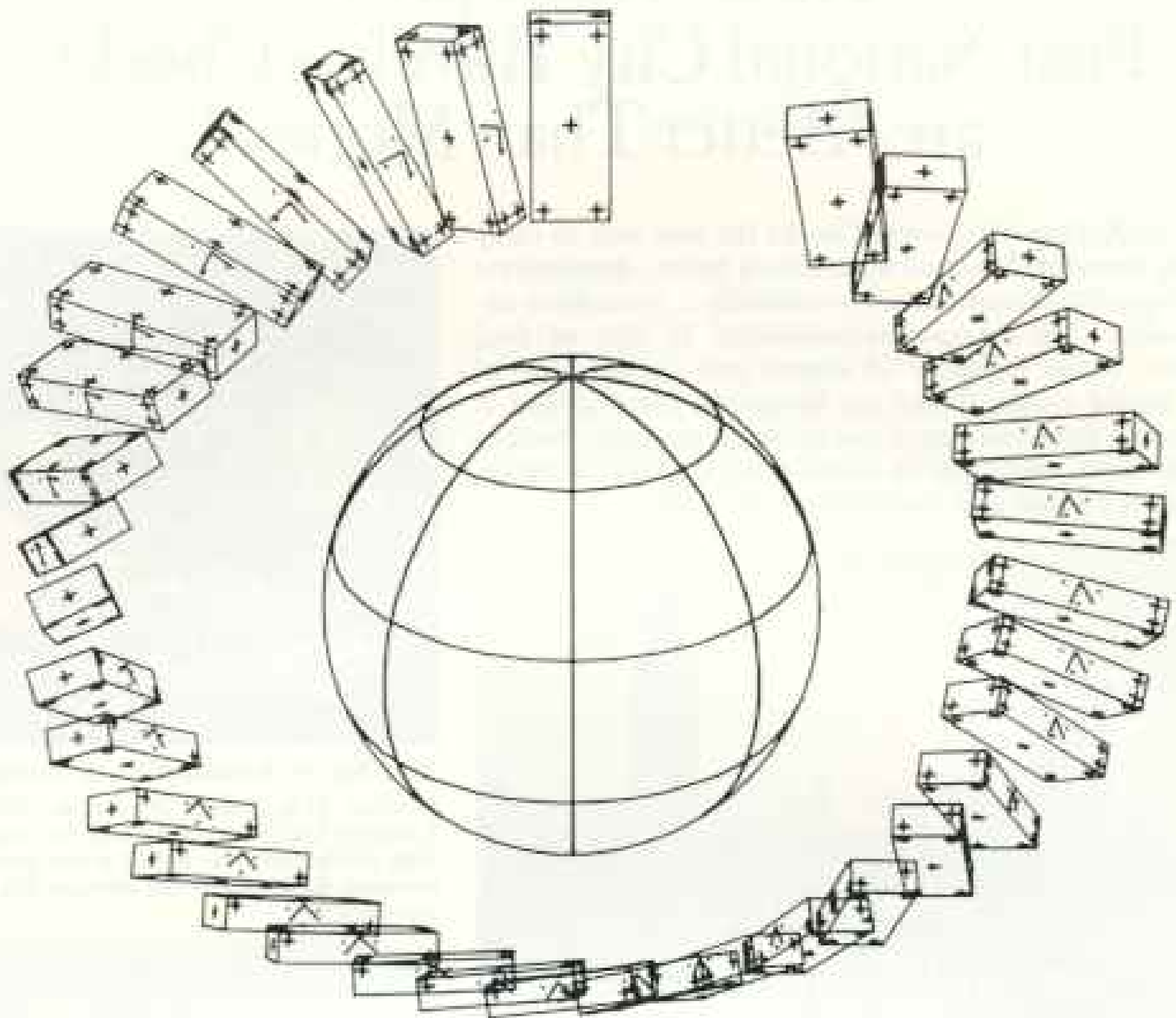


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What the computer did is called *simulation*. Working from data given it, the computer calculated, or simulated, the satellite's position at various instants and produced the picture on microfilm. The picture told us what we needed to know.

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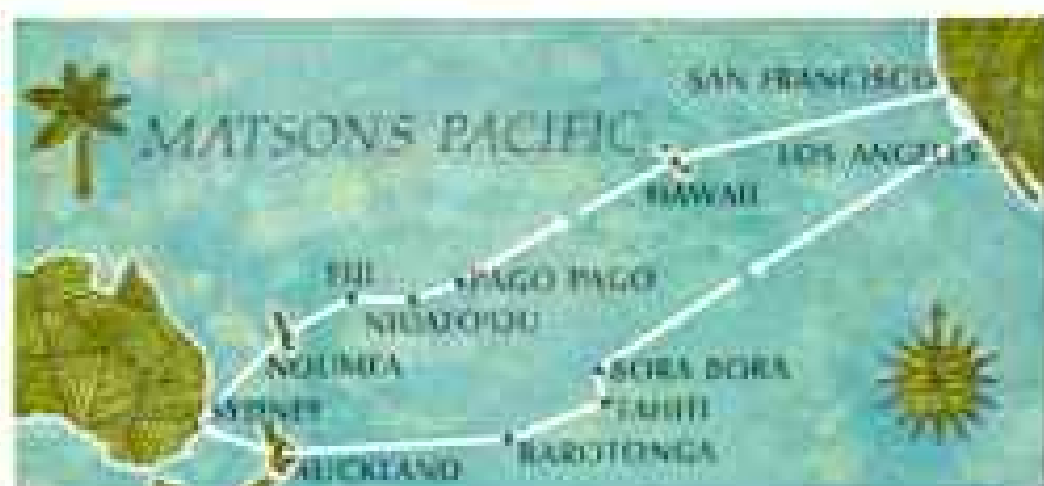
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