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SEE "THE DESERT BUSHMEN OF THE KALAHARI" THURS., APRIL 12, ON CBS TV (page 578A)

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NATIONAL GEOGRAPHIC

April 1973

"John the Baptist was not more eager to get all his fellow sinners into the Jordan than I to baptize all of mine in the beauty of God's mountains."

—JOHN MUIR

John Muir's Wild America

By HARVEY ARDEN
NATIONAL GEOGRAPHIC STAFF

Photographs by DEWITT JONES

HAPPILY, IT WAS RAINING. The good weather that had plagued me since my arrival in Alaska finally dodged behind a wall of clouds, and the drops began sifting down.

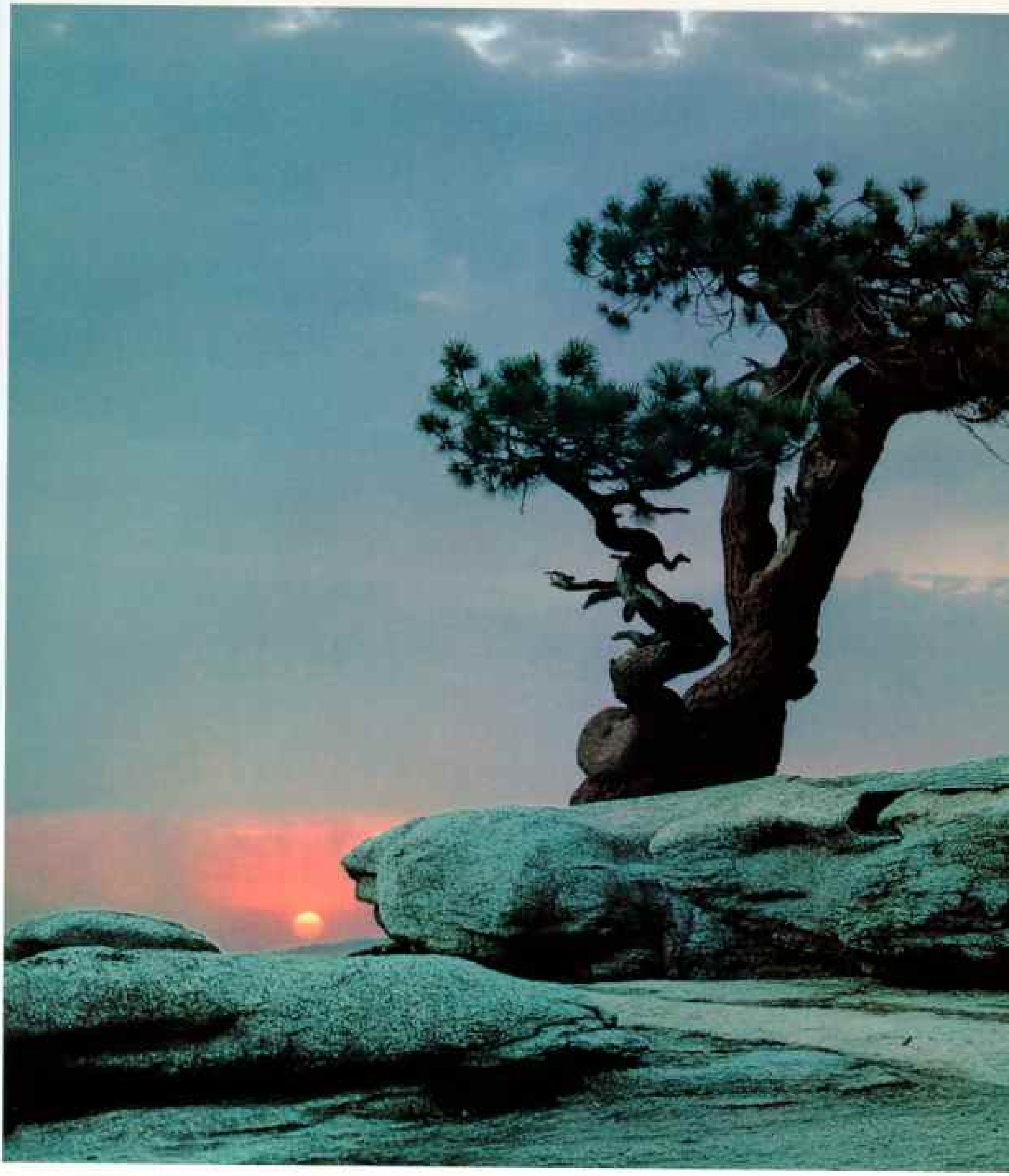
"John Muir weather," intoned my companion, Bob Howe, who superintends the unearthly preserve of water, ice, rock, and solitude called Glacier Bay National Monument. We were gazing out the rain-streaked window of ranger headquarters on a vista whose sheer sogginess would normally have had me rushing for the great indoors. But not this day, nor any other during my pursuit of John o' Mountains—a man who considered a storm an invitation and comfort an irrelevancy.

Father of Yosemite National Park, savior of the sequoias, guiding light of the national park movement, explorer and mountaineer, naturalist and mystic, adviser to Presidents and gadfly of the establishment—such was John Muir (1838-1914), America's apostle of wilderness.

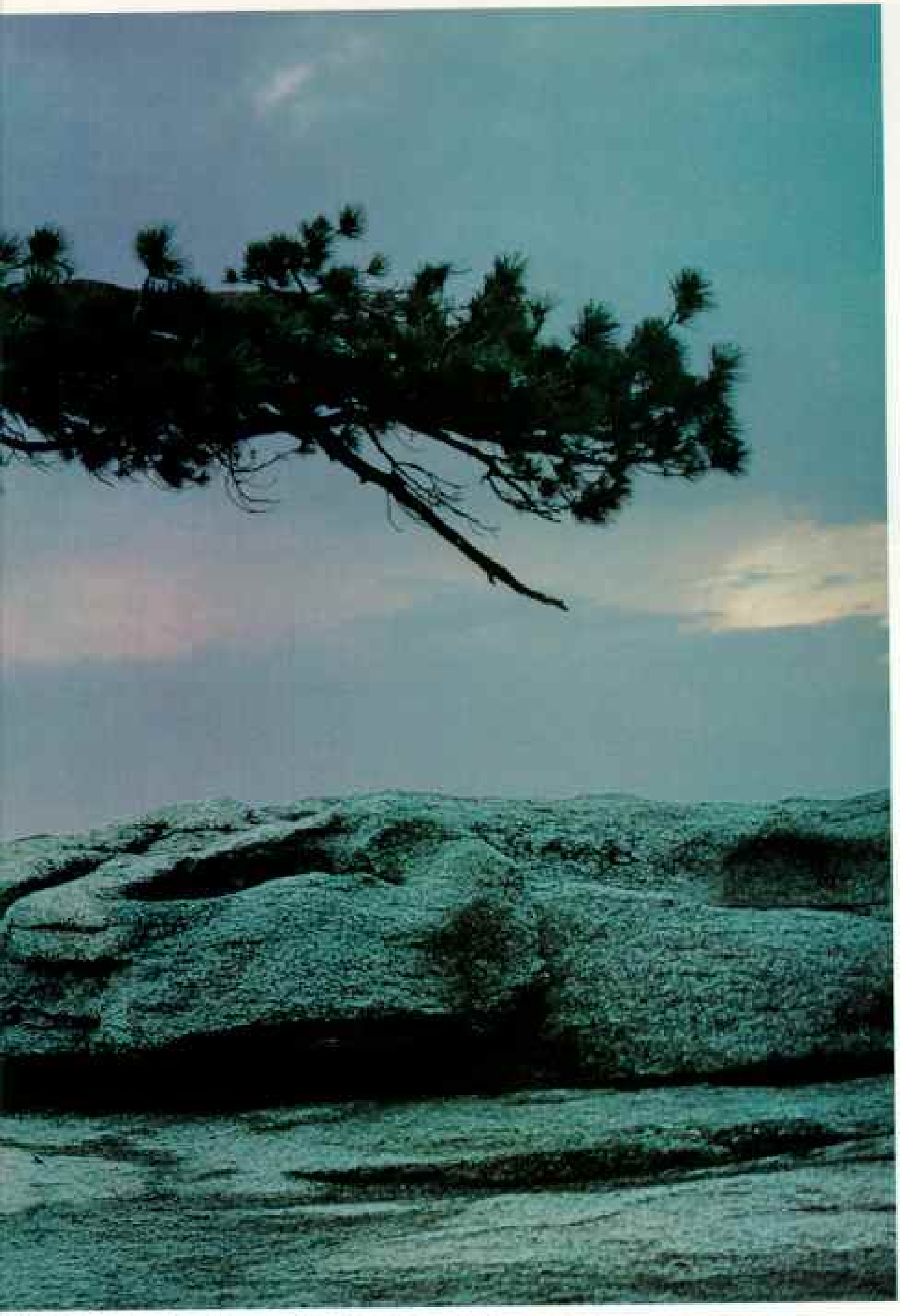
Pulling open the door of ranger headquarters, Bob Howe let in a gust of rain as he let me out. "You'll get wet to the bone," he said, "but you'll see the glaciers in the same light Muir did when he explored here in '79. Better than bright sunlight, you know. Rainlight turns the ice to sapphire."

Later, soaking up some of that good John Muir weather on the foredeck of a small cruise boat, I confirmed Bob's words. Before me, through misting rain and swirling clouds, a gigantic blue fist of ice—half a mile wide at the knuckles—punched

SELF-PORTRAIT (ABOVE) IN A LETTER MUIR WROTE TO A FRIEND IN 1887, FROM THE YOSEMITE NATIONAL PARK COLLECTION, COURTESY MUIR-HANNA FAMILIES



"I . . . am always glad to touch the living rock again
and dip my head in high mountain sky."



Gnarled old mountaineer, a storm-beaten Jeffrey pine eyes the dying day from the granite pulpit of Sentinel Dome in California's Sierra Nevada. To this "Range of Light," a century ago, came John Muir —a wild-bearded naturalist, wanderer, and visionary driven by a consuming desire for scientific knowledge and an irresistible urge to see what lay beyond the next crest. From his sojourns among the mountains he brought back a message of wilderness salvation that helped inspire our system of national parks and forests.

Brown bear feasts on a humpback salmon near Wrangell, Alaska.

> "... if a war of races should occur between the wild beasts and Lord Man, I would be tempted to sympathize with the bears."

From its tree-trunk home, a woodpecker peers out at the world of Sequoia National Park.

directly out of treeless mountains into the bay.

Not even Muir's ecstatic descriptions could have prepared me for the overpowering reality of that ego-dwarfing, soul-expanding scene. Looking out on shining wet beaches slipping from beneath the receding Ice Age remnant, I felt as if I had arrived at the cutting edge of time itself.

This was why John Muir had devoted his life to enticing others into the wilderness—to share with each of us the incandescent experience of actually being there.

Scanning the glacier's fantastically crevassed and wrinkled surface, I half fancied I would see Muir's wild-bearded, baggy-trousered figure disentangling itself from the mists out there, waving at me to follow.

Certainly here was a man worth following. Indeed, if you happen to be looking for a guide to trackless regions—outer or inner—I can recommend none finer than John Muir.

FULFILLING AN OLD DESIRE this past year, I undertook a pilgrimage to major way-stops along the great naturalist's life trail, using his writings as my guidebook. With twofold purpose, I sought to absorb his wilderness gospel at the source and to see how, in the century or so since he traveled this way, things have changed—or not changed—in John Muir's wild America.

As if in antithesis to the epic grandeurs of Glacier Bay, my trail head in this biographical journey lay in mountainless central Wisconsin. There, one green-and-gold Indian-summer day, I drove through a neatly barbered land whose trim farmhouses and cow-dotted meadows give an impression that this is the way it has always been—as if, when the glaciers pulled back millenniums ago, this very same rural landscape had unrolled in their wake, complete with split-rail fences and flags-up mailboxes.

Only an occasional patriarch oak, limbs gnarled arthritically, hints at the "glorious Wisconsin wilderness" that locked this land in green embrace when 11-year-old John Muir and his immigrant family arrived here from Dunbar, Scotland, in 1849.

It seems almost a calculated irony that Muir should have begun his life in America as a destroyer of this very wilderness—though in those days the destroyers were called pioneers. That primordial forest had to be cut, its great oaken and hickory stumps extracted, its soil broken for farming—all

labors requiring Herculean effort from a wiry lad whose head barely reached above the breaking plow's handles.

"We were all made slaves through the vice of over-industry," he later recalled. "After eight years of this dreary work of clearing the Fountain Lake farm . . . father bought a half-section of wild land four or five miles to the eastward and began all over again. . . ."

That John Muir could emerge from this wilderness sweatshop and still look on a tree with love and consuming wonder seems one of his more remarkable achievements.

In fact, it was in this Wisconsin crucible that Muir had the dawning notion of an idea that would, decades later, be magnified by himself and others into America's system of national parks. Shortly before leaving his boyhood home, he said to his brother-in-law, by then the owner of Fountain Lake farm:

"Sell me the forty acres of lake meadow, and keep it fenced, and never allow cattle or hogs to break into it . . . I want to keep it untrampled for the sake of its ferns and flowers; and even if I should never see it again, the beauty of its lilies and orchids is so pressed into my mind I shall always enjoy looking back at them in imagination. . . ."

Unfortunately Muir lacked the cash to make a down payment on that dream.

"Wasn't till recent years that Fountain Lake farm got turned into a county park," explains Syl Adrian of Montello, who has made Muir's Wisconsin years his life's avocation.

"The meadow Muir wanted to save was grazed by cattle a good many years. But it's finally been bought and included in the county park. Now it can grow shaggy-wild again. Muir'd like that, I think.

"Lots of folks hereabouts still hardly know who John Muir was," Syl confesses. "Out in California, now, almost every schoolboy knows about him. But here, where he grew up, and where you might say the national parks had their start, well . . . I've been trying for thirty years to have some kind of national park or monument established here. Maybe one day it'll happen."

Syl, himself the inventor of an old-time jukebox called the Adrianola, reminds visitors that Muir first won local fame not as a naturalist or conservationist but as the inventor of an array of mechanical contrivances.

Strange, marvelously sculptural creations they were: hand-whittled wooden clocks, including one with a rock-weighted pendulum, 14 feet long, intended to be hung from a tree so fieldworkers might know the time; an "early-rising machine" that tipped the sleeper out of bed at the appointed hour; a mechanical scholar's desk that shoved a textbook under the student's gaze, allowed a given period for perusal, then replaced it with another (pages 440-41).

With a sampling of these marvels, Muir departed the Wisconsin homestead at age 22. Already luxuriating from his chin was the thick beard that would remain affixed there throughout his life.

Maude Wells, 96, of nearby Portage, recollects hearing her father, a boyhood friend of Muir's, talking about the beard.

"That beard really bothered father. It was so bushy and thick that things got tangled in it when Johnnie ate. Father was always after him to comb it out."

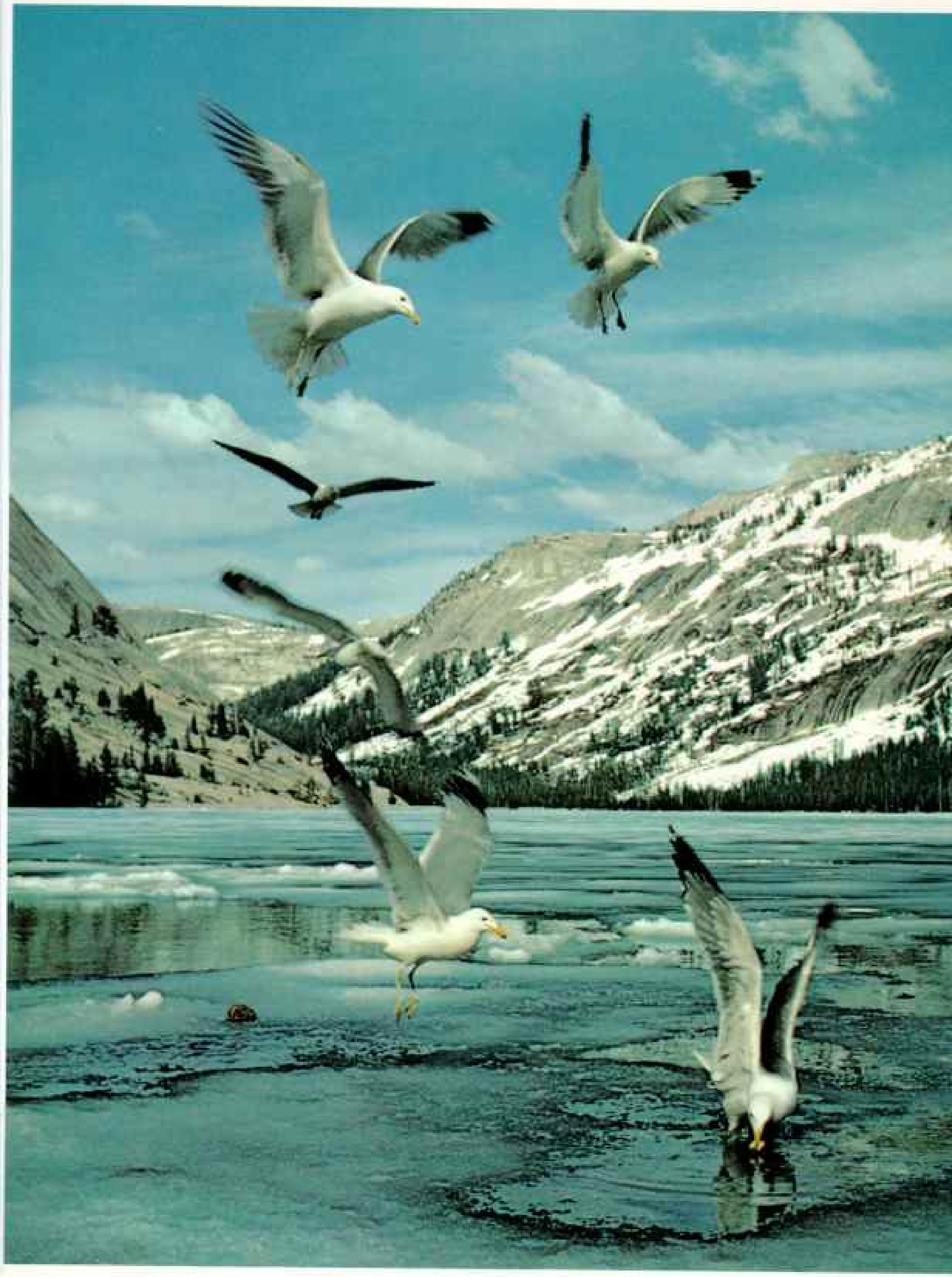
THE RAW YOUTH'S astonishing inventions brought him instant acclaim at the Wisconsin State Agricultural Fair in Madison in 1860, prompting prophecies of a great career as an inventor.

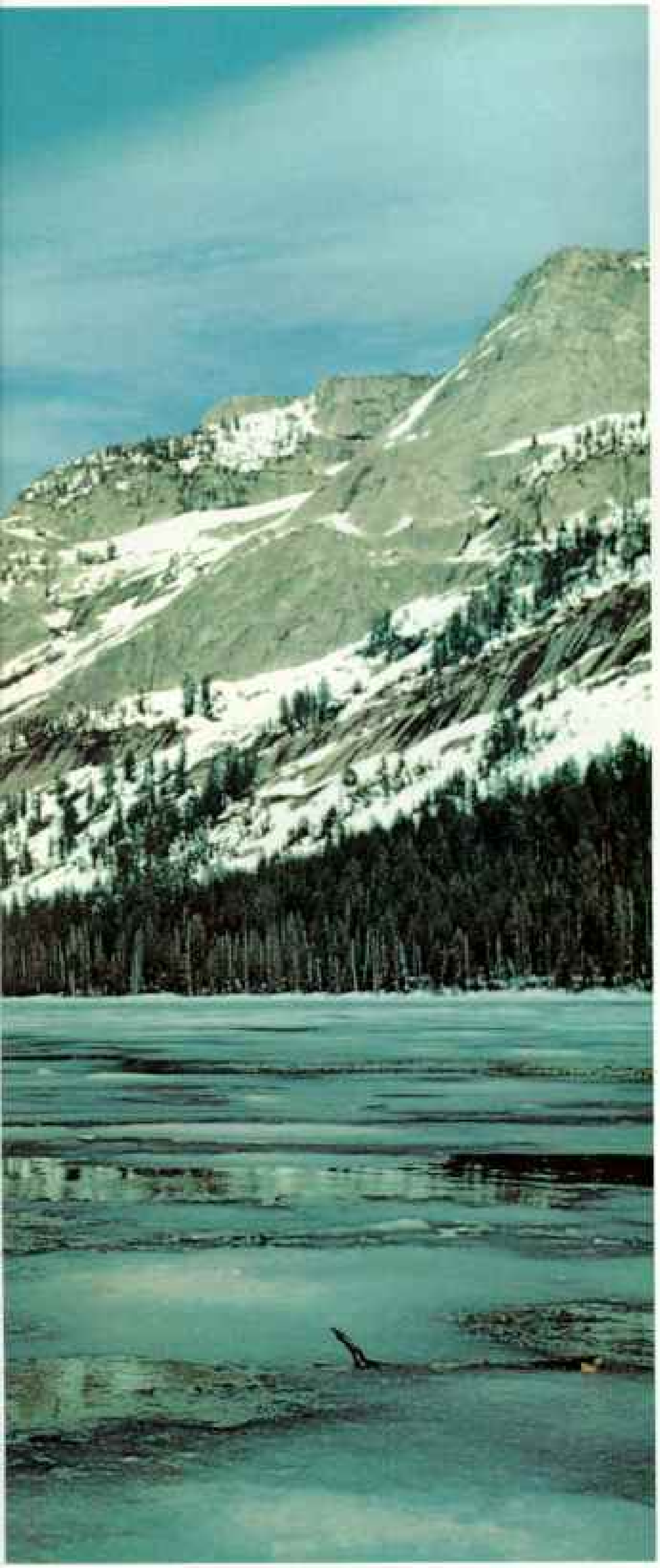
Muir, however, was still hungry for pure knowledge; applied science could wait. He enrolled at the University of Wisconsin and devoured a self-selected curriculum in the sciences. Between terms he took wide-ranging geological and botanical "rambles" through wild parts of Wisconsin and adjacent states—testing textbook theories against the realities they were supposed to explain.

Finally, full up with formal learning, torn between a vague but ever stronger yearning to "go wild" and a need to earn a living, he listened to his more practical instincts and took a job with a carriage maker in Indianapolis. Almost overnight his mechanical innovations boosted the firm's efficiency severalfold. The owner offered him a partnership, and a profitable, if mundane, future seemed assured, when fate—as they say—intervened.

While he was working in the carriage shop, a file slipped from Muir's grasp and lanced his right eye. The pain was exceeded only by his dismay when the left eye went sympathetically blind as well.

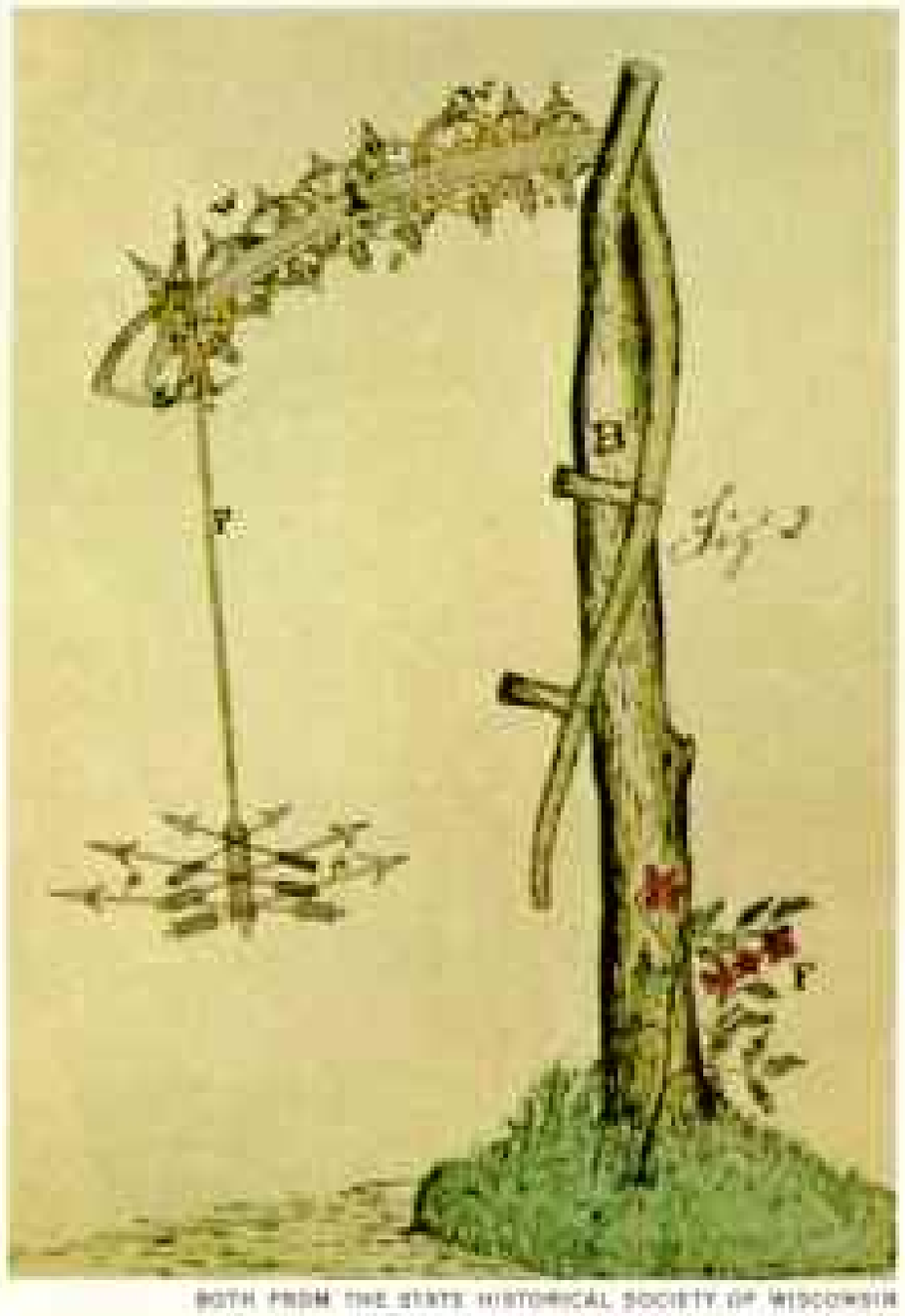
Possibly deprived forever of seeing and exploring the world of wilderness, he came to a pivotal decision. Henceforth, should his sight recover, he would give up the inventions of men and devote himself to "the study of the inventions of God."





"... this has been a big feast day. Plants, animals, birds, rocks, gardens, magnificent clouds, thunderstorms, rain, hail—all, all have blessed me!"

In the ice-crackling quiet of a late-spring day, California gulls feed on half-frozen morsels in Tenaya Lake—one of more than a thousand watery mirrors flung across the High Sierra. Sleuthing among these barely explored mountains through most of the 1870's, amateur geologist Muir noted that the lakes were not haphazardly placed, but instead brimmed in the footprints of long-vanished glaciers. "The grandeur of these forces and their glorious results," Muir wrote, "overpower me and inhabit my whole being. Waking or sleeping, I have no rest. In dreams I read blurred sheets of glacial writing, or follow lines of cleavage, or struggle with the difficulties of some extraordinary rock-form."



BOTH FROM THE STATE HISTORICAL SOCIETY OF WISCONSIN

Early blossoming of a brilliant mind, Muir's scholar's desk (left)*—every piece hand carved —presents the student with an open textbook, then allows a given span of time for perusal before thrusting another lesson into position. His design for a hickory clock* (above) *was shaped like a scythe to symbolize Father Time. Muir's career as an inventor was cut short when a workshop accident temporarily blinded him. Thereafter, he "bade adieu to mechanical inventions, determined to devote the rest of my life to the study of the inventions of God."*

When the light gradually returned to both eyes, he launched unswervingly into his new vocation. "I might have become a millionaire," he wrote, "but I chose to become a tramp."

No ordinary tramp, it might be added, for he had in mind nothing less than to trace the German explorer Von Humboldt's trail across Venezuela's Orinoco Basin, continue to the Amazon, and then raft down to the Atlantic —a "ramble" of some 3,000 miles.

First, however, he decided on a shakedown walk from the Ohio River to the Gulf of Mexico—traveling, as would henceforth be his style, "by the wildest, leafiest, and least trodden way I could find. . . ."

A STRANGE FIGURE this bewhiskered citizen of the wilderness must have made as he tramped through Appalachia and the South, stopping when the mood struck him to examine an insect, sketch a rock formation, or preserve the fading beauty of a flower in his plant press.

In *A Thousand-Mile Walk to the Gulf*, published posthumously from his journals, he describes his meeting with a backwoodsman, who challenged him: "You look like a strong-minded man, and surely you are able to do something better than wander over the country and look at weeds and blossoms."

Muir asked him, "You are a believer in the Bible, are you not?"

"Oh, yes."

"And . . . do you not remember that Christ told his disciples to 'consider the lilies how they grow'. . . . Now, whose advice am I to take, yours or Christ's?"

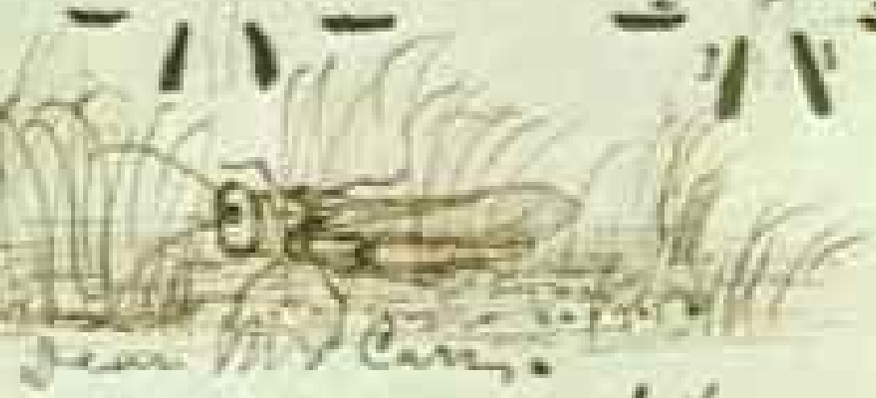
The backwoodsman stood convinced.

In those post-Civil War years, roving brigands preyed on travelers as hawks on field mice. Once a thief stole Muir's bag, then returned it after finding within "only a comb, a brush, towel, soap, a change of underclothing, a copy of Burns's poems, Milton's Paradise Lost, and a small New Testament."

At Savannah, Georgia, where his last few dollars ran out, Muir took refuge from bandits by sleeping in Bonaventure Cemetery. There, building a lean-to among the tombs and subsisting on crackers and muddy brown water, he waited out the days until a prearranged packet of money from his brother arrived at the local post office.

Intersecting his route, I spent a few eerily beautiful after-midnight hours in Bonaventure's crucifixed darkness. Feeling totally

(Continued from previous letter page)



Yosemite Valley
Sunday Sept 27th 1874

I have been down into the Canyon. I wonder if I will ever have another river like this. After floating along in the sparkling crystal I swam across to examine a cleft in the bank & found a small back ten feet below like a flue & disappearing in a vertical portion of the bank I discovered two small frogs of a new species each roughly molded in a damp matrix from stone they could look out over the water they are not water frogs I reckon. I swam over with them in my hand holding them aloft & when I landed they made a great narrowing ado I have them in my room keeping they may sing like crickets - or tree frogs for me in the night

In walking over the pebbles I observed some tiny clear crystals & other drift formations upon the edge of my foot. The wind lifted delicately through my raining flesh & thrilled every fiber. The afternoon sun shimmered upon the stony pebbles bright as upon the upheaved summits of the river. A thicket of tall waving golden rods warms the sandy bank & the whole valley is filled light like a lake in it's own individuality loves & dreams as if it were rich

I chased a grasshopper & finally roused the lady bellows & made him attempt to fly out the river side of the fall & I succeeded & enjoined him before any of the hands. Caroline began one flew up & I also succeeded in driving into the river but just as I got within arms length of a giant - caught him by the legs & drew him down & aloft - the wings of the giant & carried him to my room to experiment upon his habits & arrangements. Here is an exact - copy of his walking embroidered tracks which I got by coaxing him to walk across a pencil line of ink on a piece of paper & showed the original track to an Indian & just his only friend & Indian Lake. Blanche Shannon was also fascinated & thought it magnificent in writing. Billy Simms helped along & inquired for Pillow & Platte. I showed him my track & he guessed it might be Platt's a tarantula or centipede. No 1 in the fig is made by the middle foot No 2 by the front foot & No 3 by the left of the big jumping grasshopper fig 2 is made by his body & is more or less erratic according to the tenderness of the depth the left foot sank in the sand. The three figures at the head are copies of the tracks by crickets in jumping. Fig 1 is made by the hind pair, 2 the second & the third & by the body in crawling

It is beautiful to be out & the track embroidery & the grey legend is still more beautiful

unmenaced, as Muir had, I could see why he described the graveyard as "so beautiful that almost any sensible person would choose to dwell here with the dead rather than with the lazy, disorderly living."

The bald eagles and lurking alligators he observed here have long since disappeared. But the towering live oaks bearded by wind-rippled Spanish moss—"the most magnificent planted trees I have ever seen"—remain as nobly impressive as ever.

Though many a tombstone has inevitably been added since 1867, at least one other thing remains unchanged: the "hungry stinging mosquitoes" that Muir complained about, and whose bites, I can personally vouch, remain as painful today as a century ago.

Perhaps one of these lance-nosed beasties caused the "malarial fever" that struck Muir off his feet a few weeks later. Fortunately, newfound friends on Florida's Gulf Coast took the stricken wanderer in. But the fever struck repeatedly, influencing him to abandon his itinerary through South America's vapor-drenched jungles. He needed a healthier wilderness.

AN INNER COMPASS pointed westward to the soul-beckoning peaks of California's Sierra Nevada. Muir recalled vividly a travel folder he had read, extolling the beauties of a newly discovered valley called Yosemite. There, he hoped, his fever might be "cooled with mountain winds and delicious crystal water."

Weeks later he arrived in San Francisco, and after a brief sojourn inquired of a passerby the quickest way out of town.

"Where do you want to go?" asked the man.

"Anywhere that is wild!" replied Muir.

After days of tramping, he stood atop Pacheco Pass on a crest of the Coast Ranges and looked across California's San Joaquin Valley at his goal, the Sierra Nevada—"so gloriously colored, and so luminous, it seems to be not clothed with light, but wholly composed of it, like the wall of some celestial city. . . . Then it seemed to me the Sierra should be called not the Nevada, or Snowy Range, but the Range of Light."

Today a ragged yellow veil of smog often curtains off that once transparent vista. California's great Central Valley, described by Muir as "but little trampled or plowed as yet . . . one furred, rich sheet of golden compositae,"

(Continued on page 450)

"The universe would be incomplete without man; but it would also be incomplete without the smallest transmicroscopic creature that dwells beyond our conceitful eyes and knowledge."

The world of little things, Muir taught, is open to anyone with knees to fall upon, eyes to see with, and a magnifier to peer through. A diminutive spider (above) *absorbs the rays of the sun on the Wisconsin farm where Muir and his Scottish immigrant family settled in 1849. On the margin of an 1874 letter to a friend* (facing page), *Muir embroidered a motif of grasshopper tracks—one of the seldom-noticed phenomena he so delighted in observing. In his enthusiasm for Yosemite's Merced River, he equates it with India's revered Ganges.*

HENRY E. HUNTINGTON LIBRARY AND ART GALLERY, SAN MARINO, CALIFORNIA

Land of living glaciers, Alaska offered Muir a natural laboratory where he might prove the theories he had formulated in the Sierra—that great valleys like Yosemite owed their origin to glaciers rather than to cataclysms. He conducted the first explorations of Glacier Bay in 1879; the Indians who manned his canoes knew him as the "Ice Chief."

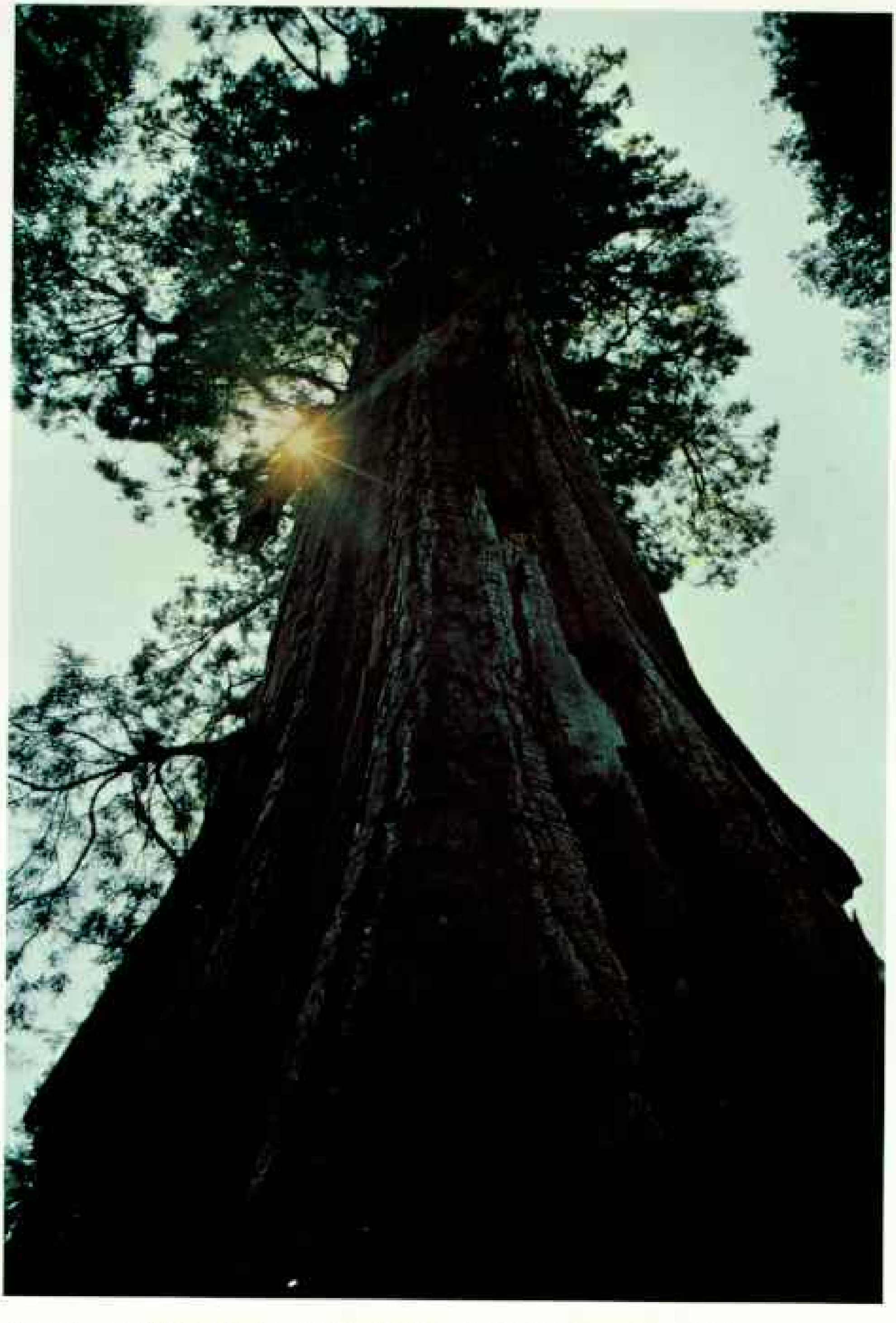
Reminder of the Ice Age (below), *a glowing iceberg drifts away from one of the many tidal glaciers pouring directly into the bay. At nearby Gustavus* (left) *wild flowers and a settler's cottage share a meadow that gains its richness from glacial silt. Muir, fusing the scientist's eye with the poet's vision, marveled that "out of all the cold darkness and glacial crushing and grinding comes this warm, abounding beauty. . . ."*

"Glacier Bay. . . . a picture of icy wildness unspeakably pure and sublime."

Nevada Falls and Vernal Falls drop the frothing Merced River into the Yosemite Valley.

JONATHAN BLAIR

"...a grand page of mountain manuscript that I would gladly give my life to be able to read."



Ages-old giant in Sequoia National Park stands as a colossal reminder of Muir's role in saving the Big Trees, then being dynamited to make grape stakes for California winegrowers.

Polished cross section of a log in Petrified Forest National Park might long ago have been ground up for sandpaper had Muir not raised a clamor to save Arizona's fossil trees.

"Any fool can destroy trees."

NATIONAL PARK SERVICE COLLECTION, YOSEMITE

Pressed flowers, lovingly preserved from a Muir botanizing trip, adorn the pages of one of his journals.

"I set forth . . . joyful and free, on a thousand-mile walk to the Gulf of Mexico. . . . by the wildest, leafiest, and least trodden way I could find. . . ."

Cameo of nature, a dime-size butterfly poises for flight in Yosemite Valley.

has today become a decidedly unwild place of farmyards, vineyards, feedlots, and upstart towns and cities.

As I drove through the domesticated landscape toward Yosemite, the incongruity between Muir's vision of 1868 and my own of 1972 jangled over and over again in the back of my mind like an out-of-tune piano chord.

WITH A SENSE of deliverance I followed the snaking road upward out of the San Joaquin Valley's shimmering heat haze into the ever cooler heights of the Sierra. Here, at last, I found a reality to match what Muir had seen—"a glorious wilderness that seemed to be calling with a thousand songful voices. . . . Beauty beyond thought everywhere, beneath, above, made and being made forever."

His approach to Yosemite Valley was an experience of successive revelations, as it is to the visitor today. On first seeing Bridalveil Fall from a distance, Muir remarked to a traveling companion: "See that dainty little fall. . . . It looks small from here, only about fifteen or twenty feet, but it may be sixty or seventy."

Most first-time visitors make similar mistakes, for the human eye simply loses its way in Yosemite's mind-wrenching immensity. That waterfall Muir calculated on first sight to be 60 or 70 feet high actually spills a dizzying 620 feet.

You can hardly enter the granite-walled enormity of Yosemite Valley without wondering how in the transcendental blazes such a geologic marvel could have been created. To the untutored eye, it might seem as if this flat-floored valley bracketed by towering walls of naked granite had been made by some sort of cosmic karate chop.

In fact, most theories of the time posited a cataclysmic origin for Yosemite. The eminent geologist Josiah Dwight Whitney concluded that the valley formed when a mile-wide wedge of the earth's crust simply "sank down" during violent earth movements.

Muir scoffed at such a notion. For one thing, he could not accept the idea that the bottom had dropped out of anything God had made. For another, his piercing blue eyes saw signs everywhere that a different agency had been at work here.

He observed that "Nature chose for a tool, not the earthquake or lightning to rend and split asunder, not the stormy torrent or eroding

rain, but the tender snow-flowers noiselessly falling through unnumbered centuries . . ."

The notion that snow, compacting into mighty glaciers, could have created the wondrous Yosemite Valley was as novel as it was poetic. In Muir's time, theories on the role played by glaciers in forming the earth's crust were still being formulated. Whitney himself flatly asserted that no glaciers had ever existed in Yosemite. Even if they had, it seemed hardly likely that a mere thing of ice could ever have carved this mile-deep notch in the Sierra's bedrock granite.

Hearing Muir's theory that converging rivers of ice had been the instrument of Yosemite's creation, Whitney laughed it off as the wild mouthings of a man who had earned his living as a shepherd.

Muir, indeed, had taken work as a shepherd during his first summer in the Sierra. He also was a horsebreaker, sawmill operator, carpenter, harvest hand, and guide in Yosemite Valley. Such jobs gave him the time and financial pittance needed to conduct his "mountain-work." The brilliant mind so recently freed from its labors in the service of human technology now shifted its focus to the inner clockwork of Yosemite's creation.

On a placid bank of Yosemite Creek in the vast green-meadowed valley lies a small glacial boulder with a plaque recalling that Muir's first cabin stood in this area.

"Many an epic Muir ramble began and ended here," explains Yosemite historian Shirley Sargent. "It must have been the most charming place in the world to come home to. Just imagine. A full-face view of Yosemite Falls right out the door. Inside, a brooklet ran through one corner of the cabin, giving him a continuous supply of ice-cold water. Ferns and other plants grew wild inside. Even a few frogs made their home there, singing Muir to sleep with their chirping."

At every opportunity Muir gamboled up into the surrounding mountains to go sleuthing after vanished glaciers, tracing their one-time courses by deciphering the landscape's "hieroglyphics"—scratches on granite walls, oddly placed boulders, stone surfaces worn mirror smooth by the scouring ice.

Nearly always he climbed alone, without ropes or pitons, using at most an ice ax, carrying only dried bread and tea leaves for sustenance. A thin blanket was his usual bedding, and even that was left behind on more strenuous climbs. Once, stranded for the night on a frozen mountaintop, he kept warm by dancing the Highland fling until dawn lighted his way back down.

Many previously unclimbed Sierra crests —including a 14,015-foot peak that later became Mount Muir—succumbed to the tireless assaults of this transplanted lowlander.

Between Red and Black Mountains he discovered a "living glacier!" Here, at last, was a flat reproof to Whitney's contention that glaciers had never existed in the area.

Muir's glacial theories, in fact, have proved more nearly correct than any others of his time. The modern view of Yosemite's origin differs from Muir's chiefly in giving more importance to preglacial river cutting and in determining that not one but several invasions of ice swept across the Sierra. But his basic premise that glaciers had helped gouge out Yosemite and similar valleys on the Sierra's west slope has been solidly confirmed.

TO EVERY PHENOMENON of nature that passed before his glacial blue eyes, Muir turned the same loving inquiry. At times he proved as endearingly fallible as the rest of us—as when he suggested that the gaps in the belt of sequoia forests on the Sierra's west flank had been plowed by glaciers. Scientists have since determined that the gaps have been created not by glaciers but by frigid air currents that drain down the funnel-like mountain passes.

Indiscriminate slaughter of the Big Trees, largest of living things, was at its height in Muir's time. Thousands were cut into shingles or blasted to smithereens to supply grape stakes for the San Joaquin Valley winegrowers.

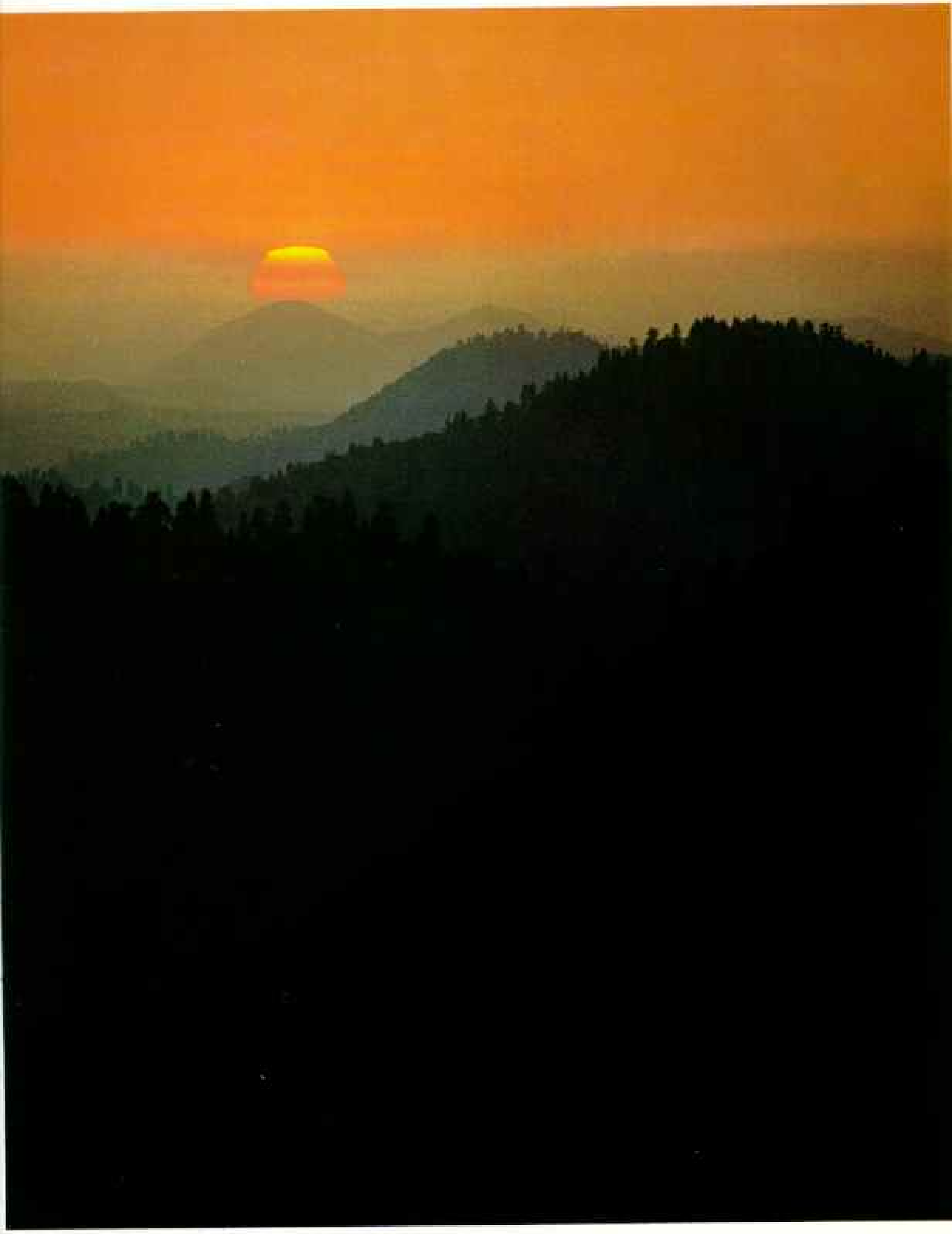
Of this wholesale destruction, Muir wrote: "As well sell the rain clouds, and the snow, and the rivers, to be cut up and carried away if that were possible."

His outraged cry, resounding in his lectures and a series of newspaper and magazine articles, had much to do with prodding Congress into finally setting aside Sequoia National Park in 1890.

Nothing quite so entranced Muir's imagination as trees—trees of any sort, particularly during a storm. Once, when a windstorm erupted while he was exploring the Yuba River Valley, he climbed to the madly swaying top of a Douglas fir and "clung with muscles firm braced, like a bobolink on a reed," remaining there for hours to hear the needles chorusing in the wind.

"This grand show is eternal. It is always sunrise somewhere; the dew is never all dried at once; a shower is forever falling; vapor is ever rising. Eternal sunrise, eternal sunset, eternal dawn and gloaming, on sea and continents and islands, each in its turn, as the round earth rolls."

The westering sun ends another day's passage over the Sierra, as seen from Moro Rock in Sequoia National Park.



He often demonstrated this capacity for transmuting physical danger into a kind of spiritual ecstasy. While climbing a canyon wall above Yosemite one day, he heard a terrible roar and abruptly found himself riding a snow avalanche 2,500 feet down to the canyon floor.

Landing miraculously unhurt, he exulted in "This flight in what might be called a milky way of snow-stars . . . the most spiritual and exhilarating of all the modes of motion I have ever experienced. Elijah's flight in a chariot of fire could hardly have been more gloriously exciting."

Another time, while climbing a sheer face of Mount Ritter, he found himself "brought to a dead stop, with arms outspread, clinging close to the face of the rock, unable to move hand or foot either up or down. My doom appeared fixed. I *must* fall. . . .

"When this final danger flashed upon me, I became nerve-shaken . . . and my mind seemed to fill with a stifling smoke. But this terrible eclipse lasted only a moment, when . . . . I seemed suddenly to become possessed of a new sense. The other self, bygone experiences, Instinct, or Guardian Angel,—call it what you will,—came forward and assumed control. Then my trembling muscles became firm again, every rift and flaw in the rock was seen as through a microscope, and my limbs moved with a positiveness and precision with which I seemed to have nothing at all to do. Had I been borne aloft upon wings, my deliverance could not have been more complete."

Once again, after he had ranged the Sierra and neighboring mountains for more than a decade, an inner compass needle pointed Muir in a new direction—this time to Alaska. In that terra incognita, bought from Russia only a dozen years before, he could test his theories in a laboratory of living glaciers.

Traveling by steamer to the raw little town of Fort Wrangell in Alaska's panhandle, Muir

"Ink cannot tell the glow that lights me at this moment in turning to the mountains. . . ."

Sun-gilded waters on a fringe of Waterwheel Falls silhouette a visitor to Yosemite National Park.

planned to hire some Indian guides and launch an expedition into glacier country.

To the local Indians—as to most whites of the era, for that matter—this intense, blue-eyed Scot was a phenomenon almost beyond comprehension. His fascination with glacier country—where they could see no sensible reason for a man to go—earned him the sobriquet "Ice Chief."

Still Muir won their friendship, if not their understanding, with his transparent sincerity and warm interest in their culture. He especially admired the artistry of their totem poles. "With the same tools," he observed, "not one in a thousand of our skilled mechanics could do as good work."

I SOUGHT OUT one of the last Tlingit totem carvers, octogenarian Tom Ukas, in a cramped rear workroom of a bleached wooden house in Wrangell. While the chips flew from his chisel, he spoke to me in low, murmuring tones. "Mostly I copy from old totem designs. The poles will begin to rot away in forty or fifty years, you know. They contain sacred old knowledge that someone must preserve.

"Our young men," he said with a sigh, "don't want to be carvers. They want jobs at the cannery or sawmill. I can understand. But for years I worried that the knowledge in my fingers would die with me. Then. . . ."

He nodded toward a black-haired youth bent over a small totem at a workbench.

"That's Harold. Harold Riach. No, he's not Indian. He's a South Korean, adopted by a local family and raised here in Wrangell. But he has the patience and the ability. And the *desire*. I'm privileged to teach him. Soon the old knowledge will be in his fingers, too. Then I can stop worrying. . . ."

The Indians Muir hired as guides in 1879 told him of a strange bay of ice, where rivers of blue snow ran into the sea. No vision could

have been more compelling to the Ice Chief, and his party's canoes were soon slicing through the waters of Glacier Bay.

My own cruise boat followed in their wake, entering a phantasmagorical realm whose waters are strewn with icebergs of the most fantastic shapes and astonishing blueness—"shrieking vitriol blue," Muir described it (pages 444-5).

Clouds lay draped like cotton candy across glacier-scoured mountains that slumped round-shouldered into the sea. Ahead, through marbled mists, rose a stark blue cliff of ice.

Reversing engines, our boat came to a stop half a mile away—though it seemed hardly fifty yards. As if watching a silent movie, I saw a great slab of ice break off from the blue wall and slide into the water below, sending out a huge ripple. Moments later the berg thunder reached our boat, and I felt momentarily as if I were on the inside of a drum being pummeled by an angry strong man. The boat lurched and bobbed as tilting mini-bergs scraped ominously against our hull. A quick glance up at the captain—his cigarette glowing calmly behind the pilothouse window—reassured me that all was well.

"Those bergs calving off the main glacier are typical of places where the ice meets tidal waters," explained Park Service Ranger-Naturalist Barbara Minard, standing beside me on the pitching deck. "Some of these glaciers—including Muir Glacier over to your left—are retreating a quarter of a mile or more a year.

"When Vancouver sailed by here in 1794, he saw only a huge wall of ice at the mouth of a small inlet. By the time Muir arrived in 1879, that inlet had become a bay stretching back more than forty miles.

"In the ninety-odd years since Muir made the first detailed explorations, the glacier named for him has retreated another twenty-five miles. Those little beaches you see slipping out from beneath the ice have been untouched by sunlight for thousands of years."

I asked Barbara why the ice is so blue.

"Compression from the fantastic weight of the glacier," she replied with her usual knowledgeability. "The more compacted the ice, the more its crystals absorb yellows and reds from the sunlight and reflect the intense blues everyone oohs and ahs about."

A TINGLING VIBRANCY animates Barbara's voice as she expounds. Muir, too, had this way of speaking in raptured tones about things scientific. "Somehow a glacier never seemed cold when Muir was talking about it," remarked a contemporary.

After he returned from his rambles over the glaciers, Muir would collar the first available listener and breathlessly relate all that he had seen and learned in the "thousand rooms of God's crystal temple."

It was this eagerness to communicate, this

Lowland abode of John o' Mountains in his final decades, Muir's Victorian homestead lies all but engulfed by the freeways of another age at Martinez, California. From here, conservationist Muir generated his militant crusade for wilderness that was to prod the conscience of the nation.

compulsion to transmit to the rest of us the vision of what he had seen, that was finally to bring John Muir down from the mountains to preach his wilderness gospel. More perhaps than any other individual of his time or our own, he was to give shape, impetus, and a poet's voice to the national park movement.

"Wildness," he taught, "is a necessity . . . mountain parks and reservations are useful not only as fountains of timber and irrigating rivers, but as fountains of life." It was no easy message to get across in an era when most people looked on wilderness as something to be driven back, hewed down, conquered, and —above all—feared.

Whether talking to Presidents or ordinary citizens, to railway magnates or farm boys, Muir would offer the same invitation:

"Climb the mountains and get their good tidings. Nature's peace will flow into you as sunshine flows into trees. The winds will blow their own freshness into you, and the storms their energy, while cares will drop off like autumn leaves."

Following the wanderer's life trail back to California, I stopped off at a somehow un-Muirlike setting in the dusty coastal lowlands north of Oakland—the John Muir National Historic Site at Martinez. Here, wedged between a freeway, a railway trestle, and the remnants of an orchard, stands the Victorian homestead (left) where John o' Mountains came down to earth to conduct his messianic mission.

Marrying the daughter of a California fruit-grower, he took upon himself the worldly task of managing the family orchards at Martinez. So shrewd was he in business affairs that within a decade he had saved enough money to support his wife and two daughters and devote himself full time to saving America's fast-dwindling wilderness.

I spent a quiet hour among the shadows and memorabilia of Muir's "scribble den," where he labored countless deskbound hours reshaping his visions for the cramped confines of the printed page. Though the thunder of avalanches and calving glaciers had always delighted him, domestic noise he could not abide. In particular the sound of his daughters' piano practice grated on his nerves. More than once his spare figure, pencil in hand, would loom at the top of the stairs and shout down for blessed silence.

"For all his wanderings, Muir was an astonishingly prolific writer," his bibliographer, William Kimes, told me. "I've spent years tracking down all his published writings. So far I've catalogued 425 separate published items—newspaper features, magazine articles, contributions to books by others, and nine full-length books of his own.

"He also left more than sixty travel journals plus several thousand letters that often run half a dozen pages or more. I sometimes think the tip of Muir's pen must have traveled nearly as far as the soles of his feet!"

But Muir had no liking for this "penwork." A writer's life, he once complained, is "like the life of a glacier, one eternal grind." Even into old age, he would get away from his desk for periodic "rebaptisms" in the wilds. On one of these forays, in 1903, he camped out alone with President Theodore Roosevelt in the Mariposa Grove of sequoias.

"I stuffed him pretty well regarding the timber thieves, and the destructive work of the lumbermen, and other spoilers of the forest," Muir later recalled.

They camped out a second night near Glacier Point and woke up under four inches of snow. T.R. proclaimed it "the grandest day of my life!" and returned to Washington aglow with Muir's ideas. He soon put into motion governmental machinery to set aside five national parks, 16 national monuments, and 148 million acres of national forest.

THE NAMES OF PARKS in whose origins Muir himself played a direct motivating role read like a conservationist's doxology: Yosemite, Sequoia, King's Canyon, Rainier, Petrified Forest, and Grand Canyon.

He was also a guiding light behind the 1906 Antiquities Act, which gives Presidents the power to proclaim national monuments. The creation of the National Park Service, finally achieved in 1916, two years after Muir's death, was another of his worked-for dreams.

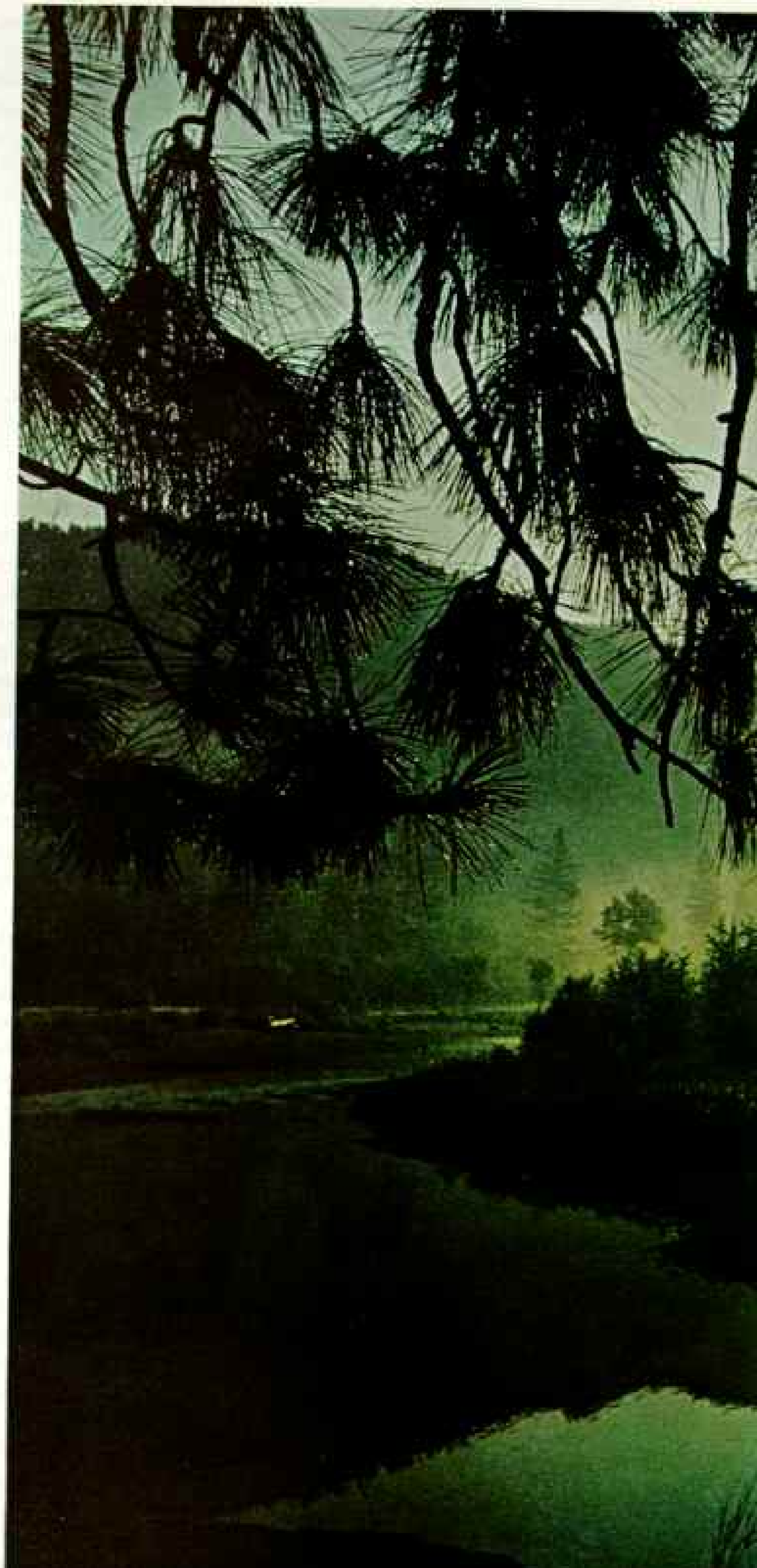
Yet another accomplishment was the founding of the Sierra Club in 1892. For eight decades that militant conservationist organization, imbued with Muir's ideals, has stood watchdog against wilderness exploiters.

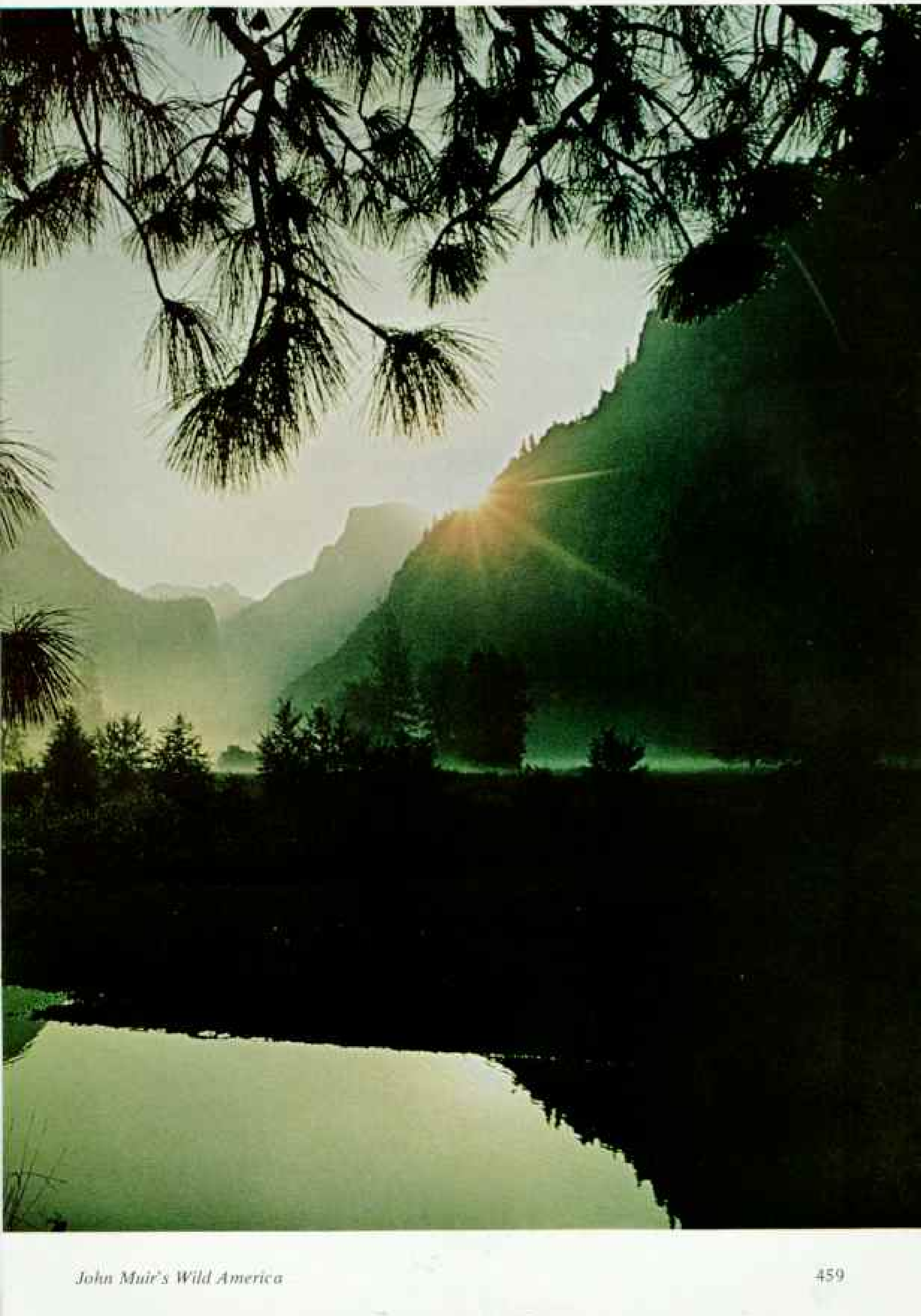
Among so many successes there were, inevitably, defeats. Most painful of these to Muir was his failure to save Hetch Hetchy Valley, Yosemite's magnificent twin to the north, from becoming a reservoir for San Francisco.

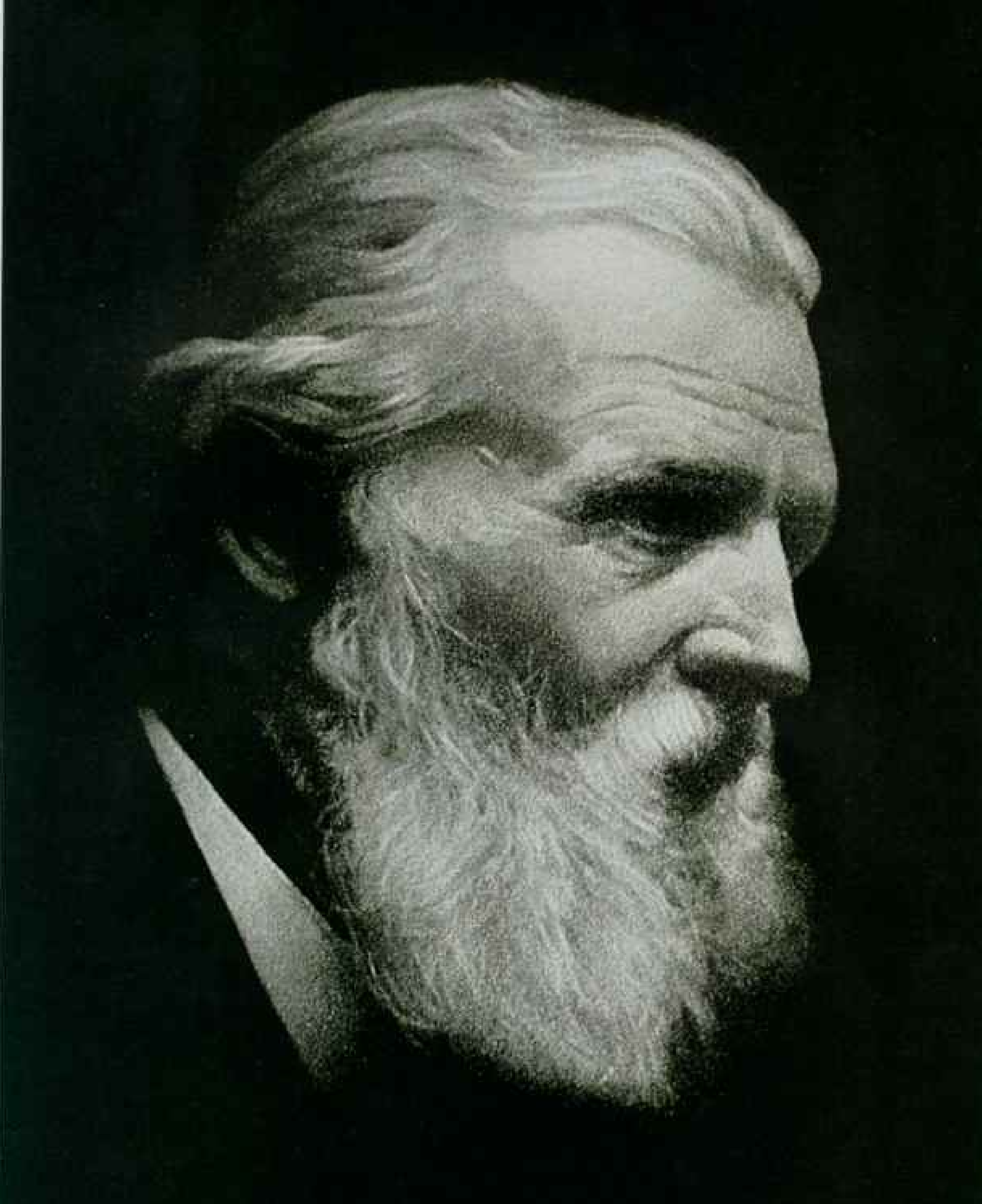
"Dam Hetch Hetchy!" Muir cried. "As well dam for water-tanks the people's cathedrals and churches, for no holier temple has

"Oh, these vast, calm, measureless mountain days. . . . in whose light everything seems equally divine, opening a thousand windows to show us God."

Morning casts a cathedral glow over Yosemite Valley and the Merced River.







ever been consecrated by the heart of man."

Today, all-but-forgotten Hetch Hetchy lies inundated, its impounded waters closed to the public, its waterfall-tasseled cliffs visited by only a few climbers on weekends when, just 17 miles south, 40,000 or more visitors flock into superpopulated Yosemite Valley.

But beyond his material successes or failures, Muir left a subtler heritage—the luminous human example of his own life. Ralph Waldo Emerson, after meeting Muir in Yosemite in 1871, returned to Concord and added Muir's name to his brief list of great personages. At the time, Emerson was nearing 70; Muir was only 33.

IN HIS OLD AGE Muir hopped restlessly from continent to continent, spreading his wilderness gospel far beyond home shores, and visitors came from afar to see him. A conversation with a Japanese nature enthusiast, Ryozo Azuma, inspired the latter to help develop Japan's national park system, today one of the world's finest.

In the ecology-conscious 1970's, Muir's message still rings with crystalline resonance. His notion of the interrelatedness of all nature, of man's place in the midst of rather than on top of the scheme of things, has become a guiding principle for a new generation of kindred spirits.

"When we try to pick out anything by itself," he wrote, "we find it hitched to everything else in the universe." The same idea underpins the modern science of ecology.

Seeking out a closer communion with Muir, many a hiker carries his writings into the Sierra, there to recite them aloud around a campfire or absorb them silently while sitting alone, as Muir so often did, upon a makeshift pew of storm-felled sequoia.

Climaxing my own Muir travels, I betook my city-soft muscles up the slopes of one final challenge—the stone-and-ice immensity of 14,162-foot Mount Shasta in northern California. In 1875 Muir and a hiking companion nearly died atop Shasta during a raging snowstorm, saving themselves from freezing by wallowing in the hot, sulphurous mud issuing from a volcanic vent near the summit.

Accompanying me on the climb were a dozen supple-limbed and tireless teen-agers from a summer camp named Earth Camp One, run on Muirian principles by Steve Kubby of Montgomery Creek.

Aware that city pavements were my natural habitat, Steve cautioned:

"Remember. You don't conquer a mountain like Shasta. You are permitted to walk on it."

Or not permitted, as I was to discover.

A good many hours and thousands of feet later, at the foot of a torturous slope aptly named Misery Hill, I stuck my cramponed boot into a pothole of ice and gave a sharp wrench to my already rubbery left knee. It took only a few painful steps more to realize that Shasta's summit would not stand beneath my feet that day.

Sheldon Tarre, one of Earth Camp One's leaders, was kind enough to help me hobble the long way down while the rest of the expedition continued to the summit.

"Don't feel too bad," Shelly commiserated. "You did pretty well . . . for a writer."

Limping homeward, I recalled Steve Kubby's words about being permitted to walk on Shasta. That day, quite simply, permission had been denied. Remembering Muir's near disaster on Shasta, I could only be thankful that I was being let back down so gently. Perhaps another time I'll be permitted passage all the way to the top.

I hope so. I still have an appointment up there with John Muir. And with myself. □

Citizen of the universe, Muir inscribed his cosmic calling card (right) on the flyleaf of his first travel journal. In old age, still the incorrigible wanderer, he shrugged off the remonstrances of relatives and embarked on a wide-ranging series of "rambles" to Europe, Asia, South America, and Africa—ever the seeker after new knowledge. "The world's big," he exclaimed at 74, two years before his death, "and I want to have a good look at it before it gets dark."

PORTRAIT AND INSCRIPTION REPRODUCED WITH PERMISSION OF NATIONAL PARK SERVICE, YOSEMITE

The American Lobster:

By LUIS MARDEN
CHIEF, FOREIGN EDITORIAL STAFF

Photographs by
DAVID DOUBILET

Feast in armor, a 15½-pound lobster flails in a diver's grasp off Gloucester, Massachusetts. Packing a two-fisted wallop, it relies on its sharp-toothed ripper claw and clublike crusher, at right, to mangle enemies and seize its prey—including smaller lobsters. Too large for most traps, such giants are usually taken by divers, who may

Delectable Cannibal

legally hunt in the Bay State but not in New Hampshire or Maine. Once so plentiful that they could easily be picked up at low tide, lobsters become scarcer each year, victims of a ravenous national and overseas demand. Harvest of this valuable resource brings some 25 million dollars annually to the northeastern states.

JONATHAN SWIFT WROTE: "He was a bold man that first eat an oyster," and so he was. Even braver, I think, was the unknown hero who first sampled a lobster.

To me the lobster is a thing of beauty, a samurai of the depths clad in lacquered armor of vermilion, copper green, electric blue, and orange. But how was the first gourmet to know that beneath the forbidding shell of the great toothed claws and jointed body lay hidden the most exquisite flesh this side of Paradise?

I speak of the true lobster, *Homarus americanus*, the big-clawed crustacean that lives in the frigid waters of North America's northeast coast. (The so-called spiny lobster of the frozen tails, savory though he may be, is not even in the same family with the American lobster and its European cousin, *Homarus gammarus*.)

It saddens me to report that this delectable gift from the sea is in danger of disappearing, not from the bed of the ocean, perhaps, but quite possibly from our tables. Overfishing, increasing consumption, pollution—all these so threaten the lobster that some biologists predict demand will exceed supply by 1980. Already prices have rocketed, in the winter season of scarcity, to unbelievable heights.

Talk to any lobsterman about the vanishing lobster and he will say: "Disappearin'? The bottom is crawlin' with snappers," a term for the short, not-yet-legal lobster. But every year fishermen take 90 percent of the lobsters of legal size. Even these are frequently sexually immature, so that many of

them are caught before they have a chance to carry on the race.

With the inshore fishery operating at maximum capacity—but producing less—biologists hope to increase the yield from an offshore fishery only about five years old. Oceangoing vessels now set pots on and beyond the edge of the continental shelf, in water as deep as 2,000 feet. The fishery now brings in ten million pounds a year.

Isle Still a Jewel on the Dark Sea

The Indians had always harvested the lobster that abounded on their shores, but our lore of the American lobster begins in the spring of 1605, when an English ship commanded by Capt. George Waymouth approached the North American main.

"About sixe a clocke at night we descried the land," wrote his chronicler, "... an Iland of some six miles in compasse, but I hope the most fortunate euer yet discoured." Waymouth had sighted the island that was to become the lobster-catching capital of Maine. The Indians called it "Monahigan."

Like other early Old World visitors to these waters—long before the Pilgrim Fathers—Waymouth sought cod. But the chronicler noted: "We drew with a small net ... about thirty very good and great lobsters...."

Until recent decades lobsters were so common that boys could catch them with their bare hands at low tide. Today the shellfish are so scarce they bring the highest price of any seafood fished from U. S. and Canadian waters, with an annual catch worth $70,000,000.

I went out to Monhegan Island, 15 miles offshore from Boothbay Harbor, one piercingly cold but brilliantly blue-and-gold afternoon in late February. The sea was black, scalloped with white where the waves toppled in the fresh breeze. There had been a roaring nor'easter a week before, and the granite isles that studded the bay were rimed with frozen spray.

To Waymouth in 1605 Monhegan appeared "woody, grouen with Firre, Birch, Oke, and Beech," but now the spiked frieze of spruce trees that ran along the cliffs was sheathed in glittering ice. Except for the crunch and squeak of snow under my boots, the island lay silent under a blazing blue sky (pages 467-8).

When I opened the door of the general store, a wave of warmth redolent of spices, sweets, and newly cut wood enveloped me. Leaning on the counter and sitting on boxes, a group of lobstermen who had done their day's hauling watched Doug Odom nail oak laths and frames into lobster pots.

Douglas and Harry Odom have run the Monhegan store and fished for lobsters for nearly thirty years. Doug, broad shouldered and slow talking, looked up and said:

"It's been a lousy trap-bustin' winter. That last nor'easter gusted to 90 miles an hour!"

"Yes," said a man in a billed cap, "about this time of year you get sick of poundin' around out there, even though prices are good. We call it the 'March blues.'"

Lobsters are scarcest in winter, because the crustaceans go into semihibernation, burrowing down in mud and feeding little. Ice locks harbors on the mainland, so that many inshore lobstermen cannot put to sea. Monheganers fish through the winter, as the heat-retaining sea keeps the island as much as 10 degrees warmer than the mainland.

Prices Increase Gastronomically

In February and March of 1972, because of gales and unusual cold—and, some say, market manipulation—lobster prices reached the highest point in history. At the Boston airport live lobsters retailed for an incredible $5.30 a pound. The fishermen marveled at the prices *they* were paid for their catch.

"Two dollars and fifty cents a pound!" said Harry Odom. "Some of those old-timers would come clear out of their graves if they could hear that. When I started lobsterin' in 1945, top price was 45 cents, but we caught twice as many lobsters."

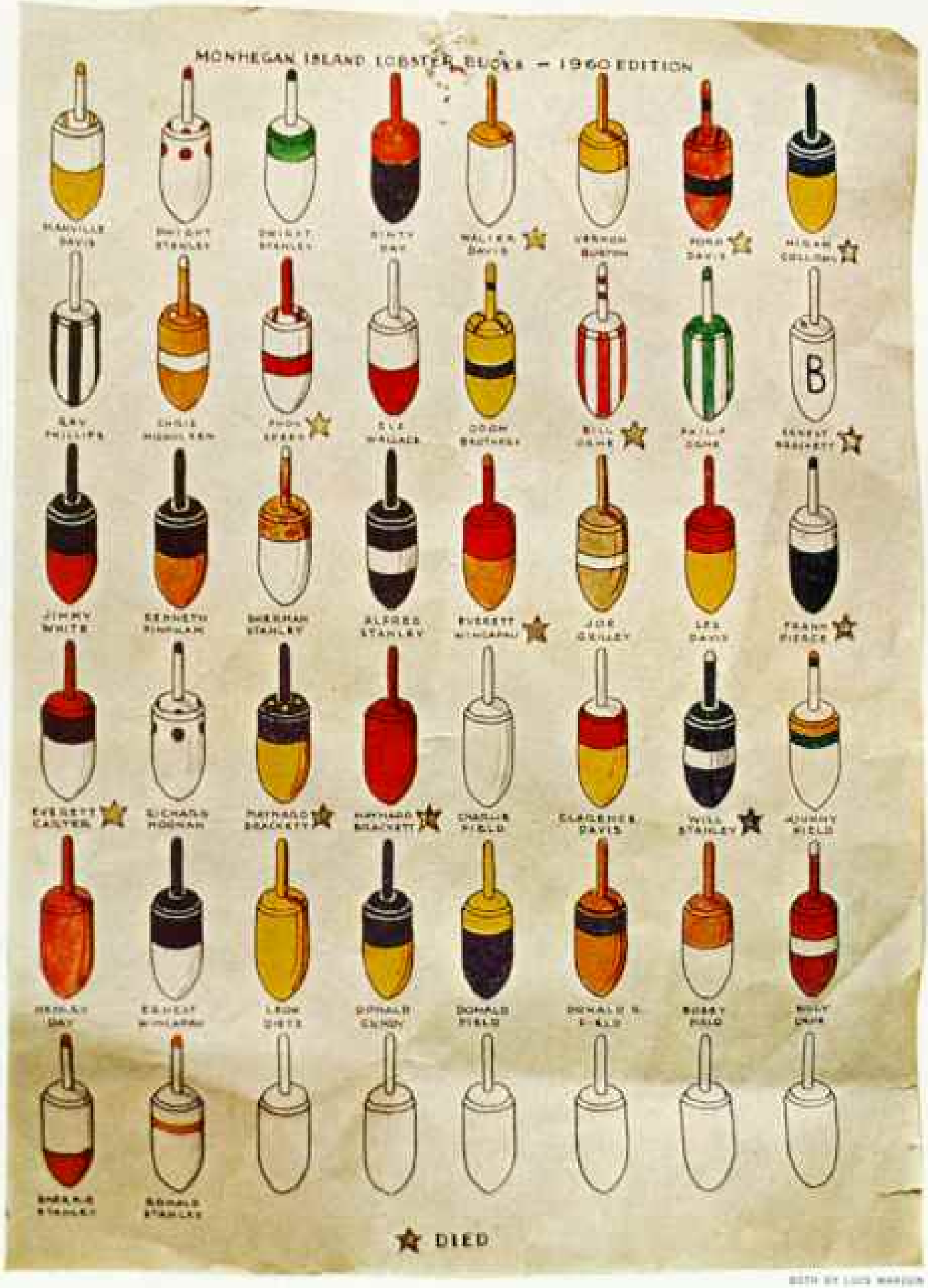
"I can't afford to eat lobsters when prices are this high," one man said with a grin. "I have to settle for steak."

The Odoms closed the store, and we went upstairs to continue the conversation around an oil-fired stove in the kitchen. Newt Searls, sternman in the Odoms' boat, passed the whiskey bottle to a man who said:

"Don't mind if I do have a honk."

(Continued on page 472)

Hauling a final lobster pot from the sea floor, a Gloucesterman races sundown, the legal curfew for harvesting. The small boat identifies the man as a part-time lobsterman, one of thousands of Northeasterners who draw a secondary livelihood from the sea. Buoys dotting the water's surface mark other submerged traps.



BUOYS BY LUIS MARDEN

Wintry skies hang over Monhegan, an outpost ten miles off Maine's coast, promising blustery nor'easters and marrow-chilling cold to hardy islanders whose main livelihood is the lobster. Each dawn from January to June, when weather permits, two-man crews point their diesel-powered boats, laden with pots and bait, into the Atlantic. At each buoy, painted with its owner's distinctive colors (**above**), they boat the catch and rebait, or replace rigs damaged by storm. To protect their resource, Monheganers had a state law passed in 1907, limiting their season to six months. The rest of Maine fishes the year round. Any non-islander lobstering within two nautical miles of Monhegan's shores does so at peril of losing his gear. When the lobstermen lift the last pot of the season, they turn to entertaining the tourists who venture their way, and to repairing old traps and building new ones for the start of the next arduous season.

FACING PAGE FOLDS OUT

Undersea gladiators duel to the death in an arena crowded with sea urchins and anemones (**left**). Vying for the same territory, battlers face off in a cloud of sand (**above**), then cautiously attack head on. Claws clash, parry, and crush, as the lobsters grapple. Although tailless and mortally wounded, the die-hard loser locks its opponent in a death grip for nearly an hour (**below**). Finally the victor extricates itself and retires in triumph, leaving its shattered assailant to swirling schools of cunner, a voracious sea-floor scavenger (**bottom**).

I asked about the two-mile limit round the island. Monheganers will not allow any non-islander to fish for lobsters within this arbitrary perimeter.

"If you're going to live on this rock and make a living out of it, then you'd better take care of what you've got!" said Harry Odom. "Pass the bottle."

The islanders do take care of what they have. Alone in Maine, Monhegan lobstermen follow a closed season. This self-imposed restriction became law in 1907. Monheganers fish only from January 1 to June 25, taking more and bigger lobsters than those mainlanders who fish the year round.

Was it true that they earned as much in six months as mainlanders did in a year?

"Maybe," said Rusty Court, a red-haired young fisherman who is one of the high-liners who bring in the largest catches. "It depends on how many traps you put into the water and how hard you want to work.

"I live to fish, but the other day I got up at six in the morning and hauled my brains out until noon, and all I got was 28 lobsters. It's discouraging. Still it's a lot better than pounding nails somewhere, or working in a shoe factory. So you just clump along during March and make what you can. I'll take a honk."

Harsh Conditions Wash Away Pettiness

"Because of weather we fish only about 90 days every season," said another man. "Paper down to Portland says a man can make $20,000 a year here. Maybe he can, though $6,000 would be nearer for some of us."

"Let's look at the other side of it," Rusty continued. "A well-equipped lobster boat costs at least $20,000. One of our boys lost his boat in a sou'wester last year. A gang of 500 traps'll cost you $5,000 for materials alone, not countin' labor. Every year we get an average of 15 days when the wind blows 60 miles an hour or stronger. That last breeze blew 80 and 90, and I lost 100 traps. That cost me $1,000 right there. Now, you pay your sternman, buy fuel, bait, trap materials, and rope, and you sit down and figure out what's left of what you get for your lobsters."

For my part, I think that whatever a fisherman gets, he well and truly earns. It is cold, hard, backbreaking work. Facing hardships and the possibility of sudden death every day seems to wash pettiness out of a man's mind. Everywhere I have gone in the world, fishermen are decent, straightforward men, and I wonder not at all that Jesus chose five of His Apostles from among them.

"Well, this ain't gettin' us any lobsters," one man said, and the party broke up.

A big window looking out to sea framed an oblong of indigo dusk. From banks of violet snow, gray trapezoids of the fish houses rose against a black sea. On the hump of neighboring Manana, across the strait, a solitary yellow light marked the Coast Guardsmen's house. As I watched, a pale reflection of the beam from the lighthouse on the hill behind us swept slowly from left to right, briefly painting the 19th-century Christmas card with a stroke of pallid gold, then passed on, leaving the night to darkness.

JAMES A. SUGAR (LEFT); LOU MARSH

Rugged harvesters of deepwater bounty, offshore lobstermen brave heavy seas and gale-force winds to set their slatted pots as far as 200 miles off the coast. Here 10- to 15-pounders (**above**) occur commonly.

It was still dark the next morning as we moved through the snow down to a gravel beach. Ragged tatters of gray fog drifted in from the open sea. Twice in every minute the foghorn on Manana mourned hoarsely.

The Odoms' boat, *Monhegan*, is 37 feet long and diesel powered. Slowly we motored out of the narrow channel, past Smutty Nose Island. In the icy wind of early morning livid whitecaps raced past to a rendezvous with destruction somewhere in mid-ocean.

Across our stern we carried a dozen pots to replace any that had been lost to heavy seas. The classic American lobster pot, basically unchanged for more than a hundred years, is made of slats nailed to a rectangular or half-round frame (pages 486-7). Netting funnels lead the lobsters in to the bait, then to an inner chamber called the "parlor."

In the growing light, lobster-pot buoys stippled the sea with random dots of lime, rose, and saffron. Inshore, a flock of black-and-white eider ducks rode the yeasty surf under the cliffs.

The first Odom buoy, of chrome-yellow styrofoam shaped like a spindled top, came close to our starboard side. With one easy motion, Newt Searls gaffed the line and passed it through a block hanging from a davit—"davy" to the lobstermen—and over a grooved sheave on the bulkhead. Doug moved a lever, and the hydraulically powered winder began to haul the pot up from 25 fathoms. The line, dripping and furred with sea growth, fell in graceful loops at Doug's feet.

"This is some better, let me tell you," Doug said. "With the old winches we had to keep constant tension on the line. End of the day your back was breakin'."

Undersized Captive Earns a Reprieve

The trap broke the surface in a smother of foam, and Newt swung it inboard. Flapping vigorously in the parlor was a small lobster. Doug hooked his $3\frac{7}{16}$-inch brass gauge in the eye socket; the other end extended a fraction beyond the end of the carapace. Doug tossed the lobster overboard. "Good-bye; see you next year."

Newt refilled the netting bait bag with cuttings left over from filleted ocean perch, then threw the float overboard. The boat moved forward and the warp paid over the side, pulling the heavy trap into our churning wake.

"We lose a pot, we call it a ghost pot," Doug said. "That pot'll keep right on fishin'. When the bait's eaten, the biggest lobster'll eat the small ones and when only one's left, he lives—I guess—on the grass and stuff that grows on the wood.

"In the old days we made traps of spruce. Now we use oak; it don't give up so quick."

Conservationists argue that at least one lath should be of spruce, so it would give up quickly and liberate the lobsters.

What is the lobster's greatest enemy, I asked Doug.

"Me!" he said with a laugh. "Next, the codfish. I've dressed a 30-pound cod that had a two-pound lobster inside him."

Lobsterman's Knot Carries a Warning

Through the fog loomed a black navigation buoy, plunging wildly on the breaking seas. On the chart it was marked Number 7 Bell, but it was strangely mute. Then I saw that its tongue was locked in ice. Number 7 would warn no mariners until spring.

I asked Doug what would happen if someone came from off-island and set pots inside the Monhegan two-mile limit.

He smiled. "We-l-l, a storm might come up during the night and carry away all his buoys. Law says as long as I pay my ten dollars for a license I can go over to Port Clyde and put my traps down, but I'd never do it. If I did, I'd find a half hitch around my buoy spindles. That's a warnin'. If I kept doin' it, my traps'd disappear."

It began to snow, thick wet flakes whirling down from a slate-gray sky.

"Last year Trap Day was supposed to be January first. We was all ready to go, but one man's engine wouldn't start. So we waited, and weather held us up till the 5th. That's the way we work; if one can't go on Trap Day, nobody goes. Later, if a man's sick, we take turns haulin' his traps till he's on his feet."

By midday we had hauled 62 traps, from which we took 29 "counters" that averaged one and one-quarter pounds each. Back in the harbor we dropped the lobsters into the Odoms' big floating "car," a box in which lobsters are kept alive until the smack comes in from Tenants Harbor to buy them.

Doug pointed to a crusty type who was tying his boat up to the pier.

"We get all kinds of people here in the summer. My friend over there, last season he was paintin' his buoys when this woman, flat heels, spinsterish lookin', marches up to him and says straight out, 'Captain, they tell me

you're the biggest liar on Monhegan.' Old So-and-so looks up and says, 'Lady, you're the most beautiful woman I've ever seen.'

"Yeah, dogfish and summer people arrive here about the same time, first of June. See you then."

American lobsters range from Labrador to North Carolina, but south of New Jersey most of them are taken from the cold, deep, offshore waters.

Dragger fishermen, who trundle a purse-like net over the bottom, had always brought up big lobsters in their nets from time to time. A giant of 44½ pounds—so far as is known the world's record—was hauled up by a dragger fishing off New York's Long Island in 1956. Vessels began to fish exclusively for deepwater lobsters when a Bureau of Commercial Fisheries research ship located big offshore populations in the 1950's.

The limit of the continental shelf, the submerged platform from which North America rises, is marked by the 100-fathom line, which lies 80 to 250 miles off the coast of New England. In the fissured canyons along the edge of the shelf live the deepwater lobsters.

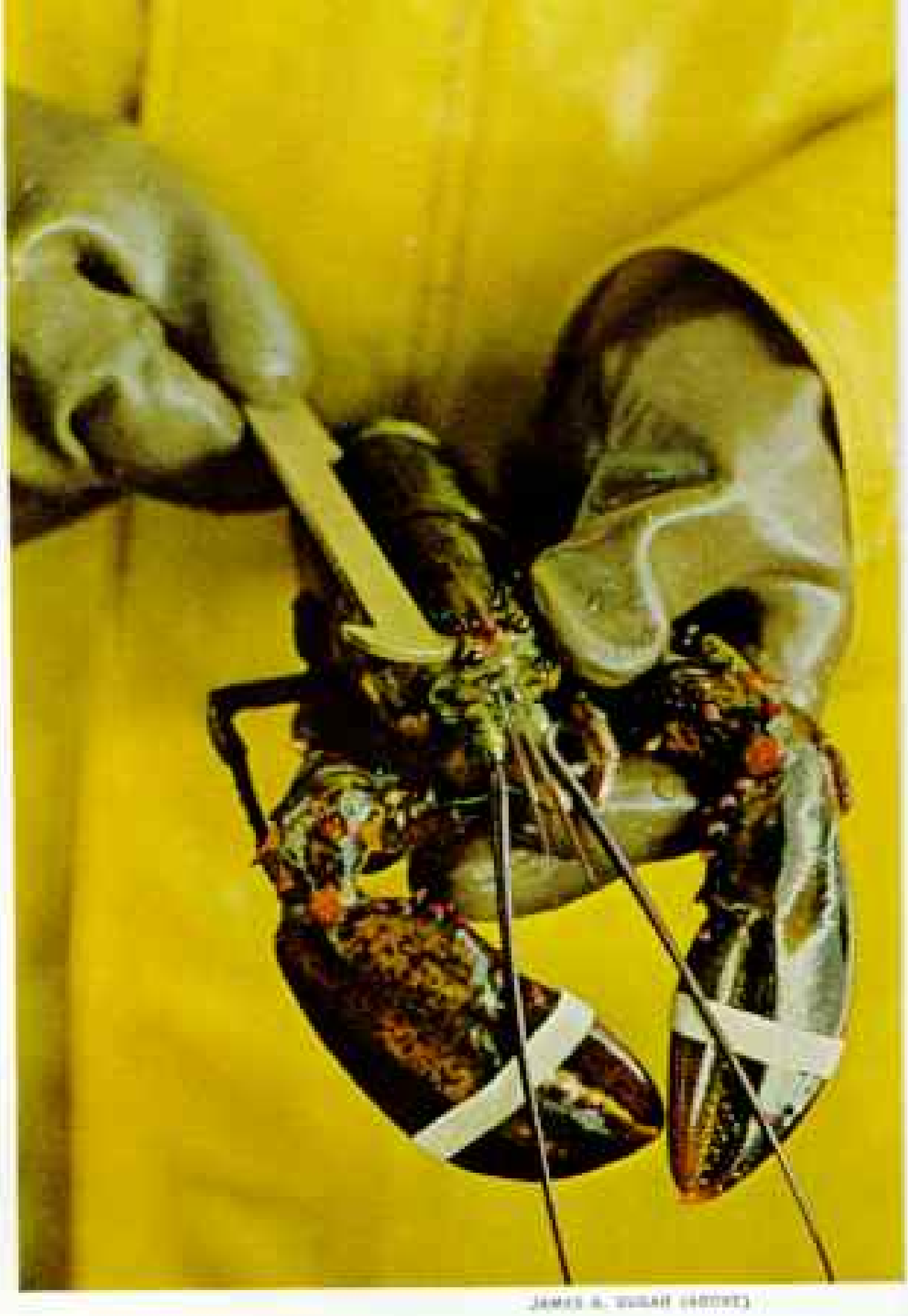
Heavy Trawls Damage the Catch

For a while, the draggers tapped a virgin fishery. Their nets, rumbling over the bottom on big wooden rollers, scooped up thousands of large lobsters that had crawled undisturbed in the penumbra of the depths until Juggernaut overtook them.

The trouble is, anywhere from 25 (say the draggers) to 60 percent (say the potters) of trawled lobsters come up dead or mutilated, crushed in the heavy nets. Laws effectively prohibit cooking lobsters at sea because it might be done under unsanitary conditions, or fishermen might cook long-dead lobsters.

Some draggers cook the cripples anyway, and the crew sells the meat to black marketeers ashore. Such a by-product is called "shack" by the fishermen. Shack is anything other than the prime quarry of the fishery, and by tradition belongs to the crew.

Some 15 years ago William Whipple, a tall, professorial clergyman who had worked his way through divinity school by catching lobsters, noted that more and bigger lobsters seemed to frequent deep water offshore. He began to set his pots farther and farther out, to the amusement of other fishermen. One day when he was well out to sea south of Martha's Vineyard one hailed him and shouted, "The



JAMES A. SUGAR (ABOVE)

Small but legal, a chicken lobster—about a pound—measures up to a standard lobster gauge (**above**). In most states keepers must be at least $3\frac{3}{16}$ inches from eye socket to the end of the carapace. Maine fishermen also observe a maximum limit, 5 inches, established years ago because, proponents said, big lobsters lay more eggs. Spot checks by state wardens (**below**) discourage lawbreakers, who face fines or imprisonment.

ALL BY VICTOR R. BOSWELL, JR.,

Two-week-old cannibal, a half-inch lobster larva eagerly devours one of its own kind (**above**). Another grasps a sea flea (**left**), a crustacean that plagues lobstermen by invading pots in hordes and stripping them of bait.

Aggressiveness and cannibalism hamper efforts to raise lobsters in captivity. By keeping them in individual pools or separating them with moving water in tanks kept at 70° F., biologists have grown one-pound adults in less than two years —a five-to-eight-year span in nature's cold underwater realm.

land's that way!" Whipple thanked him and went on fishing.

In 1966 Mr. Whipple formed a company named Prelude. It became a public corporation in 1969, and the large-scale deepwater fishery for lobsters was under way.

I sailed one summer evening from Fall River in Massachusetts aboard *Mars*, newest and biggest of Prelude's deep-sea lobster trawlers. At 12 knots we motored toward the offshore grounds beyond Nantucket.

Prelude vessels fish in pairs, and our partner was *Willy Fox*. She already had spent nine days at sea, hauling and setting two-and-a-half-mile-long lobster trawls, or strings of pots. Her skipper had radioed the position of the first string, and we would find taped to a buoy marking one end a chart on which were plotted the other 23 trawls, set half a mile apart over 100 square miles of ocean.

I stood in the dimly lit wheelhouse behind Capt. Bernie Bolduc. The automatic pilot, clicking softly in the ruby glow from the compass, held *Mars* on a steady ESE course.

"We fish 4,000 pots, 2,000 to a vessel. A string of pots may soak from one day to four or five before hauling again," Bernie said.

Just before dawn a steady light like a small planet lay dead ahead. *Mars* forged toward it through a sea like heaving gray silk, and a slender mast topped with a radar reflector materialized out of the morning haze. Round the buoy a flock of Mother Carey's chickens, the swallows of the sea, swooped and fluttered, pattering the smooth face of the sea with delicate feet, as if to demonstrate why they are also called petrel, little Peter, after the Apostle who walked on the Sea of Galilee.

Skipper and mate moved to the control station, a glass cage on the starboard side above a rollered chute that ran the full length of the vessel. A crewman threw out a grapnel, caught the buoy, hauled it aboard, and retrieved the chart. Another passed the 7/8-inch polypropylene line over a sheave, and *Mars* began to wind in the trawl from 300 feet.

Lobster Pot Yields a Varied Bag

The first pot rose black and dripping from the sea. With a resounding clang the stainless-steel clamp from which it hung hit the sheave, then passed through to waiting crewmen who seized the pot and overturned it.

Out slid a writhing yellow conger eel; a dozen crabs; one hake, a bottom fish with bulging eyes and everted viscera ballooning from mouth and anus from the rapid decompression; and a beautiful 8-pound lobster.

Albert, the mate, seized the lobster, snapped rubber bands around its claws, and put it in a holding tank. Lobstermen use rubber bands, or pegs inserted in the joints of the claws, to immobilize them and thus keep the lobsters from injuring each other.

Every ten seconds the pots broke the surface, *rumble*, *clang*, *thump*. When the holding bin was full, Albert lifted a board and the lobsters slid down into the flooded hold.

"Lobsters seem happiest around the 50° mark," said Bernie. "In winter they head for deep water and we set our pots in 1,200 feet. We have fished down to 3,500 feet, but we didn't find many there. From 50 fathoms in summer to 200 in winter seems to be the range.

Liberated juvenile rests beside its newly molted shell. The animals crawl out of their sheaths as growth demands, perhaps a dozen times in the first year. In adults, molting also allows reproduction, for only soft-shelled females can be fertilized. Months after mating, females extrude thousands of tiny, dark-green eggs and carry them underneath the tail for nearly a year before they hatch. Emerging larvae rise to the surface, undergo three or four molts, and finally return to the bottom.

Tagged by nature, mutants of unusual color permit lobster tracking in the wild, just as banding expands man's knowledge of bird migrations. Blue or red variants occur perhaps once in several million; albinos (**lower right**) are rarer yet. But selective breeding by researchers at the Massachusetts state lobster hatchery on Martha's Vineyard yields much higher ratios of the

strangely pigmented standouts. Released when a month old—long before they can wear mechanical tags—they can be periodically checked on by divers, who keep tabs on the movements of lobster populations.

"Every year we take one to two million pounds of lobster from this area. Scientists claim the fishery could yield up to 20 million. I say, yeah, but first you've got to find 'em."

I wondered at the size and beauty of the lobsters that came up from deep water. Few weighed less than two pounds, and many reached 8 and 10. The largest of them weighed 15 pounds.

"The money in lobsters is in those that fill a plate, 1½ to 3 pounds," Bernie said. "Trade calls them 'selects' and pays the highest price per pound. Bigger ones we call 'jumbos' or 'joes,' they sell for less. Smaller, chicken lobsters, about a pound, they're cheaper yet.

"Ones that have lost a claw, we call 'em 'culls,' are the cheapest. Culls with no claws are 'pistols.' Culls and big ones are bought for lobster meat or by Chinese restaurants, where they chop up the lobster anyway."

At 5:30 every morning the lobster train aboard *Mars* was set in motion; *whirr, clatter, bump*, the lobsters flapped into the hold and the empty pots went sliding to the rebaiters. From the waist Bill Dion called to me. He held up a netting bag. Over the twine squirmed scores of amphipods, minute brown crustaceans like animated commas.

"Sea fleas. When fishin's poor, it may mean they've moved in. I've seen 'em clean out bait bags in an hour."

At 11:30 one morning we sighted a vessel, and the skipper ran toward her, to see who was fishing in "our" piece of ocean. She was a white stern trawler some 300 feet long, name *Argus*, flag Russian.

When the gap between the two vessels had closed to 20 yards, the Russian crew lined the

Wet-suited census takers, diver-scientists in Maine study lobster populations with the aid of *Deep Diver*, a headlighted mini-submarine (**above**). After noting each lobster's size, sex, and location, they affix a plastic marker to the muscle at the base of the tail so that it will remain after molting (**right**). Tagging

port rail, waving and calling. Some threw over packets of Bulgarian cigarettes.

In return our men got together a can of coffee, a safety razor, a quart of ice cream, three old *Playboy* magazines, a pair of fishing gloves, and three Polaroid pictures they had just taken of the Soviet ship. Wrapping it all in a plastic bag, the boys bent the parcel to a line and heaved it over.

Two Russian sailors threw over their clasp knives and one put a weight in his cap and sent it sailing across. Near the stern a buxom woman, red hair fluttering in the breeze, blew kisses toward us.

A crewman turned to a shipmate and said, "I thought Russians didn't like Americans."

"Hell, we're not Americans," said his mate, "we're *fishermen!*"

I asked Bernie about the incident of the previous spring, when 13 or 14 Russian vessels dragged right through Prelude's trawls.

"They should've stayed clear. Stands to reason that fixed fishin' gear should have precedence over movin' gear. Now, I'm a fisherman; when you're chasin' fish—and they're after finfish: haddock, flounder, mackerel, anythin' they can get—you go after 'em, and I suppose our trawls were in the way. Anyhow, our company president, Joe Gaziano, raised hell, and the Russians sent an investigator over and paid up: $89,000 for our damaged gear. They broke up more than that, but it showed they were willin' to settle.

"Since then, we radio the positions of our gear to the Coast Guard, and they transmit the information to the Russians, Poles, Japanese, Germans, and anyone else listenin'."

by the National Marine Fisheries Service has shown that some deepwater lobsters migrate seasonally toward shore, searching for 50° to 60° F. water in which to spawn.

Many Vessels Crowd the Waters

The Coast Guard constantly keeps two cutters at sea on an offshore fishery patrol. In Boston Comdr. John H. Fournier had told me:

"Since May 1971 the Coast Guard has attempted to support and protect New England offshore fishermen, but we can only advise foreign fishermen and other mariners to stay clear of American fishing gear. We cannot order them to do so; on the high seas beyond the 12-mile limit anyone may go about his lawful occasions.

"After the Prelude incident the Russians said, 'You tell us where your gear is, and we'll do our best to stay out of it.' They're making an effort, and I'm hoping we'll have no more trouble. But there are perhaps a thousand vessels of 11 nations fishing out there. We've had 80 or more in sight at one time, and it's pretty hard to keep that many fishermen from bumping into each other."

The skipper of the *Mars* said: "They're out there all right. I don't say we should do the same, claim a 200-mile offshore limit like some South American countries, but I do think the American fisherman ought to be protected by having his country claim fishin' rights for, say, 50 miles out, so we could fish our own continental shelf in peace."

Our catch for seven fishing days totaled almost 10,000 pounds of lobsters.

"That's just fair," said Bernie. "Our record trip was last October, when *Crystal S* brought in more than 40,000 pounds."

Such catches cannot go on forever. In an attempt to replenish the sea, the State of

Massachusetts has operated a lobster hatchery on Martha's Vineyard since 1948. Its director, John Hughes, probably knows more about rearing lobsters than any man alive.

In the hatchery, seawater swirls through circular tanks holding thousands of transparent larval lobsters. Only about a third of an inch long, they looked more like fleas.

Said Mr. Hughes: "The lobster is a cannibal from birth; the current in these tanks keeps them separated. Fishermen send us female lobsters in berry—with eggs on their swimmerets. We hatch the eggs and rear the young until they're an inch long, then release them in the area the mother came from."

A medium-size female may carry 15,000 eggs, Mr. Hughes told me. Of these perhaps one-tenth of one percent survive the larval stage. "Here in the laboratory we can increase that to 40 percent, and if we went to the trouble—and expense—of keeping them in individual compartments, we might make it 90 percent. If that many survived in nature, we'd be up to our hats in lobsters.

"For more than 20 years we have been putting millions of little lobsters into the sea, but it is hard to know how much good we are doing, because there is no way of tagging lobsters this small."

Mr. Hughes pointed to a plastic tray divided into small compartments, each of which contained a lobster the size of my little finger. They were bright orange red, as brilliant as if they had been cooked (page 479).

"The normal lobster's coloring is made up of the three primary pigments: red, blue, and yellow. Once in several million lobsters a genetic accident suppresses one or more of these colors and we get results like these."

Lobster Gleams in Shades of Blue

At another tank, the director poked a stick into a submerged hollow tile, and from the other end crawled the most beautiful lobster I have ever seen. He was completely blue, a deep rich cobalt on the back, shading to ultramarine and cerulean on the sides and legs.

"In his case the red and yellow pigments

are lacking. These genetic lacks can be transmitted. My idea was that it would be easy to keep track of these tagged-by-nature lobsters, and so we have bred the red ones true. We can now produce as many as we want."

Dr. Robert Shleser, a geneticist from the University of California at Davis, has been working with John Hughes toward what they both think will be the only way to assure enough lobsters to meet the demand in the years to come: lobster farming.

"John has shown," said Dr. Shleser, "that if lobsters are kept in 70-degree water, they can be grown to legal size, about a pound, in less than two years. Nature takes five to eight years, because for much of that time the lobster lives in very cold water.

"But there's a catch." Cautiously he held his finger over a big male's tank. The lobster raised both claws menacingly.

"Unlike chickens, the lobster is a cantankerous, solitary animal. If you put four or five lobsters in a tank, pretty soon only one—the biggest—will be left."

"What we are looking for," said John Hughes, "is a gentle lobster, meek and mild; then we'll breed his progeny. In short, we are trying to create Superlobster—a peaceable, fast-growing lobster that will reach table size in one year. We have already done most of this in the laboratory; whether we can do it on a mass basis is another thing."

At the National Marine Fisheries Service laboratory in Boothbay Harbor, Maine, scientists under Dr. Richard Cooper study lobsters by diving to their natural environment (pages 480-81).

In early summer I joined Dr. Cooper and his associate Joseph Uzmann on board the mother ship of the submarine *Deep Diver*. A few miles offshore the air temperature reached the mid 60's, but on the bottom a hundred feet below the water was still a chill 37°, so we donned heavy Swedish Unisuits.

First we shrugged into shaggy one-piece nylon underwear, then pulled on a thick lobster-red neoprene outer suit. As assistants zipped us up the back, I thought of the

Lobster in the rough: A family selects its fresh-from-the-steamer feast in an Essex, Massachusetts, restaurant (**facing page**). As with most delicacies, demand sets the price and sometimes outstrips supply.

To keep prices up, dealers often hold excess catches in small dammed coves (**left**). Freshened by tides, such enclosures sustain lobsters as long as six months. This cove, just drained to permit harvesting, reveals a muddy floor pockmarked with shallow burrows hollowed out by lobsters in semihibernation as winter approaches.

In the summer of 1972, lobster prices fell to $1.00 a pound for a few days because of a red tide. The organism that causes this phenomenon poisons clams, though it does not affect lobsters. But newspaper headlines spoke of "shellfish," and housewives and diners refused to touch lobster until the scare had passed.

JAMES A. SUGAR (LIFE)

Drama of entrapment: To make these first-of-a-kind photographs, David Doublet set a well-baited pot in front of remote-controlled television and still cameras and flooded the site with red light, invisible to the nocturnal scavengers. With the TV as his underwater eyes, he patiently monitored the scene for more than a month to record the sequence here and on the following pages.

Lured by fish trimmings secured on a bait spike in a trap, two lobsters approach (**middle**). One probes underneath while the other investigates the entrance in the netted funnel-like "head." Once through this gateway, slanted to hamper escape, the scavenger finds itself in the "kitchen," where the bait rests. Unaware of peril, the creature treats its prison as a territorial possession, guarding the entrance to keep out intruders (**bottom**).

It may nibble on the bait, but sooner or later it seeks a way out. The easiest exit—a second opening, at upper right—seals the lobster's fate by leading it into the "parlor," a baitless rear chamber. Still laden with bait, the kitchen remains a magnet for other unsuspecting victims.

lobster's molting process, known as ecdysis.

When the lobster gets too big for his shell, he pulls himself out at the hinge between carapace and abdomen. A medium-size lobster may do this once a year, growing 50 percent heavier and 15 percent larger between molts.

Like the lobster, we too split up the back, but we were donning an outer shell, rather than discarding it. Wearing 40-pound lead-weighted belts, we squeezed into the after lock-out compartment of the submarine. The hatch was dogged shut and a crane lowered us into the sea. Pale-green water rose above the glass ports, and ropes of silvery bubbles streaming upward told us we were sinking.

Dr. Cooper cracked a valve, and a mixture of helium and oxygen began to hiss into the compartment. The submarine bumped gently on the bottom at 100 feet, and we undogged the hatch. When the inside pressure equaled that of the water pressing on the vessel, the hatch dropped open. We put on our face masks and flippers and took our rubber mouthpieces between our teeth. Dr. Cooper lowered himself into the water, and I paid out the air hose, then followed.

Plastic Tags Survive Several Moltings

The submarine rested on the bottom in a pool of green light, rocking gently in the tidal current. Trailing our air hoses, we kicked our way down into a rocky ravine. Almost immediately we saw the waving antennae of a lobster protruding from beneath a rock outcropping.

Dr. Cooper reached in and drew out a 3/4-pound female. Placing a numbered monofilament tag in the tip of a hypodermic needle, the biologist inserted the needle between the back of the carapace and the first tail segment and injected the toggle into the body muscle. He opened his hand and the marked lobster flipped her tail, jetting backward and disappearing under the ledge.

In half an hour we tagged eight lobsters. Deeply anchored in the flesh between carapace and tail, such tags have survived at least four moltings.

In the decompression chamber on the mother ship's deck, we shed our outer red covering, while the pressure was gradually reduced.

"We work down to 300 feet, but our objective," said Dr. Cooper, "is to put a marine biologist anywhere on the continental shelf, down to its edge at 600 feet. We hope to achieve this goal within five years."

When we emerged from the chamber, Joseph Uzmann showed me some records of tagged lobsters. More than 10,000 had been tagged and released, all the way from Monhegan to the edge of the continental shelf. To date about 2,000 have been recovered.

"The pattern emerging is that inshore lobsters seldom move very far, perhaps 5 or 6 miles. The offshore lobsters, however, are great travelers—most of them apparently go in search of warmer water in which to spawn. Here's the long-distance champion: 186 nautical miles in 71 days. Impressive. But look at this: 53 miles in 9 days. That works out to 5.9 miles a day.

"Tag studies appear to confirm that the two populations, inshore and offshore, do not intermingle, except south of Cape Cod, where we do find significant overlap."

Some Maine Lobsters Are "Naturalized"

I sailed a sloop along the Lobster Coast beyond Boothbay Harbor in midsummer, when the lobster-pot buoys were so thick they were a navigational hazard. At the small port of Cutler, Maine, a trailer truck bearing New Brunswick tags pulled up at a pier. Two men began to unload lobsters, dropping them into a floating box at the water's edge. A bystander asked what they were doing.

"Making Maine lobsters," replied one with a grin.

Canada, which annually takes about half the total North American catch, sells almost 70 percent of its lobsters in the United States.

Away Down East, not far from the Canadian border, Jonesport and adjacent Beals Island build boats for most of Maine's lobstermen. Even the street signs in Jonesport are shaped like lobster boats. The Jonesporter is the classic lobster boat, with a pronounced sheer forward to rise to heavy seas, a sweet run aft, and plenty of low-freeboard cockpit space to store and handle pots.

At Beals Island, off the tip of Jonesport's peninsula, I talked with Ossie Beal, President of the Maine Lobstermen's Association.

"Anyone who's lived in Maine for three years and pays $10 can have a lobster license," he said. "Lately the state's been issuing 400 new licenses a year, and now we have more than 7,000 people fishing 1.3 million traps. The catch is about the same, so that means the cake gets cut into smaller pieces.

"What irks lobstermen is that only about 2,000 of these license holders are full-time

fishermen; the rest have other jobs as mill hands, carpenters, or whatever.

"There's three ways to increase the catch and the lobstermen's income: Limit the number of traps, the way Canada does; license the boat, not the man; and restrict licenses to full-time fishermen to keep out dabblers.

"But it's hard to get lobstermen to pull together. Take our association. Out of the 7,000 licensed lobstermen in Maine, how many members do you suppose we have? Four hundred.

"Sometimes, when the price is too low," he said with a shrug, "we try to keep the lobsters until the price goes up. But in the end it's always the big dealers who call the shots."

Before leaving Jonesport to start south, I struck up a conversation on the waterfront with a lobsterman, who said:

"Ay-yah! Those dealers, they've got dollar signs for eyeballs! I think they get on the telephone and say 'Look! The winter's over and the whole coast of Maine is goin' to start lobsterin', so the first day of April let's put the fishermen's price down to a dollar.'

"No, there's no way in the world you're goin' to tell the big feller how much he's goin' to pay you for lobsters."

I asked if he found that discouraging.

"Oh, don't say a word!" he replied. "When I get up in the morning and find I'm still alive, I figure the good Lord's done His part. If I can make a livin' for my family, that's all I want.

"If the lobsters can hold out, I guess I can."

In 1961 Maine fishermen demanded that the state ban what they called a new menace to lobsters: the diver. Though Maine and New Hampshire now forbid it, divers may legally take lobsters in other states (pages 462-3).

Understandably, divers are reticent to reveal their favorite lobster bottom, but I have a good friend in Gloucester, Frank Scalli, the most accomplished lobster diver I know, who with two companions took me one autumn day to their secret island off the coast of Massachusetts. Six years ago from this same spot, they told me, they had brought in a male that weighed 39¾ pounds. I was incredulous, because this was close to the weight of the biggest lobster ever caught.

Under an overhanging granite ledge we dropped into the sea. I sank slowly, popping my ears in the icy grip of mounting pressure, and came to rest 80 feet down in a forest of waving kelp. Someone tugged at my foot fin. It was Frank, pointing toward the dark mouth of a cave. I upended and thrust my face into the darkness. *Something* moved slightly in the gloom.

Suddenly a brilliant light dazzled me; Scalli had snapped on his light and I was staring at the biggest lobster I have ever seen. In the white light he shone as if newly enameled, olive green and copper blue, vermilion and

Grasping for freedom, a lobster reaches out between the slats of a trap. Doomed by its ravenous appetite and by the price man sets on its flesh, this captive soon will provide a feast for some lucky gourmet.

bright orange red, an enormous male in perfect condition and coloring. He moved a tremendous crusher claw well over a foot long, and the livid white "teeth" gleamed. I pushed myself forward and my air tank struck the downcurving ledge with a metallic clang. I could go no farther, and he could retreat no more. The lobster stared at me, swiveling his stalked eyes and twitching the long whips of his antennae.

What Fate Awaits a Giant in Armor?

I turned to look into Frank's mask. He made a face and shrugged. Awed, I backed out of the cave and swam for the surface.

Frank was hanging from the boat, his mouthpiece dangling. "Well," he asked, "now do you believe?"

"I believe," I managed to sputter.

"He's lived in that hole for two years. We're waiting to catch him entering or leaving."

"Yes, but how big is he?" Wearing a diving mask makes everything look 25 percent bigger, but even so, what I had seen looked more like a dinosaur than a lobster.

"We argue about it; some of the boys say 60 pounds, but I don't believe it. He'll go well over 40 though. A new world's record? I think so, but first we've got to catch him."

I should hate to admit what I was thinking, but I was content. I had met the Great Lobster, face to face. □

Madeira, Like Its Wine, Improves With Age

By VERONICA THOMAS Photographs by JONATHAN BLAIR

Solemn footfalls of children lead fishermen of Câmara de Lobos to chapel on the feast day of St. Peter. The afternoon's devotions yield to an evening of fireworks and gaiety. Famed for flowers, embroidery, wickerwork, and wine, Madeira finds its future in the charm of its past.

THE PLANE HAD TAKEN OFF from Lisbon and was flying on a southwesterly course toward Madeira, the Portuguese island in the Atlantic, 600 miles away.

"Obrigado," I said to the young man sitting next to me when he lighted my cigarette. Obrigado means "thank-you." It was about the only Portuguese I knew.

"Obrigada," he said firmly, then leaned toward me. *"Ob-ri-ga-da."*

I stared at him for a second. "Obrigado," I repeated, hoping that would end all the thank-yous.

He threw back his head and laughed. "No, no," he said

in English. "You are a woman. *You* must say the feminine, obrigada. *I* say obrigado!"

My first lesson in Portuguese completed, we introduced ourselves. His name was Fernando Lucas, he had black hair and dark eyes, and he was on his way home after working three years in South Africa. "My parents don't know I am coming today," he confided. "But I think they will be happy when I tell them perhaps now I stay for good. Find a job. Find a nice girl and get married!"

Fernando's home was not in Funchal, the capital, but near a village called Curral das Freiras. "Let me explain Curral das Freiras to you," he said. "First the name. It means the 'corral of the nuns.' The nuns used to hide there whenever the pirates attacked Madeira. You see, Curral das

"**Like speeding downhill** in a laundry basket," said a breathless passenger at the end of the exhilarating ride—or slide—on the slopes behind Funchal. The wicker sledges rumble over steep cobblestone streets at speeds approaching 20 miles an hour.

Freiras is in a craterlike depression with high mountains all around. In those days we had no roads. The journey was long and dangerous across the mountains."

Fernando paused and grinned. "I think now the pirates would have no trouble catching the nuns. Today they could drive to Curral das Freiras in an hour!"

It's only in the past twenty years that twisting mountain roads, some of them tunneling through solid rock, have opened up much of Madeira. Before that, the only way was by foot or on horseback.

Intrigued by what Fernando was telling me, I fished out my map. The Madeira Islands consist of Madeira, Porto Santo, and two groups of uninhabited islets—the Desertas and the distant Selvagens. Madeira, the biggest, is 35 miles long by 13 miles wide.

Peaceful Island Born of Violence

During the Miocene Epoch—about 20 million years ago—Madeira burst from the Atlantic in giant gushes of volcanic flame. After the lava cooled, erosion shaped the island. There were the perpendicular cliffs, the basalt rocks, and an east-west backbone of high mountains. At 6,106 feet, Pico Ruivo—Purple Peak—is the highest. From here down to Madeira's submerged base, at the bottom of the Atlantic, is about 20,000 feet.

Politically, the islands are a part of Portugal, not a colony but an administrative district—officially, the Distrito do Funchal. Thus Madeirans are born full-fledged Portuguese citizens and send elected representatives to the Portuguese National Assembly in Lisbon.

I put away the map as the warning signs flashed on in the cabin. Our 90-minute flight was ending, and the plane began its descent.

"In a little more than two hours I am at the house of my parents!" Fernando exclaimed excitedly. I wished him a happy reunion.

My first impression of Madeira came in the taxi to Funchal, 12 miles from the airport. Never have I seen a more up-and-down, falling-off-the-edge place. Small terraced fields, supported by stone walls, tumbled around the sides of the mountains and dangled crazily over the sea.

The whole island looked like a magic garden. I saw orchids nodding on two-foot stalks and bougainvillea in bursting shades of red and purple. A turn of the road, and there were frangipani, roses, bird-of-paradise flowers, carnations, lilies, geraniums, and the indigenous blue Madeiran pride.

I passed a small group of women sitting on the grass outside a pink-washed cottage. One of them was holding a transistor radio, and the others were busily working on pieces of embroidery. An open black umbrella hung from a grape arbor overhead, sheltering them from the sun.

"Too much embroidery in Madeira," said the driver in English. Sometimes the Portuguese will say "too much" when they really mean "a lot." Embroidery is Madeira's number-one export, and it now earns the island some 150 million escudos—more than $5,000,000—annually.

Madeira Islands

Glittering puffballs, lofted by rockets, bring in the New Year with a blast at Funchal, Madeira's capital and port city. Islanders traditionally punctuate holiday revels with fireworks; their New Year's celebration is one of the world's great pyrotechnic displays.

João Gonçalves Zarco, who claimed Madeira for Portugal, anchored in this harbor in 1419. The island group also includes Porto Santo and two clusters of rocky uninhabited islets, the Desertas and the Selvagens. All are the tops of undersea volcanoes.

MULTIPLE EXPOSURE BY B. A. ADELL III

The taxi slowed for another bend, and suddenly I could see a wide blue bay with a white cruise ship. Red-roofed buildings clustered amid palms, and the diagonally striped spire of the cathedral stood out in the center. All around, the mountains lunged for the sky.

"Funchal," said the driver.

The city of Funchal was born in the 15th century, and some of its present buildings—such as the cathedral—date back to that era.

Madeira was claimed for Portugal in 1419 by one of Prince Henry the Navigator's explorers, João Gonçalves Zarco, a year after he and Tristão Vaz Teixeira had sheltered from a storm at the neighboring island of Porto Santo. When Zarco landed on Madeira, the uninhabited island was one vast forest. He named it Ilha da Madeira—island of wood.

Zarco explored Madeira's southern coast and founded what became the city of Funchal. The name is derived from the Portuguese *funcho*, or fennel, which grows wild in this area. The city has since expanded to 100,000—a third of Madeira's entire population.

Bordering the bay ran the wide Avenida do Mar. Here stands a 16th-century stone fort, now remodeled into the Palácio de São Lourenço, residence of Madeira's civil and military governors. Across the harbor I could see the quay, lively with cranes, crates, and commerce.

Near the cathedral, my taxi passed an open market where women dressed in scarlet-striped skirts, red capes, and white blouses were selling flowers. They all wore little black skullcaps with a tail curling up in the air. "Madeira costume," the driver informed me.

We drove along the Avenida Arriaga, Funchal's main thoroughfare. The sidewalks were intricate black-and-white mosaic, and all down the center of the avenue flowering jacaranda trees formed a bower of violet blue. Minutes later I arrived at the Savoy Hotel, where I was given a room with a terrace overlooking Funchal Bay.

Wine Owes Its Character to a Round Trip at Sea

From that terrace over the following weeks I would watch a scene that was endlessly fascinating. In the bay, freighters, yachts, cruise ships came and went, and at night, farther out to sea, the lights of fishing boats winked and bobbed in the dark waves.

Of all the products shipped from the port of Funchal, none is so renowned as the wine that bears the island's name. To learn its history and how it is made—a process quite different from that for other wines—I went the next day to a very old wine lodge in Funchal. Here the Madeira *mosto*, or fresh grape juice, is processed into liquid gold.

There was a delightful and leisurely confusion of hooped casks and huge wooden vats the size of cottages. I saw bottles being filled, corked, and labeled by hand. The heady scent of wine and wine-soaked wood pervaded the place.

The lodge belonged to the Madeira Wine Association, whose membership consists of most of the leading wine

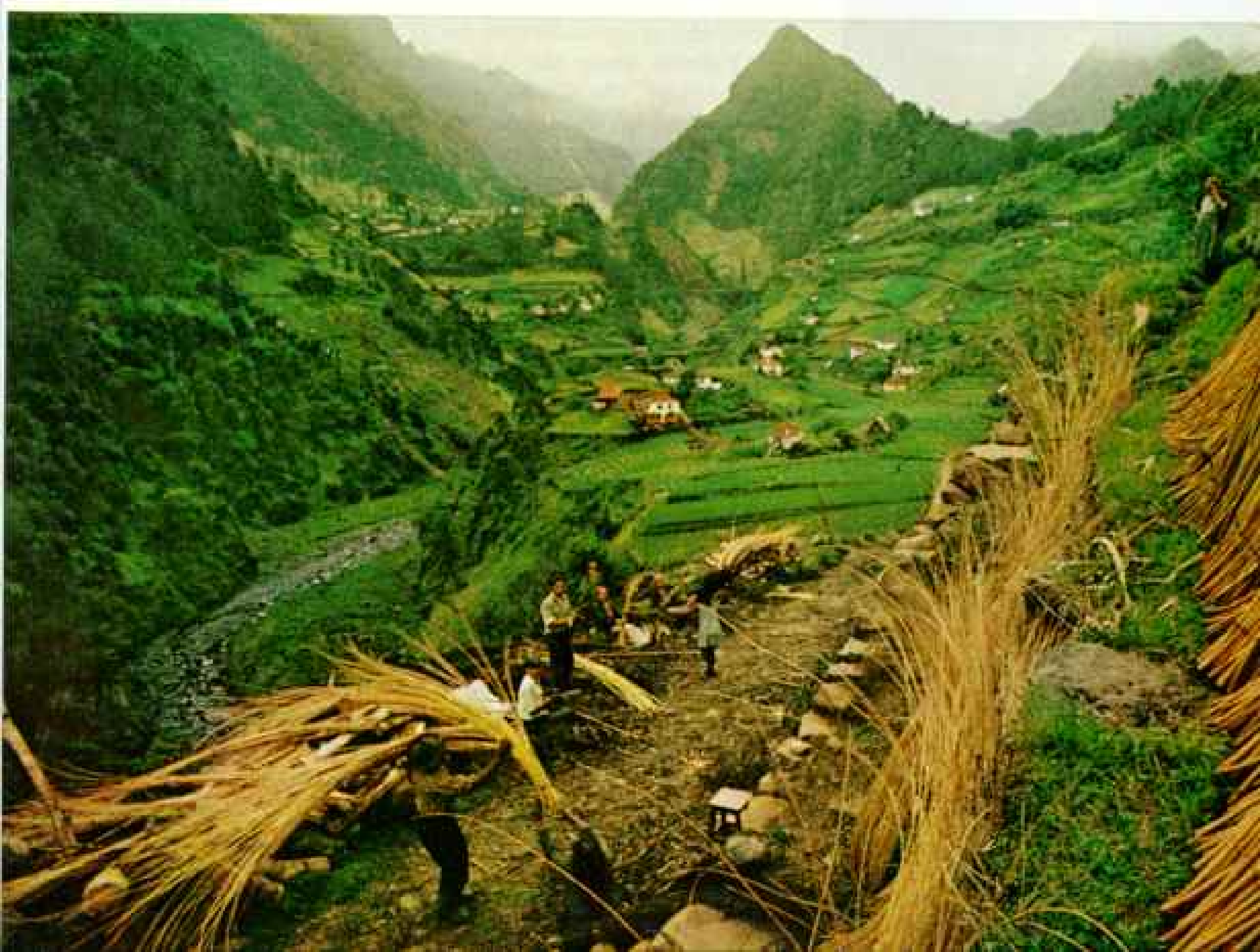
firms in Funchal. Jeremy Zino, a young man with brown hair and glasses, had volunteered to show me around. Jeremy's father, Horace Zino, was once president of the association. Figuratively speaking, Jeremy had grown up on wine.

He invited me to try some, and we sat in a tasting room on sawed-off wine casks. Jeremy raised his glass, and the light struck little darts of red and amber from it. "Madeira wine has been a tradition for hundreds of years and will continue forever," he said.

Wine has been made in Madeira since the days of Zarco when the first grapevines were transplanted from the Mediterranean islands of Crete and Cyprus. But the unique quality of present-day Madeira is generally accepted to be the result of a lucky accident that occurred long ago. It happened that a cargo of wine left the island in a sailing ship bound for the East Indies. A year or so later the cargo, still unsold, was returned to Madeira. Surprisingly, the islanders discovered that it had improved greatly during the long hot months in the tropics.

So, to reproduce the effect of the voyage through warm seas, Madeirans developed the process called *estufagem* (*estufa*=hothouse). The wine, after being fortified with brandy, is put into a special tank and heated gradually to 114° F.—about the same as the hold of a ship in the tropics. It is kept at that temperature for three to six months and then, very slowly, allowed to cool. After that it is aged in vats for an average of four years (though most exported Madeira is considerably older than that).

Uplands wrenched askew attest the volcanic forces that gave Madeira birth. Fields lush with wheat, cabbages, and potatoes demonstrate the land's remarkable fertility —capable of bearing three crops a year. A farmer, lower left, shoulders rods cut from the osier, a willow with branches supple yet strong. Peeled, bundled, and dried, the rods become the raw material for wickerwork.



The result of all this is a wine different from any other in the world. Actually, there are four main types of Madeira, ranging from the dry aperitif, Sercial, to the sweet dessert wine, Malmsey. In between, Verdelho is less dry than Sercial, and Bual is less sweet than Malmsey.

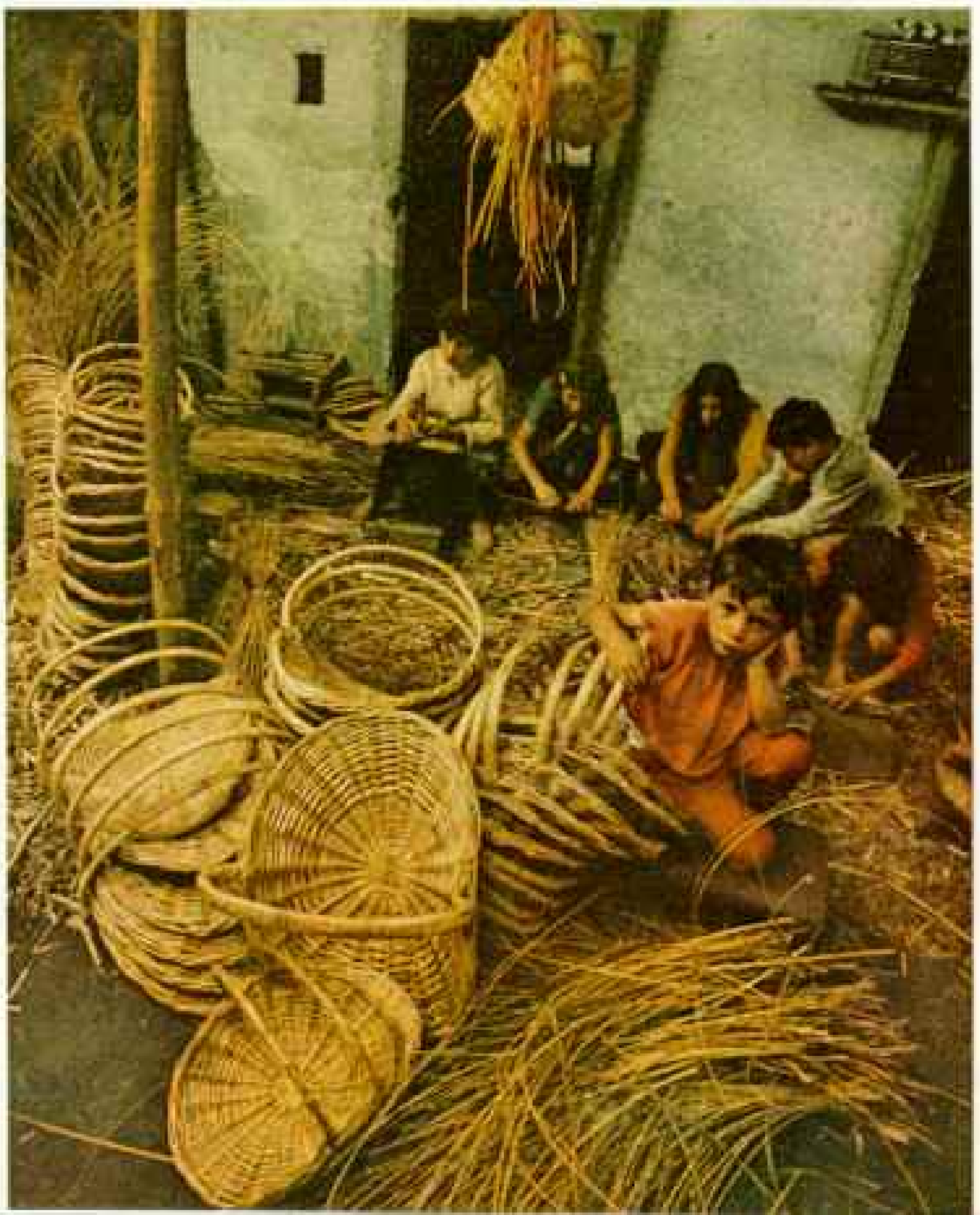
Madeira is one of the few wines in the world that can be kept for more than a century without spoiling. When Winston Churchill spent a painting holiday in Madeira, he tasted a bottle of 1792 Sercial. Awed by the experience, he said, "Do you realize that Marie Antoinette was still alive when this wine was made?" Madeira produces four million gallons of wine each year. Much of this is drunk locally—without benefit of estufagem—as table wine. The rest is heated, fortified, stored, and eventually exported at the rate of about a million gallons a year.

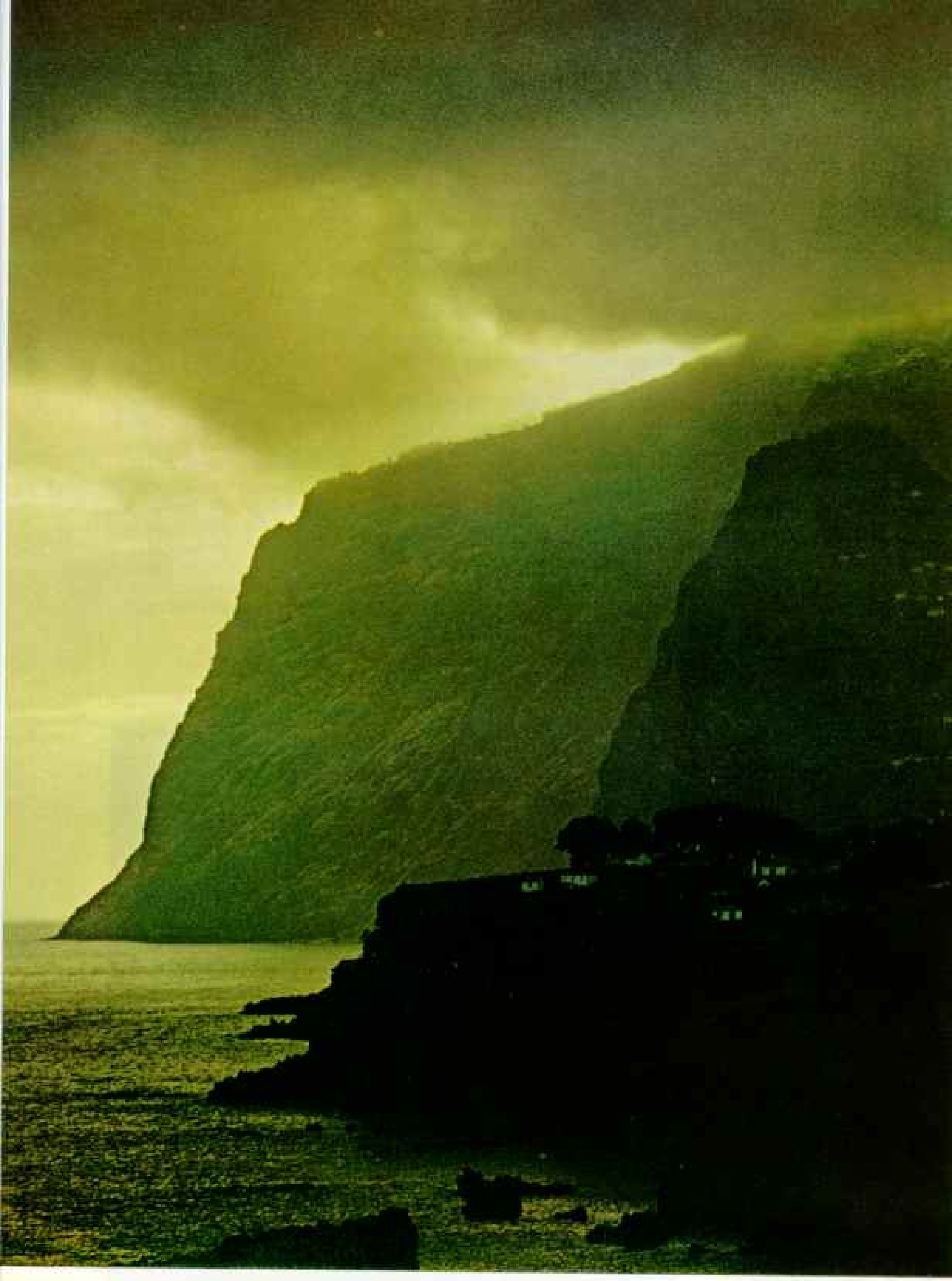
Like the wine, exquisite embroidery brings fame to Madeira, where most girls learn the art when they're very young by watching their mothers. What's more, there are two schools for embroidery on the island—one at Machico and the other at Câmara de Lobos.

I had been lucky enough to find Tito, a 23-year-old local driver who spoke English. With dark hair and olive skin, Tito looked typically Portuguese, except for his light-green eyes. Good-humored and intelligent, he was just the right companion for my wanderings around the island.

One bright May morning we set off in his Ford sedan to visit the embroidery school at Câmara de Lobos. The town is only five miles west of Funchal, but the zigzag

Braiding, bending, twisting, children weave rods of willow into wicker baskets. Families in hundreds of homes do the same, then carry their products to Funchal for sale or export. With a skill born of generations, Madeirans disdain nails, wire, and glue in the fashioning of sturdy chairs, tables, and baskets of many shapes.





Madeira's brow wears a scowl of clouds, and houses cling like climbers to its steep slopes. Cabo Girão (left), which means "cape turning," rises abruptly to nearly

2,000 feet. Confronted by the forbidding headland, explorer Zarco's superstitious crew grew fearful, legend says, and he ordered the ship to turn back toward Funchal.

roads in Madeira turn a short journey like this into a major expedition.

Again I was awed by Madeira's tilting terrain, which affects almost every aspect of life on the island. For instance, turning a sharp bend in the road, we came on what looked like a walking bush with bare feet. It was a woman carrying an enormous bundle of grass and leaves on her head, a bundle so large that the foliage came down over her face and most of her body. "Food for her cow," explained Tito.

Although there are 20,000 cows in Madeira, you hardly ever see one. A cow represents a standard of wealth. It is kept in a thatched shed called a *palheiro*. It is not allowed to roam outdoors lest it fall off an edge, but every so often is led out on a rope for a carefully supervised airing.

Even the water supply depends on tilt. A complex irrigation system channels water from springs and streams high in the mountains down to lower areas (following pages). Through man-made *levadas*, or canals, the water is rationed and distributed to farms and villages.

Madeira's rich volcanic soil and subtropical climate produce an unusual fertility. The principal crops are grapes, bananas, and sugarcane, but along with these I saw cherries, custard apples, mangoes, peaches, strawberries, and passion fruit. (From the last the islanders make a delicious soft drink called Sumo de Maracujá.)

Fishing Port Lures a Great Statesman

Câmara de Lobos means "den of wolves." It was so named by Zarco for the seals—sea wolves to him—that abounded there at the time. We came to a crossroads overlooking the small harbor, and Tito stopped the car.

"That's where Churchill painted," Tito said, pointing to a railing on our left. "He sat over there."

Câmara de Lobos is worthy of any artist's attention, with its brightly colored boats and its fishing nets strung out in the sun like giant cobwebs. Black basalt rocks give the water a darkly secretive look, and the fishermen's cottages march haphazardly down the hillside.

In the town Tito parked the car, and together we walked up a narrow, steep, cobblestone street. The embroidery school was in an old building. "We hope to get a new school built eventually," said Maria Soares Abreu, the principal, a rosy-cheeked, kindly woman who has been one of the four teachers there for 18 years. The school is free, and three hundred girls aged from 4 to 14 attend it. Most girls do not learn to do salable embroidery before they are 8.

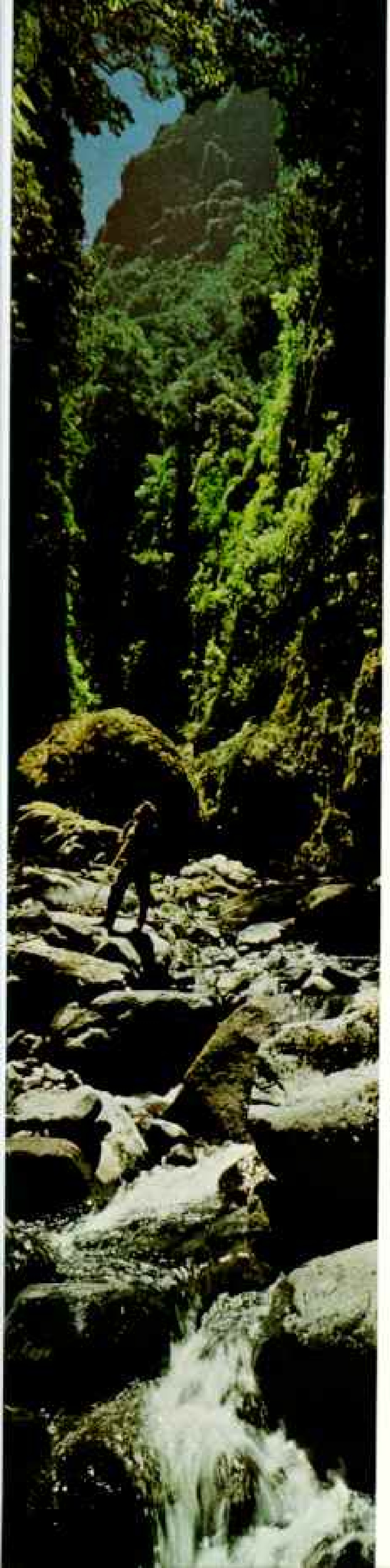
The classroom contained about a hundred child-size wicker chairs, and a row of white smocks hung on one wall like little ghosts. The class in progress was for the youngest girls, who were practicing simple stitches on pieces of cotton.

I noticed one tiny girl in particular. Her name was Odilia Pestana. She had blue eyes and blond hair tied into a pony-tail. In her pierced ears she wore gold earrings set with seed pearls. Trying to rethread her needle, she kept missing.

Senhora Abreu told me Odilia had started at the school when she was 4, and now she had just turned 5. "Speak to

Busy as elves in a dollhouse garden, women of Santana (facing page) create the embroidery for which Madeira is renowned.

Patiently threading a needle (**top**), 5-year-old Odilia Pestana will attend school for two hours daily to learn embroidery. But years of additional practice will be necessary before her hands yield such exquisite fruit as the cutwork design (**above**), the border for a tablecloth.



the lady," said Senhora Abreu, *"fala, fala!"* But Odilia only ducked her head and chewed on her embroidery.

I finally got Odilia to talk to me—by taking her on a sleigh ride. This is Madeira's most exciting tourist attraction, and is like no other sleigh ride I have ever been on, since the course has no snow.

With her mother's permission, Tito and I called for Odilia the following day and drove up to Terreiro da Luta, at nearly 3,000 feet. From there down to Funchal are several miles of steep, twisting cobblestone roads, and you hurtle along in a wide wicker basket set on wooden runners. Two men control the sledge, or *carro*, with ropes attached to the runners (pages 490-91).

Tito said he'd see us at the bottom, and I kept a firm grip on Odilia as we careened off down the mountain. The drivers, dressed in white with white straw boaters, ran on either side of the sledge in a nimble leaning-backward gait. Sometimes they jumped on the back and rode with us.

The sledge twisted and swayed as we gained speed, and Odilia squealed and slid down in her seat. I grabbed her, shouting *"Depressa!"* to the drivers. We started going even faster, which was what I had just inadvertently told them to do, and Odilia clutched my hand. I tried again. "Slower, please," I said in English, and they understood me perfectly.

Not long afterward we were pulling up at the end of the run; Tito was there waiting for us. *"Foi muito depressa!"* Odilia told him—"It was very fast!"

"Were you afraid?" he asked.

She nodded her head. *"Não*—no," she replied.

Our next stop was the Bazar do Povo to buy Odilia a doll, and we found just the right one. *"Ela vai dormir e depois acordar!"* cried Odilia delightedly—"She goes to sleep and she wakes up!"

To round off the afternoon, we went to one of Funchal's oldest sidewalk cafés—the Golden Gate. Odilia had a dish of ice cream, while Tito and I sipped strong dark coffee.

We returned a sleepy Odilia to her mother in Câmara de Lobos. Suddenly her arms went around my neck and she kissed me good-bye. It was like being kissed by a little leaf.

Found at Last—a Sandy Beach

The next few days were rainy and overcast. Then the rain ended, and there was a beautiful morning. The flowers had never seemed so bright, and the sea was a beckoning blue. On an island, on such a day, one should lie on a beach in the sun. But I had seen no sandy beaches in Madeira; I had seen only rocks and shingle.

"There is a sandy beach," Tito informed me, "a little one near Caniçal." Gleefully I threw my bathing suit into the back of the car, and away we went. Two hours later we were driving through the longest tunnel in Madeira—about half a mile—and on the other side was Caniçal, the most easterly village. For a minute I felt as if I'd left Madeira. Gone was the lush vegetation, and ahead stretched a landscape of rock and reddish sandy soil.

Caniçal has a whaling factory, and the bleached white

bones of whales lay in the yard like large pieces of sculpture. The Caniçal fishermen still hunt the sperm whale with hand harpoons from open boats they winch down to the sea. There was no activity—no whales—when I was there. The total number of whales processed by the Caniçal factory in 1971 was only 67, as opposed to 186 in 1963.

Beyond Caniçal we were driving on a dirt track rather than a road. After two miles we left the car at a cliff where stone steps lead down to Prainha—the only sandy beach on Madeira. As we walked down, I counted those steps: 324 of them. Two arms of the cliff embraced the little beach.

Tito sighed happily, took off his shirt, and lay back against a rock. "Be careful of your skin, Mrs. Veronica," he said. "I belong to Madeira and the sun knows *me*." He closed his eyes and promptly fell asleep.

Hard Work Brings Small Reward

I was sitting on the sand with my back to the sea watching lizards darting around the rocks, so totally absorbed that I didn't notice the boat coming until it was actually at the beach. Ten fishermen jumped out and put logs on the sand. Then slowly and painfully they inched the boat up over the logs, pulling on a heavy rope. One man stood in the sea giving directions. He said something in rapid Portuguese, and a man hauling the rope started shouting at him. They both got so excited so quickly that I laughed. Ten pairs of eyes switched to me, and I thought surely I had offended these men. But then they, too, burst out laughing, and it was all right.

Once the boat was safely beached, the man in the sea insisted I accept a glass of wine from the demijohn they carried. He introduced himself as João Carlos.

The men had come from the town of Machico four miles down the coast; since the old wooden boat had no engine they had rowed, and the journey took them an hour. They had rented the boat, and when the catch was sold half the money would go to the owner.

They had spread their nets behind them before beaching the boat. Now, laboriously, they hauled them in. It took well over an hour before the two brown nets became visible in the sea. But after all the effort, only a scattering of fish came with them—red mullet, sea bream, and mackerel. The men made ready to take the boat out to sea again for another try. I admired their spirit.

"If they see 20 escudos [$.73] each at the end of this day they'll be lucky," Tito said to me sadly as we climbed back up the 324 steps to the car. Hard work with meager pay is the norm in Madeira; a laborer's wage is $1.25 a day.

On the way back to Funchal we took a detour along the island's north coast. This was to see what friends had told me was "a different Madeira." They were right. The little houses were like something out of *Hansel and Gretel*, with brightly painted shutters and doors, and pointed thatched roofs that draped all the way to the ground (page 498). We passed a cluster of these houses built back from the road near a levada, and I asked Tito to stop the car.

Watercourse and walkway, a *levada* (**above**) affords a footpath to and from emerald uplands. A surefooted farmer carries bananas on his way to market. Tapping streams in the island's precipitous spine (**facing page**), levadas provide water for irrigation and electric power.

Battle-scarred veteran succumbs to man: A sperm whale, lacerated in bouts with others of its kind, is winched ashore at Caniçal. The drama began when spotters sighted a telltale plume at sea. A rocket signaled the news; soon the whalers came running to Caniçal and lowered their boats down a steep cliff. Wives brought their men food and raincoats, sweaters and wine. Then the chase commenced in 30-foot longboats crewed by men who still cast the harpoon by hand.

"The harvest is not what it was," says Luiz dos Reis, manager of the whaling factory, "but the excitement is still there. I remember José —a big man, I tell you. He threw the harpoon hard, but once he did not let go of it, and he fell onto the whale. Happy for José, the whale did not dive. The man had a long ride before he could get off and swim back to the boat."

Bulbous eyes and fearsome teeth of black espadas (**below**) belie the fish's tasty flesh. The yard-long creatures are hauled up on handlines from depths as great as 3,000 feet.

We got out and followed a path until we came to a small stone hut with smoke wisping from the chimney. Inside the open door, a little bird of a woman with a brown-skinned face and bright brown eyes was making bread. She wiped the flour from her hands and invited us in. Her name was Maria.

The hut was plainly furnished with a wooden table and some three-legged stools. On the left was a wide stone oven where Maria was burning wood. "*A minha cozinha*—my kitchen," she explained. "I do all my cooking here, and this is where we eat." Her home was nearby, and good-naturedly she showed it to me.

Flowers grew close to the red front door, and inside, the house consisted of two small rooms. The slanted beamed ceiling made the place seem very snug.

"I came to this house as a bride," Maria said. "My six children were all born here. I am 59 years old, and I have a marriage of 41 years." Maria's husband, Antonio, was off working in one of the three fields they rent for 700 escudos ($25.70) a year.

We walked back toward the hut and passed a dark-gray pig grunting contentedly in his sty. "*Porco,*" Maria said, "for Christmas." In Madeira, no matter how poor a family may be, at Christmas they kill the pig and then the feasting starts. For many it is the only time they eat meat all year. The staple diet is bread, gruel, vegetables, fruit, and fish.

Maria's 12-year-old nephew, João, was helping her with the breadmaking. Water, flour, a dash of salt, and yeast. Then Maria and João punched the dough with their fists. Presently the first batch of loaves was ready for the oven. "Bread of the country," Maria said and smiled at me. "Come back later and I will give you some."

Porto Santo Outshines Madeira

I had to return to Funchal to catch a banana boat that was making a call at the neighboring island, Porto Santo (map, page 492). It's a 4½-hour voyage, whereas the plane takes only ten minutes. But I wanted to see Zarco's other island the way he first saw it—from the sea.

My banana boat, *Gorgulho,* got underway for Porto Santo at 5 p.m. The little houses dwindled, and then Funchal disappeared as we followed the coast eastward.

It was dark when we completed the 50-mile voyage to Porto Santo. The island looked like a flat necklace of lights lying in the sea. Seven miles long by nearly four miles wide, Porto Santo has a population of 4,000. A launch puttered through the darkness to *Gorgulho* and ferried us ashore.

Porto Santo is drier and sunnier than Madeira; the main crops here are grapes, melons, figs, and grain. The people also earn a living from fishing. Porto Santo's biggest export is a local mineral water; thousands of gallons are bottled and shipped to Madeira each month.

Porto Santo has two other prime assets, one physical, one historic—both potential tourist attractions. The physical one is a superb golden beach five miles long—far superior to the only sandy beach on Madeira.

Houses vie with vineyards in the village of Porto Moniz (**facing page**). On the island's sheer slopes farmers till every nook of arable land for sugarcane, bananas, and the grapes that yield Madeira, one of the world's most robust and durable wines. Fortified with brandy, aged in heated chambers called *estufas*, the wine attains a quality that can endure for a century or more. At Funchal (**above**) vintners fill a cask for shipment to Copenhagen.

"**Oh when the Saints,** *estão a entrar. . . .*" Stern without but jubilant within, musicians at a mountain pass play "When the Saints Go Marching In" during Mass on the feast of Corpus Christi. The congregation joined in for the fervent Anglo-Portuguese rendition of the jazz hymn. Then they sang "Michael Row the Boat Ashore." "The 'alleluias' were like rolling thunder!" said photographer Jonathan Blair, who learned that the priest had heard the songs while visiting fellow Madeirans in the United

States. After Mass, celebrated on the porch of a house because there is no church in the area, the people sang and danced the day away, drinking wine and feasting on *espetada*—chunks of beef or lamb skewered on laurel branches.

The other attraction is a funny old house next to the church in the village of Porto Santo. The tiled roof is now a faded orange, and its high-set windows give the house a blind look. The people of Porto Santo will tell you that it was here in 1479 that Christopher Columbus, then aged 28, lived with his bride, Filipa.

It could be true. I could find no firm evidence that Columbus lived in this particular house. But many historians agree that he did stay for a while on Porto Santo. Filipa's father, Bartolomeu Perestrello, had been the island's first governor. Perestrello's great interest was navigation, and one can even speculate that Columbus would have pored over his father-in-law's books and papers on the subject.

"Best of Both Worlds" May Reward Tomorrow's Tourists

"If Porto Santo and Madeira were to marry," a friend remarked to me, "what a marriage it would be! The mountains and flowers of Madeira and that beautiful golden beach on Porto Santo!"

This best-of-both-worlds idea might well come into effect, for tourism is growing in Madeira, and one day visitors may be offered a "flying beach extension" to Porto Santo.

The British have sampled the pleasures of Madeira for more than a hundred years. In Funchal the quietly elegant Reid's Hotel has housed many distinguished visitors from Great Britain; besides Winston Churchill the list includes David Lloyd George and George Bernard Shaw.

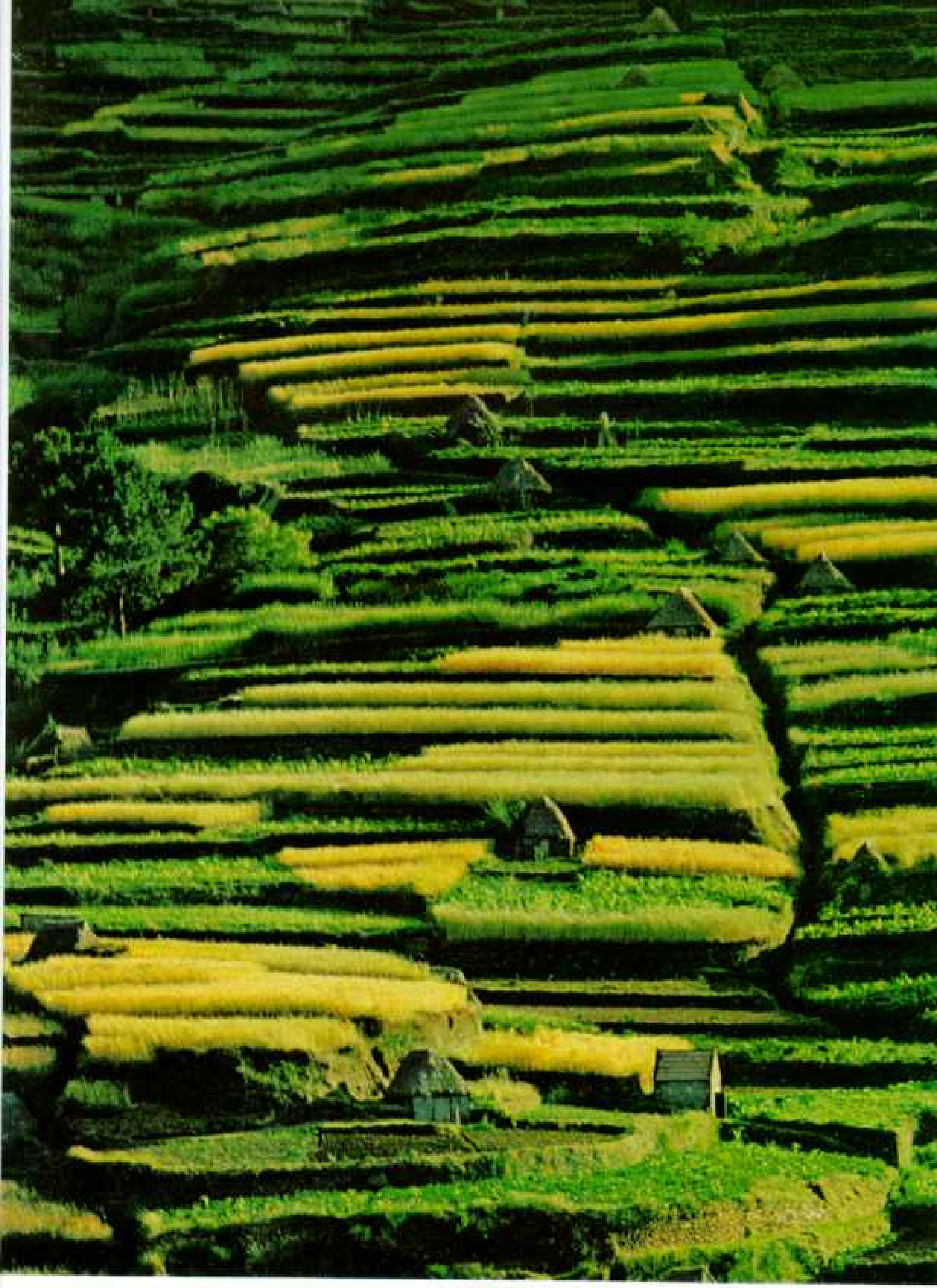
During a recent hotel-building boom, the Madeira Hilton opened at Funchal in 1971, and a Sheraton was completed there in November 1972. Near Machico a futuristic-looking complex called Matur is now taking shape. Its furnished apartments and villas, together with a 300-room Holiday Inn, can accommodate 2,000 guests.

My time in Madeira was drawing to a close, and I remembered Fernando, the young man I'd met on the plane when I first arrived. Before leaving, I decided to go to Curral das Freiras to see if I could find him. One of the friends I'd met in Funchal offered to drive me there. His name was Gino Romoli, and he acted as consultant artist for the Madeira Superbia tapestry factory. Gino was a tall, bearded man with fiery blue eyes, in his early sixties. He had come to Madeira from Italy in 1930, and made the island his home ever since.

Gino Romoli and I drove north out of Funchal and started the climb up the mountains. Curral das Freiras lay in the rugged center of the island, and negotiating the road that led to it was a bit like flying. The way wound upward in a series of hairpin bends, with the mountains and woods falling away into space.

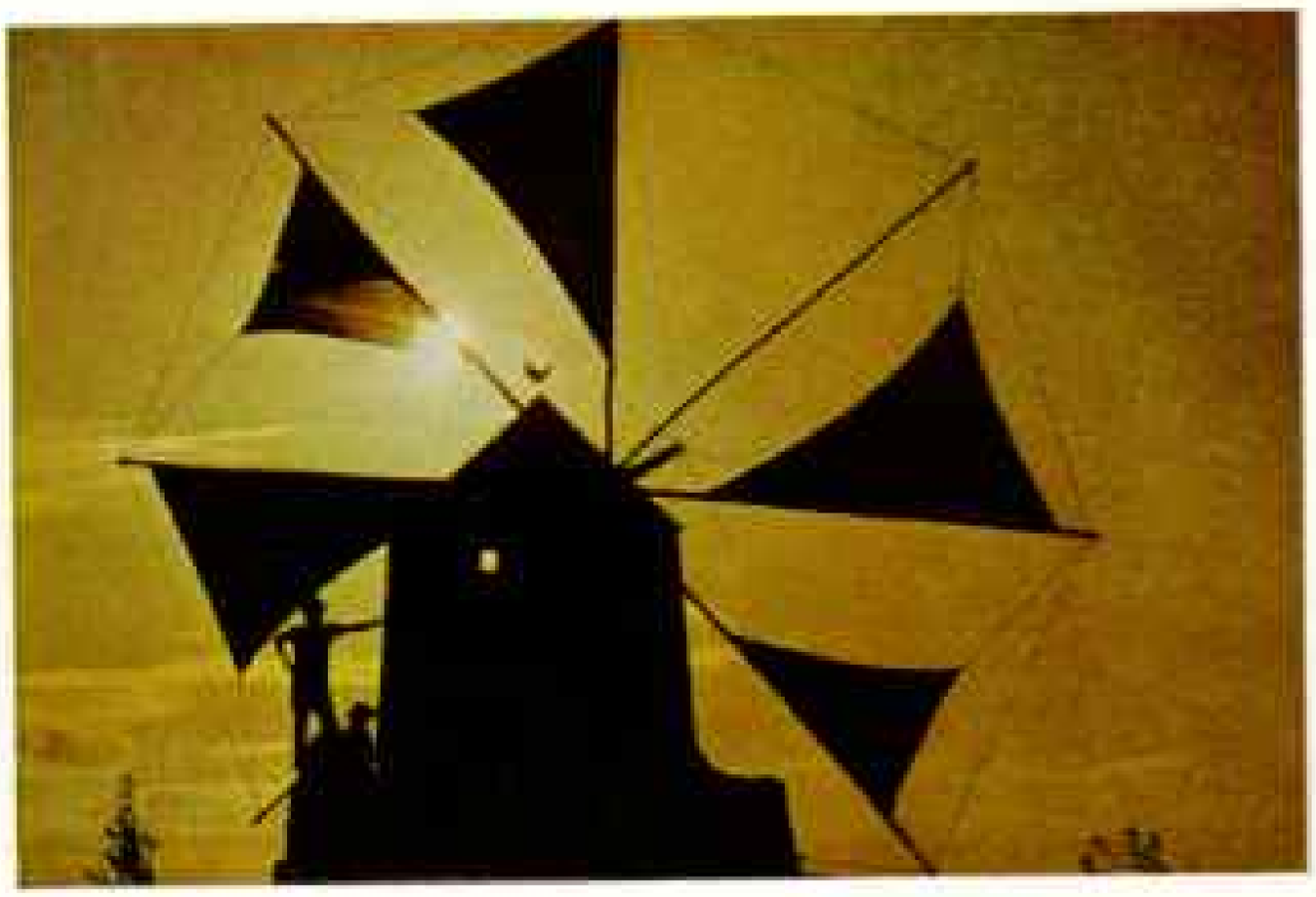
Presently a tiny village with a toy-size church appeared far below us, surrounded by mountains. We drove toward it through a tunnel and within minutes were near the church in Curral das Freiras. Our arrival attracted a group of people, all anxious to help us. We soon learned our mission was in vain—Fernando had gone to Funchal for the day.

(Continued on page 512)



Trim stands of ripened grain stripe a terraced hillside. Thatched houses shelter

cows, whose owners walk them like leashed dogs over Madeira's treacherous terrain.



Plunging into the placid Atlantic, boys leave their footprints on the golden beach of Porto Santo, where Christopher Columbus may have walked. The young navigator apparently sojourned here with his bride, Filipa, daughter of Porto Santo's first governor, Bartolomeu Perestrello. Perhaps Columbus examined his father-in-law's sea charts, talked with mariners who had dared the waters to the west, and puzzled over strange flotsam—wood carved by men of an unknown realm—borne by ocean currents to the Madeiran archipelago.

Trampling feet of oxen (**below**) thresh grain on a clay platform. A farmer separates kernels from straw with a toss of his pitchfork. Windmills more than a century old (**above**) stone-grind the kernels into flour.

"No doubt we passed him on the road!" Gino said wryly.

"Fernando Lucas lives an hour's walk from here," a man told us. "But I will take a message to him when he returns tonight. I have other messages for the mountain."

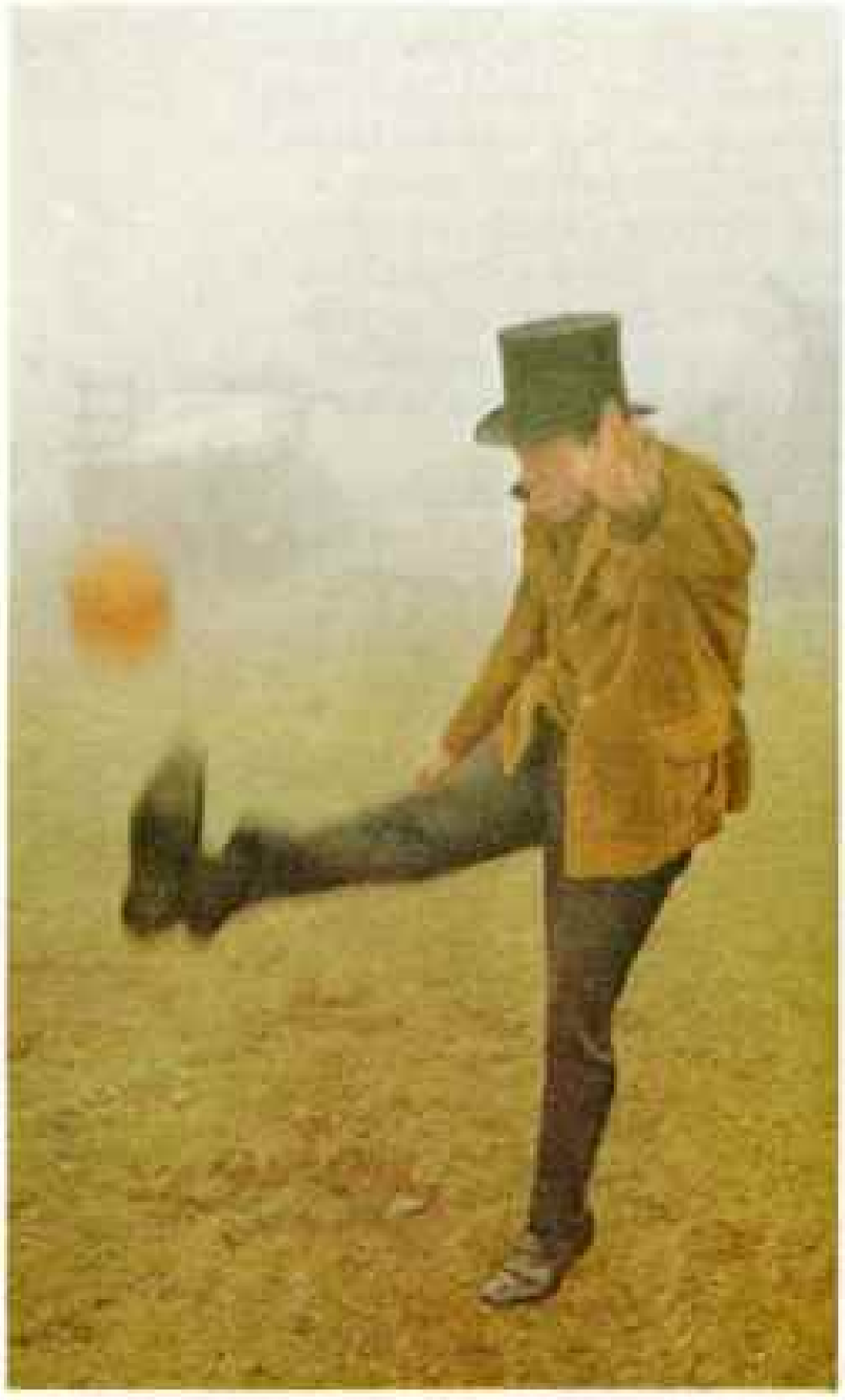
Quickly I wrote Fernando a note and, just like that, two glasses of red wine were handed to us through the car window. "To refresh you for your journey back to Funchal," said one of the smiling villagers.

The next day was my last in Madeira; I was in my room packing when the telephone rang. It was Fernando. He had received my message and was at the hotel. I joined him in the lobby where we sat and ordered coffee.

"How was the reunion with your family?" I asked.

"My mother, oh, she cried when she saw me. Even my father cried a little!" he exclaimed. "Later on we had a party for the family and a few old friends." Fernando smiled; then his face changed and he looked sad. "But

Fog thick as wool delays the annual shearing of sheep. Unable to find flocks that roam the island's central heights, the shepherds pass the time in conversation, meals, and games. During an impromptu soccer match, a goalie kicks the ball into the fog, and loses it.



jobs are still very hard to find in Madeira," he told me. "That is why I went away before."

For the time being Fernando planned to stay with his parents and help farm their bit of land. However, when his money ran out, he would probably leave again and try to build up savings in a foreign country. Many Madeirans are forced to do this, but almost always they return to their island.

Later that afternoon I left Madeira. As the plane took off for Lisbon, I gazed out the window, and my last glimpse of the island was the fishing village of Caniçal. I recalled the morning I had spent on the beach there with the fishermen, how they had shared their wine with me, their poor catch, and the undaunted way they had taken that cumbersome wooden boat out to sea again. Courage and kindness: There is a lot of both in Zarco's island.

"Obrigada," I thought. "Obrigada, Madeira!" □

As the fog lifts, shepherds spy their flocks and bring them to the pens. With the hospitality that marks Madeirans, José Teixeira takes time to pour a little wine to warm the spirits of a companion.

Those Outlandish

Goldfish!

ARTICLE AND PHOTOGRAPHS BY
PAUL A. ZAHL, Ph.D.
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THEY ARE NOT ALL GOLDEN, these garish mutations derived from common goldfish. A score or more of colorful and exotic varieties overshadow the fishbowl model we know so well.

Deep red or pitch black, vivid blue or crazily mottled patchwork, a bewildering assemblage of "fancies"—lionheads, fantails, bubble eyes, Moors, celestials, calicoes—populates this hybrid world. Telescope eyes bulge and pivot, translucent fins drift and billow like curtains at an open window. Elfin streamlined swimmers with puckish mouths slice through water like tiny gliders.

Their rarity and value can be as surprising as their features. I was reminded of this one day last year in Tokyo. Standing by a man-made pond, I watched a fish culturist net a prize example. He deftly lifted the fish from the net, then gently stroked its lacy fins and graceful tail.

At ten inches long the fish was unusually large for a fancy. There is, however, no real average size for goldfish of any variety, because maximum growth is controlled almost entirely by environmental factors—tank or pond size, food supply, population density, predators, and parasites. Adult fish in a crowded aquarium can peak at three inches, while siblings raised in a spacious lake may reach ten inches or more.

This Tokyo specimen was a wonder of selective breeding, no matter what its size. Its oval body was brassy yellow, and its spectacular, massive head attested to the origin of the variety's name: lionhead. Though some might have found it grotesque, I thought the fish oddly glamorous (pages 517 and 526).

"For sale?" I asked the gowned proprietor.

"Perhaps," he said, as he gently returned

Oriental apparition, the extraordinary bubble eye wears marble-size, fluid-filled eye sacs like water wings. The breed is only one in a gallery of bizarre variations of the common goldfish. Developed over ten centuries by Oriental breeders, this living art of the East today attracts growing numbers of Western aquarists.

Crazy quilts of the watery world, shubunkins (**above**) originated in Japan. Widely varying colors result from mixtures of yellow, orange, and black—the only known pigments in goldfish.

Pug-faced and fancy-finned orandas were first bred by crossing a fantail goldfish with a lionhead.

Bushy "eyebrows," actually flaps of skin, protrude above organs of smell located near the eyes, giving this breed the name pompon.

Masked marvel, a lionhead grows puffy nodules that may envelop its gill covers and eyes. Breeders in the Orient pare such growths when they threaten a fish's vision or breathing.

Sleek sophisticates, Moors add contrast to a tank glittery with red and gold. The hardy blacks have double tails and often turn bronze or even reddish with age.

the fish to the pond. "Perhaps for $1,000."

I gulped. The term "goldfish" in this instance took on an almost literal meaning.

Though I didn't buy, I could understand why he valued such a fine specimen so highly. For years to come, possibly as many as 15, this handsome breeder fish could yield thousands of progeny of similar design.

I recalled the charming story of a jet-black Moor that had even greater value. Moors, usually blue-black in color, tend to turn bronzy or reddish at some point in their life. This individual, originally named Old Black Joe, reportedly turned red, white, and blue during World War I, became known as "Miss Liberty," and was used to promote the sale of Liberty bonds. Its owner valued his patriotic possession at an imposing $5,000.

Chinese Improve on Nature's Mistakes

The first fancy goldfish were nature's creations, produced by unknown factors that triggered chromosome alterations. The Chinese, with their traditional interest in dragons and mythical monsters, segregated these deviants and mated them with similar sorts to produce living freaks, weird and outlandish.

Over the centuries finicky selection of the progeny and repeated inbreeding or crossing resulted in new strains to intrigue the esthetic sensibilities of Oriental fish fanciers.

Though the variations in shape, color, and size are numerous, all goldfish are of one species, *Carassius auratus*. And probably no goldfish contains pigments other than orange, yellow, and black. The beautiful blues, dramatic reds, and other colors we see in some varieties are produced by combinations of these three colors, plus the effects of light refraction and reflection.

By the time fancy goldfish firmly appeared in recorded history, during China's Sung Dynasty (A.D. 960-1279), they were well established as household pets. Fascination with these multihued relatives of the common carp spread throughout the Orient. By the 16th century selective breeding had become common practice.

In the 18th century newly forged trade routes carried goldfish to Europe. King Louis XV of France reportedly obtained some of the first specimens from China as a gift for Madame de Pompadour. Russian Prince Potemkin so loved his collection that he decorated banquet tables with goldfish bowls.

In the 19th century goldfish reached the New World. One account credits P. T. Barnum with importing several as early as 1850. By 1865 a New York pet store was selling them as novelties.

Descendants of the original *chin yü*, as the Chinese know the common variety, today rank among the most popular of household pets in the United States. Each year Americans buy an astounding 60 million common goldfish—a figure almost twice that of the nation's estimated dog population.

Unlike the common variety, fancies until recently enjoyed limited popularity outside Asia, for several reasons. They are expensive: A retail price of $25 to $50 is not unusual for an extremely fine lionhead, celestial, or bubble eye. More readily available Moors, fantails, and calicoes cost as much as $5 each. And breeding of fancies requires a considerable degree of expertise. Unless carefully controlled, they tend within a few generations to revert to the ancestral form.

"Goldfish breeding is the riskiest business in the world," says one breeder. "Anything can happen to them, and usually does."

Orient Dominates Goldfish Trade

Even hardy common goldfish may yield only six or eight salable offspring for every hundred eggs laid. Fingerlings raised in outdoor ponds may succumb to diseases, insects, snakes, hawks, and other enemies. A bullfrog, for example, may consume eight in less than 24 hours. Adult goldfish also fall prey to a host of diseases and predators.

Cultivating goldfish calls for art and acumen as well as caution, traits of the Japanese and Korean breeders who have been extraordinarily successful in elaborating on types imported from China.

The creation of a new variant is usually heralded by the press. One Tokyo success, a breed that may well remain forever rare, is the lionhead veiltail, a pumpkin-faced variety

Straight out of a Jules Verne fantasy: With mottled coat and goggle-eyes, a calico telescope cruises nearsightedly in search of food. Tropical fish have claimed the spotlight in recent decades, but fancy goldfish are gaining popularity as aquarium favorites. Specimens of many varieties are priced at less than $5 each.

Mating frenzy roils the shallows at a goldfish farm—the first step in the cycle that brings sixty million pets to American aquarists annually. Mats of Spanish moss or plastic fiber simulate natural conditions and thus induce egg laying. The slimmer males chase and bump the egg-heavy females (**left**) until they vent their burden. Simultaneously, the males emit fertilizing milt.

Fungus filaments appear as star bursts (**right**) as they attack and digest unfertilized eggs; nearby fertile eggs are spared. In five months, when 1½ to 2 inches long, the young are ready for sale.

Those Outlandish Goldfish!

Ordinary or bizarre? The egg gives no clue to the form an adult fish will take. Four days after fertilization (**top**), a black eye shines brightly from the egg sac. The spine and chromatophores, or color cells, show darkly.

On the fifth day the hatchling (**above**) escapes its egg case but continues to absorb yolk visible near its stomach.

At week's end half-inch-long larvae (**opposite**) begin to search for food.

Many months later, to the delight of owners, the adolescents may develop "fancy" abnormalities; genetic variations occur frequently in common goldfish.

that swims so clumsily it can't catch insects or compete with other fish for food. When the aquarium at New York City's Coney Island received a lionhead veiltail as a gift some years ago, a Japan Air Lines representative demonstrated how to hand-feed the fish—using chopsticks.

The Japanese generally export their fish by jet from Tokyo, while the Chinese send theirs by way of Hong Kong. Transportation techniques are virtually foolproof: The fish are placed in plastic bags of water topped off with pure oxygen, and the bags may be reoxygenated along the way.

Catch Now, Pay Later

While visiting Hong Kong in early 1972, I traveled to the British colony's New Territories, bordering on China, to observe the business side of goldfish breeding. With importer-exporter Jack Aronowitz, a goldfish expert from Los Angeles, and his two assistants, Paula Ross and Alex Ko, I drove toward the Chinese border, leaving congested traffic, high-rise apartments, and churning humanity behind as we passed sprawling paddy fields. We stopped at a fish hatchery three miles short of the border, near the city of Fanling, where spring-fed streams teeming with goldfish lace the land.

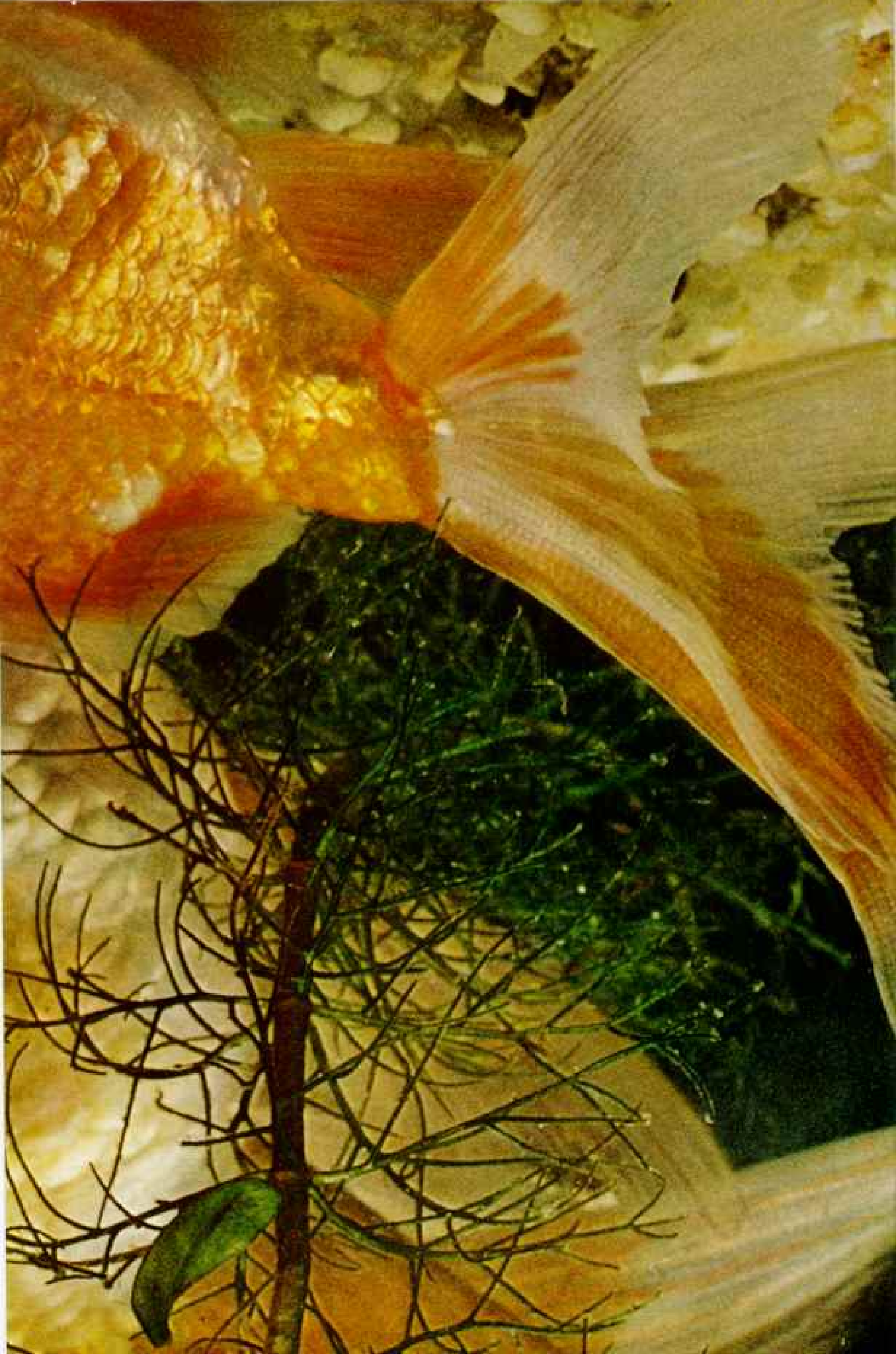
"Almost everyone here deals in goldfish —mostly fancy varieties that they import, breed, and sell," Jack told me as we trudged along slippery earthen dikes. "These people wouldn't look twice at pet-store types. They'd grind them up for fertilizer."

We approached a compound guarded by fierce-looking dogs. The caretaker, recognizing Jack, opened the gate.

Before us spread an enclosure of perhaps two acres of concrete pools filled with darting specks of living gold. Other buyers strolled along narrow walkways among the pools, scooping up masses of splashing fish in hand nets. They gave their catch to hatchery employees who graded the fish according to type, color, scale brilliance, fin perfection, profile, and energy. A combination of structural peculiarities, color, and sheen distinguished the best of the specimens.

I walked past pool after pool, astounded by the variety. Bubble eyes displayed an enormous bladderlike growth about each eye, that flopped like the udder of a running cow (pages 514-15 and 532). Celestials struck me as even stranger, their bulbous eyes fixed unalterably

HEAVENWARD GAZE *identifies the celestial. Korean Buddhists traditionally keep this breed in temple ponds.*



upward, recalling the tradition that these fish, with their heavenward stare, first were bred in a Korean Buddhist temple.

How celestials manage to avoid obstacles, let alone forage, seems a marvel to me. In the tightly competitive world of the wild, such offbeat endowments would spell immediate doom (preceding pages).

Equally perplexing were other fish whose exquisite and utterly fragile fins gave them their names—fantail, ribbon tail, and twin tail. They drifted along, pausing now and then as if to display themselves like models in a fashion show.

The color and shimmer of goldfish are produced by pigmented skin cells, as well as by light refraction and reflection from crystals of the complex chemical guanine. Subtle tints result from pigment-particle dispersion and the position of the chemical on a scale.

Goldfish shows, where fanciers and culturists gather to exhibit and ogle the latest genetic wonders, are frequent both in the Orient and in Europe. Judging is highly unpredictable: What one specialist regards as blue-ribbon material, another—reflecting his district's bias—will as likely reject.

Busy Times at the Finny Farm

Images of the Hong Kong goldfish market still lingered in my thoughts weeks later when I sought a contrasting view far from the Orient. I found it in the Ozark foothills near Stoutland, Missouri! Here Ozark Fisheries, Inc., turns out the familiar comet goldfish on assembly-line principles—by the tens of millions. Comets, I learned, are essentially the same old-fashioned goldfish of the sort to

Lost in its own glory, a chocolate-hooded, ten-inch-long lionhead at the Yoshida Yo-gyojo hatchery in Tokyo is valued at $1,000. Such large fish with symmetrical scales and unusual color become breeding stock.

From the holding tanks (**right**), buyers may choose among common goldfish at far right, fancies in the foreground, and large brocade-patterned carp, or koi, in the adjoining tank. The company sells millions of fish in Japan, and also airfreights them—bagged with oxygenated water—to dealers around the world. Hong Kong merchants distribute goldfish from China.

which my aunt once fed crumbled crackers.

There on 400 water acres in central Missouri a cycle of mating, egg laying, feeding, culling, harvesting, and marketing involves a year-round vigil. Trucks equipped for aeration carry some of the crop to markets hundreds of miles away, but the major part is moved by airfreight and parcel post.

"We produce, measure, and sell our product by the ton," the sales manager told me as our car bumped over miles of roadways defining a vast network of fishponds. Alongside the roads teams of workers stood hip deep in water, seining and funneling bucketfuls of slippery catch into trucks that would transport the fish to grading and packing houses.

Other employees were dumping pails of high-protein feed—a composite of soybeans, wheat, meat, fish meal, and vitamins—into a pond. We watched from shore as the water around the feeding site quickly turned golden with a concentration of hungry fish.

Ozark's operation is vast, supplying more than 13,000 retailers in the United States, Canada, and England.

Name Change Boosts Sales

Besides the common goldfish—the original dime-store type—the fish farm breeds four fancy varieties: graceful fantails, second to the common comet in popularity; eye-bulging Moors; brilliantly colored calicoes; and highly mottled, mostly blue shubunkins, a type developed in Japan about 1900.

Shubunkins, whose name means "autumn brocade" in Japanese, rank low in sales at Ozark, but in England they achieved considerable popularity when an enterprising

promoter changed the name to "Cambridge blue." Blue is the Cambridge University color.

Ozark doesn't attempt to breed other fancy or outlandish fish because the market demand is still limited and production costs high. The Ozark goldfish people prefer to leave that field to specialty breeders and to their skillful friends in the Orient.

I might have been back in the Orient when I visited a goldfish farm near Thurmont, Maryland, a few weeks later. Hunting Creek Fisheries, Inc., located in the shadow of the Catoctin Mountains not far from the Presidential retreat, Camp David, boasts aquariums that gleam with fancy varieties.

The collection seemed to me every bit as impressive as those I had seen in Hong Kong. When I mentioned this to hatchery owner Ernest F. Tresselt, he agreed.

"They ought to be," he said. "Much of my original stock came from China by way of Hong Kong—some from your friend Jack Aronowitz, in fact."

Spawning Fish Have Human Help

Ernie's father founded the hatchery in 1924, and it has prospered since.

"We're not the country's largest," he conceded, "but I'd say we're prominent among the small ones." The hatchery's customers and visitors over the years have numbered several well-known personalities, including two who paused one day on their way from a conference at Camp David, then called Shangri-La: President Franklin Delano Roosevelt and Winston Churchill.

"Though we sell some fancies," Ernie said, "the usual commercial varieties are our bread and butter." He led me from his office building to a nearby pond about 200 feet long and half as wide. The pond had been meticulously cleared of weeds and other debris in preparation for the crucial breeding season. Any slipup now, he said, and the business might as well close for the year.

Most of the time, sex differences in goldfish are externally indiscernible, but at the approach of the breeding season—usually late March through June—males develop a sandpapery surface of tiny nodules on each operculum, or gill cover.

We watched as the fish swam about in helter-skelter fashion. "We make no secret of our production methods," Ernie remarked. "We have no trade gimmicks, and we don't

(Continued on page 533)

Gossamer veils trail from a Japanese Ryukin.

SKYWARD EYE
PEARL SCALE
RED TIGER HEAD

RISQUE
PURPLE CAP
BUBBLE EYE

"Gold scales, embroidered gills, red and white fins;
Restlessly hither and thither they play in the waves."

NACRIAL BOUBOUET
BLUE DRAGON EYE
REDHEAD

RED DRAGON EYE
RED-AND-WHITE DRAGON EYE
BLACKBACK DRAGON EYE

Thus wrote 13th-century poet Po Yu-ch'an. As early as the tenth century the Chinese had domesticated this member of the carp family. Patiently they mated individuals that showed variations of color, fins, shape, and scales, creating a panoply of ornamental breeds. Since the Chinese traditionally kept their pets in ceramic bowls and outdoor pools, they observed them from above, a view reflected on many of these postage stamps issued in 1960 by the People's Republic of China. Some of the names appearing in Chinese on the stamps' lower margins vary from those familiar to U. S. fanciers.

mind competition. The principles of goldfish breeding are simple and available to anyone, but sustained production is very demanding. Experience doesn't come overnight."

I knelt by the pond. Milling about in the deeper water a few yards from me were females gravid with eggs; they were some of the several hundred hefty male and female breeder fish, some as long as ten inches, that had been "planted" in the pond the previous day.

Beside us on shore, mats of dried Spanish moss were stacked like flat sofa pillows. Ernie began putting the mats on barely submerged wooden racks lining the shallows. Immediately, scores of females driven by the powerful urge to mate and drop the weight of their maturing eggs—as many as 5,000 each—rose from the depths and darted for the matting. Instinctively, a larger horde of males surfaced in hot pursuit, wriggling, pushing, bumping, forcing their way among the frenzied females.

While I watched, thousands of sticky translucent orbs about 1/16th of an inch in diameter were vented over the matting to mingle with fertilizing spermatozoa.

Finally, after several hours, a lull set in, and the fish retreated to deeper water.

Parents Pose a Threat to Young

Ernie lifted the egg-laden mats from the water, and workers began to stack them in open trucks for transfer to a nearby nursery pond where no adult fish swam.

"If we left the moss with the breeder fish," Ernie commented, "in a few hours we'd have no eggs. Goldfish are blindly cannibalistic. They eat their own and others' eggs almost as fast as they're laid."

When I drove away from Hunting Creek Fisheries that afternoon, I had an unusual package on the seat beside me: a wrapped fragment of the egg-dotted moss, a gift from Ernie. That evening the moss floated in an aquarium at my Washington laboratory.

I knew that male chromosomes in each egg had paired with female to become single units. These would split as each cell became two joined cells, and split again as those became four, eight, sixteen, and so on—the mysterious modus of all higher creatures.

During the next few days I continually surveyed my budding goldfish collection through a microscope. Slowly the shape of a primitive vertebrate emerged at the surface of each yolk sac; then there were spasmodic tail twitchings, and finally internal pulsations. Simultaneously, irregular blobs of black or gray developed in the translucent surface tissues; these would turn golden as yellow-orange chromatophores mingled with darker ones (page 522).

After Five Days, Freedom

Finally, on their fifth day in my aquarium, the eggs began to shake with birth pangs and violent rendings of their soft husks. From one popped a baby goldfish that rushed for cover in the shade of a water plant.

During the next several days I lost count as a flood of goldfish pressed for their independence; before long they were feeding on the protozoans and algae I had provided for them (page 523).

The following morning, to aid the tiny creatures in their struggle for survival, I dumped the entire contents of my aquarium into a spacious backyard pond. There they could fend for themselves nicely while I was away from home for a month.

When I returned, I transferred a netful of fish to the aquarium. They were doing well. At least fifty of them, each now nearly an inch long, were showing signs of gold.

But one stood out. It already was a rich golden, much more so than the others, and it displayed a flowing, lacy double tail fin as it swam along the front glass of the tank.

Something else about this fish struck me as odd: Its eyes seemed abnormally large, bulging a bit from their sockets.

Was the fish merely posing just a little, I wondered, or could it be that this spawning had produced something other than a common goldfish? Through genetic mutation or variation it could happen anytime, I knew.

With that thought, I suddenly felt almost as if I were wrapped in a kimono and wore sandals on my feet. And I knew in a flash how a glistening, shimmering goldfish centuries ago had set a fashion that is still in style. □

Ogling the outside world, bubble eyes captivate the viewer with headstands and belly bumping as they grope along a bottom they cannot see. Sharp objects must be eliminated from bubble eyes' aquariums to avoid damage to the fragile sacs.

The human spirit breaks through barriers of poverty, disease, and overpopulation to triumph in Calcutta, India's largest city and —incongruously—one of its richest. Gleefully thrown splashes of colored water and gaudy powder mark the springtime festival of Holi. These men rejoice in a political victory a few days later.

Why is it that **Calcutta**—

the world's most maligned metropolis—

is where so many people want to be?

By PETER T. WHITE

FOREIGN EDITORIAL STAFF

Photographs by RAGHUBIR SINGH

WALKING ON Ashutosh Mukherjee Road in the city of Calcutta, I have just been hit on the back of the neck by a water balloon. It burst, and a cool blue liquid is trickling down my back. The little boy who aimed so well gives me an engaging smile. "The rule is no splashing on the main roads," a policeman tells me, "but if it's small children, what can you say? It's a big day to them."

And so it is to a majority of the 3,200,000 people of all ages here in the city itself, to most of the 8,200,000 in the Calcutta Metropolitan District, comprising India's greatest metropolis. For today is Holi—a springtime festival of renewal and good cheer, when friends rub red or green powder on each other's faces, for good luck, and strangers may quite properly douse one another with colored water, for fun.

That's why I carry a high-powered brass squirt gun, thanks to which that engaging little boy is now dripping purple, and why I feel all the more exhilarated by the challenge of making sense of the stupendous paradox that is Calcutta.

Alas, no other city of modern times has evoked such discouraging words. Dreadful, gruesome, frightening. The world's largest slum. A disastrously overcrowded place where tens of thousands sleep in the streets, a hell of degradation and squalor, the cesspool of the world. A dying city. A vision of the end of man.

Serious writers have expressed themselves thus, and I met visitors from Europe and America who after just one day could hardly wait to get to the airport.

Yet daily I am assured by people who live here that there is nothing moribund about the place at all, that this is not only the capital of the State of West Bengal but in fact the commercial and cultural capital of much of India—productive, creative, throbbing with vitality. Poets, plentiful in Calcutta, declaim devotion to this city, and how unhappy they would be if they couldn't be here. Even families bedding down on the sidewalks tell me they are here by choice.

How to account for such divergent views, that's my big question, but for a start I have been inquiring about a lot of little things that seem puzzling enough—such as bits of color one sees on people's foreheads every day.

Why that little girl's big black smudge? It makes her unattractive to demons. Her mother's forehead features a small and perfectly round mark in aqua—for beauty, to match her graceful aqua sari. A vermilion smear on man or woman marks a blessing from a temple. And that man's silvery spot? Lime powder, an antiseptic for a pimple.

"Don't hesitate, just ask," says Subhas, a poet, "and don't be too formal, because we aren't." I tell him I know, I gave a man a light and he didn't even thank me.

Subhas is unabashed. "We take cordial behavior for granted, so to say 'thank you' would be an affectation. But I think you will find our people very warmhearted." He recalls that when he went to jail—long ago, when that seemed a good way to protest against the government—he met a pickpocket, who said: "When we get out, if you need money, I'll give you some, so you can publish your poems."

NOW WE have reached a neighborhood market—greens, cooking oil pressed from mustard seed, fresh fish. And fresh neem-tree twigs: Cut them into six-inch sections, peel off an inch of bark, and chew; the fibers spread to make a toothbrush, the sap makes a delicious dentifrice.

Subhas greets a film director. I notice that nearly all the early-morning grocery getters are men. Yes, they come every day before going to work. The ladies stay home, getting the children ready for school.

Most offices don't open before 10, but by 9:30 life thickens in the business districts. The city's population density is put at 79,000 per square mile—roughly that of Manhattan Island a dozen years ago, before so many moved to the suburbs. And, as in Manhattan, every working day commuters pour in by the hundreds of thousands. But here it looks as if everybody stays swarming in the streets, as if all India had broken loose.

I see men hanging in clusters from packed buses and trams, men balancing high on a bamboo framework to paint a building. Men pulling rickshas, pushing carts piled with bundles, carrying baskets on their heads with bricks, with toys, with government files en route from one office to another. On four heads bobs a 20-foot-square movie poster.

Many shops have open fronts, so that shopkeepers and customers meld into the street picture too. I pass a dozen shoeshops in a

Elegance living and elegance lost: Exuding wealth and status, a Bengali matron watches races at the Royal Calcutta Turf Club track. Beyond the horses rises the Victoria Memorial, a reminder that Britain founded Calcutta in 1690 and ruled until India gained independence in 1947.

Rich Britons and Bengalis of earlier days built mansions that gave Calcutta one of its nicknames, "City of Palaces." Today few of the old homes retain their glory. One residence (**right**) now is cut into apartments for descendants of the builder, who use its columned courtyard as a dairy.

row, two dozen adjacent dealers in used steel rods and springs, a honeycomb with hundreds of stalls with saris. Isn't that bad—so many competitors, so close together?

It's good, says a sari seller, it attracts many shoppers, eager to bargain; and so there'll be customers for every seller bargaining with sufficient shrewdness.

I step into the center of competition for tea. It comes from the foothills of the Himalayas, some 300 miles to the north; it is shipped from the Port of Calcutta down the Hooghly River through the Bay of Bengal to all the tea-thirsty world. India grows a third of the world's tea, and more than half of that is auctioned in this ten-story building.

But first it must be tasted. Qualities vary from grower to grower, from year to year; thousands of shipments must be sampled. I see rows of white bowls and a brisk routine: 1 gram tea plus 50 cc boiling water; after 6 minutes, judge the color, then. . . .

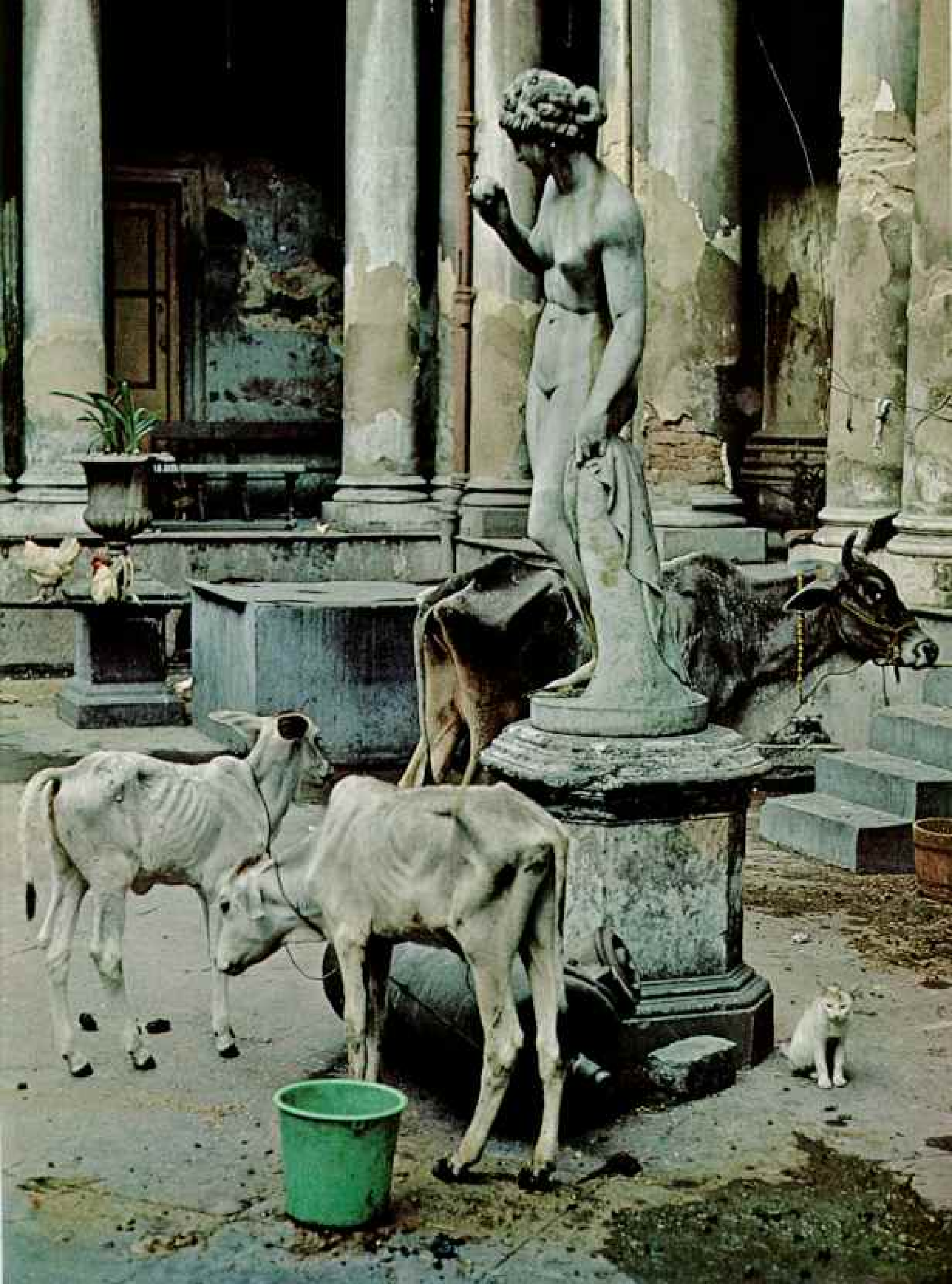
"Ah—bright, strong, thick!" Bright means reddish, lively, good. "Hmm—dull, plain, thin. . . ." Why is one tea dubbed chesty? The taster says he can sense the plywood of the tea chest. "It's even worse if the wood wasn't seasoned properly. That's cheesy."

The auction amphitheater occasionally erupts with high-pitched barks, as small traders quickly agree to split a consignment for local consumption. The bulk of the exports goes to England and the Soviet Union.

AT DUSK Subhas's neighborhood is dimly lit, but on nearly every block shines a doorway outlined in bright lights. These are houses rented for marriage ceremonies and the feasting of guests. This is the relatively cool season, between November and March—a traditional time for weddings, before the fierce heat and monsoon rains. But why are so many people still outdoors?

"To us the streets are friendly," Subhas says. "They are a big part of our life. We make appointments to meet friends on the street, we stand around, we talk. . . ." He adds that living conditions might have something to do with it—the less room one has at home, the more one feels at home on the street.

Living conditions most deeply impress the foreigners on the sight-seeing bus setting out at 8:30 a.m. from the government tourist bureau—past Calcutta's big telephone exchange to Howrah Bridge and across the wide Hooghly; past Howrah Station, India's



Lifeline across the Hooghly River, famed Howrah Bridge daily

channels half a million workers to and from the inner city.

Streets by day, bedrooms by night, the thoroughfares of Calcutta often shock visitors who see for the first time the homeless and desperate living out their lives on the pavement. But to tens of thousands of Indians who have flocked to the city in search of a livelihood—many of them landless farmers from neighboring states—the streets offer rent-free homes where they can sleep, eat, socialize, and be entertained.

Even those who manage to earn enough rupees to pay rent—such as the man who sells peas and peanuts to feed his troupe of wire-walking rats (**above**)—may elect to sleep on the pavement and send the money home to families in the country. And in the humid, near-100-degree heat that grips Calcutta for months at a time, others prefer the streets to sweltering rooms. One late riser (**right**) slumbers on Harrison Road.

biggest railroad terminus, to the Botanical Gardens and "the world's biggest banyan tree." To the majestic riverside temple at Belur. Back again across the river to more temples, to the Indian Museum, to the gigantic white-marble Victoria Memorial—a squat Taj Mahal finished in 1921, full of memorabilia of British rule that ended 26 years ago.

It is late afternoon by the time we reach the zoo, with its seven white tigers. The guide apologizes for the tedious stretches on potholed roads, for all the inching along in monumental traffic jams. But without these delays, we wouldn't have seen as much along the way. A man sitting on the pavement being shaved by a man squatting. Men asleep on stone steps, a man picking through garbage. Women washing their hair at sidewalk water taps, squatting to nurse babies, carrying cans of water home. Children wearing nothing but amulets, playing in gutters.

A Dutch lady is aghast. "My goodness, that people can be so poor. How they live, how they behave!" She had seen a man squatting to urinate. A German says what these people need is a strong government.

NEXT DAY a city engineer lists for me Calcutta's specific deficiencies. Insufficient drinking water, he says. Insufficient drainage, so that in the monsoon months a street may for a whole day stay knee-deep in water. And insufficient sewerage, so that a fifth of the population depends on so-called service privies: little brick sheds with a platform above a two-foot-wide earthenware bowl at ground level; the bowls are emptied by municipal employees who carry the contents to trucks.

Housing also is insufficient. A third of the population lives in narrow-laned slums, in single-story huts divided into rooms, each for a family or a group of men sharing the rent. During the monsoon, many of these rooms may stay flooded a whole day too, and when the privies aren't serviced on schedule, the overflow sloshes down those narrow lanes.

A ricksha puller tells me why he wants to be here just the same. "I come for six months every year. The rest I stay in my village, far away, with my family. Half the year I can find no work on the farms, no way to earn anything. Here I can earn money."

He shares a 10-by-18-foot room with 14 men. Aren't they terribly cramped? He says they want one more to come in, it would


যাকতে পারে না
হিংস্রতা
বর্জন করুন

mean that much less rent for each. "Whatever I earn, after my expenses, I send home. Every month I send something."

Isn't a flooded street especially hard on ricksha pullers? Won't they hurt their bare feet on unseen obstacles?

The man says: "If it is my fate to be hurt, what can I do? When there is flooding, more people want to ride, so I can charge more."

Would he prefer more flooding then?

He stares at me, as if he doubts I'll ever learn. "Look, it means *money*. . . ."

HOW DID SO MUCH of Calcutta get to be such a mess, and yet a magnet attracting so many? A sociologist steers me through vagaries of history and geography. In the 18th century Britain's East India Company built up a trading port on the east bank of the Hooghly; the nearby swamps were advantageous then, for defense.

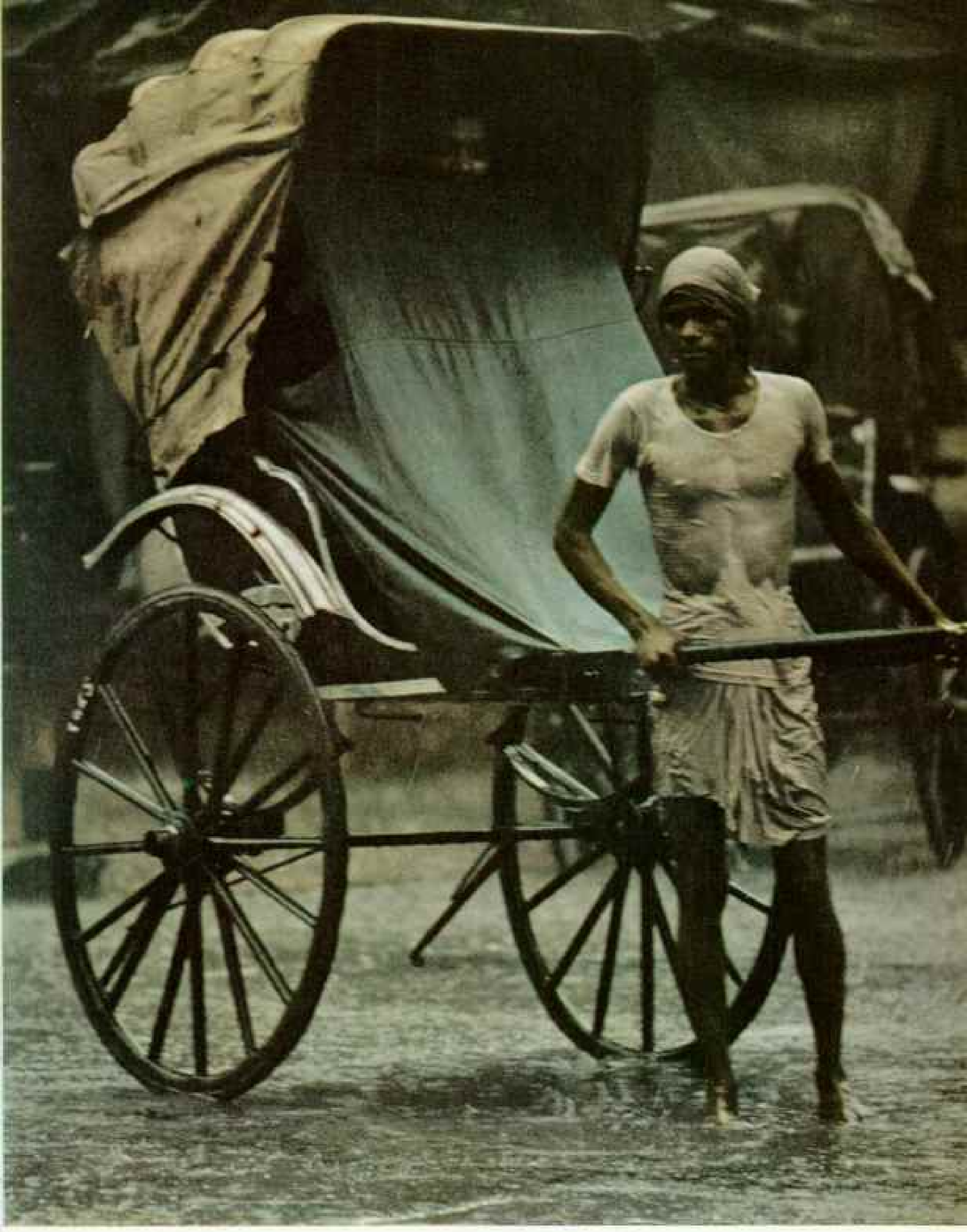
The 19th century brought industrialization: Mills weaving cloth and gunnysacks from Bengal's golden crop of jute spread up and down both banks, to profit from cheap water transportation. And machine shops, utilizing Bengali coal and iron.

Calcutta's middle-class Bengalis educated their sons to be clerks and teachers; to man the factories came landless peasants, chiefly from the neighboring State of Bihar. They occupied neat *bustees*, meaning living quarters, near the factories. Most of the wealth thus produced went to England, but Calcutta —now capital of all British India—prospered, grew, and became known as the second city of the British Empire, a "City of Palaces."

The 20th century brought shocks. Famine drove masses into the city in World War II; thousands starved to death in the streets. Religious riots raged on the eve of independence, just before the partition of India split Bengal, making East Bengal part of Pakistan. Many Bengali Moslems left, but many more Bengali Hindus moved in, across the new border only 35 miles away—eventually a million or more.

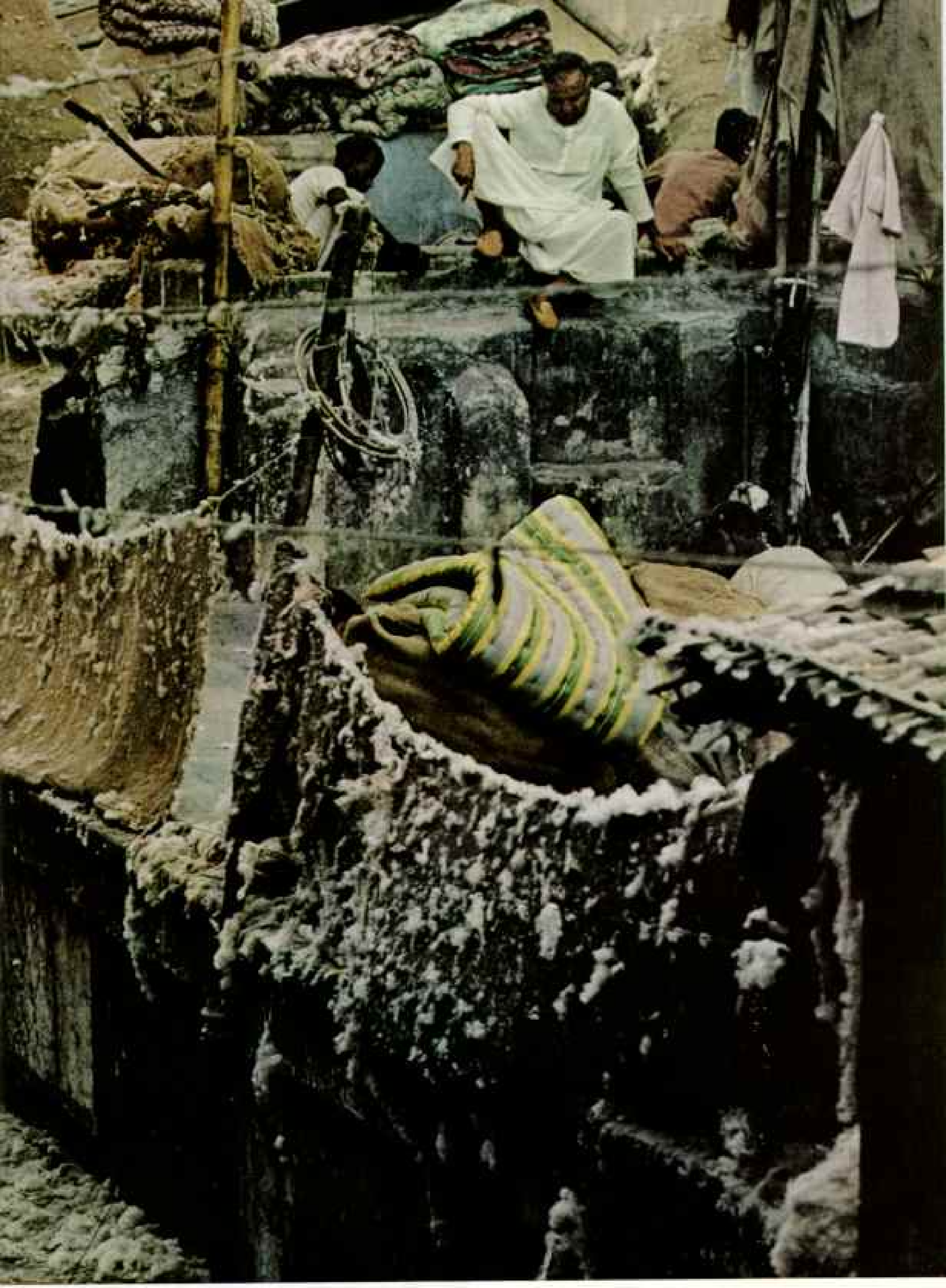
The refugees squeezed into bustees throughout the city; bustee became synonymous with slum. Huts sprouted on swampy tracts, city services went to pot, drains clogged.

Magnet to millions. Calcutta and dozens of satellite communities sprawled from riverbanks onto marshy areas, where a lack of sewers compounds drainage problems.



He alone welcomes Calcutta's adversary, the monsoon. This ricksha wallah raises his fares during downpours from June through September, when a total of 50 inches of rain floods streets, tenements, and outdoor toilets. Hindi-speaking men from the State of Bihar monopolize jobs as ricksha pullers, porters, and freight carriers.

Like flecks of foam, cotton stuffing from quilts and mattresses spatters a



bedding factory perched atop shops near Chitpore Road, in the city's heart.

Hence those miserable monsoon floods.

"Today Calcutta still is the urban hub for a vast region of eastern India containing 150 million people," says the sociologist. "Nine out of ten of them are peasants. A third of these are landless and impoverished."

What does that mean in human terms?

"If the head of a family dies, the widow is lucky if she can sweep floors and wash clothes for neighbors, for two square meals a day. But those aren't really square meals, because she must feed her children too. If a son grows up strong, he will have plenty to do at harvest-time, but what then? If he's energetic, he'll try to come to Calcutta."

That's why in this largely Bengali city there are three males to every two females; and of these three men, one is from Bihar—here without his family, doing strenuous physical work. My ricksha puller was typical.

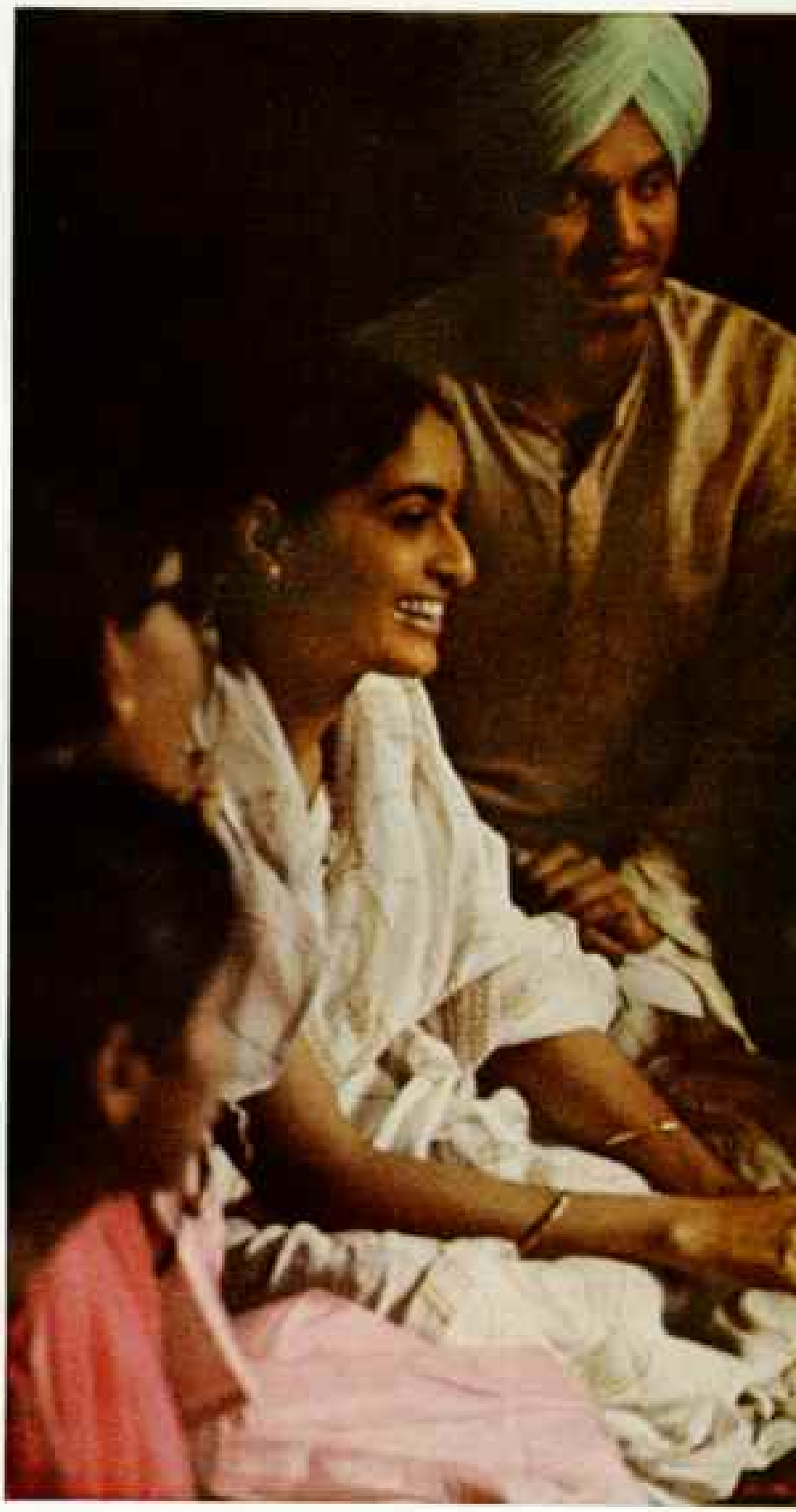
So are the men I meet when one evening, in the marshy eastern part of town, I trace a curious smell. Bones are boiling in great vats, to get the fat out. I enter a cavernous shed. Boiled bones everywhere, as high as I can see. It could be the setting for a horror movie. It's a bone mill.

Not human bones, of course; just waste from daily garbage, but not to be wasted. Noisy machinery grinds, sifts, and grinds again, exceedingly fine, for fertilizer. A dozen Biharis work here 13 hours a day, to earn overtime. They sleep here too, to save rent. One asks me: "Would you like to open a mill like this? I can find you good workers, from my village. They would work hard for you."

MY INTERPRETER says that in the dim light this Bihari must have taken me for a Marwari.

What are Marwaris? They're at the top of Calcutta's economic heap. They hail from the desert region of Rajasthan a thousand miles away, mostly from the district of Marwar. They are merchants and entrepreneurs who've been moving in as British capital moves out. Their most notable family is the Birlas—hence the Birla Industrial and Technological Museum, and the Birla Planetarium.

There are only about 1,000 Englishmen in Calcutta now, and about 100,000 Marwaris. At dusk quite a few of the latter can be found before the Victoria Memorial—standing around, gossiping and chewing betel nut, drinking Coca-Cola or 11-UP. That's right, 11-UP. A Marwari takes me home to dinner.



RICK DURRANCE II

Confluence of many cultural streams, Calcutta bubbles with intellectual vitality. Music, painting, and poetry flourish, theaters sell out most performances, and literary magazines abound.

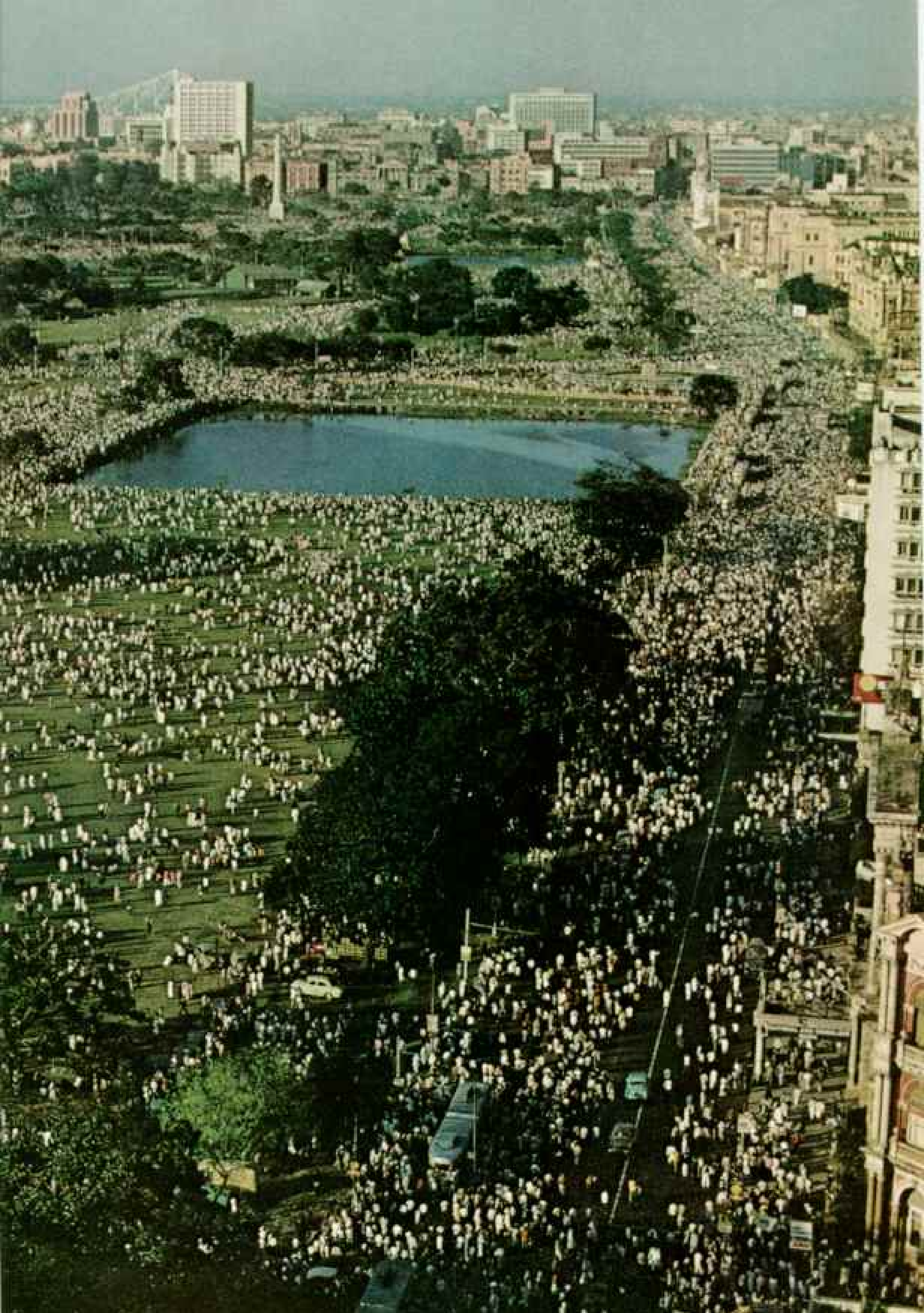
Maestro of the sitar, Imrat Khan instructs pupils (**above**) in the intricacies of the teak-and-gourd instrument and gives concerts to overflow audiences.

A leading Bengali poet in a city of poets, Subhas Mukhopadhyay (**left**) finds inspiration in the resilience of the poor, both Hindu and Moslem.

Film maker Satyajit Ray (**right**) tells hauntingly sensitive stories. His first movies about peasant life, acted by amateurs, won international awards; he also has dramatized the problems of educated city dwellers.

Calcutta, India's Maligned Metropolis

Largest village square in all India, the 1,280-acre Maidan offers myriad amusements for throngs attuned to country life. A hawker deals out sugar-coated "potency" pills to eager hands (**above**). Snake charmers, fortune-tellers, and holy men vie for attention. Boys play cricket and soccer; other young people cluster at informal concerts. Here, in February 1972, a million people disperse after a rally for Prime Ministers Indira Gandhi of India and Sheik Mujibur Rahman of Bangladesh. The human river flows down broad Chowringhee Road, right, toward the city center, with its phalanx of modern bank and office buildings.



I've been hearing Bengalis talk about Marwaris—why do they so often call them overly shrewd, grasping, underhanded?

"They're jealous," says my host. He sits silent. Then he says: "Some men fight with swords. We fight with our brains. We control 50 percent of business and 60 percent of private industry, and we're proud of it!"

I VISIT a newspaperman. He says he's a cynic. "Wouldn't you be, if you lived in a place where people make off with manhole covers, to have something to sell? This morning my commuter train stalled because somebody snipped off the overhead wires. Yesterday it was a power failure. But you know, you may have come at a gradual turning point. Things may, perhaps, improve, slowly."

Calcutta's insufficiencies have received intensive attention for decades. Consultants came from abroad, from the World Health Organization and the World Bank; a metropolitan planning organization set to work, aided by the Ford Foundation; by 1966 a master plan was ready. But there was no money. Local tax collections were minimal, and India's central government, drawing much revenue from Calcutta, gave little back.

Now there are beginnings of action, the newspaperman says. The government has been dispersing money to the new Calcutta Metropolitan Development Authority. "Not because somebody said the bustees need latrines, or the sewers need repair. No, it was simply fear. Calcutta was on the verge of political chaos."

That had been building up for years. Unemployment, strikes, lockouts, frustration, agitation. A leftist United Front government was elected in West Bengal; its chief Communist component, the CPI(M), seemed insufficiently radical to some bright young Maoists —neophyte guerrillas called Naxalites. These two Communist factions fought each other with knives, homemade bombs, and pipe guns—crude pistols firing shotgun shells. It was the time of "the politics of murder," with victims in the hundreds.

A senior police official recalls: "The Naxalites joined with hoodlums and began to kill policemen. We fought back. When we caught them, we killed them. Some were our most promising university students."

Now the Naxalites were in jail or in hiding. West Bengal was ruled by the central government through an appointed governor backed by soldiers and Central Reserve Police. And soon there would again be elections. The Congress Party, the party of Prime Minister Indira Gandhi, is expected to prevail.

The Calcutta Metropolitan Development Authority invites me to visit some of its projects—first a road being fixed near the docks. My escort says this rates top priority. "The potholes got so big that buses got stuck and trucks tilted over. Those were elephant holes! The city did nothing. One day people put up barricades and let nobody pass. They blockaded the railroad headquarters. We got to work the next morning."

We drive to the adjoining municipality of Garden Reach, where the 12-foot-high outfall of the main open sewer is half silted up. The sandy embankments have been sliding. Now they are being lined with brick.

As we continue southeast—past factories and silvery oil-storage tanks—my escort explains that the Metropolitan District, stretching 50 miles along both sides of the river (map, page 542), encompasses 97 urban units, interspersed with 472 villages. "The jurisdictional tangle is frightening. We're supposed to cut through all that."

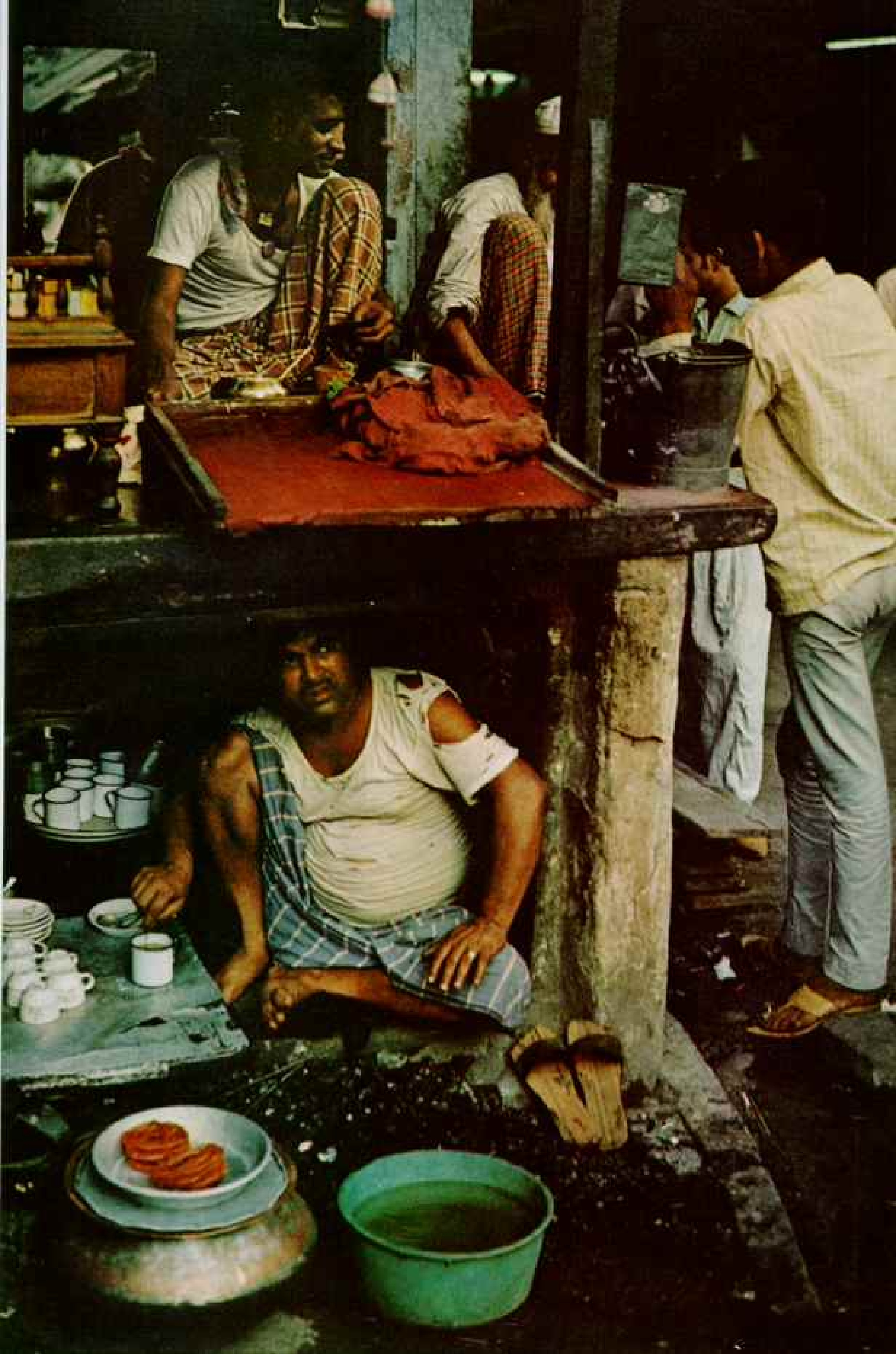
We stop at a bustee in Budge Budge, a municipality in the far southwest, to look at a partly bricked pathway. Twelve thousand people walk here daily—two shifts of a jute mill half a mile away—and during the rainy season the path has been flooded, a sea of mud.

Men of the bustee meet us. They are angry. Those bricks are no good, they say—not first quality, as promised, but third quality. And the mortar isn't one part cement to four parts sand, it's eight parts sand! They will not allow the contractor to continue. They say he's paying off the municipal engineer.

On walls all around I see posters and slogans. It's like that all over Calcutta, because of the coming elections; here it's all hammers and sickles of the CPI(M). I ask my escort as we drive off: Were these men agitators?

No, he doesn't think so. People are very

Rising tide of documents engulfs state-government employees in the Writers' Buildings, former living quarters for clerks, or "writers," of the East India Company. Seat of national, state, and municipal agencies, Calcutta generates red tape in profusion. As one example, 50 different jurisdictions deal with transportation and traffic problems.



inquisitive, very knowledgeable, they know when work is good or bad.

So the contractor has been cheating? Well, bids were out for seven months, it took another three months for approval, and by then brick prices had gone up, so he may have substituted a cheaper grade. . . .

What now? The municipal engineer will check. Then the Development Authority will check what he says. It will take time. Next monsoon that path will still be mud.

I ASK TO SEE more of the Metropolitan District, and of the ups and downs of development, so next morning we're off again—northward, through traffic chaos at Shambazaar, across the Circular Canal, now being redug, to the huge overhead water tank at Tallah. Built in 1911, it holds nine million gallons; two underground reservoirs have since been added. But the old steel water pipes are leaking; en route north along the Barrackpore Trunk Road I see more digging; the leaking pipes are being encased in concrete.

The road runs parallel to the river, past great factories with fading mansions for the managers, slums for the workers. Nearly every mile there's another municipality—Baranagar and a textile mill. Kamarhati, making machinery and cigarettes. Panihati with a paper mill. I want to stretch my legs at Khardah, but the driver says it's not a good area: Five men and a boy were killed here yesterday; now it's CPI(M) versus Congress. Violence flares if one party tries to parade in another's territory, or to paint out the other's slogans; after an hour all seems quiet again, but you never know.

At the great cantonment of Barrackpore, army officers play golf, the Central Reserve Police do push-ups. In a quiet garden I see statues of British viceroys and governors-general, only recently removed from central Calcutta. King George V gazes across the Hooghly at the billowing smoke of a jute mill.

Our goal is the waterworks at Palta, with its new intake jetty and two powerful new pumps. The superintendent says he'll soon get a third—a total capacity of 100 million gallons a day! But he worries about the river. Except in the rainy season, the water level is very low, big tides come up, and the salinity is high. So the pumps can be worked only part of the day.

It wasn't always thus. The Hooghly is the westernmost distributary of the Ganga, or Ganges. Its water branches off 140 miles to the north—and unfortunately the main stream has been shifting its course, so that now very little water comes down this arm. A great barrage has been finished up there, at Farakka; the necessary channels are being dug. "So, if the planners are right, we'll have plenty of fresh water. . . ."

As we head toward the northeastern tip of the district, toward the new town of Kalyani, we pass increasingly open country—mango trees in bloom, clusters of huts amid palms and ponds and sugarcane, irrigated fields sprouting green rice and white egrets.

And a great emptiness of dry fields, with square imprints left by big tents. Masses of men, women, and children huddled here, recent refugees from terror in East Bengal. Ten million fled to India, the majority to West Bengal; it had been another shock. But the central government mastered that problem. The war with Pakistan was quick and decisive; East Bengal became independent Bangladesh, and by now those refugees have all gone back.*

Kalyani is a planner's dream. A few factories here, a university over there, a neat railway station for commuters; scores of miles of underground sewers and paved roads—healthful space for a million middle-class people, the administrator says, designed in 1954 to take pressure off Calcutta.

How many are here now? About 25,000. Plus several thousand workers, but they don't live here, they're bused in. Why so few residents? The administrator says the reasons are very complicated.

Back in Calcutta, the sociologist shrugs. "I'll give you one reason. The poor were kept out. Look, if we're all of the same status, who'll do the services? If a friend drops in, I want to send out for fresh betel nut. Did they

*The birth pangs of Bangladesh were described in the September 1972 GEOGRAPHIC.

One man's roof is another's sales counter on Chitpore Road. The ground-floor shopkeeper sells deep-fried sweets and tea by the cup; the upper one, betel nut sprinkled with spices and wrapped in leaves. Sometimes stacking stalls three high, Calcutta's open-air merchants attract convivial customers—and their business thrives.

Bengali hero Subhas Chandra Bose (**below**), who died 28 years ago, is still revered as Netaji—the Leader—in Calcutta. Fighting to end British rule, he disdained Gandhi's nonviolence and sought support from the Axis side in World War II.

Political violence so troubled Calcutta in recent years that people would not leave their neighborhoods, or go out after dusk, for fear of being murdered. Then India's government stepped in. Its Central Reserve Police, rifles chained to their bodies (**left**) lest they be snatched in a melee, helped curb terrorism so that elections could be held in 1972.

An aggressive Communist faction (**top**), the CPI(M), bid strongly for power in Calcutta and the State of West Bengal. Though often vociferously radical, many college students (**above**) supported Mrs. Gandhi's moderately socialist Congress Party. Her military victory over Pakistan, which relieved Calcutta of the burden of millions of Bangladesh refugees, helped her party win overwhelmingly. Violence has now died down, but few expect the return of days when policemen on the street carried no firearms at all.

plan for the betel-nut seller? What about the shopping? In Calcutta, every five steps there are people selling things. . . ."

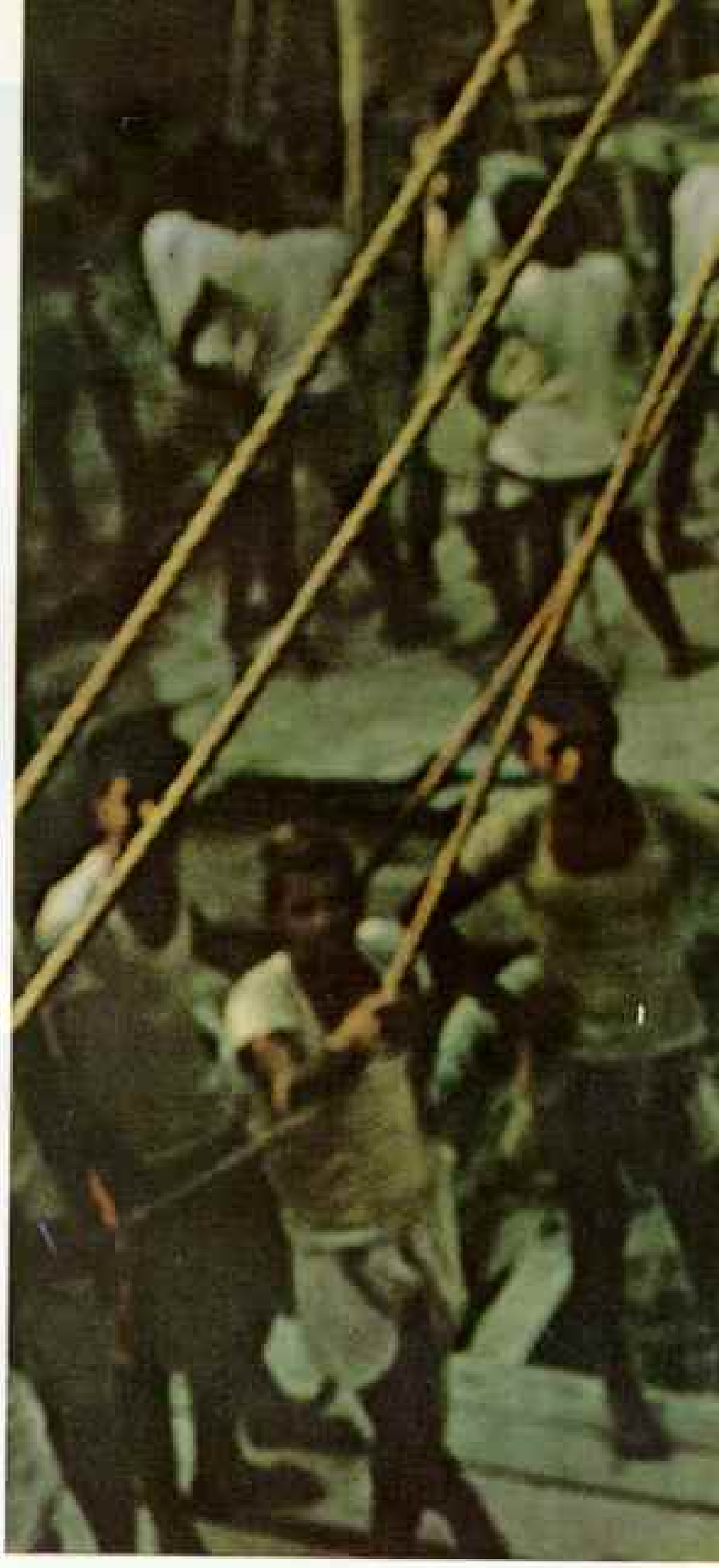
But Kalyani will grow now, he says. "Poor people are moving in, and putting up shacks near the houses, to eke out a living by giving services." Would he like to move out to Kalyani, once it is developed?

Once more I get that look, as if I'll never learn. "That would be like living in Delhi, or in Bombay, dull! Let's go to the theater."

The choice of diversions is sizable. I am torn between *The Threepenny Opera* in Bengali and Ali Akbar Khan on the sarod, a kind of lute. Half of India's drama groups are in Calcutta, an impresario tells me. "Not long ago the theater was suffering, people didn't dare go out after dark, for fear of bombs. Now we sell out every night."

At the annual show of the Agri-Horticultural Society, the big hit is the supersize dahlias. A prizewinner says the climate does it, "and amateurs who really care." On Saturday, on the great green expanse in the heart of town called the Maidan, the track of the Royal Calcutta Turf Club is thronged. Between races, Gurkhas of the Indian Army play Scottish tunes on bagpipes; they ceremoniously receive a ration of rum from the Senior Steward, the Maharajadhiraja of Burdwan, while the clubrooms tinkle with upper-class Indian conversation, in the crispest English. "Mrs. Gandhi wants to nationalize everything, coal, jute, tea. . . ." "Excellent lobsters will soon be coming from Bangladesh."

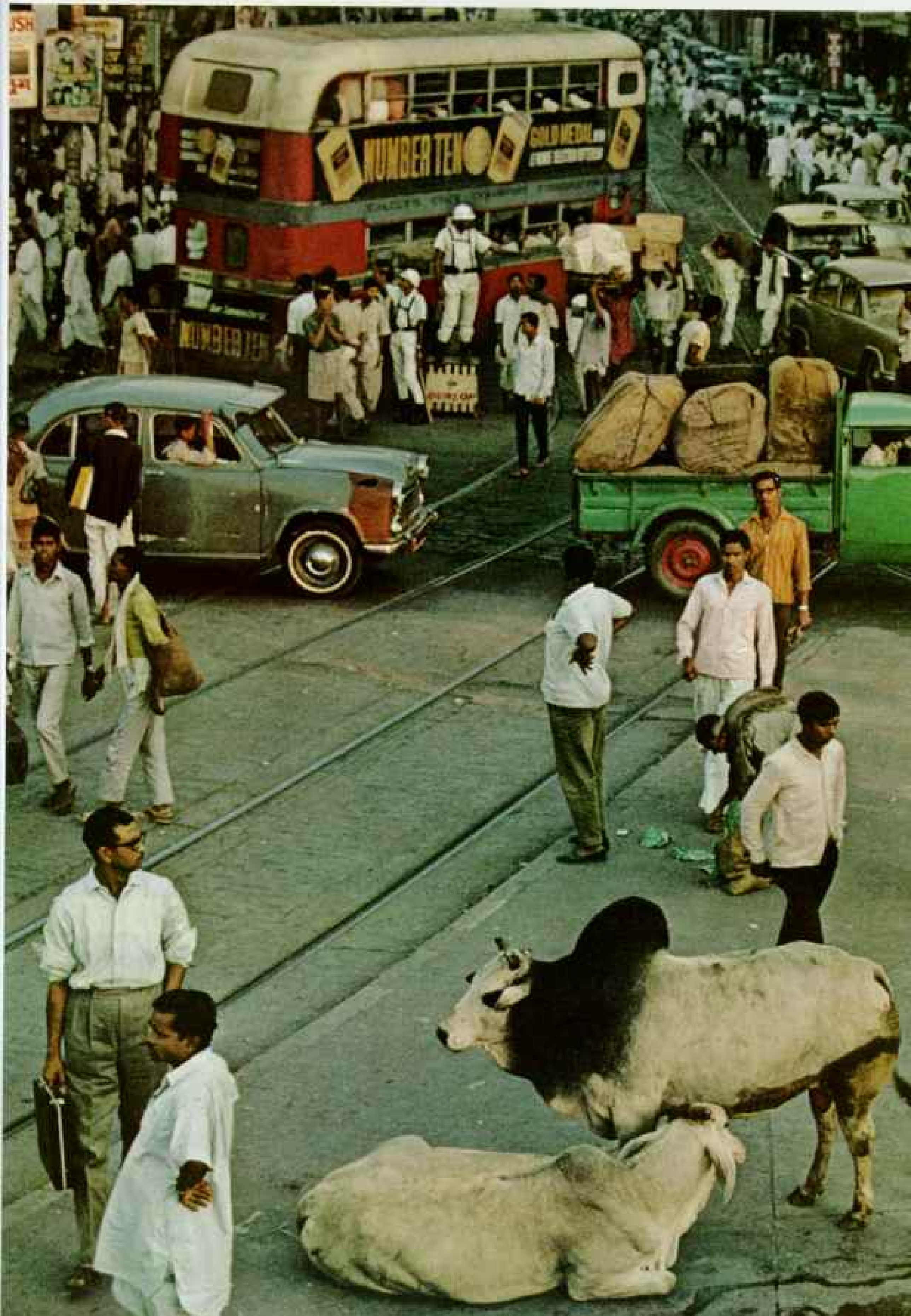
On Sunday, on another part of the Maidan, I mingle with men who watch performing monkeys and dispensers of folk medicine; many line up to squat before tooth pullers. The majority here speak Hindi, in the accents



DICK DURRANCE II

Human cogs in a building machine, chanting laborers haul up weights to drive pilings for a hospital; another worker hangs off scaffolding lashed with ropes.

Sophisticated palates taste tea brewed at a Calcutta auction house. Tea by the ton funnels from Assam plantations through Calcutta's Kidderpore Docks (**right**). Silting of the Hooghly now bars large ocean freighters, but a new deep-water port nears completion at Haldia, 65 miles downstream.


NUMBER TEN
NUMBER TEN

of Bihar. The biggest crowds watch the wrestling—it's free—or sit in circles around singers of religious songs. Next Sunday, near the statue of Lenin presented by the U.S.S.R., there'll be a big political meeting.

I wander to a far corner of the Maidan. In a tent, the Headmasters' Association of West Bengal is fasting; they want to be paid on time. Under nearby trees runs a continuous performance by a resident colony of rats. One pulls a leaf into a hole, another pulls it out again. Two race for the same hole and collide in midair. The crowd is delighted. It reminds me of the prairie-dog colony at the zoo in Washington, but here one may feed the animals. They get corn and peas.

I AM LUCKY to have an indefatigable interpreter, Ajit Kumar Das, nicknamed Gopal. I owe him a lot more than the chance to ask questions wherever I go. We have become friends, and I begin to feel very much at home in his house in Kalighat, one of Calcutta's oldest sections and to me the most revealing.

Gopal has a wife and two teen-age daughters who try to monopolize the telephone. His younger brother runs a print-shop downstairs. There are three unmarried sisters; one will marry the son of the electrical-supplies dealer next door. I witnessed the decorous occasion when the boy's family came—the ladies sat in one group while the men, in another, discussed the settlement.

Gopal's father is dead, and so he's the head of the family, but his old mother is very much alive. She's the first one up, going to the little room reserved for devotions, with water from the river, for the Hooghly is the Ganga, the holiest of rivers. And she makes magnificent *muri*.

She mixes rice kernels into heated sand and gently brushes them away the moment they're puffed to perfection. It's a favorite snack, available at any corner, but there it'll never taste homemade. "Eat," says Gopal's mother. "It's good for you."

There are two more shops downstairs. A man from the Punjab repairs radios; he says he just bought a truck, there's money in transportation. The other shop wholesales stainless-steel ware. Men who have come from Gujarat, a thousand miles away on the Arabian Sea, take pots on credit. Going from door to door, they exchange them for old clothes. They pull gold and silver thread from the better saris, and sell that for reprocessing. They keep for themselves whatever clothes are suitable and sell the rest to a rag dealer.

I learn a lot in Kalighat. Youngsters run after the picture man and his antique show-and-tell machine. It occurs to

Placidly parked, a cow and black-humped bull ignore honking horns and tinkling ricksha bells during rush hour on Harrison Road. India's cherished cattle earn their keep by providing fresh milk in a city lacking adequate refrigeration. When they go dry, they often wander at will. Another dividend—dung—is dried for fuel.

Ministering to the poorest of the poor, Albanian-born Mother Teresa (**below**) has worked in Calcutta's slums for decades. Her order, the Missionaries of Charity, manages an orphanage, schools, clinics for lepers, and a refuge for the dying. But relief organizations cannot keep up with the problems. At Maniktala (**right**), one entire family shares each brick-walled room and bathes in the polluted ponds. Government housing, in the background, becomes badly overcrowded as renters sublet space. When 300 such flats were completed, thousands of people applied.

me that these boisterous imps, who daily see so much of life, are as familiar with death as my little boy is with the flattening of villains in television cartoons. Every day corpses of the poor and the prosperous are carried through the streets on cots to the public burning ground. Many are bedecked with flowers, but one always sees the still faces.

At the temple of the goddess Kali—Mother Kali—a lawyer tells me he just won a big case, so he brought this little goat, to be sacrificed. It is washed, a blade flashes, the head is off. It goes to a priest. The lawyer takes the carcass home, for cooking.

I have always hated to think of animals suffering, and had I read about such a scene I would have shuddered. But when I see it, I marvel how quickly it's over. If only all the animals in the slaughterhouses of the world would die so expeditiously.

CALCUTTA, from a zoological perspective, is a city of crows and cows. The crows, ever noisy, help with cleaning up. The cows, I learn, are here principally for commercial purposes.

"A cow in a city must seem strange to you," says an economist. "Well, people want fresh milk. Where shall it come from? Refrigeration is still scarce and costly, and in our climate milk will stay fresh five hours or less. Think of milking ten cows and then taking the milk around—if you must do this in less than four hours, where will you locate your production facilities? In a village? You would need motor vehicles and fuel. That would drive up your cost. So, if milk must be distributed quickly at a reasonable price, production must be close to the consumer. And so, in the bustees throughout the city, there are *khatals*, or stables. At least 50,000 head of cattle."

That is why so many barges on the river are overloaded with rice straw; it's food for cows—to be chopped and mixed with molasses in the khatals. But what about all these cows out in the streets? They seem as ubiquitous as Volkswagens in Chicago.

"They're dry, so the owners let them scrounge, it's cheaper. They always come back on their own. Nobody hurts them, and they get food from devout people. As soon as one has a calf, she'll be tied up."

Cows, always calm, are benign creatures people are glad to see, symbols of good. If they wander into traffic, there is no panic; one calmly steers around them (pages 558-9). Their dung never lies around long. Poor people collect it, mix it with straw, and sell it as kindling, to start coal fires for cooking. The emblem of Mrs. Gandhi's party, beckoning from many walls, is a cow suckling a calf.

I go cow-watching with a veterinarian in the throbbing Dalhousie Square area, around the stock exchange and the banks. The middle class is buying lunch at sidewalk stands. A skinny, obviously unproductive cow lumbers between parked cars toward a pile of discarded coconut shells. Another munches banana peel; her udder also looks dry.

"Our indigenous zebu cows are poor yielders," says the veterinarian. "Hey, look at her!" She looks sleek. "Half Jersey! Very costly, very productive." Obviously.

Her owner is nearby—a doorman. Near his door he has a little shed with two more cows. He's a Bihari, and we talk awhile. He's sending home quite a bit of money to his village; soon he'll be quite a landowner.

Back in Kalighat after dark: Six figures sleep on a sidewalk, wrapped in blankets. Ten feet away, in an open-fronted shop for oil and

Good reigns victorious each fall when Calcutta's Hindus honor their beloved goddess Durga, vanquisher of evil, with a festive round of clothes buying, gift giving, family visits, and worship. Here girls dab on vermilion before their neighborhood's mud-plaster image of the deity. Finally, hundreds of the figures are cast into the Hooghly, in the certainty that next fall Durga will reappear from her Himalayan abode—a symbol of courage and hope.

spices, the proprietor does accounts by the light of a kerosene lantern.

"Oh, they've been here for years," he tells me. "The women do cleaning, and the men something or other. They keep their stuff in the doorway by day. They're happier than I am. What do they have to worry about? I wish they'd go away."

One figure coughs and stands up. It's a naked little boy, barely two feet tall. He puts a hand to one ear and cries. The oil-shop man pays no attention.

The little boy coughs and cries bitterly. He toddles to the curb. A woman walks up swiftly and scoops him up. They disappear around the corner.

What's going on? Gopal and I run after them. The woman says, "He's my nephew. I am taking him to his mother."

Sure enough, in a bustling street a couple squat at a fire, five feet from the tram tracks. The woman reaches for the boy and cradles him. "His name is Moni," she says. "He was sleeping, so I let him sleep. This is where we always cook." Moni again sleeps.

Moni's father stirs vegetables in a pan. He motions me to sit. He is a Bengali, from a village just south of the Metropolitan District. He says he goes back to visit once in a while, but it's better here. "You earn a little money, and sometimes people give you things." Today it was a little pot of rice.

DON'T PEOPLE get awfully sick, living like this? I visit the city's chief health officer. What about cholera, which so alarmed the World Health Organization?

"Three deaths last week, but those were patients brought from outside. In May we might get ten cases and perhaps five deaths."

In the past decade, he goes on, cholera deaths in Calcutta have dramatically declined. "Since 1963 we've been trying to chlorinate all the water piped in—including what you see pouring out of street taps." Methods of treating cholera have greatly improved.

But lesser gastrointestinal upsets remain common. When you ask a Bengali how he is and he replies *ek rokom*—meaning so-so—chances are his insides are out of sorts. Public cleanliness is abysmal, but personal cleanliness is high; even bustee people manage two baths a day.

All in all, the death rate has been going down, the health officer adds. Most dramatic is the decline of smallpox. No cases now but

perhaps three or four a week later on, and a death or two.

That jibes with what I heard from the image makers along Kalighat Road. The demand for figures of the goddess Sitala, who protects against smallpox, is down. For likenesses of the goddess Durga, it's up. Durga destroys the demon of evil each autumn. It's Calcutta's biggest festival.

At the All India Institute of Hygiene and Public Health I inquire about leprosy.

"Perhaps 15,000 cases in the city. Quite a few come to Calcutta because they can get treatment here, and then they stay. Often we can arrest it."

Malnutrition is another matter, says the institute professor. What I hear leaves me unspeakably sad. It's a tale of protein, poverty, and parental blindness, of mothers wanting to make their babies happy, but in fact doing them grievous harm.

"There are relatively cheap proteins available," the professor begins, "in pulses—such as lentils or peas, especially in the chickpeas called Bengal gram. Same caloric value as rice or wheat, but 22 percent protein of high quality. The body can utilize 65 percent of it, to help oxidize or burn up carbohydrates. You may have seen it, a yellowish powder. . . ."

That's what the food man weighs out every day in front of Gopal's house. Bihari ricksha pullers eat it, kneaded with water and salt; it comes with chilis and mango pickles. They call it *chattu*. It's a square meal.

"Yes, but Bengalis don't want to eat chattu. Chattu eater! That's a term of derision. They give their infants starchy stuff with hardly any protein—especially sago, like tapioca. They do it because that's what their mothers did. Now look what happens. . . ."

If a very poor mother's child gets nothing but a little sago, he draws on his body protein to oxidize this starch, he gets terribly thin —bony, skin wrinkled, a monkey face. This is marasmus. Very bad, but he can be helped. There isn't so much internal damage. . . .

Kwashiorkor doesn't look as bad, but it's worse. Mother goes off to work happy, her child had plenty of sago, he won't be hungry. The child is stuffed with carbohydrates that cannot be oxidized. This damages tissues, he'll swell up with edema, get an enlarged fatty liver, and finally a peeling of the skin. . . .

Is this typical of Calcutta?

"What you see in Calcutta seems to be symptomatic of India. I estimate that two percent of our children between one and five years old are marasmic; one percent has kwashiorkor. But for every obvious case of kwashiorkor, ten cases are developing. *If* these could be diagnosed, and *if* they could be protected with Bengal gram. . . .

"You see, a disease caused by just one factor can be got rid of with money and manpower. Malaria was. But malnutrition is socio-economic-cultural. Sago is part of the culture of West Bengal."

In two months in Calcutta I had seen a dozen marasmic children, a tiny girl carried by her begging bigger sister, and the others in a charity ward. Now I remember a day in a bustee—how touched I was by the small fry emulating their elders. A little girl grinding vermilion on a brick, a boy building a shrine with a stick for an image and empty antibiotic bottles for offerings. When I passed a woman selling sago, how could I have known what that meant? Her little boy sat there so quietly, with his belly a little bigger than it should have been. . . .

THE ELECTION IS OVER, the CPI(M) was swamped. The Congress Party rules West Bengal, violence has died down in the Calcutta Metropolitan District.

I am haunted by thoughts of a factory clerk who died just before the election. The police told me it was politics, of course.

Never mind what his party was. At two in the morning armed men came to the little brick house he had built near a pond and some palms. They dragged him away and hacked him to pieces. Then they came back and raped his wife. She is gone now, with the four children. The little house is empty.

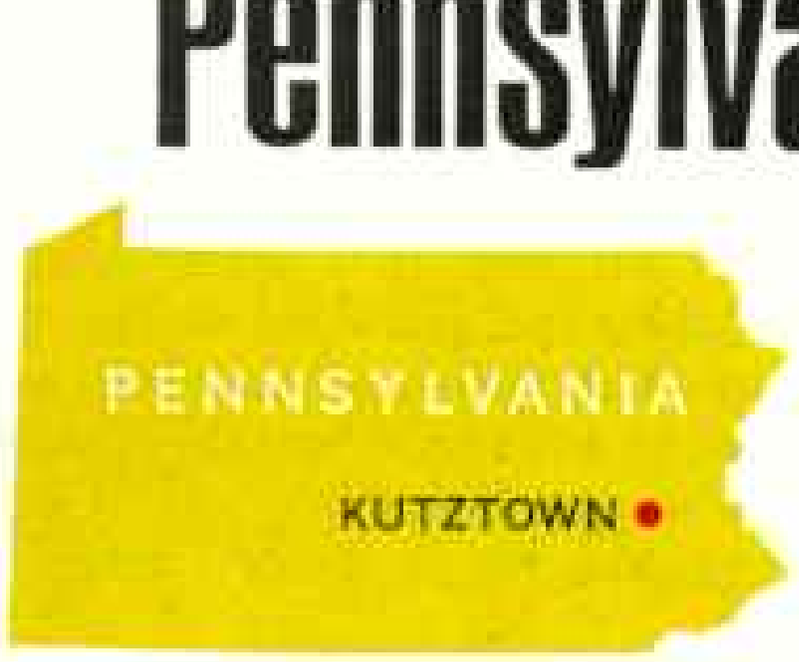
A fellow worker tells me, "He was a good man. What can you do? It leaves a wound on the heart."

As I fly home, a fellow passenger says, "You've been to Calcutta? Tell me, is it true. . . ?"

Yes, many of the awful things said about Calcutta are true. But Calcutta is not dying. On the contrary, it is a place where the overwhelming majority scrounges, struggles, strives, survives. In a sense—and Bengalis assured me that this is not an irreverent thing to say—Calcutta is an enormous cow, being milked by millions as best they can. And so, is it not a symbol of life?

And like life, it leaves wounds on the heart. □

Pennsylvania's Old-time Dutch Treat



By KENT BRITT

Photographs by H. EDWARD KIM

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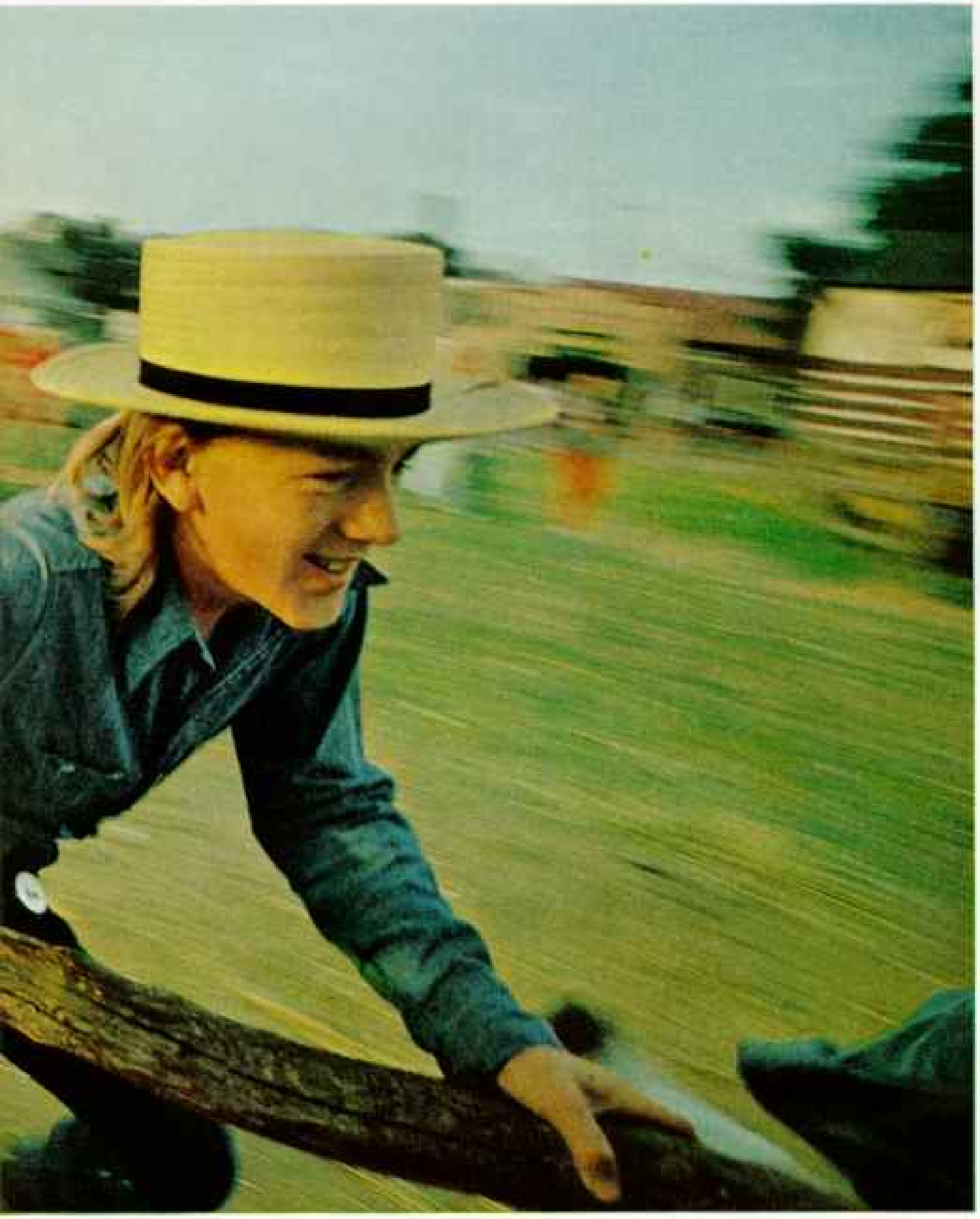
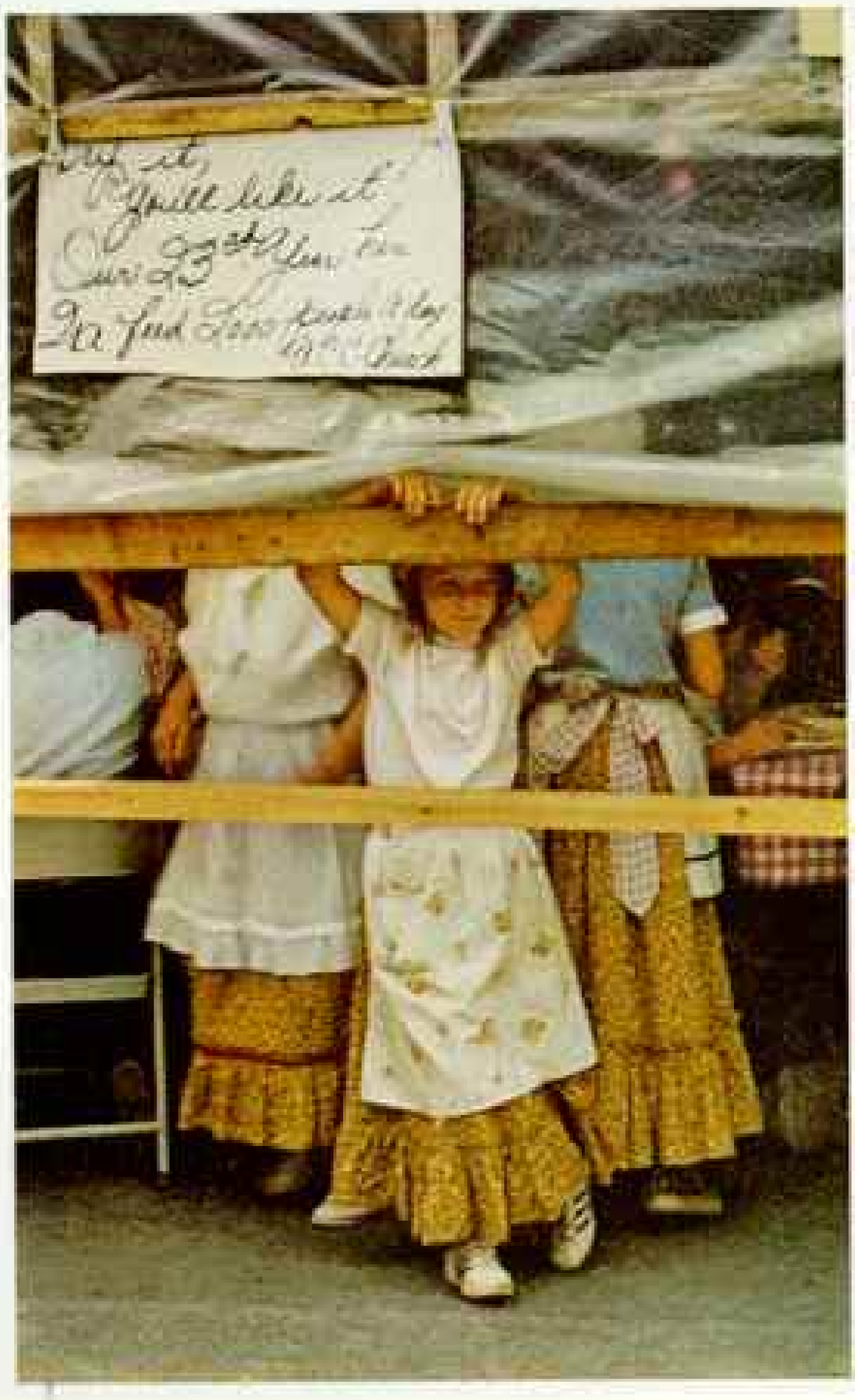


"IT'S CHUST FOR NICE," the sunbonneted matron told me in richly accented English. Her sweeping glance surveyed the bustle of activity at the 23d annual Kutztown Folk Festival. Over the hubbub we heard the gleeful noise of children at play. Boys in just-purchased Amish summer hats (**above**) had turned an antique farm machine into a make-do merry-go-round.

Actually more than "just for nice," the eight-day festival in July is education gaily packaged as a celebration. The Pennsylvania Folklife Society sponsors the event to preserve, display, and pay tribute to the Pennsylvania Dutch way of life. Like 125,000 other visitors from all over the United States, I had come to Kutztown to see firsthand the arts and crafts of early Pennsylvania—many of them still in daily evidence in "Dutch Country."

IF EATING were an Olympic event, the Pennsylvania Dutch would surely win gold medals. The rich heavy food relished by these trenchermen accounts for the great girth and robust strength so common among them.

At the Country Kitchen, an open-sided exhibit of farm cooking on a wood- and cob-burning stove (**facing page**), I watched with awe as hearty festival craftsmen heaped their plates with second and third helpings of homemade chicken potpie, beets, succotash, salad, chowchow, bread and butter, and more—and then finished with chocolate cake and raspberry pie.



I HAD PLANNED at the outset of the festival to enjoy a similar meal each day at any one of the all-you-can-eat food pavilions (**below left**), but the temptation of on-the-spot snacks usually prevailed. From early morning until late afternoon I frequented the fragrant outdoor stalls: Shoofly pie and sarsaparilla here, funnel cake and birch beer there, strawberry shortcake (**above left**) down the way, and just around the corner, my favorite—huge pretzels (**above**), soft and hot from the oven.

PIONEER KNOW-HOW on parade: Festival craftsmen and exhibitors march around the common on the Fourth of July (**left**) with symbols of their specialties—funnel-cake frying, chicken plucking and dressing, hand-wringer washing, and baking. Nine-year-old Denise Leibensperger (**above**), who demonstrates how to whitewash fences, snaps photographs of marching friends.

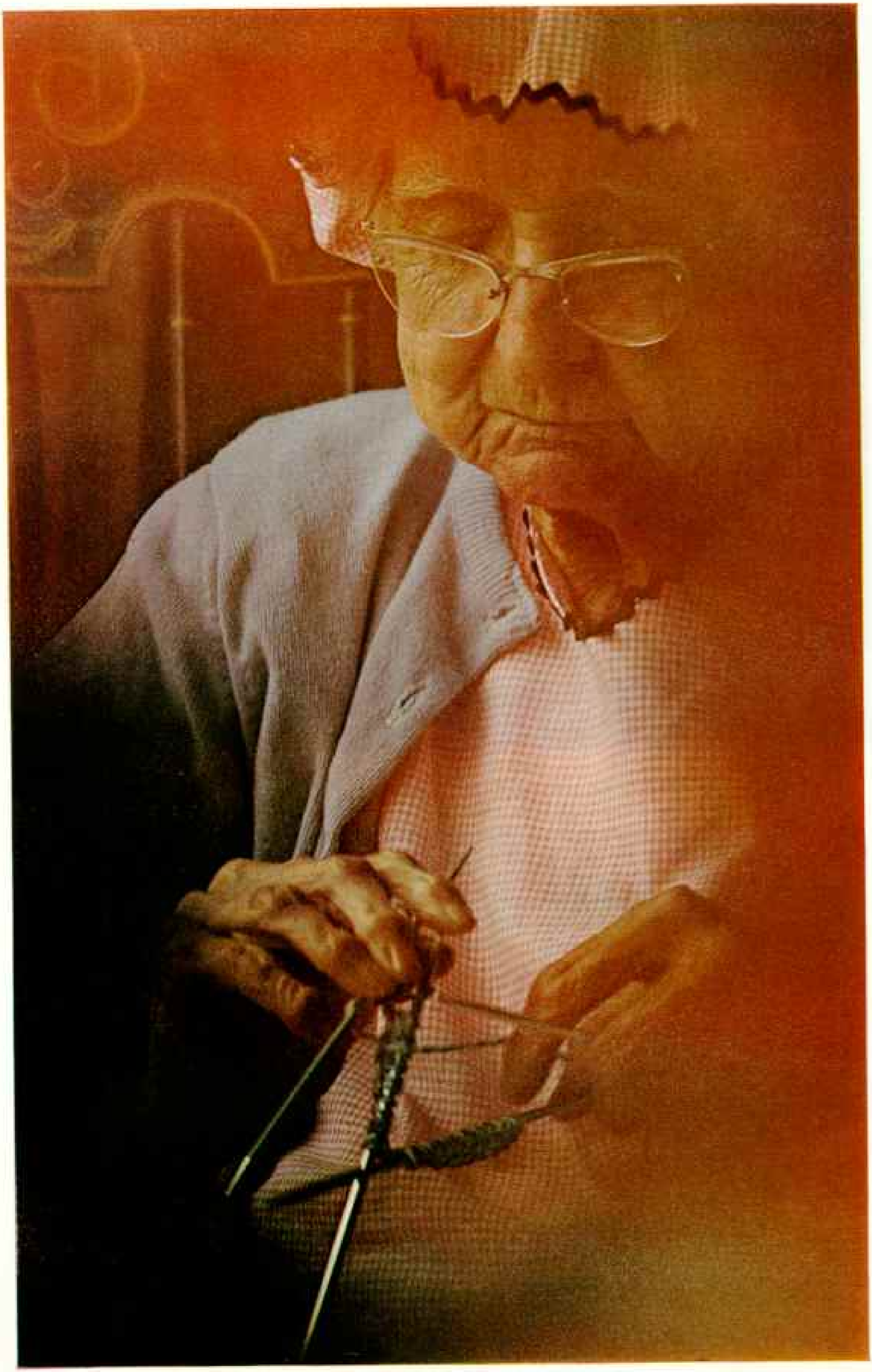
The Plain Dutch—austere Mennonite, Dunker, and Amish sects—take no part in the Kutztown festival. Their religion forbids participation in worldly affairs. The Fancy, or Gay, Dutch—primarily of Reformed and Lutheran persuasion—normally wear conventional clothing, but don old-fashioned garb for the annual event. Both groups descend from German (or *deutsch*, from which the Americanism "Dutch" derives) and Swiss Protestants who immigrated into William Penn's land in the 17th and 18th centuries. Most of the immigrants retained the High German dialect of their forebears while at the same time developing the distinctive "ferhuddled English" for which they are famous: "Look the window out and see if it is making down anything yet."

POIGNANT REMINDERS of earlier, simpler times spring from the fingers of festival handicrafters. Keeping the art of fraktur alive, Mrs. Lois Harting (**right**) creates exquisitely lettered and decorated house blessings and baptismal and marriage certificates.

With her crinkled-velvet visage, Mrs. Pearl H. Angstadt (**facing page**) is the quintessential grandma as she rocks and knits without pause.

Five area women with 250 years' combined quilting experience practice their craft on a broken-star pattern (**lower right**).

Human features emerge from an apple (**below**) after six weeks of drying, pinching, varnishing, and decorating.

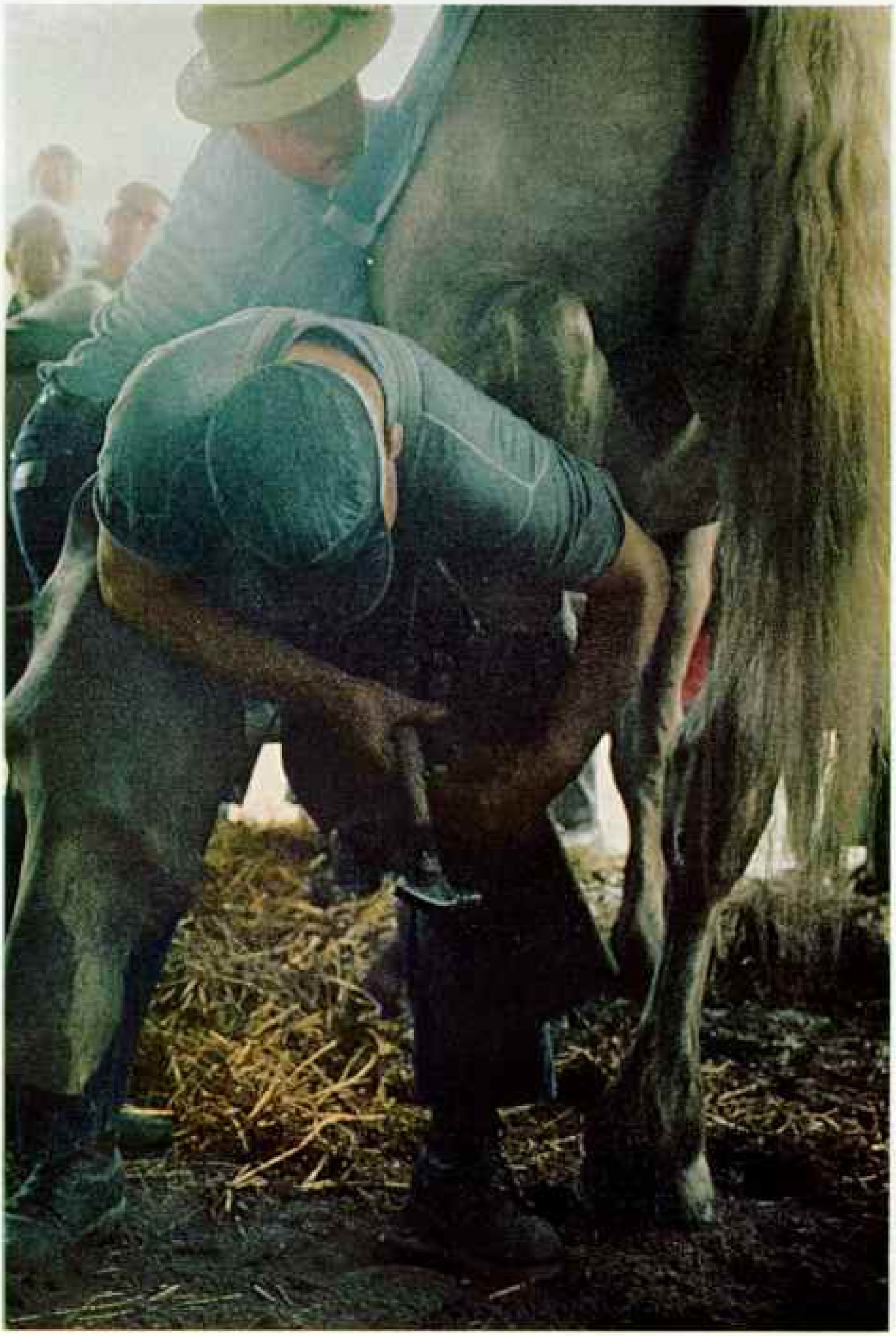


IN THE COOLING GLOOM of Old Plow Tavern, a thirst-slaking oasis in the scorching July heat, I found Donald Morgan (**above**) dispensing smiles and sarsaparilla with an expert's ease. Although patterned after the old way-stop taverns along Pennsylvania's early freight roads, the new Kutztown model offers no alcoholic drinks.

At the opposite end of the 35-acre festival grounds I was stopped short by the familiar face of a girl I had never met—a young lady as wholesome-looking as the golden loaves of bread she peddles from her parents' bakery stand. There, next to a notice put up by her proud mother, stood 13-year-old cover girl Kathy Ann Gasser (**right**), flashing the impish grin easily recognized by the 200,000 families who own National Geographic's 1970 publication, *Vacationland U.S.A.*

That's My Daughter...

PITTING HEFT against horsepower, blacksmith H. Edgar Messerschmidt shoes a huge hoof of an 1,850-pound Belgian draft horse as his son William restrains the giant (**below**). "*Dunnerwetter!*—Thunderation!" he exploded moments later as the animal broke loose, smashing its new iron shoe into his thigh. "Boy oh boy! Now how am I going to get around tonight?"



But he did, and only a slight limp betrayed an injury that would have immobilized lesser men.

Most Kutztown crafts are of a quieter sort. Artist Constantine Kermes (**below**) demonstrates the woodblock-printing technique he often uses in documenting the simple lives of his Plain Dutch neighbors in nearby Lancaster County.

John P. Claypoole fashions the "chust-for-pretty" hex signs (**lower right**) that decorate the homes and barns of the Fancy Dutch.

Watertight buckets, bound with wood and containing neither nail, peg, nor adhesive, are the specialty of cooper Jim Younkin (**lower left**). Metal straps of "the old oaken bucket, the iron-bound bucket" prove it had been repaired, the wood craftsman told me.

YESTERDAY'S DRUDGERY is today's delight for big-city children unaccustomed to rural life. I smiled as I watched hordes of youngsters from East Coast cities jostle for a chance to crank the handle of a 75-year-old shelling machine into which Kutztown's Richard C. Folk was feeding hard-kerneled corn (**left**). And later I laughed when I overheard an exchange between a small girl and her grandparents, who were passing one of the festival's exhibits: an old wooden outdoor privy. "What was it," the tot asked in honest puzzlement, "that you used to do in that funny little house?"

THE LUCKIEST KIDS are those with roles in the festival—like David Roth (**top**) of the barn-raising team (**above**).

The admission price—adults $2.50, children 50 cents—entitles visitors to see every folk demonstration and event on the grounds. Any profits from gate and concession receipts are used for educational purposes by Ursinus College in Collegeville, which sponsors the Pennsylvania Folklife Society.

"ONE HAS to have a compulsion," says Dodds Meddock, explaining his infatuation with the derring-do of ballooning. The ascents of the 32-year-old aeronaut have been a highlight of the festival for five years. His soaring passages above the grounds conjure up images of earlier balloonists who amazed and entertained the Pennsylvania Dutch at country fairs in the 19th century.

Meddock's moment of glory comes at day's end, when winds diminish and the sun's heat wanes. Crouched in his tiny basket, he directs the flames of his propane burners into the gaping maw of the balloon (**above right**). The air inside grows hotter, expands, and finally lifts the man and his fragile 340-pound contraption aloft. Minutes later, high in the silky silence, the daredevil has a bird's-eye view (**right**) of the entire Kutztown Folk Festival—a genuine Dutch treat. □

WATCH "THE DESERT BUSHMEN OF THE KALAHARI" ON MOST OF THESE CBS TELEVISION STATIONS

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WETTING A POISONED ARROW TO HIS SINEW BOWSTRING, A BUSHMAN READIES FOR THE HUNT. LAURENCE K. MARSHALL

Gentle nomads in a harsh land

ELUSIVE AS EVENING SHADOWS, the shy and diminutive Bushmen of southern Africa's Kalahari Desert step out of their sand and scrubland wilderness for a fascinating one-hour visit to your home via CBS Television, Thursday, April 12.

Tear out this notice as your reminder to be on hand to greet them when the National Geographic Society presents "The Desert Bushmen of the Kalahari," the dramatic third offering in our 1973 series of color documentaries. Narrated by Leslie Nielsen, the program was produced in association with Wolper Productions. Sponsors are Western Electric and Lincoln-Mercury.

BIRK BIZELLI (ABOVE) AND LAURENCE K. MARSHALL

Songstress of the bush, a woman lightens the harsh realities of her desert existence with outpourings of song —accompanying herself with strummings on a harplike, sinew-stringed *kwashi*. Fragments of ostrich eggshell, strung like pearls, adorn her hair.

Siphoning precious moisture from a water hole all but invisible to unpracticed eyes, a Bushman transfers each drop to his ostrich-egg canteen. On his back he totes two indispensable sticks—one for digging roots from the arid ground, the other for carrying his bag of belongings.

Seasoned veteran of expeditions to Bushman country since the 1950's, anthropologist John Marshall has returned with a TV crew to chronicle what may be the final chapters of a vanishing way of life. Here, during an earlier expedition, he chats with his Bushman subjects before filming a boys' game.

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COVER: Believe it or not, this bubble eye is a variety of the common goldfish (pages 514-15 and 532). PAUL A. ZAHL

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SIDNEY BRINDAMOUR

The great red ape

ITS SHYNESS IS LEGEND. Few people have met a free-roaming orangutan face to face. Logging and poaching threaten its very survival as a species. Thus it was a rare moment when this huge male (**left**) descended from his treetop home in the rain forest of Borneo to feed in the presence of Mrs. Birutė Galdikas-Brindamour. An orang orphan that she raises clutches the gunwales of her dugout (**below**).

Encouraged by the late Dr. Louis S. B. Leakey, the young scientist—with her photographer husband—has begun a painstaking years-long study of this imperiled Asian primate. A National Geographic Society research grant, supported by your dues, helps make this work possible. Won't you invite a friend to join today.

*Suggested list price. Details on camera comparison available from Polaroid Corp. Cambridge, Mass. 02139.

The best minute of the day.

Look who just found out how soft Grandma is and won't let go. The kind of moment memories are made of.

A moment you can bring back while the magic is still in the air with the 60-second pictures you get with this camera.

Our Square Shooter 2.

This Polaroid Land camera is only $24.95* and it is equipped like cameras costing $20 more.

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You use Polaroid's face-in-the-square viewfinder. Just fit the little square to the subject's face. It gives you the best distance for most shots, the best distance for flash.

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And Polaroid's snap-in film packs. This is our square film. Strictly color—and it gives you the least expensive one-minute color pictures you can take.

60 seconds. $24.95.

The best minute of the day.

The Polaroid minute.
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CAN AMERICA HAVE ENOUGH ENERGY AND A CLEAN ENVIRONMENT?

AMERICA NEEDS BOTH. AND WE CAN HAVE BOTH.

IT WON'T BE QUICK. IT WON'T BE EASY. BUT REAL PROGRESS IS BEING MADE.

MORE PROGRESS IS NEEDED, BECAUSE TO CLEAN THE ENVIRONMENT WE'LL NEED EVEN MORE ENERGY THAN WE USE NOW.

This is a report to the American people on the twin subjects of energy and environment.

The two have been closely related ever since our remote ancestors discovered fire—and with it, smoke. All of man's efforts to produce and consume energy have had their effects on the physical world in which man lives.

Today, we are asking ourselves how we can reconcile our need for energy with our desire for a clean environment.

Progress is being made. A recent study by the Government's Council on Environmental Quality reports that the air has been made cleaner.

MORE CARS, BUT LESS POLLUTION

Air pollution resulting from automobile emissions has been significantly reduced.

As 1971 ended, there were 113 million automotive vehicles in this country. New equipment and new gasolines have reduced total hydrocarbon emissions in the air to the levels of 1960, when there were 74 million vehicles.

Total carbon monoxide emissions are down to the levels of 1963, when there were 85 million vehicles.

As older cars are replaced by new ones with better emission controls, there will be further declines of hydrocarbons, carbon monoxide and even oxides of nitrogen in the air.

SULFUR EMISSIONS ARE DOWN

Another source of air pollution is the sulfur released from burning oil. Since World War II, the sulfur content of home-heating oils and diesel fuels has been reduced more than 50% through increased use of low-sulfur crude oils and improved refining techniques.

Progress has also been made with the heavy fuel oils used by industries and power plants. In New York City, for example, pollution from sulfur dioxide was severe a few years ago. But, in response to regulations, the sulfur levels of heavy fuel oils burned in New York City have been reduced 90% since the mid-Sixties.

$3.3 MILLION A DAY TO CONTROL POLLUTION

For air and water pollution control in our own drilling, transporting and refining operations, oil companies spend an average total of $3.3 million every day, $1 billion a year, in the United States. This is the largest environmental expenditure by any industry.

Concrete, measurable efforts like these are a solid basis for believing that America's desire for a cleaner natural environment can be realized.

But every American lives in other "environments" besides nature's.

Our homes are one environment. The places where we work, where we shop, where we study, where we are entertained, are also environments.

All of these depend upon adequate supplies of energy. And, although we are making progress toward cleaner air and purer water, our energy supply problem is getting worse.

TWO GOALS TO KEEP IN MIND

The nation must keep *both* goals in mind: enough energy *and* a clean environment. To pursue either goal without considering the other is to invite disaster.

Environmental concerns and economic factors are postponing the development of additional domestic energy: oil, natural gas, coal, nuclear power. Supplies are falling far behind the nation's fast-growing demand.

Oil and natural gas now furnish 77% of all our energy, including nearly 40% of our electricity. Experts believe there are substantial resources of oil and gas still to be discovered in America, especially off-shore. But exploratory drilling has been held up again and again by government authorities and by court actions brought by citizens.

For the record: during the past 25 years, 16,000 oil and gas wells have been drilled in America's coastal waters. There have been only three significant instances of environmental damage, no evidence of permanent damage. The oil industry's drilling techniques and safety technology are constantly improving.

MISSING: 2,000,000 BARRELS A DAY

In Alaska, the largest oil field in American history was discovered six years ago. It could supply two million barrels of oil a day, about one-eighth of our current needs.

But none of it is yet available, because the construction of the pipeline needed to bring this oil to market has been delayed by environmental objections.

Nuclear power and coal could contribute more to our energy supply but have not because of a combination of economic and environmental considerations.

The United States cannot hope to get the energy it needs at home unless it takes a more realistic approach to environmental problems.

ENERGY TO CLEAN THE ENVIRONMENT

The fact is, cleaning the environment and keeping it clean will require huge additional amounts of energy.

Sewage treatment and water purification; recycling aluminum, steel, glass and paper; tearing down and rebuilding urban ghettos and blighted areas everywhere—all these operations demand energy and lots of it.

The life-styles that most Americans want depend on energy—on oil and natural gas—as well as on clean air and pure water. Our aim should be to safeguard *all* these necessities.

THE NATION'S TWO NEEDS

Clean energy and a clean environment are *not* "either . . . or" choices. They are both expensive, but we need both.

We are making progress toward a better environment, although much more remains to be done.

We will not "run out" of energy in the near future. But, right now, we are running out of time to make prudent decisions about energy. Long lead time is needed to develop important new domestic supplies of oil and natural gas, nuclear and geothermal power, sulfur-free coal, synthetic oil and gas, solar energy.

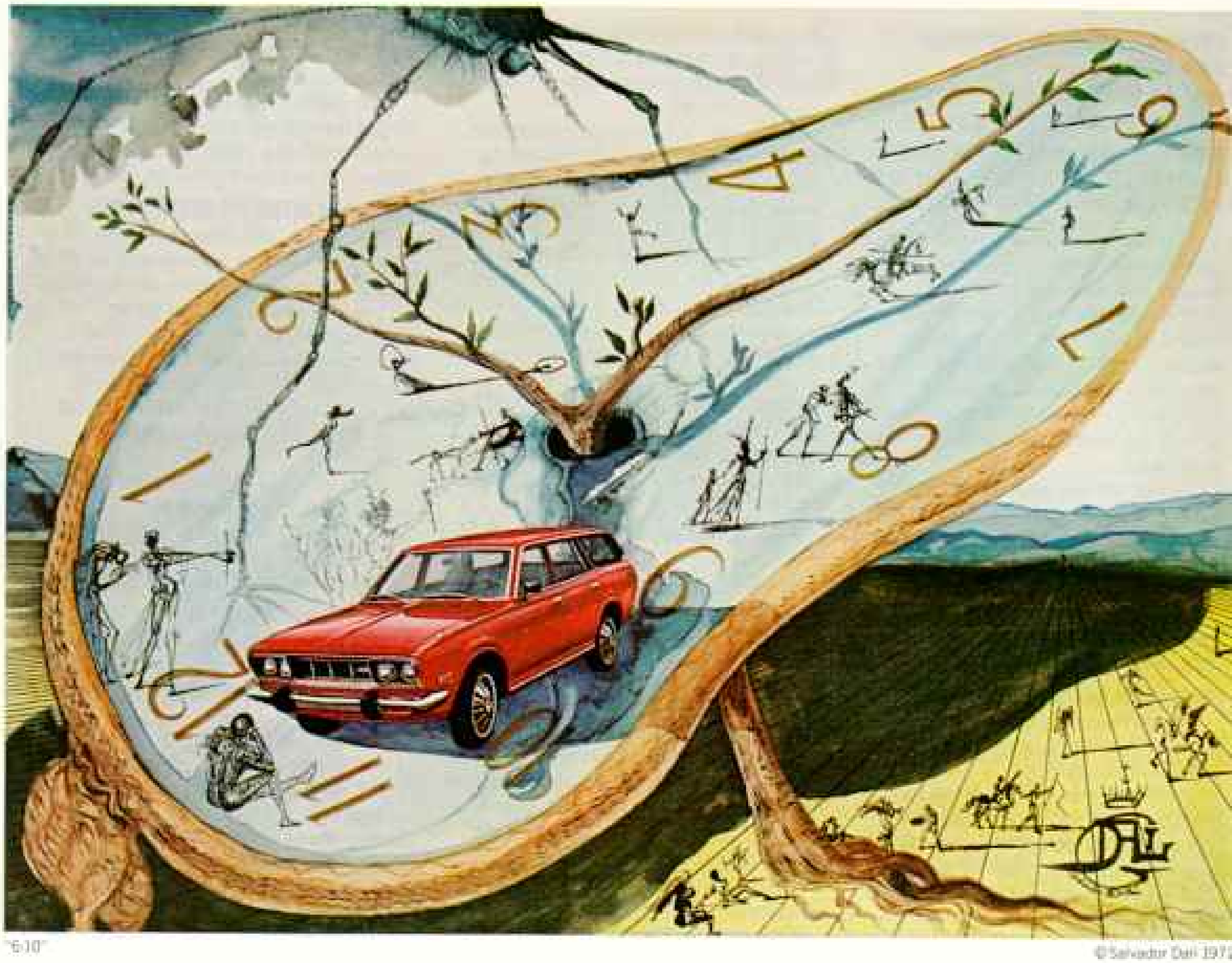
Delay today could plague us for at least the next critical decade.

To help you stay informed, we've prepared three basic booklets, "The Energy Gap," "Statement of Policy on Energy" and "A Guide to Efficient Energy Use in the Home." Write to Dept. G, American Petroleum Institute, 1801 K Street N.W., Washington, D.C. 20006 for your free copies.

With your understanding and help, America can have enough energy *and* a clean environment.

A COUNTRY THAT RUNS ON OIL CAN'T AFFORD TO RUN SHORT.

THE OIL COMPANIES OF AMERICA



"610"

New Datsun 610 Wagon. An original portrait by Salvador Dali.

Salvador Dali, leader of surrealism, master of the unexpected. We wanted a man with unusual vision and insight to portray this new Datsun 610, to capture the very spirit of the product itself. This portrait, an Original by Salvador Dali, makes that kind of statement.

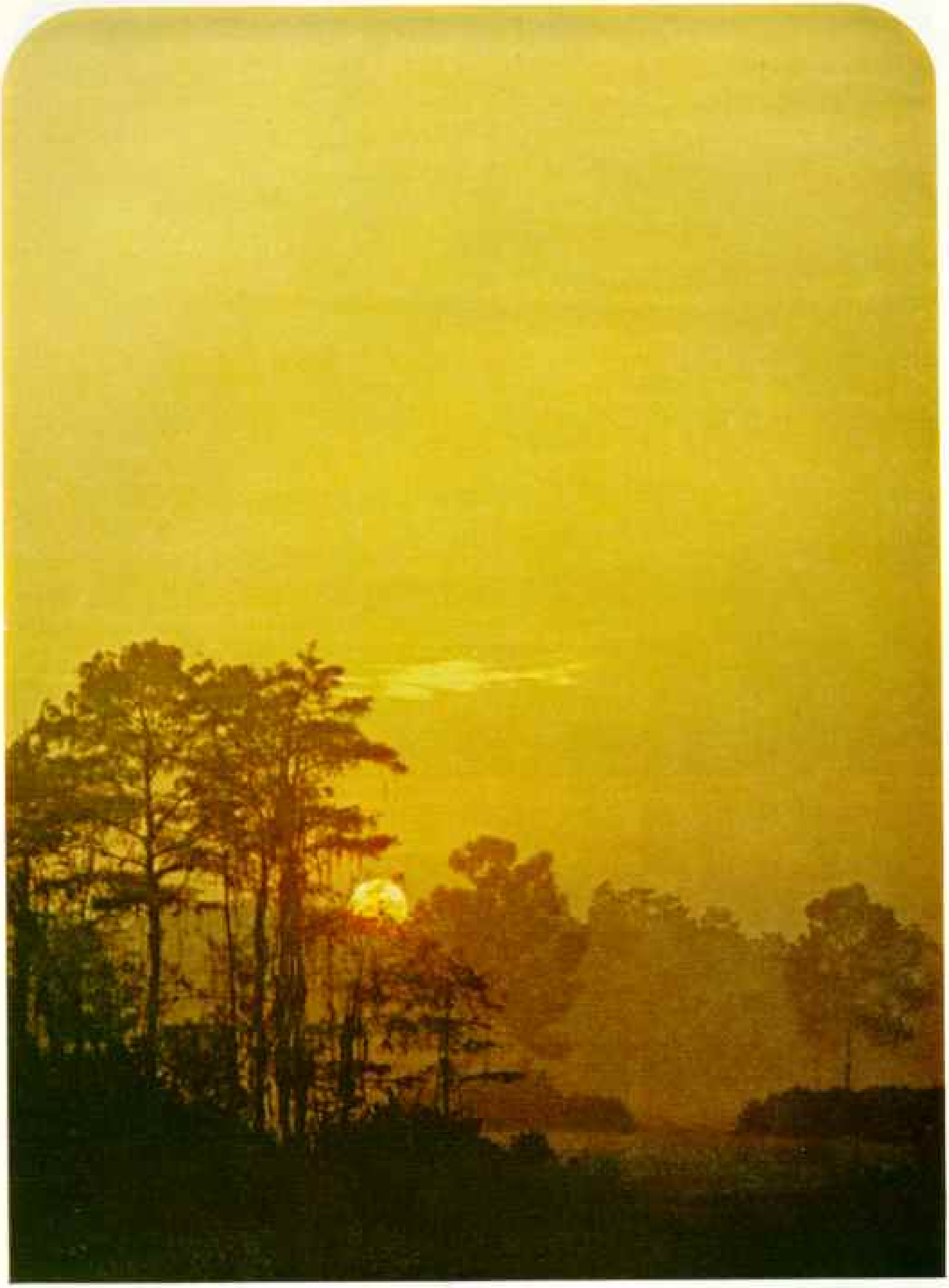
The 610 Wagon is a Datsun Original. A luxury economy car. Five wide doors for maximum accessibility. New 1800 cc overhead cam engine. New power assist front disc brakes. Plus comforts that may surprise you for a wagon at this price: handsome vinyl-trimmed interior, fully reclining bucket seats, full carpeting, tinted glass. And, a big cargo area that can accommodate just about anything you can dream up to carry. The Datsun 610 Wagon. Interpreted with unusual candor by Salvador Dali, designed for those who demand unusual value in their automobiles. Drive a Datsun . . . then decide.

Own a Datsun Original.

From Nissan with Pride

Port LaBelle

Discover a new way of life in Florida's peaceful heartland.



Port LaBelle

**The style of Florida living you've always wanted.
In a community with all
the comforts and conveniences you'll need.**

Port LaBelle—the eighth General Development community in Florida—will emerge in a land of waterways.

Century-old oak at Port LaBelle.

Waterfront home at Port Charlotte.

Shopping center at Port Charlotte.

Port LaBelle—Florida's heartland.

Port LaBelle—a totally planned community—is emerging in the heartland of Florida. Here you'll discover a land that's truly unspoiled. A green land of fresh air, clear skies and clean water.

Port LaBelle's natural environment gave our master community builders a beautiful head start. Here the land gives root to tall oak trees and flowering plants. Clean lakes and streams abound with fish. Year 'round temperatures average in the sunny mid-70's. So people who love the great outdoors can fish, boat, swim, hike, horseback ride, camp or picnic whenever they want. And that's how General Development plans to keep it here in *Fresh Start Country*.

Excellent highways—and even a trans-Florida waterway to the Atlantic and the Gulf—link Port LaBelle to all the sites and cities of the Sunshine State. Port LaBelle's just 30 miles east of Fort Myers. 117 miles northwest of Miami's Gold Coast. 91 miles west of Palm Beach. Only 120 miles south of fabulous new Disney World.

The great Caloosahatchee River, which forms part of Florida's only cross-state waterway, borders Port LaBelle. Pleasure boats can cruise 30 miles east to the second largest freshwater lake wholly within the United States—Lake Okeechobee. Or, they can make way for the nautical fun of two oceans. Maybe your own boat will take you on these scenic voyages someday.

Our Neighborhood Concept

General Development believes in the "neighborhood concept." Homesites and homes will develop as neighborhoods. Each will have shopping facilities and an elementary school within easy walking distance. And the neighborhoods will cluster around the core of the community's impressive shopping center, with major stores, offices, repair services and restaurants.

A Complete Leisure Community

As a complete community, few places will match all that Port LaBelle offers. An 18-hole championship golf course—the ninth course we've built—is now being constructed for completion in 1973. Chick Harbert, former PGA champion and member of Golf's Hall of Fame, designed it. A marina on the river's shore will be ready in 1974 to take boats as big as oceangoing yachts. Also in 1974, we'll have the community tennis courts, swimming pool and clubhouse completed. And as the needs of the community increase with the population, medical facilities, schools, houses of worship and more will be built.

Large Homesites plus All Utilities

Every Port LaBelle homesite will include paved streets, sanitary sewers and community water. We'll put all utilities underground, leaving clear views of greenbelts and waterways. To allow lots of room for growing greenery, homesites are at least 10,000 sq. ft.

Available in over 70 designs, there will be a Florida home for every buyer. With up to four bedrooms, they'll offer enough space for families of all sizes. Yet even a retiree can afford one of these luxurious homes. Central air conditioning is a standard. And private pools and patios are available.

Entire families can soon enjoy Port LaBelle's new way of life. Pleasantly. Privately. Affordably. For you and your family, Port LaBelle could be the discovery of a lifetime.

In the swim at Port Malabar.

Teeing off at Port St. Lucie.

Lighted court at Port Charlotte.

Riding at Port LaBelle.

It costs nothing to learn the facts about Port LaBelle, Florida—a totally planned community.

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See overleaf for details. Tear off along dotted line and complete reply card; then fold on line, tape together, and mail.

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Get your complimentary copies of the Port LaBelle Fact Pack *plus* the 20-page "Conversations with Kellstadt"—authoritative guides to living and land owning from one of America's leading business statesmen.

Simply print your name and address in the space below. Detach, fold and seal this flap with tape. Mail it today—no postage stamp required.

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THE INTEGRITY COMPANY

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Port LaBelle

Here the experience of the "Integrity Company" will set new standards for Florida living.

Great freshwater fishing at Port LaBelle.

Port LaBelle's area—an unspoiled haven for wildlife.

The planner is master of all he surveys.

General Development's world-wide headquarters in Miami.

General Development has already created seven communities in Florida. Port Charlotte, Port Malabar, Port St. Lucie and our other communities have over 38,000 residents. Ask them about us.

They'll tell you about our experience in planning, building and maintaining the communities and environments of our Florida ports. Experience that earned us a reputation as a company of unquestionable integrity.

Today, some 5,000 General Development employees are working to live up to that reputation. And we've invested over $100-million in land improvements, utilities and environmental preservation. Especially at Port LaBelle, our eighth totally planned community.

The President of General Development Corporation, Frederick E. Roach, is personally making sure that everything's done right. His personal involvement and that of all our employees has made us one of Florida's leading home builders and community developers. With assets exceeding $400-million. A listing on the New York Stock Exchange. And a network of offices spanning the world.

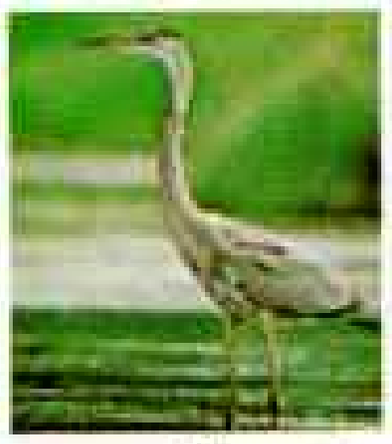
Will Port LaBelle set new standards for what Florida living should be like? We're convinced. And committed. And we've got the experience of creating seven other successful communities to back it up.

GENERAL DEVELOPMENT
THE INTEGRITY COMPANY

Making beautiful memories is a Virginia tradition.

Whether it's a bright patchwork quilt from the rough, gentle hands of a mountain craftsman, or a snapshot of the tiny wild ponies on Assateague Island, you're going to go home from your Virginia vacation with something wonderful to hold on to and remember and love. Because whatever you love is here.

You can escape to the unspoiled wonder of an Eastern Shore beach, or discover the romance of the sea at Newport News' famous Mariners Museum.

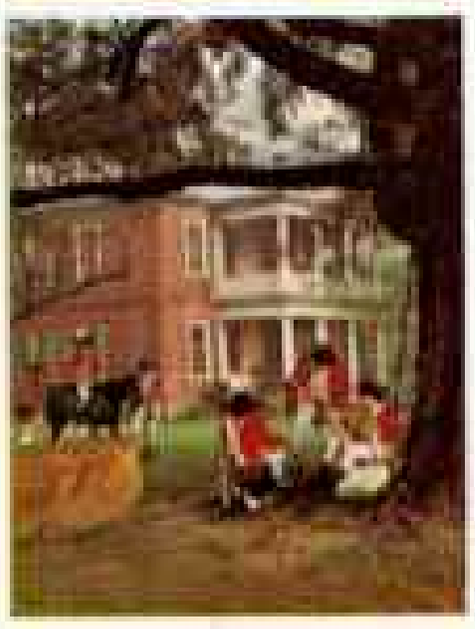


You can trace Stonewall Jackson's campaign through the Shenandoah Valley, where glittering, glistening caverns as old as time itself create an underground spectacle like nothing on earth. Or relive an age of grace and grandeur in James River plantations like the Carter family's Shirley, where Washingtons and Jeffersons once mixed politics and port.

But whether it's a quilt or a homespun yarn, a souvenir or the memory of a pickin' and singin' jamboree, you're going to take home something beautiful.

And unforgettable.

Like love.



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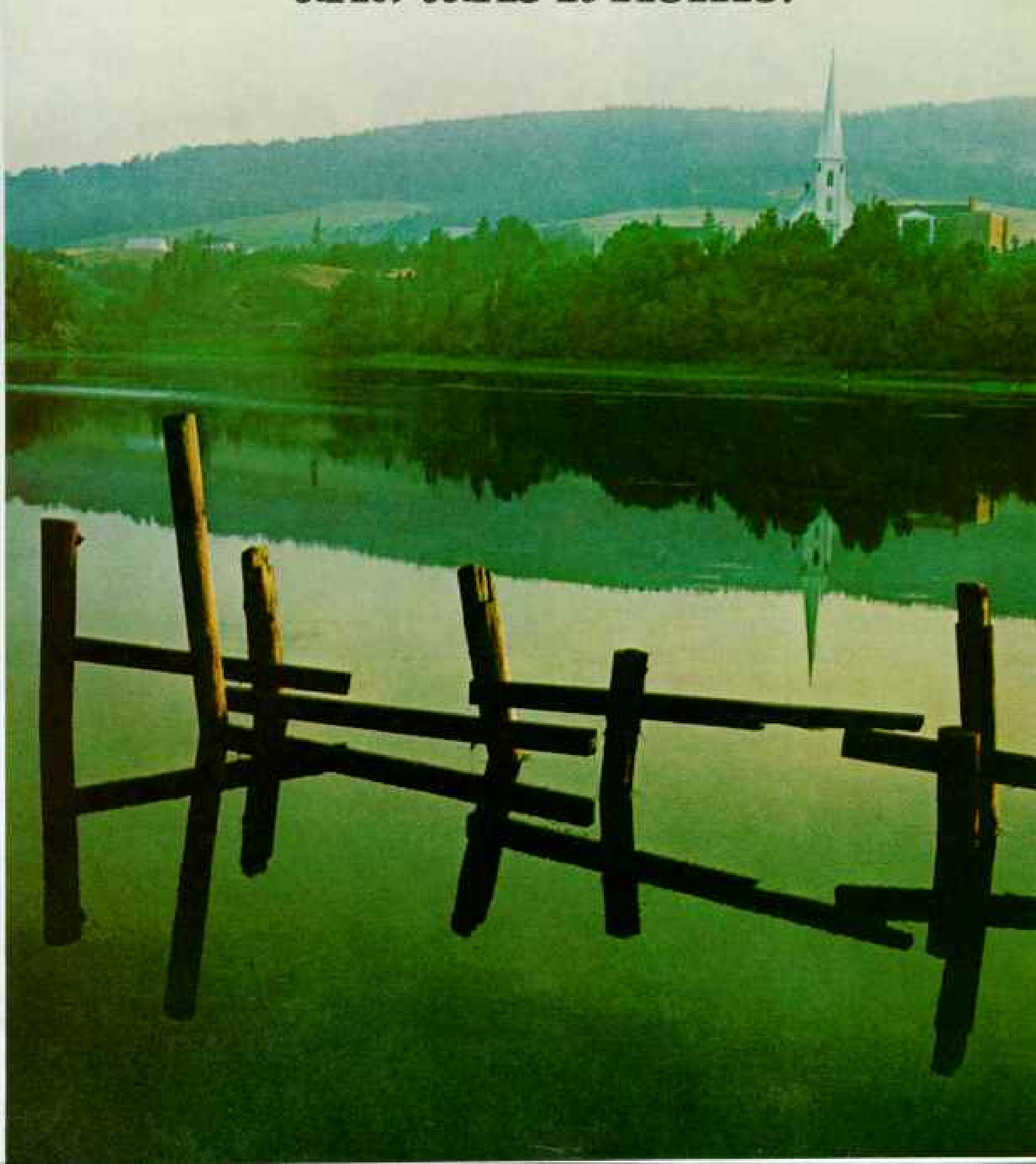
Dept. 303, 906 17th St., N.W., Washington 20006, phone (202) 293-5350.

You want to wrap it up and take it home.



How do you squeeze a village into a suitcase?

How do you tow away one of those little fishing coves sheltering on Nova Scotia's South Shore?

When you leave Nova Scotia, you leave it, regretfully, where it is, riding peacefully at anchor off Canada's eastern seaboard.

But you don't have to content yourself with photographs and memories.

There are many beautiful, tangible things you can take home with you to remind you of your vacation.

For example: While Alexander Graham Bell was busy down in the cellar inventing things, Mrs. Bell was establishing a rug hooking industry in Baddeck (the Bells' summer home).

In the intervening years, the home industry of rug hooking has spread into almost all the small towns and coastal villages around Cape Breton.

But the center is Cheticamp, where you can watch the women at work weaving colorful, original designs.

Native artistry and materials make Nova Scotian handicrafts unique as well as beautiful.

You may go home with hand-made pottery made from the Musquodoboit clay banks, Micmac Indian baskets or beadwork, original paintings by Nova Scotian artists, marine souvenirs or mementos from early colonial days.

You may go home with something that's free for the finding, such as seashells, or semi-precious gem stones, or even a 2 million-year-old fossil, because Nova Scotia is a paradise for rockhounds, and fossil-collectors.

But even if all you go away with is memories, that's fine with us.

We know they'll bring you back.

Nova Scotia

Couldn't you use a little now?

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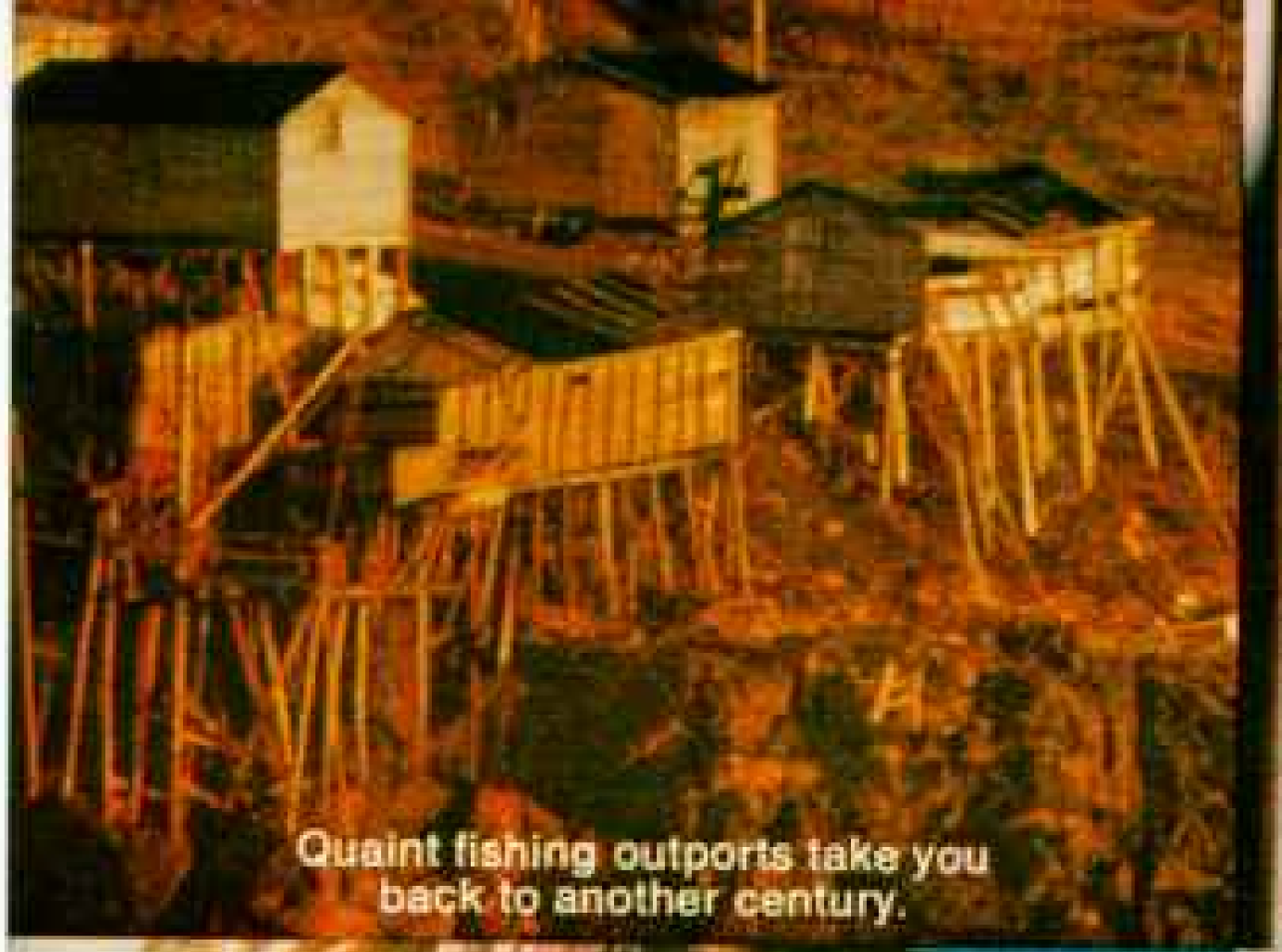

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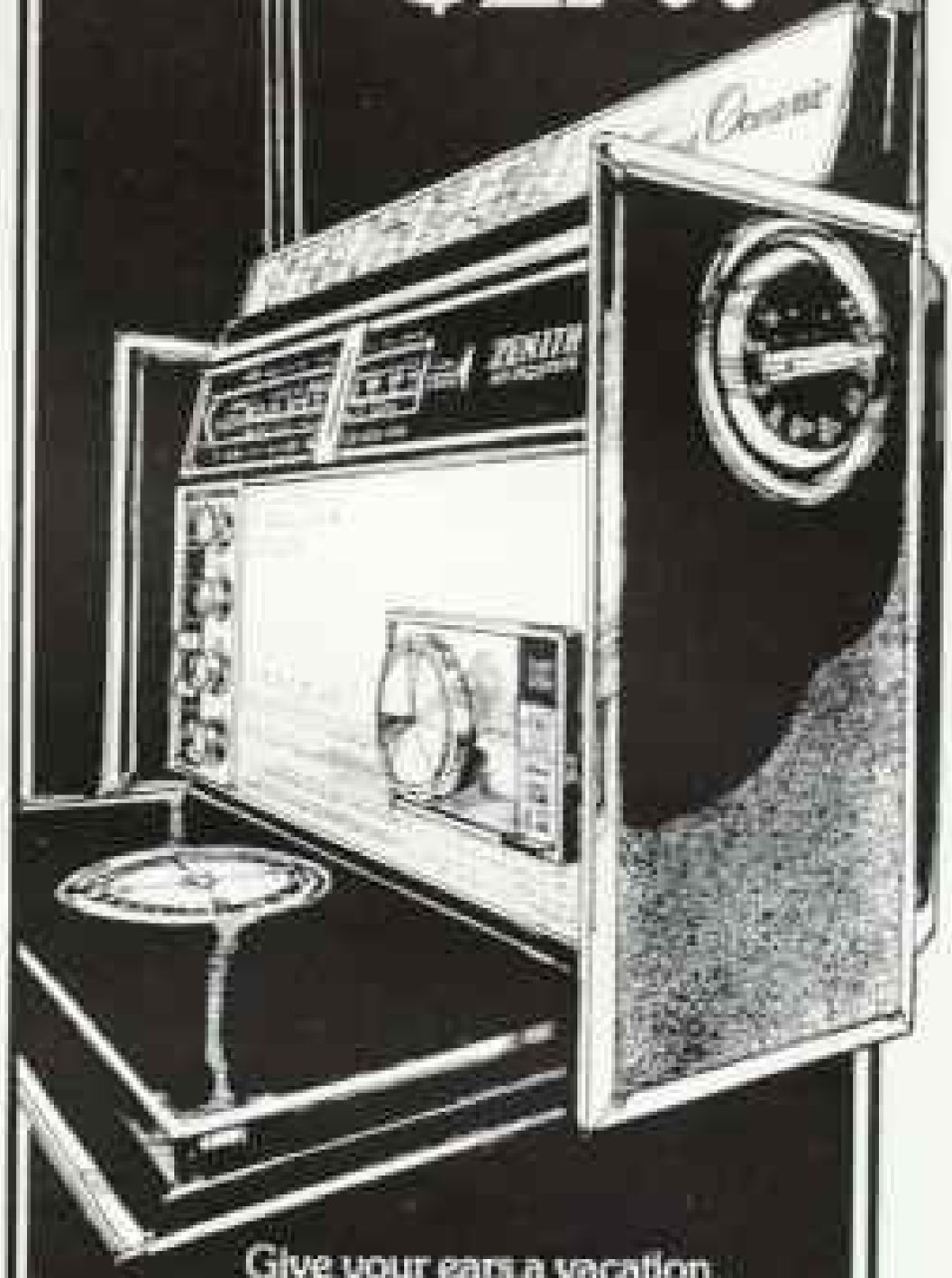

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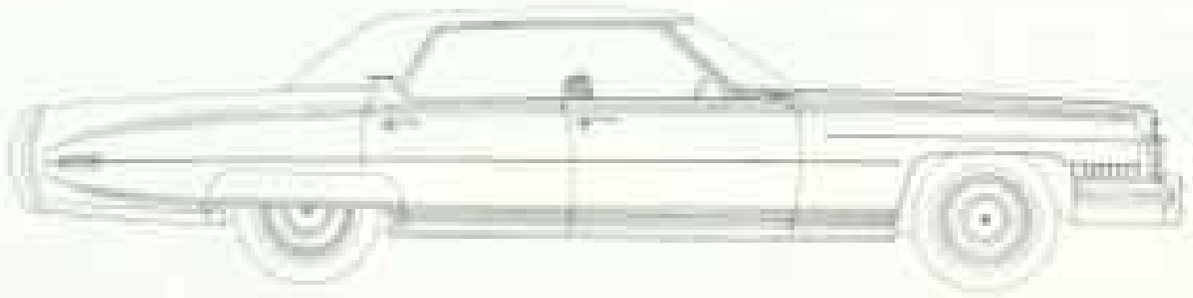

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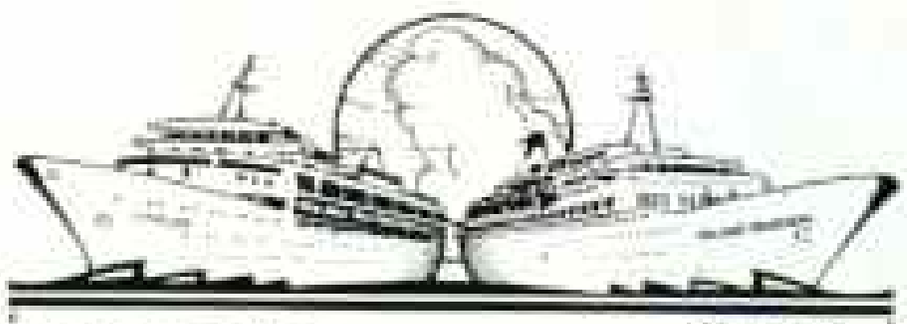

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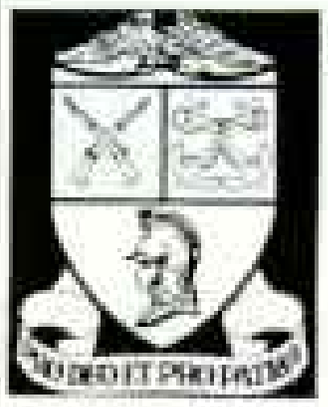

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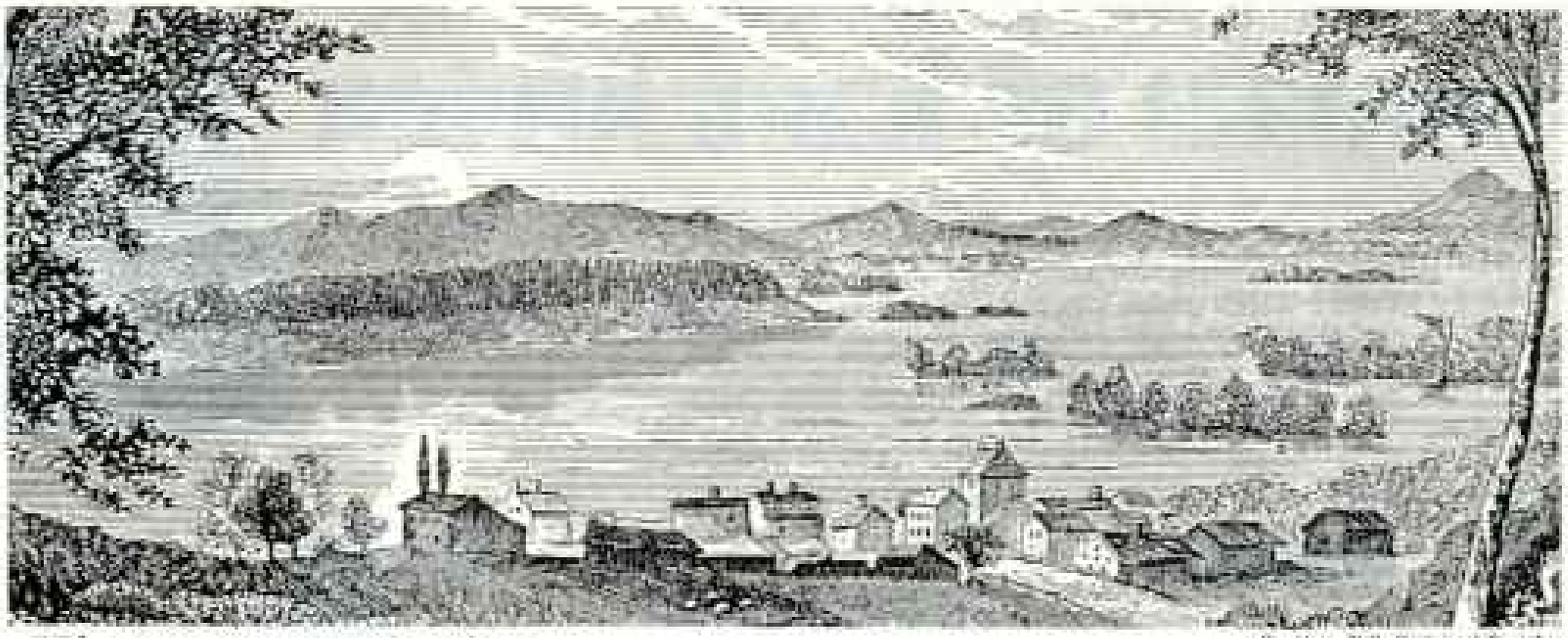

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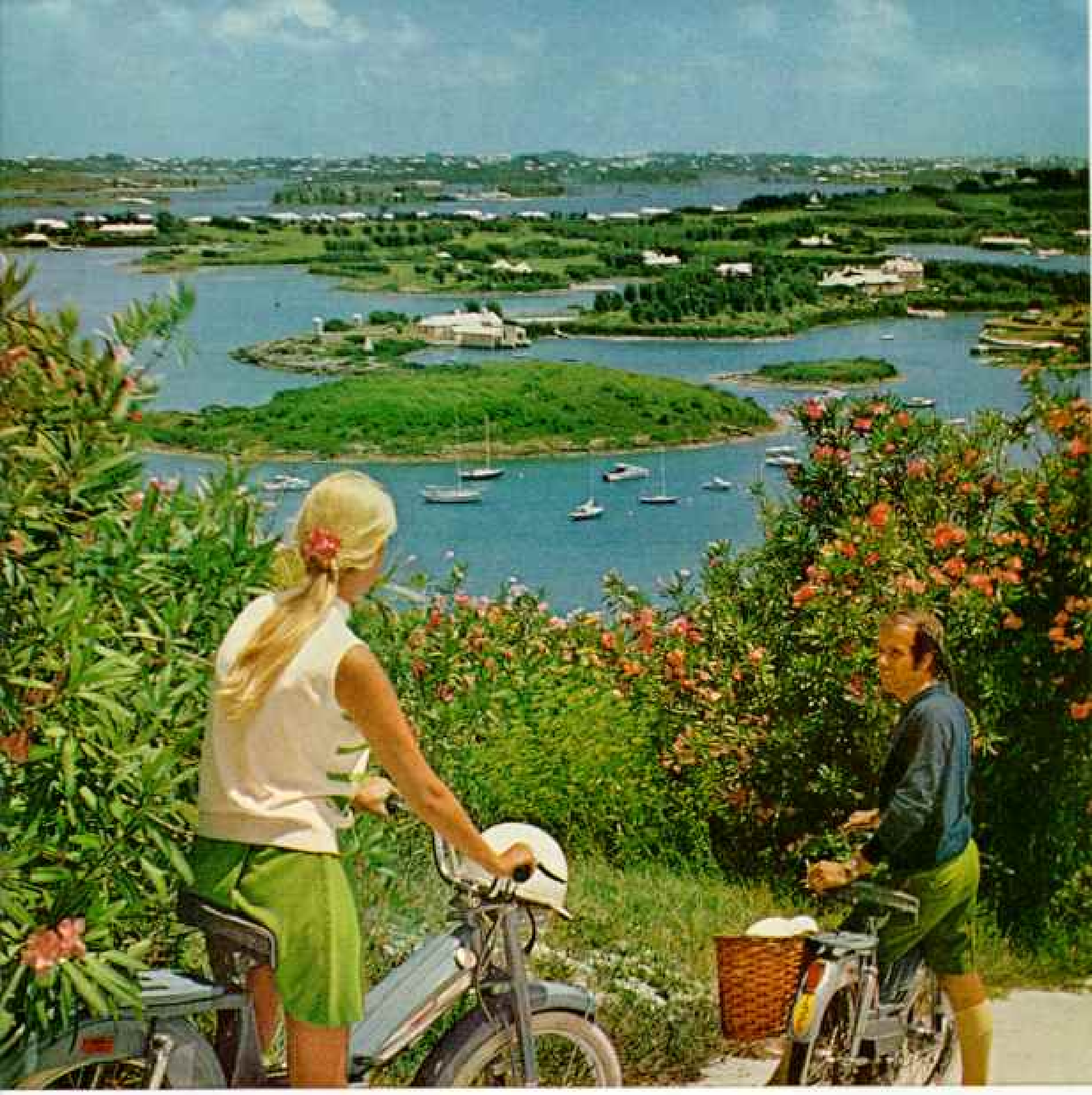

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